Board Advising

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Abstract

While the fraction of independent directors has been widely used as a proxy for monitoring effectiveness of the board, there are no clear-cut measures that capture the advising effectiveness of the board. We develop and validate two new measures of board advising: (i) per-outside-director advising quality; and (ii) aggregate board advising capability. These measures, which are based on connections of outside directors to directors on other boards, offer the advantage of being easy to compute from readily available data. We find that as firm demand for advising, as measured by firm complexity, increases: (i) both advising quality and total advising increase; and (ii) the sensitivity of firm value to both advising quality and total advising increase.

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Board Advising

The board of directors of a firm serves two primary functions: to monitor and advise the CEO. It becomes important, therefore, to understand the ability of the board to perform these functions effectively. The fraction of independent directors has emerged as a widely used measure of the ability of the board to monitor the CEO. No such simple, intuitive measure has been proposed, however, to capture the ability of the board to advise management. We bridge this gap in the literature by proposing and empirically implementing new measures of board advising. Based on these measures we examine the determinants of board advising and assess the implications of advising for firm performance. The statistical and economic significance of our results confirm the validity of our measures of board advising.

Coles, Daniel, and Naveen (2008; henceforth CDN) emphasize provision of advice and expertise by the board. They find that firms that require more advice and expertise benefit from having more outside directors. One interpretation of the CDN study is that the number of outsiders on the board represents or is correlated with the *quantity* of advice and insight provided by the board. The CDN formulation, however, excludes explicit consideration of the capability or skill of individual directors in bringing insight to the company and, thus, neglects the *quality* of the advice and insight supplied by a director individually and by the board overall. We introduce measures of *quality* of advising and *total* advising, with the latter being the product of *quantity* and *quality* of advising from outside directors.

Our proxy for the quality of the board's advice, *Advising Quality*, is based on the connections that an outside director of a firm has with directors at other firms. We focus specifically on connections of outside directors because such outside directors are central in advising the CEO and management team.[1] One reason we focus on director networks and connections is that those connections arise because an executive has qualities that make her valuable as a director. Connections represent derived demand for director services. Demand for director advising services derives from the ability of an executive to provide useful advice, with that ability arising from talent, experience, perspective, and expertise. Connections indicate advising capacity and value.[2] Our second reason for focusing on connections is that connections themselves directly enable better advising. Directors who are more connected have better access to information about market conditions, competitors, customers, suppliers etc., which enables them to offer higher quality of advice to the top management of the firm. Moreover, connections potentially add value through non-informational channels. For example, networks help the firm to project influence and obtain resources at lower cost.

Reflecting both the indicative and direct value of connections, as outlined just above, Eli Lilly, in appointing a new outside director, states:[3]

> A successful business leader with experience on four continents, Sir Win Bischoff brings to our board his extensive global perspective, network and financial skills…….Lilly operates in an increasingly competitive and complex world marketplace, and Win will be an invaluable asset in helping us achieve global leadership.

Likewise, in terms of connections and the nature and value of director advice, Mace (1971, pp. 13, 179, and 179, resp.) notes that:

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[1] See Coles, Daniel, and Naveen (2008). Also, Hermalin and Weisbach (1988) note that "the CEO may choose an outside director who will give good advice and counsel, who can bring valuable experience and expertise to the board."

[2] Kaplan and Reishus (1990) imply that having more directorships is a signal of higher quality and state that "(outside directors) are valued for their ability to advise, to solidify business and personal relationships…" See also Gilson (1990) and Brickley, Coles, and Linck (1999).

[3] "Lilly looks for added global perspective with board additions", Associated Business Wires, 6/26/2000.

> If management is capable of taking the advice and using the contacts that a board member can provide to them, then that's the best that a board member can bring to them, to the management. …If you ask a hundred or so directors whom I know well what they conceive their function to be, 99 ½ percent will say, 'To advise the management.'
>
> And some thoughtful presidents, when selecting new members of the board to fill vacancies, identify the particular set of desired qualities or areas of advice – general or specialized – which the presidents believe will add something to their management decisions...
>
> ...Outside directors were found to be especially helpful in the advisory role where their general or specialized backgrounds and experiences could be applied to the specific management problems of the company served...

We compute our measure of *Advising Quality* as follows. First, for each outside director in a given firm, we count the number of directors on other firms that he or she is connected to by serving together as directors on the board of another company. Then we sum across all outside directors of the firm, taking care to eliminate duplicate connections. Finally, we divide the sum by the number of outside directors to obtain *Advising Quality* per outside director. *Total Advising* is given by the product of *Advising Quantity* × *Advising Quality*, where *Advising Quantity* represents that number of outside directors as in CDN.

A simple example illustrates the idea. Assume firm 1 has four directors, A, B, C, and D. Assume D is the only insider on the board. Per CDN (2008), we measure *Advising Quantity* as the number of non-employee directors on the board and this equals 3. Director A is a director in only that firm. Director B serves on another board (call it Firm 2) that has five other directors E, F, G, H, and I. Director C serves on a different board (Firm 3) that has four other directors E, F, J, and K. Then the unique connections of firm 1's outside directors are E, F, G, H, I, J, and K, which sum to 7. Our measure of per-outside-director *Advising Quality* is the sum of all the unique director connections divided by the number of outside directors and equals 2.33 (= 7/3). If a firm has none of its outside directors sitting on other boards, *Advising Quality* equals zero.

This does not necessarily mean that the outside directors without any connections provide no useful advice. In ordinal terms, zero is the lower end of the range for our measure. *Total Advising* is then given by the product of *Advising Quantity* and *Advising Quality*, and equals 7.

Using data on firms covered by RiskMetrics for the period 1992-2007, we find that the average *Advising Quality* is 5, which implies that a typical outside director is connected to 5 unique directors in other firms. Average *Advising Quantity* is 8, which is consistent with CDN (2008) and other recent studies on boards in large US companies (e.g., Linck, Netter, and Yang, 2009). *Advising Quantity* and *Advising Quality* are distinct measures. The Pearson correlation is 0.32, so they are modestly positively correlated. Mean *Total Advising* is 43.

Based on these measures of director and board capability in providing advice and insight, we pursue two empirical thrusts to validate our proposed measures. First, we examine the "determinants" of the advising measures. CDN argue that CEOs of more complex organizations – those that are large, operate in different product markets, and have more leverage – need more and better advice from their boards. We extend this argument to predict that the advising quality of the board and aggregate board advising will increase in firm complexity. We find this to be true in our data. Both *Advising Quality* and *Total Advising* increase in complexity after controlling for firm and year fixed effects and a variety of other control variables. Furthermore, we confirm the result in CDN that *Advising Quantity* (the number of outside directors) increases in firm complexity.

Second, we examine the association between *Advising Quality* and *Total Advising* and firm value. Our hypotheses arise from transaction cost arguments (developed below) that are similar to those presented in CDN and elsewhere. Our logic predicts that as firm complexity increases, meaning that as the value of and demand for advice and insight from outside directors increase, firm value will increase in both *Advising Quality* and *Total Advising*. Using Tobin's *Q* as a proxy for firm value, we find results in line with our predictions. We find that, controlling for the effect of *Advising Quantity*, Tobin's *Q* increases with *Advising Quality* as complexity increases. The empirical constructs, *Advising Quality* and *Advising Quantity*, appear to capture distinct aspects of the board's advisory role. Finally, we also find that Tobin's *Q* increases in *Total Advising* as firm complexity increases.

We attempt to address endogeneity in several ways. First, our base case specifications include firm fixed effects to control for biases introduced by firm-specific, time-invariant, omitted variables. Second, we identify three instruments for *Total Advising* and estimate two-stage least squares regressions. Our first instrument is the total number of firms located within a 60-mile radius of the firms' headquarters. The premise is that greater the number of firms, greater the potential supply of 'local' directors, the greater the probability that the firm's specific demands for directors with high advising capability will be met (Knyazeva, Knyazeva, and Masulis (2011)). Thus, we expect this instrument to be correlated with *Total Advising*. At the same time, we do not expect the local supply of directors to affect individual firm performance. A second instrument is the number of executives associated with firms located within a 60-mile radius. This instrument includes both the top executives listed in Execucomp database and the directors associated with these firms. Our third instrument is the total number of connections of the executives in firms within a 60-mile radius. Our results on Tobin's *Q* continue to hold when we use these different instruments.

In checking robustness further, our results are qualitatively similar with three alternative measures of advising quality and their corresponding aggregate board advising measures. First, we count all the connections of outside directors without eliminating duplicate connections.

This recognizes that each set of connections is unique and provides value. Second, we count only directors from the large firms (above median sales) as connections. Third, we count the number of years that each set of connected directors has known each other.

