

Distance, Information Acquisition, and Monitoring by the Board of Directors

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ABSTRACT

We use data on over 4,000 residential addresses to study the determinants and implications of geographic distance between corporate board members and headquarters. Our tests show that, after controlling for a variety of factors, directors tend to reside closer to headquarters when a firm has fewer capital-intensive assets or more intangibles. We also document that top management turnover is more sensitive to “hard” information (i.e., stock performance) when directors reside at greater distances from headquarters. In addition, board distance is unrelated to CEO cash compensation but positively related to the level and pay-to-performance sensitivity of CEO equity compensation. Thus, a board’s proximity to headquarters appears to be related to the ease with which it can obtain “soft” information and use it to monitor top management. Overall, our results shed light on how geographic distance from headquarters affects the board’s role as intermediary between the firm’s top management and its outside directors.

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Recent empirical evidence underscores the influence of geographic distance in a number of financial contexts, including venture capital (Lerner (1995)), banking (Petersen and Rajan (1994, 2002); Degryse and Ongena (2005)), equity analysis (Malloy (2005)), and investment management (Coval and Moskowitz (1999, 2001)). A general conclusion from these studies is that physical distance can hinder the acquisition of firm-specific information by market participants or market professionals. Within the context of corporate governance, finance theorists (e.g., Hermalin and Weisbach (1998); Raheja (2005); Adams and Ferreira (2007); Harris and Raviv (2008)) argue that information plays an important role in corporate directors' monitoring of top management. These two strands of the literature suggest that directors' geographic distance from headquarters could be an important dimension of governance. However, to date there has been an absence of research exploring the connection between geographic distance from headquarters and corporate directors' monitoring activities.

In this paper, we examine empirically how geographic distances between corporate directors and headquarters relate to monitoring by the board. We posit that geographic distance matters for board decision-making because certain kinds of information used in monitoring are "soft," i.e., not easily quantified or verified. As suggested by Petersen (2004), such soft information can only be obtained from personal observation or face-to-face contact with informed individuals. Moreover, soft information is not transferrable: the user of soft information must be the same individual who collects. Hence, distance will matter for board governance insofar as directors who reside farther from headquarters face a greater cost of obtaining soft information about the