We attempt to isolate the determinants of director advising capacity and the effects of director advising and insight on firm performance by controlling for alternative economic explanations. For example our results are robust to controlling for the "busyness" of directors and boards (Fich and Shivdasani (2006)). Another possible explanation is that complex firms are harder to monitor and connected directors add value by their ability to more effectively monitor the CEO. Thus the value addition that we document could arise from better monitoring by the board and not better advice. One problem with such an interpretation, however, is that connected directors are more constrained for time, and are therefore less likely to be effective monitors. Empirically we find no evidence that our advising measures are associated with better monitoring – if anything, boards with higher advising ability appear to be weaker monitors. We find *Total Advising* is unrelated to CEO turnover-performance sensitivity and CEO pay, while CEO pay-performance sensitivity *decreases* (rather than increases) with *Total Advising*. We also find no relation between *Total Advising* and the probability of accounting restatements. Our results on monitoring are similar when we use *Advising Quality* rather than *Total Advising*.

Despite the strength and robustness of our empirical results, we recognize that it is likely that other, perhaps better measures of advising quality and aggregate advising could be developed based on directors' educational backgrounds, work experience, industry affiliation, productivity in their own firms, political connections, other business relationships, influence, etc. To the extent that these characteristics are correlated with director connections, however, our measures should still reflect the advising capability of directors and boards. Moreover, the advantage of our measures is that they are easily computed for a large cross-section of firms without resorting to hand-collected data. Our analysis responds to the call in Adams, Hermalin, and Weisbach (2010) to examine the causes and effects of additional board connections and director networks.

The paper proceeds as follows. Section I describes the related literature and develops the hypotheses. Section II describes the data used in the study. Section III describes our main results, while Section IV explores alternative interpretations and describes several robustness tests. Section V concludes.

I. Related Literature and Hypotheses

In this section, we place our study in the context of the related literature and develop our key hypotheses.

A. Related Literature

While early studies, such as Mace (1971), note that directors provide advice and counsel to the CEO, the subsequent literature has focused primarily on the monitoring role of the board.[4] More recently, there has been a renewed interest in the advisory role of the board. Coles, Daniel, and Naveen (2008) examine the advisory role of the board as a whole and argue that complex firms require greater advice. Such firms benefit, therefore, from having a board with more outside directors. Other studies have examined the value of specific types of outside directors

[4] For example, monitoring roles pertain to: appointment and dismissal of the Chief Executive Officer (Weisbach (1988), Borokhovich, Parrino, and Trapani (1996), Denis, Denis, and Sarin (1997), Dahya, McConnell, and Travlos (2002), Coles, Daniel, and Naveen (2010)); setting CEO pay (Core, Holthausen, and Larcker (1999), Coles, Daniel, and Naveen (2010)); setting CEO pay-performance sensitivity (Coles, Daniel, and Naveen (2006,2010)); adoption of antitakeover devices (Brickley, Coles, and Terry (1994)); and negotiating takeover premiums (Byrd and Hickman (1992), Cotter, Shivdasani, and Zenner (1997)).

within a board in terms of providing advice to the CEO. Examples include studies on political directors (Agrawal and Knoeber (2001), Goldman, Rocholl, and So (2009)), venture capital directors (Field, Lowry, and Mkrtchyan (2010)), CEO directors (Fahlenbrach, Low, and Stulz (2010)), supply chain directors (Dass, Kini, Nanda, Onal, and Wang (2011)), and multinational directors (Daniel, McConnell, and Naveen (2011)). These papers identify a specific role played by a specific type of board member. Our measures, on the other hand, capture the advising capability of the overall board.

While our paper can be placed in the emerging literature on social connections, we differ along several dimensions.[5] One strand of the literature focuses on connections between a firm's CEO and its board of directors. Such connections have been shown to increase the probability of fraud (Chidambaran, Kedia, and Prabhala (2010)) and reduce the intensity of monitoring of the CEO by the board (Hwang and Kim (2009)). A second branch of the literature argues that connections between a firm's CEO and executives outside the firm are valuable to the CEO (Engelberg, Gao, and Parsons (2010)). A third strand of the literature examines connections between a firm's directors and other directors outside the firm, using connection measures based on network theory. These studies find that firms that are more centrally located in the director network are subject to weaker monitoring of the CEO (Fracassi and Tate (2010); Barnea and Guedj (2009)), have higher returns (Larcker, So, and Wang, 2010), and follow similar investment policies (Fracassi (2009)). Our paper is most closely related with the third strand, but we focus on connections and the quality of director and board advising rather than on the effects of network centrality on monitoring, returns, and investment similarity.

[5] Consistent with the fact that this literature is at a nascent stage, all but two of the following papers that we cite on social connections are working papers.

B. Hypotheses

Our first hypothesis is based on Coles, Daniel, and Naveen (2008). They argue that complex firms – those that are large in size, diversified across products markets, and have high leverage – need greater advice. By the same logic, we argue that CEOs of complex firms need greater quality of advice from their board and greater aggregate board advising. Formally, we propose:

> ***Hypothesis 1****: Advising quality and aggregate board advising will increase in firm complexity*.

Our second hypothesis relates advising quality and aggregate advising to firm value. Firms face a trade-off between the increased value from better advice given by more connected directors and the decreased value from potentially weaker monitoring associated with connected directors. For instance, Fich and Shivdasani (2007) show that busy boards, which by definition includes many connected directors, monitor the CEO less intensively. Therefore, the objective function that firms maximize will have an inverted U-shape with respect to advising quality and aggregate board advising.

If firms endogenously choose advising quality and aggregate board advising and if there are no transaction costs to changing board structure, there should be no linear relation between advising quality and firm value in the data (see Demsetz and Lehn (1985), Coles, Daniel, and Naveen (2008), and Coles, Lemmon, and Meschke (2011)). This is because all firms will lie at their optimum. On the other hand, deviations from this optimum could occur if there are significant transaction costs to changing board structure. Coles, Daniel, and Naveen (2008, pp. 333-335) discuss some of these transaction costs, which could result in deviations from optimal board structure.

Given that deviations from the optimum are likely, it still is difficult to ascertain whether firms will lie to the left of the optimum (which will yield a positive relation between advising quality and firm value) or to the right of the optimum (which will yield a negative relation between advising quality and firm value). One reason firms are likely to lie to the left of the optimum is that some firms may be unable to satisfy their need for connected (or high-quality) directors because the demand for such directors is high. For instance, Fahlenbrach, Low, and Stulz (2010) suggest that there is significant demand for high-quality directors and such directors can essentially choose which boards they serve on. While their paper examines directors who are CEOs of other firms, their logic easily applies to any set of high-quality directors. Further, per Hypothesis 1, the optimal advising quality will be increasing in firm complexity. Thus as firm complexity increases the shortfall from optimality is likely to increase. Thus, we propose:

> ***Hypothesis 2****: As firm complexity increases, firm value increases in advising quality and aggregate board advising.*

Of course, it is possible that high-quality directors will prefer to be associated with complex firms, both for the prestige of working in a large firm, as well as for the higher monetary benefits that larger firms offer to their directors (Linck, Netter, and Yang (2009)). If so, as firm complexity increases the shortfall from optimality is likely to decrease. This will bias us against finding evidence that is consistent with H2.

II. Data

Our sample of directors comes from the universe of firms from 1996-2007 on the RiskMetrics database (which consists of the S&P 1500 firms). We supplement these data with data from Execucomp (on CEO characteristics and compensation), from Compustat (on firm characteristics), and from CRSP (on stock returns). Coles, Daniel, and Naveen (2010) discuss some potential data issues with the RiskMetrics database and describe how they deal with these issues. We adopt the same methodology here.

Panel A of Table I provides the summary statistics for the main variables. To minimize the impact of outliers, we winsorize all variables at the 1st and 99th percentile values. The average firm has $4,505 million in sales revenue, 2.3 segments, and a leverage of 0.23.[6] As in CDN, for each firm-year observation in our sample, we compute a factor score based on firm size (= natural logarithm of firm sales), the number of business segments, and leverage. The factor score for a firm-year observation is a linear combination of the transformed (to standard normal) values of these three variables. We term the resulting factor score as *Complexity* because it increases in firm complexity. In unreported results, we find *Complexity* to be highly correlated with the underlying components: firm size (82%), number of segments (74%), and leverage (44%). As we discuss in Section IV.E, our results are qualitatively similar when we use alternative definitions of *Complexity*.

In terms of board characteristics, the average board size is 10, of which 8 are outside directors, our measure of *Advising Quantity*. Outsiders are those who are categorized as independent or affiliated directors by RiskMetrics. We find that the average *Advising Quality* is 5.1. We find that *Advising Quantity* and *Advising Quality* have a correlation of 0.32. Thus, quantity and quality are distinct empirical measures. *Total Advising* equals the product of *Advising Quantity* and *Advising Quality*. Mean *Total Advising* is 43. On average, outsiders on

[6] In 1998 the Financial Accounting Standards Board (FASB) changed the segment reporting requirements. Therefore, for segment data after 1998, we use the methodology suggested in Berger and Hann (2003) to classify firms as single-segment or multi-segment.

the board know 43 other directors through their external board seats.[7] An example is illustrated in Figure 1.

III. Results

A. The Effect of Firm Complexity on Advising

Our first hypothesis predicts that advising quality and aggregate board advising will be increasing in firm complexity. Table II presents univariate results. We sort firm-years into quintiles based on *Complexity*. Consistent with H1, we find the mean of *Advising Quality* increases monotonically from 2.5 in the lowest quintile of *Complexity* to 8.5 in the highest quintile. The difference in *Advising Quality* between the highest and lowest quintiles (= 6.0) is economically meaningful: it represents a more than three-fold increase. The difference is also statistically significant (t = 47.8, $p < 0.01$). Likewise, mean *Total Advising* also increases in a monotonic fashion from 14.9 in the lowest quintile of *Complexity* to 80.8 in the highest quintile of *Complexity*. This difference in *Total Advising* is again economically (more than 5-fold increase) as well as statistically significant (t = 54.9, $p < 0.01$).

Table III reports multivariate tests of Hypothesis 1. Here and throughout the rest of the paper we: (i) include year and firm fixed effects; (ii) report t-statistics based on standard errors that are adjusted for heteroskedasticity and firm-level clustering (Petersen, 2009); and (iii) include the intercept, but do not report the coefficient in the tables for brevity.

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[7] We can consider only the connections within the RiskMetrics universe of firms because of the limitations of the database. While this may underestimate the potential number of connections (because board seats on non-profit organizations and private firms are not included, for example), we do not believe the exclusion creates any bias because experience gained from serving on the boards of (small) private corporations and non-profit entities is not as helpful in corporate advising situations. Also, since RiskMetrics covers the S&P 1500 firms, in terms of ability indicated by connections and direct advising benefits of connections, we believe we have counted those connections that are most important.

We start by estimating a regression of *Advising Quantity* on *Complexity* as in CDN.[8] The results are shown in Model 1. The estimated coefficient on *Complexity* is highly significant (t = 4.2, $p < 0.01$), consistent with CDN. The economic significance of the impact of *Complexity* on *Advising Quantity*, however, is relatively modest. An interquartile increase in *Complexity* increases *Advising Quantity* by 4%.

In Model 2, we estimate a regression of *Advising Quality* on *Complexity*, as a test of H1. Since we are the first to introduce this measure of advising quality, we have no guidance on which control variables should be included. Thus, we start with a basic specification that includes only *Complexity*, year fixed effects, and firm fixed effects. Consistent with our predictions, we find that the coefficient on *Complexity* is significantly positive ($t = 2.9$, $p < 0.01$).

Model 3 contains controls used in Model 1 (as suggested in CDN). CDN focus on *Advising Quantity*, and it is likely that the same set of variables would be relevant in explaining the cross-sectional variation in *Advising Quality*. Regressing *Advising Quality* on *Complexity* and other controls, we continue to find a significantly positive coefficient on *Complexity* ($t = 2.8$, $p < 0.01$). In terms of economic significance, an interquartile increase in *Complexity* increases *Advising Quality* by 0.41. This corresponds to an 11% increase in *Advising Quality* compared to its median value. *Complexity* has a larger effect on *Advising Quality* than on *Advising Quantity*.

Models 4 and 5 in Table III use *Total Advising* as the dependent variable. Consistent with our expectations, we find *Total Advising* is positively related to *Complexity*, with $t > 3.7$ and $p < 0.01$ in both specifications. In terms of economic significance, an interquartile increase in *Complexity* results in an increase in *Total Advising* of 5.02 when we use the coefficients from Model 5. This corresponds to a 19% increase in *Total Advising* compared to its median value of

[8] We use the same specification used in CDN with two exceptions: we include firm-fixed effects to reduce omitted variable bias, and we use the continuous value of *Complexity* rather than high and low *Complexity* dummy variables. We get similar results here when we replicate the specification in CDN exactly.

26. From above, recall that the corresponding numbers for *Advising Quality* and *Advising Quantity are* 11% and 4%. Clearly, the combination of quality and quantity, as reflected in total board advising, provides significant statistical evidence in favor of Hypothesis 1.

B. The Impact of Advising on Firm Value

Hypothesis 2 predicts that as firm complexity increases the sensitivity of firm value to both advising quality and total board advising will increase. We proxy for firm value by Tobin's *Q*, which we estimate as the ratio of market value of assets to book value of assets. As an initial test of Hypothesis 2, we perform two independent sorts. As before, we sort firms into five groups based on the level of *Complexity*. We also sort firms into two groups based on their *Advising Quality*. Firms with above median *Advising Quality* are labeled "High Advising Quality" firms and those with below median values are labeled "Low Advising Quality" firms. Panel A of Table IV presents the average Tobin's *Q* for the various subsamples. With the exception of the first quintile (lowest *Complexity* firms), for every quintile of *Complexity*, Tobin's *Q* is significantly higher for firms with high *Advising Quality* compared to firms with low *Advising Quality*. Importantly, the difference widens as *Complexity* increases. The difference is -0.04 in quintile 1 and this increases to 0.34 in quintile 5. The results are consistent with our hypotheses H2 and suggest that more complex firms benefit more from boards that provide higher advising quality.

Panel B presents similar results, but this time we sort firms based on *Total Advising*. The results are similar. We find that Tobin's *Q* is higher for firms with high *Total Advising* relative to firms with low *Total Advising*. The difference is statistically significant for three of the five quintiles. Further, the difference widens as *Complexity* increases. Overall the results in this simple analysis support our prediction H2.

Table V presents multivariate evidence on the impact of *Advising Quality* and *Total Advising* on Tobin's *Q*. Again, all models include year and firm fixed effects. We first follow CDN and regress Tobin's *Q* on *Advising Quantity* as well as the interaction of *Advising Quantity* and *Complexity*.[9] The results are provided in Model 1. We find that the coefficient on *Advising Quantity* × *Complexity* is significantly positive, consistent with CDN (t = 2.7, p < 0.01).

We then examine our Hypothesis 2, which pertains to how firm complexity affects the impact of board advising on firm value. Our primary explanatory variable is the product of the relevant advising measure and *Complexity*. The results are shown in Model 2. The coefficient on *Advising Quality* × *Complexity* is positive and significant (t = 2.4, p < 0.05). Consistent with H2, as firm complexity increases, the marginal benefit from *Advising Quality* increases.

In Model 3, we include both measures: *Advising Quality* as well as *Advising Quantity*. Including both measures in the same model yields slightly attenuated coefficient estimates on each interaction term and a modest reduction in statistical significance for each (t = 2.3, t = 1.9). Both coefficients continue to be significant at least at p < 0.06. Again, *Advising Quality* and *Advising Quantity* are distinct empirically.

Model 4 is the same as Model 3 except we use *Total Advising* rather than *Advising Quantity* and *Advising Quality*. Consistent with Hypothesis H2, we find the coefficient on *Total Advising* × *Complexity* is significantly positive (t = 2.8, p < 0.01). That is, as *Complexity* increases, the effect of *Total Advising* on *Tobin's Q* increases.

In terms of economic significance, per Model 3, an interquartile increase in *Complexity* and *Advising Quality* leads to an increase in Tobin's *Q* by 0.060 (= 0.011×0.86×6.3) , or 4.0% of

[9] We use the same specification used in CDN with two exceptions: we include firm-fixed effects to reduce omitted variable bias, and we use the continuous value of *Complexity* rather than high and low *Complexity* dummy variables. We get similar results here when we replicate the specification in CDN exactly.

median *Q* (1.48).[10] Based on Model 4, an interquartile increase in both *Complexity* and *Total Advising* increases Tobin's *Q* by 0.084, which is 5.6% of median *Q*.

Note that the effects of *Advising Quality* and *Total Advising* overall depends on the value of *Complexity*. The value of *Complexity* at which the derivative of Tobin's *Q* in *Advising Quality* (*Total Advising*) changes from negative to positive is 0.72 (0.83). The overall effect of directors and board advising on firm value is positive in firms that are considerably complex.

The coefficients on control variables are consistent with those obtained in CDN. We find *Complexity* to be negatively related to Tobin's *Q*, while R&D/Assets, risk (proxied by standard deviation of daily returns), and profitability (proxied by Return on Assets) are positively related to Tobin's *Q*.

C. Endogeneity

We apply several different strategies to address endogeneity. First, all multivariate specifications include firm fixed effects to control for biases introduced by unobserved firm characteristics that do not change over time. Second, we estimate two-stage least squares regressions (2SLS). We need an instrument that is correlated with *Total Advising*, but does not affect Tobin's *Q* directly. It is reasonable to assume that the firm's realized *Total Advising* is correlated with the firm's demand for advising. Whether the demand is met or not depends on the supply of directors. We focus therefore on the overall supply of talented directors as an instrument. We identify three instruments. Our first instrument is the total number of firms located within a 60-mile radius of the firms' headquarters. The premise is that greater the number of firms, greater the potential supply of 'local' directors, the greater the probability that the firm's specific demands for directors with high advising capability will be met (Knyazeva,

[10] The corresponding change in Tobin's *Q* for an interquartile change in both *Complexity* and *Advising Quantity* is 5% of median *Q*.

Knyazeva, and Masulis (2011)). Thus, we expect this instrument to be correlated with *Total Advising*. At the same time, we do not expect the local supply of directors to affect individual firm performance.

In untabulated results, we confirm the relevance of the instrument. Regressing *Total Advising* on our instrument and the other variables in Model 5 in Table III yields a significantly positive coefficient on our instrument. We then use the predicted value of *Total Advising* and the interaction of the predicted value of *Total Advising* and *Complexity* in the second stage regression of Tobin's *Q*. We adjust the standard errors to allow for the fact that we use predicted values. We find results similar to those reported in Table V.

Our results are robust to two other related instruments. Our second instrument is the number of executives associated with firms located within a 60-mile radius. This instrument includes both the top executives listed in Execucomp database and the directors associated with these firms. Our third instrument is the number of connections of the executives in firms within a 60-mile radius.

IV. Robustness

In this section, we explore several alternative explanations and perform several robustness tests.

A. Alternative Proxies for Board Advising

Our results are robust to several alternative proxies for *Advising Quality* and *Total Advising*. We consider three alternative proxies for *Advising Quality* and their corresponding *Total Advising* measures, which are given by the product of *Advising Quantity* and *Advising*

Quality. As before, if a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* measures equal zero.

Our base-case *Advising Quality* measure is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outsiders on the board. This assumes that the benefit of external connection is the same regardless of which director interacts with the external connection. This need not be true always. If the main interaction among the directors is centered around board activities, then it may be appropriate to include duplicates. We term this measure, *Breadth of Connections*.

We also construct another measure of advising: *Importance of Connections*. This is defined based only on connections arising from service on boards of large firms, where large means sales above the sample median. The idea is that a director serving on the board of a large firm will have more ability to deal with a wide array of issues confronting the board and will be in a better position to advice the CEO (Ferris, Jagannathan, and Pritchard (2003)).

A third alternative measure of advising, termed *Depth of Connections*, captures the intensity of the connection. For each outsider on the board, we estimate the number of years for which he or she has been connected to a director in another firm. We then sum across all connections. If an outsider is connected to the same director through two different board positions – one for 3 years and one for 5 years (say), then we include both. The premise is that even though the outsider is connected to the same director, it is in different board settings, each valuable in their own way. Also, it is likely that repeated interactions are more valuable in establishing deeper relationships.

Table VI reports the results. Panel A is a test of Hypothesis H1 while Panel B is a test of Hypothesis H2 using the alternative advising measures. Panel A reports results based on

Model 3 of Table III but for alternative proxies for *Advising Quality* (row 1) and Model 5 of Table III but for alternative proxies for *Total Advising* (row 2). We focus on the coefficient on *Complexity*, the variable of interest. We report the economic significance, which is the percentage increase in the alternative advising measure (relative to its median value) for an interquartile increase in *Complexity*. The reported t-statistics are for the coefficients on *Complexity*. Panel B reports results based on Model 3 of Table V but for alternative proxies for *Advising Quality* (row 1) and Model 4 of Table V but for alternative proxies for *Total Advising* (row 2). We focus on the interaction term of alternative advising measures and *Complexity*. We report the economic significance, which is the percentage increase in Tobin's *Q* (relative to its median value) for an interquartile increase in both the advising measure and *Complexity*. The reported t-statistics are for the coefficients on the interaction term of the alternative advising measures and *Complexity*.

As can be seen from the table, the statistical and economic significance using these alternative proxies are similar to the base-case. The results offer further support for H1 and H2.

B. Are Boards with Greater Advising Capability Just Busy Boards in Disguise?

Our *Total Advising* measure is related to the measure of 'busy' boards used previously. For instance, Fich and Shivdasani (2006) define an indicator variable, *Busy Board*, which equals one if the majority of outside directors on a board hold three or more directorships, and equals zero otherwise. Fich and Shivdasani focus on monitoring, and find that busy boards are weaker monitors and firms with such boards have poorer performance.[11] While a board definitely does not have to be 'busy', per the Fich and Shivdasani definition, in order for *Total Advising* to be high, it is possible that there is some correlation between the two measures and that our *Total*

[11] Ferris, Jagannathan, and Pritchard (2003) find no evidence that multiple board appointments harm firm performance.

Advising simply captures busy boards. Thus, we define *Busy Board* as per Fich and Shivdasani. We then re-estimate Model 5 of Table III, but using *Busy Board* as the dependent variable instead of *Total Advising* and Model 4 of Table V using *Busy Board* as well its interaction with *Complexity* in addition to our *Total Advising* measure.

We find no evidence that *Complexity* has power to explain *Busy Board*. When we include *Busy Board* and the interaction of *Busy Board* with *Complexity* in regressions of Tobin's *Q*, neither coefficient is statistically significant. We continue to find, however, that the sensitivity of Tobin's *Q* to *Total Advising* increases in *Complexity*. Moreover, the results are qualitatively similar when we use a less restrictive definition of *Busy Board* (equals one if the majority of outside directors hold two or more directorships).

C. Are Our Measures Capturing Monitoring Effectiveness Rather Than Advising Capability?

We next examine the impact of *Advising Quality* and *Total Advising* on the board's monitoring effectiveness. Higher values of *Advising Quality* and *Total Advising* imply that outsiders on the board are sitting on other boards. It is possible that these connected directors are better monitors, especially in complex firms. Thus, their value addition in complex firms could arise from their ability to more effectively monitor the CEO, rather than their ability to provide advice. One problem with such an interpretation, however, is that connected directors are more constrained for time, and are therefore less likely to be effective monitors. Nevertheless to test this hypothesis, we investigate CEO turnover and CEO compensation policies, which are an integral part of a board's monitoring duties. Table VII presents the regression results, all of which control for year and firm fixed effects.

In Panel A, we examine the sensitivity of CEO turnover to firm performance. Higher turnover-performance sensitivity has been suggested as a mechanism that aligns managerial interests with that of shareholders (Weisbach (1988)). If higher values of *Advising Quality* and *Total Advising* are indeed associated with more effective monitoring, we expect the turnover-performance sensitivity to increase in both these measures. To test this hypothesis, we estimate logistic regressions of *CEO Turnover*, where the key independent variables are *Prior Abnormal Return* and the interaction of *Prior Abnormal Return* with *Advising Quality* (Column 1) and with *Total Advising* (Column 2). Control variables are based on Fich and Shivdasani (2007). *CEO Turnover* equals 1 if there is a CEO turnover, and equals 0 otherwise. *Prior Abnormal Return* is our proxy for prior performance. For turnover years, this is measured as the stock returns in the year leading up to the actual date of CEO turnover minus the value-weighted market returns over that period. For non-turnover years, this is measured as the stock returns over the previous fiscal year minus the value-weighted market returns over that period. It is well-documented that, in practice, prior performance is negatively related to the likelihood of CEO turnover (for example, see Weisbach (1988), Warner, Watts, and Wruck (1988), and Parrino (1997)). Thus, we expect the coefficient on *Prior Abnormal Return* to be negative. If our advising measures are associated with stronger monitoring, the coefficient on the interaction term should be significantly negative. We find that the coefficient on the interaction term is insignificant in both column 1 and column 2, implying that neither *Advising Quality* nor *Total Advising* has any impact on monitoring, as reflected in turnover-performance sensitivity.

We also examine CEO pay policies. If a board with strong advising capability causes more effective pay policies, we will observe at least one of the following: (i) pay will be decreasing in our advising measures; and/or (ii) CEO wealth-performance sensitivity will be increasing in our advising measures. Panel B of Table VII reports regression results for total CEO pay, while Panel C reports regression results for CEO wealth-performance sensitivity, where the key independent variables are *Advising Quality* (Column 1) and *Total Advising* (Column 2).

Total CEO compensation, *CEO Pay*, is given by the Execucomp variable *TDC1*, which includes the value of annual stock option grants, salary and bonus, value of annual restricted stock grants, other annual compensation, long-term incentive payouts, and all other total compensation. We do not include CEO turnover years and require that the CEO's tenure be at least one year. This is because 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 quickly their incentives) and higher bonus (including signing bonuses). The dependent variable is the natural logarithm of *CEO Pay*. The control variables are based on prior literature (see Murphy (1999) for a review of CEO compensation), and include firm size, firm performance (both stock and accounting), CEO tenure, and CEO ownership. The results (Panel B of Table VII) indicate that neither of our two advising measures has any impact on CEO pay.

We also examine CEO wealth-performance-sensitivity, which we term *CEO Delta*. This is defined as the change in CEO's firm-related wealth for a 1% change in stock price, and is estimated using the approach of Core and Guay (2002) but with adjustments to Execucomp data as specified in Coles, Daniel, and Naveen (2010). We select control variables based on the prior literature on the determinants of delta (Core and Guay (1999) and Coles, Daniel, and Naveen (2006)). Per Panel C of Table VII, delta is not related to *Advising Quality* but significantly negatively related to *Total Advising*. This result suggests that our advising measures are associated with lower CEO incentive alignment.

Our specifications above in Panels A, B, and C of Table VII do not include the fraction of independent directors, the conventional proxy for monitoring effectiveness. This is because we wish to examine if *Advising Quality* or *Total Advising* are somehow proxying for the monitoring effectiveness of boards. In untabulated results, we estimate all the specifications in Table VII with the inclusion of fraction of independent directors as an additional control variable (in panel A, the fraction of independent directors interacted with returns is also included as an additional regressor). We continue to find that neither *Advising Quality* nor *Total Advising* have any effect on CEO pay levels or CEO turnover-performance sensitivity, while CEO delta is negatively related to *Total Advising*.[12]

Finally, we estimate logistic regressions of the probability of accounting restatements (results untabulated in the interest of conciseness).[13] A higher probability of restatement is indicative of weaker monitoring by the board. If *Advising Quality* and *Total Advising* are capturing greater monitoring effectiveness, then these two variables should be associated negatively with the probability of restatement. Our specification is based on Burns and Kedia (2006). We find neither of our two measures is related to the probability of accounting restatements.

Overall, the results in this section suggest that our advising measures are at most associated with slightly weaker monitoring of the CEO. This implies that the increase in

[12] We find that the sensitivity of CEO turnover to performance increases with the fraction of independent directors (consistent with Weisbach (1988)). However, the fraction of independent directors is unrelated to CEO pay levels and negatively related to CEO delta.

[13] We obtain financial restatement data for the period January 1, 1997 through June 30, 2006 from the Financial Restatement Database of U.S. General Accounting Office (GAO). GAO collects data from public sources, Lexis-Nexis, and from SEC filings. This database includes a list of financial restatements identified as having been made because of accounting irregularities.

sensitivity of Tobin's *Q* to *Total Advising* (or to *Advising Quality*) as *Complexity* increases can only be attributed to better advice provided by such boards.

D. Corrections for Data Issues

All regressions control for both time and firm effects. Moreover, the reported t-statistics in all our regression results are based on standard errors clustered at the firm level. Per Petersen (2009), such a correction is appropriate when there is a firm fixed effect. If there is cross-sectional dependence across firms (a "time" effect), then Fama-MacBeth standard errors are appropriate. We find that the results using the Fama-MacBeth methodology are consistent with our main predictions.

Our base case models control for firm fixed effects, which rules out the possibility of estimating industry fixed effects. To ensure that industry factors are not driving the results, we compute excess Tobin's *Q* as the Tobin's *Q* of the firm net of the industry-median Tobin's *Q*, and then estimate the usual firm fixed effects model but using excess Tobin's *Q*. All results continue to hold.

In our tests, all variables are winsorized at the 1^{st} and 99^{th} percentile values to minimize the impact of outliers. Alternatively, we estimate the models using the least absolute deviation criterion (instead of least squares) with respect to departures from the median (as in Gompers, Ishii, and Metrick (2003), CDN). Our results are unaltered.

E. Alternative Definitions of Firm Complexity

Our definition of *Complexity* is the factor score based on firm size (= natural logarithm of firm sales), the number of business segments, and leverage. When we assess the individual components of *Complexity*, our results are driven primarily by firm size. This is true both for regressions with the *Total Advising* as dependent variables and for regressions with firm performance as the left-hand-side variable.

Alternatively, we estimate *Complexity* three other ways: (i) instead of sales, we use assets; (ii) instead of number of business segments, we use an indicator variable that equals 1 if the firm is diversified, and equals 0 otherwise; and (iii) we add an indicator variable, *MNC*, which equals 1 if the firm is a multinational corporation, and equals 0 otherwise. We define a firm as an MNC in a given year if it reports at least one non-domestic segment and non-zero foreign income in that year.[14] In all cases, our inferences regarding *Total Advising* remain unchanged.

F. Excluding Finance and Utility Firms

Our sample includes finance and utility firms, but some studies, such as Yermack (1996), exclude these firms. Our results generally are the same when we exclude such quasi-regulated firms.

G. Director Advising and Board Independence Through Time

Boards have faced increasing political pressures to select directors who are not overburdened with too many board seats. We therefore examine whether there is any variation through time in our measures of board advising. Consistent with such pressure, Figure 2 indicates that *Advising Quantity* is constant through time whereas both *Total Advising* and *Advising Quality* declined during our sample period. The pressure from listing requirements and other sources to maintain or increase the proportion of outside directors on boards has, on the other hand, resulted in an increase in the fraction of independent directors over our sample

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[14] Firms are required to report the audited financial information for geographic segments that account for more than 10 percent of their sales, profits, or assets. Further, they are required to disclose pre-tax income, current taxes, and deferred taxes if any of these three measures accounts for more than 5 percent of the firm's consolidated total (see Denis, Denis, and Yost (2002), and Bodnar and Weintrop (1997) for further details).

period. Thus it appears that companies, investors, regulators and/or shareholders have shifted towards monitoring and away from advising in terms of board function.

V. Conclusions

In this paper, we develop a measure of per capita outside director advising, *Advising Quality*, and a measure of advising provided by the aggregation of outside directors, *Total Advising*.. *Total Advising* is the product of *Advising Quality* and *Advising Quantity* (the number of outside directors on the board as in Coles, Daniel, Naveen (2008)). The idea is that outside directorships reflect demand for those directors because of skills, experience, and talent. Moreover, outside connections directly affect advising capability because such directors potentially have access to better information and experience pertaining to the firm's suppliers, competitors, and customers. Furthermore, such connections represent director access to business associates who can advise the advisor by providing their own perspective and expertise.

We report two primary results. As firm demand for advising, as measured by firm complexity, increases, both *Advising Quality* and *Total Advising* increase. Moreover, the sensitivity of firm value, as measured by Tobin's *Q*, to both *Advising Quality* and *Total Advising* increases with firm complexity.

Several other research questions could be addressed using our advising measures. Do firms with boards with higher advising capability make better reorganizations (carveouts, spinoffs, divestitures, joint ventures)? Do such boards make better investment decisions (capital expenditure, R&D, M&A)? Do such boards enable the firm to respond more effectively to industry shocks? Do such boards make better financial decisions (time debt and equity issuance to take advantage of interest rate and stock market movements)? Do such boards reduce IPO underpricing?

We show that advising quality and total advising matter. While we measure advising using outside director connections arising from service on other boards, it is likely that our measures are correlated with other intrinsic measures of capability. Such measures potentially include business experience, educational background, intelligence, social capital, networking ability, political connections, other business relationships, influence, etc. There remain opportunities for further research along these lines.

References

Adams, R., Ferreira, D., 2007. A theory of friendly boards. *Journal of Finance* 62, 217-250.

Adams, R., Hermalin, B., Weisbach, M., 2011. The role of boards of directors in corporate governance: A conceptual framework & survey. *Journal of Economic Literature*, Forthcoming.

Agrawal, A., Knoeber, C., 2001. Do some outside directors play a political role? *Journal of Law and Economics* 14, 179-198.

Barnea, A., Guedj, I., 2009. Director networks. *Working Paper*, Claremont McKenna College.

Berger, P., Hann, R., 2003. The impact of SFAS 131 on information and monitoring. *Journal of Accounting Research* 41, 163-223.

Bodnar, G., Weintrop, J., 1997. The valuation of foreign income of U.S. multinational firms: A growth opportunities perspective. *Journal of Accounting and Economics* 24, 69-97.

Borokhovich, K., Brunarski, K., Parrino, R. 1997. CEO contracting and antitakeover amendments. *Journal of Finance* 52, 1495-1517.

Brickley, J., Coles, J., Terry, R., 1994. Outside directors and the adoption of poison pills. *Journal of Financial Economics* 35, 371-390.

Burns, N., and Kedia, S., 2006. The impact of performance-based compensation on misreporting, Journal of Financial Economics 79, 35-67.

Byrd, J., Hickman, K., 1992. Do outside directors monitor managers? Evidence from tender offer bids. *Journal of Financial Economics* 32, 195-222.

Chidambaran, N., Kedia, S., Prabhala N., 2010. CEO-Director connections and corporate fraud. *Working Paper*, Fordham University, Rutgers University, and University of Maryland.

Hwang, B., Kim, S., 2009. It pays to have friends. *Journal of Financial Economics* 93, 138-158.

Coles, J., Daniel, N., Naveen, L., 2006. Managerial incentives and risk-taking. *Journal of Financial Economics* 79, 431-468.

Coles, J., Daniel, N., Naveen, L., 2008. Boards: does one size fit all? *Journal of Financial Economics* 87, 329-356.

Coles, J., Daniel, N., Naveen, L., 2010. Coopted boards. *Working Paper*, Arizona State University, Drexel University, and Temple University.

Coles, J., Lemmon, M., Meschke, J., 2011. Structural models and endogeneity in corporate finance. *Journal of Financial Economics*, Forthcoming.

Coles, J., Lemmon, M., Wang, Y., 2007. The joint determinants of managerial ownership, board independence, and firm performance. *Working Paper*, University of Utah.

Core, J., Guay, W., 1999. The use of equity grants to manage optimal incentive levels. *Journal of Accounting and Economics* 28, 151-184.

Core, J., Guay, W., 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. *Journal of Accounting Research* 40, 613-630.

Core, J., Holthausen, R., Larcker, D., 1999. Corporate governance, chief executive officer compensation and firm performance. *Journal of Financial Economics* 51, 371-406.

Cotter, J., Shivdasani, A., Zenner, M., 1997. Do outside directors enhance target shareholder wealth during tender offer contests? *Journal of Financial Economics* 43, 195-218.

Dahya, J., McConnell, J., Travlos, N., 2002. The Cadbury committee, corporate performance, and top management turnover. *Journal of Finance* 57, 461-483.

Daniel, N., McConnell, J., Naveen, L., 2011. The role of non-domestic directors in U.S. firms. *Working Paper*, Drexel University, Purdue University, and Temple University.

Dass, N., Kini, O., Nanda, V., Onal, B., Wang, J., 2011. Board expertise: do directors from related industries help bridge the information gap. *Working Paper*, Georgia Tech, Georgia State University, and Baruch College.

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

Denis, D., Denis, D., and Sarin, A., 1997. Ownership structure and top executive turnover, *Journal of Financial Economics* 45, 193-221.

Denis, D., Denis, D., Yost, K., 2002. Global diversification, industrial diversification, and firm value. *Journal of Finance* 57, 1951-1979.

Dittmar, A., Mahrt-Smith, J. 2007. Corporate governance and the value of cash holdings. *Journal of Financial Economics* 83, 599-634.

Engelberg, J., Gao, P., Parsons, C., 2010. The price of a CEO's rolodex. *Working Paper*, University of North Carolina and University of Notre Dame.

Fama E., MacBeth, J., 1973. Risk, return, and equilibrium: empirical tests. *Journal of Political Economy* 81, 607-636.

Fahlenbrach, R., Low, A., Stulz, R., 2010. Why do firms appoint CEOs as outside directors? *Journal of Financial Economics* 97, 12-32.

Ferris, S., Jagannathan, M., Pritchard, A., 2003. Too busy to mind the business? Monitoring by directors with multiple board appointments. *Journal of Finance* 58, 1087-1111.

Fich, E., Shivdasani, A., 2006. Are buys boards effective monitors? *Journal of Finance* 61, 689-724.

Fich, E., Shivdasani, A. 2007. Financial fraud, director reputation, and shareholder wealth. *Journal of Financial Economics* 86, 306-336.

Field, L., Lowry, M., Mkrtchyan, A., 2010. Are busy boards detrimental? *Working Paper*, Pennsylvania State University.

Fracassi, C., 2009. Corporate finance policies and social networks. *Working Paper*, University of Texas, Austin.

Fracassi, C., Tate, G., 2010. External networking and internal firm governance. *Journal of Finance*, Forthcoming.

Goldman, E., Rocholl, J., So, J., 2009. Do politically connected directors affect firm value? *Review of Financial Studies* 22, 2331-2360.

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

Hermalin, B., Weisbach, M., 1988. The determinants of board composition. *Rand Journal of Economics* 19, 589-606.

Hwang, B., Kim, S. 2009. It pays to have friends. *Journal of Financial Economics* 93, 138-158.

Kaplan, S., Reishus, D., 1990. Outside directorships and corporate performance. *Journal of Financial Economics* 27, 389-410.

Knyazeva, A., Knyazeva, D., Masulis, R., 2011. Effects of local director markets on corporate boards. *Working Paper*, University of Rochester and University of New South Wales.

Larcker, D., So, E., Wang, C., 2010. Boardroom centrality and stock returns. *Working Paper*, Stanford University.

Linck, J., Netter, J., Yang, T., 2009. Effects and unintended consequences of the Sarbanes-Oxley Act on corporate boards. *Review of Financial Studies* 22, 3287-3328.

Mace, M., 1971. Directors, Myth, and Reality. Harvard Business School Press, Boston, MA.
Murphy, K., 1999. Executive Compensation, in Orley Ashenfelter and David Cards, Eds: *Handbook of Labor Economics*, Volume 3, North Holland: New York.
Parrino, R., 1997. CEO turnover and outside succession: A cross-sectional analysis. *Journal of Financial Economics* 46, 165-197.
Petersen, M., 2009. Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies* 22, 435-480.
Warner, J., Watts, R., Wruck, K., 1988. Stock prices and top-management changes. *Journal of Financial Economics* 20, 461-92.
Weisbach, M., 1988. Outside directors and CEO turnover. *Journal of Financial Economics* 20, 421-460.
Yermack, D., 1996. Higher market valuation of companies with a small board of directors. *Journal of Financial Economics* 40, 185-212.

Table I
Descriptive Statistics

The data include all firms on the *RiskMetrics* database from 1992-2007. *Sales* is in millions of dollars. *Segments* is the number of business segments of the firm. *Leverage* is the ratio of total debt to assets. *Complexity* is the factor score based on firm size, segments, and leverage, where firm size is given by the natural logarithm of sales. *Board Size* is the number of directors on the board. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. *Total Advising* is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* equal zero. *IQ Range* denotes interquartile range. All variables are winsorized at 1st and 99th percentile values.

	Mean	Median	Min	Max	Std.	IQ Range
Firm characteristics						
Sales	4,505	1,284	50	58,247	9,051	3,315
Segments	2.3	2.0	1.0	7.0	1.5	2.0
Leverage	0.23	0.22	0.00	0.83	0.18	0.28
Complexity (Factor score)	-0.08	-0.12	-1.42	2.03	0.62	0.86
Tobin's *Q*	1.92	1.48	0.76	8.10	1.27	1.01
Board characteristics						
Board Size	10	9	5	19	3	4
Advising Quantity	8	7	3	16	3	3
Advising Quality	5.1	3.7	0.0	22.3	5.0	6.3
Total Advising	43	26	0	230	50	54

Table II
Impact of Firm Complexity on Advising: Univariate Evidence

The table reports the average values of *Advising Quality* and *Total Advising* for two subsamples based on median values of *Complexity*. *Complexity* is the factor score based on firm size, segments, and leverage. *Firm Size* is the natural logarithm of sales, *Segments* is the number of business segments of the firm, and *Leverage* is the ratio of total debt to total assets. We sort firms into quintiles based on their level of *Complexity*. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. *Total Advising* is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* equal zero. All variables are winsorized at 1st and 99th percentile values. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

Complexity Quintile	*Advising Quality*	*Total Advising*
Complexity (1) – Low	2.5	14.9
Complexity (2)	3.4	22.7
Complexity (3)	4.7	35.2
Complexity (4)	6.1	52.0
Complexity (5) – High	8.5	80.8
Difference (5) – (1)	6.0^{***}	65.9^{***}
t-statistic	(47.8)	(54.9)

Table III
Impact of Firm Complexity on Advising: Multivariate Evidence

The table reports results from regressions of advising measures. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. *Total Advising* is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* equal zero. *Complexity* is the factor score based on firm size, segments, and leverage. *Firm Size* is the natural logarithm of sales, *Segments* is the number of business segments of the firm, and *Leverage* is the ratio of total debt to total assets. *Risk* is the standard deviation of daily returns. *ROA* is EBITDA/Assets. *FCF* is free cash flow, defined as operating cash flow minus common and preferred dividend. *Intangible Assets* is 1 – ratio of net property, plant, and equipment to assets. We use the natural logarithm of *CEO Tenure*, *CEO Age*, and *Firm Age* in the regressions. All variables are winsorized at 1st and 99th percentile values. Intercept is included but not reported. *t-statistics* given in parentheses 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:				
	Advising Quantity	Advising Quality		Total Advising	
	Model 1	Model 2	Model 3	Model 4	Model 5
Complexity	0.340***	0.448***	0.481***	6.631***	5.841***
	(4.2)	(2.9)	(2.8)	(4.6)	(3.7)
CEO Tenure	-0.062*		-0.335***		-2.962***
	(-1.7)		(-4.3)		(-4.3)
CEO Age	0.052		2.067***		18.267***
	(0.2)		(3.5)		(3.5)
Firm Age	1.305***		1.122***		20.803***
	(8.3)		(3.2)		(6.6)
R&D/Assets	-0.943		1.053		-1.165
	(-0.8)		(0.4)		(-0.1)
Risk	-7.426***		-13.454***		-116.563***
	(-3.4)		(-2.7)		(-3.0)
ROA	-0.321		-0.936		-5.986
	(-1.0)		(-1.4)		(-1.2)
Lagged ROA	0.086		0.535		8.350*
	(0.3)		(0.9)		(2.0)
FCF/Assets	-0.149		0.263		1.722
	(-0.6)		(0.5)		(0.4)
Intangibles/Assets	0.918***		1.027**		15.124***
	(4.1)		(2.0)		(3.4)
Firm, Year Dummies?	Yes	Yes	Yes	Yes	Yes
Observations	11,273	13,921	11,273	13,921	11,273
R-squared	0.098	0.101	0.101	0.080	0.118

Table IV
Impact of Advising on Firm Value: Univariate Evidence

The table reports the average value of Tobin's *Q* for subsamples based on advising measures and firm complexity. Tobin's *Q* is defined as the ratio of market value of assets to book value of assets. The market value of assets is calculated as the book value of assets plus the market value of equity minus the book value of equity. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. *Total Advising* is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* equal zero. *Complexity* is the factor score based on firm size, segments, and leverage. *Firm Size* is the natural logarithm of sales, *Segments* is the number of business segments of the firm, and *Leverage* is the ratio of total debt to total assets. We perform two independent sorts. First, we sort firms into quintiles based on *Complexity*. Second, firms are sorted into two groups based on their *Advising Quality* (in Panel A) and on their *Total Advising* (in Panel B). Firms with above-median *Advising Quality* are termed "High Advising Quality" and those with below-median values are termed "Low Advising Quality." Similarly, firms with above-median *Total Advising* are termed "High Total Advising" while those with below median values are called "Low Total Advising". The mean of *Tobin's Q* for each sub-sample is reported. All variables are winsorized at 1st and 99th percentile values. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

Panel A: Advising Quality, Complexity, and Tobin's *Q*

Complexity Quintile	Low Advising Quality	High Advising Quality	Difference High – Low	t-statistic
Complexity (1) – Low	2.54	2.50	-0.04	0.5
Complexity (2)	2.04	2.27	0.23	4.2
Complexity (3)	1.76	2.00	0.24	5.4
Complexity (4)	1.63	1.93	0.29	6.7
Complexity (5) – High	1.46	1.80	0.34	7.8

Panel B: Total Advising, Complexity, and Tobin's *Q*

Complexity Quintile	Low Total Advising	High Total Advising	Difference High – Low	t-statistic
Complexity (1) – Low	2.54	2.46	-0.09	1.0
Complexity (2)	2.11	2.15	0.04	0.7
Complexity (3)	1.79	1.98	0.18	4.1
Complexity (4)	1.64	1.92	0.28	6.4
Complexity (5) – High	1.48	1.79	0.31	6.7

Table V
Impact of Advising on Firm Value: Multivariate Evidence

Firm value is measured by Tobin's *Q*, defined as the ratio of market value of assets to book value of assets. The market value of assets is calculated as the book value of assets plus the market value of equity minus the book value of equity. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. *Total Advising* is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* equal zero. *Complexity* is the factor score based on firm size, segments, and leverage. *Firm Size* is the natural logarithm of sales, *Segments* is the number of business segments of the firm, and *Leverage* is the ratio of total debt to total assets. *Fraction Outsiders* is the ratio of the number of outside directors on the board to board size. *Risk* is the standard deviation of daily returns. *ROA* is EBITDA/Assets. *Intangible Assets* is 1 – ratio of net property, plant, and equipment to assets. All variables are winsorized at 1^{st} and 99^{th} percentile values. Intercept is included but not reported. *t-statistics* given in parentheses 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 *Q*			
	Model 1	Model 2	Model 3	Model 4
Advising Quantity × Complexity	0.037***		0.031**	
	(2.7)		(2.3)	
Advising Quality × Complexity		0.014**	0.011*	
		(2.4)	(1.9)	
Total Advising × Complexity				0.0018***
				(2.8)
Advising Quantity	-0.033***		-0.032***	
	(-3.3)		(-3.2)	
Advising Quality		-0.009*	-0.008*	
		(-1.9)	(-1.7)	
Total Advising				-0.0015***
				(-2.6)
Complexity	-0.527***	-0.335***	-0.550***	-0.342***
	(-4.5)	(-5.4)	(-4.6)	(-5.6)
Fraction Outsiders	-0.109	-0.486***	-0.132	-0.420***
	(-0.6)	(-3.2)	(-0.7)	(-2.7)
R&D/Assets	2.217**	2.247**	2.251**	2.253**
	(2.4)	(2.4)	(2.4)	(2.4)
Risk	5.301***	5.681***	5.245***	5.589***
	(3.2)	(3.4)	(3.2)	(3.4)
ROA	4.899***	4.892***	4.891***	4.899***
	(17.7)	(17.7)	(17.7)	(17.7)
Lagged ROA	0.955***	0.952***	0.961***	0.959***
	(4.2)	(4.1)	(4.2)	(4.2)
Intangibles/Assets	-1.232***	-1.261***	-1.227***	-1.250***
	(-7.0)	(-7.1)	(-7.0)	(-7.1)
CEO Ownership	0.008*	0.009*	0.008*	0.009*
	(1.7)	(1.9)	(1.7)	(1.9)
Firm, Year dummies?	Yes	Yes	Yes	Yes
Observations	11,284	11,284	11,284	11,284
R-squared	0.250	0.249	0.251	0.251

Table VI
Robustness to Alternative Proxies for Advising

Panel A reports results based on Model 3 of Table III but for alternative proxies for *Advising Quality* (row 1) and Model 5 of Table III but for alternative proxies for *Total Advising* (row 2). We focus on the coefficient on *Complexity*, the variable of interest. We report the economic significance, which is the percentage increase in the advising measure (relative to its median value) for an interquartile increase in *Complexity*. The reported t-statistics are for the coefficients on *Complexity*. Panel B reports results based on Model 3 of Table V but for alternative proxies for *Advising Quality* (row 1) and Model 4 of Table V but for alternative proxies for *Total Advising* (row 2). We focus on the interaction term of alternative advising measures and *Complexity*. We report the economic significance, which is the percentage increase in Tobin's *Q* (relative to its median value) for an interquartile increase in both the advising measure and *Complexity*. The reported t-statistics are for the coefficients on the interaction term of the interaction term of alternative advising measures and *Complexity*. *Tobin's Q* is defined as the ratio of market value of assets to book value of assets. The market value of assets is calculated as the book value of assets plus the market value of equity minus the book value of equity. *Complexity* is the factor score based on firm size, segments, and leverage. *Firm Size* is the natural logarithm of sales, *Segments* is the number of business segments of the firm, and *Leverage* is the ratio of total debt to total assets. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality. Our base-case *Advising Quality* measure is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outsiders on the board. We consider three alternative proxies for *Advising Quality*, and each will have its own corresponding *Total Advising* measure, which is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* measures equal zero. To compute the *Breadth of Connections*, we aggregate all outside director connections but include duplicates. We then sum it up without eliminating the duplicates and then scale by the number of outsiders. *Importance of Connections* is calculated the same way as the base-case *Advising Quality* measure; however, we impose the restriction that the connected director should sit on at least one large firm. For this purpose, a large firm is defined as a firm with sales above the median value for that year. To calculate *Depth of Connections*, for each outside director in a firm, we consider every director he or she is connected to in other firms. For each of these connection pairs, we take the number of years for which the pair is connected. We then cumulate this number over all outsiders in the firm, and then scale by the number of outsiders. All variables used in regressions are winsorized at 1st and 99th percentile values. *t-statistics* given in parentheses are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

Panel A: Impact of Firm Complexity on Advising

% Change in Alternative Advising Measures for an interquartile change in *Complexity*

	Advising Measure =			
	Base-case	Breadth of Connections	Importance of Connections	Depth of Connections
Advising Quality	6.5%***	7.0%***	8.2%***	7.2%***
	(2.8)	(2.9)	(3.6)	(3.1)
Total Advising	19.3%***	21.0%***	26.9%***	23.7%***
	(3.7)	(3.6)	(4.0)	(4.0)

Panel B: Impact of Firm Complexity on the Sensitivity of Firm Value to Advising

% Change in Tobin's *Q* for an interquartile change in both Alternative Advising Measures and *Complexity*

	Advising Measure =			
	Base Case	Breadth of Connections	Importance of Connections	Depth of Connections
Advising Quality	4.0%*	4.1%**	5.6%***	4.2%**
	(1.9)	(2.0)	(2.6)	(2.2)
Total Advising	5.7%***	5.6%***	6.5%***	5.0%***
	(2.8)	(2.8)	(3.3)	(2.6)

Table VII

Are Our Measures Capturing Monitoring Effectiveness Rather Than Advising Capability?

We examine CEO turnover and CEO compensation policies. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. *Total Advising* is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* equal zero. In *Panel A*, the dependent variable is *Turnover*, which equals 1 if the identity of the CEO changes, and equals 0 otherwise. For turnover years, *Prior Abnormal Return* is measured as the annual stock returns in the year leading up to the actual date of CEO turnover minus the value-weighted market returns over that period. For non-turnover years, *Prior Abnormal Return* is measured as the stock returns over the previous fiscal year minus the value-weighted market returns over that period. In the year of turnover, all CEO variables correspond to that of the departing CEO; in non-turnover years, they are measured contemporaneously. *CEO Age6466 Dummy* is an indicator variable that equals 1 if $64 \leq$ CEO Age ≤ 66, and 0 otherwise. In *Panel B*, the dependent variable is the natural logarithm of *CEO Pay*. This is the total annual pay (Execucomp variable: *TDC1*), which includes the value of stock options granted, cash compensation, the value of restricted stock grants, other annual compensation, long term incentive payouts, and all other total compensation. 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. In *Panel C*, the dependent variable is *CEO Delta*, defined the dollar change in CEO's firm-related wealth for a 1% change in stock price, where components of delta arise from current CEO holdings of own-firm stock and options, per Core and Guay (2002). *Tobin's Q* is defined as the ratio of market value of assets to book value of assets. *ROA* is EBITDA/Assets. *Intangibles* equals Assets minus Net property, plant, and equipment. *Firm-specific Risk* is the natural logarithm of standard deviation of residuals from a firm-level time-series regression (estimated for each fiscal year) of daily excess returns on the Fama-French factors. All variables are winsorized at 1st and 99th percentile values. Intercept is included in all regressions but not reported. *t-statistics* given in parentheses are based on standard errors corrected for heteroskedasticity and firm-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels.

Panel A: Turnover-Performance Sensitivity

	Dependent Variable: CEO Turnover	
	Advising Measure =	
	Advising Quality	Total Advising
Advising Measure × Prior Abnormal Return	-0.022	-0.001
	(-1.2)	(-0.8)
Advising Measure	0.027*	0.004**
	(1.7)	(2.1)
Prior Abnormal Return	-0.448***	-0.496***
	(-3.6)	(-4.3)
Firm Size	-0.354**	-0.368***
	(-2.5)	(-2.6)
CEO Age6466 Dummy	0.365***	0.361***
	(3.1)	(3.1)
CEO Tenure	0.388***	0.387***
	(23.3)	(23.3)
CEO Ownership	-0.047**	-0.046**
	(-2.3)	(-2.2)
Firm, Year dummies?	Yes	Yes
Observations	7,733	7,733

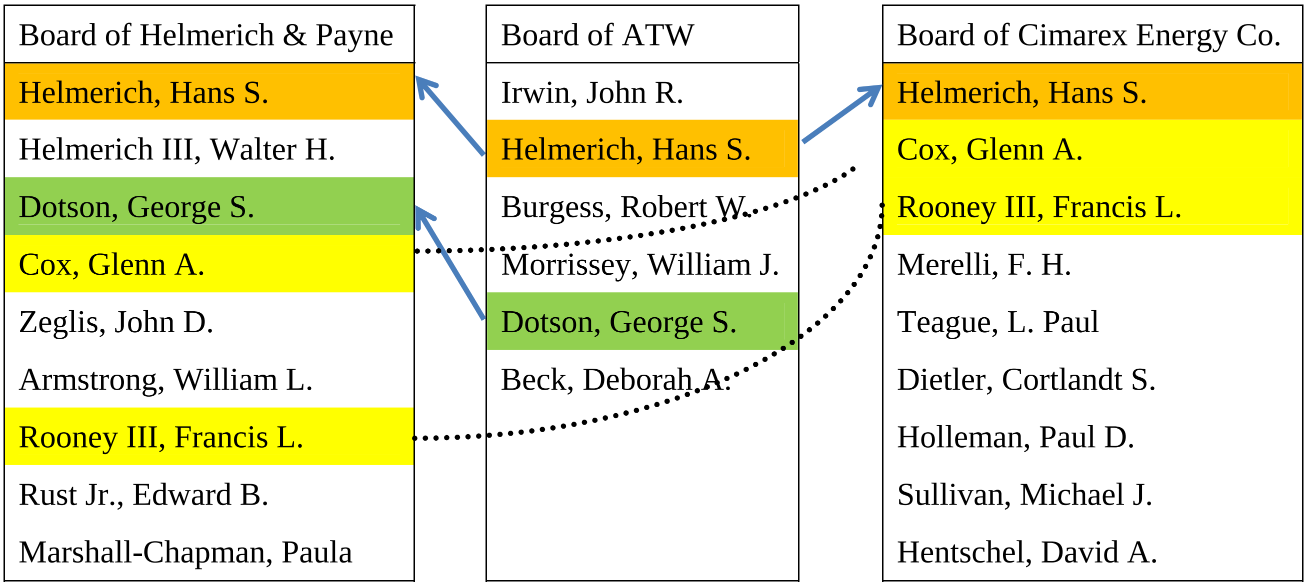
Panel B: Pay Level

	Dependent Variable: CEO Pay	
	Advising Measure =	
	Advising Quality	Total Advising
Advising Measure	0.0001	-0.0001
	(0.0)	(-0.2)
Firm Size	0.297***	0.298***
	(9.9)	(9.9)
Return	0.126***	0.126***
	(6.6)	(6.6)
ROA	1.442***	1.440***
	(8.2)	(8.1)
CEO Tenure	0.006***	0.006***
	(2.6)	(2.6)
CEO Ownership	-0.016***	-0.016***
	(-2.6)	(-2.6)
Firm, Year dummies?	Yes	Yes
Observations	11,441	11,441
R-squared	0.188	0.188

Panel C: Wealth-Performance Sensitivity

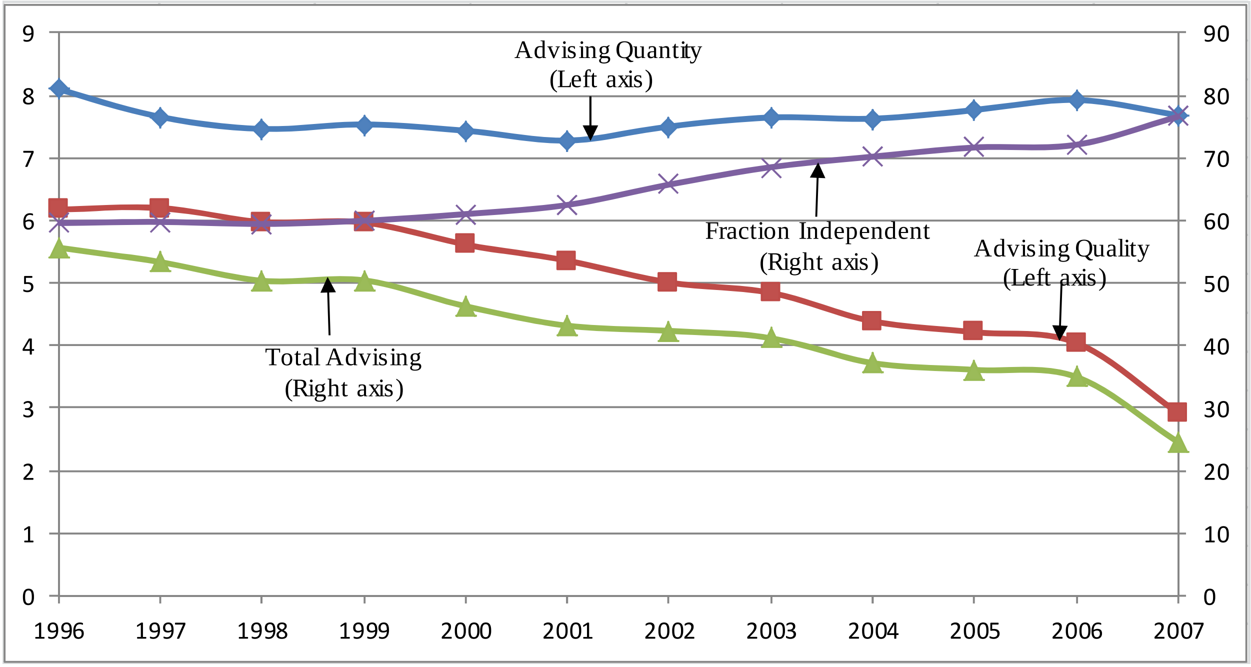
	Dependent Variable: CEO Delta	
	Advising Measure =	
	Advising Quality	Total Advising
Advising Measure	-7.505	-1.896**
	(-0.9)	(-2.0)
Firm Size	290.029***	305.471***
	(3.6)	(3.8)
Tobin's Q	434.034***	432.081***
	(8.3)	(8.3)
R&D/Assets	-2,613.427**	-2,618.042**
	(-2.0)	(-2.0)
CAPEX/Assets	892.429	876.782
	(1.3)	(1.3)
Leverage	-251.912	-253.224
	(-1.2)	(-1.2)
Firm-specific Risk	-29.975**	-30.333**
	(-2.3)	(-2.4)
CEO Tenure	71.452***	71.343***
	(7.8)	(7.8)
Firm, Year dummies?	Yes	Yes
Observations	10,834	10,834
R-squared	0.168	0.169

Figure 1: Estimating Advising Quality and Total Advising for Atwood Oceanics (ATW) in 2006



Advising Quantity is the number of outside directors on the board. It equals 5 (Irwin, John R., is only insider). *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. Total connections of outside directors of ATW (not including firm's own directors) = 7 directors on Helmerich & Payne + 8 directors on Cimarex Energy = 15. But two of these are common (non-unique) connections: Cox, Glenn A. and Rooney III, Francis L. Thus unique connections = 15 – 2 = 13, and *Advising Quality* = 13 / 5 = 2.6. *Total Advising* is the product of *Advising Quantity* and *Advising Quality* and equals 5 × 2.6 = 13.

Figure 2
Time-series Variation in Advising Measures



The figure plots the average values over time of four board characteritics. *Advising Quantity* is the number of outside directors on the board. *Advising Quality* is the per-outside-director quality, and is given by the number of unique directors to whom the outside directors on the board collectively are connected, scaled by the number of outside directors on the board. *Total Advising* is the product of *Advising Quantity* and *Advising Quality*. If a firm has none of its outsiders sitting on other boards, then both *Advising Quality* and *Total Advising* equal zero. *Fraction Independent* is the ratio of independent directors to board size.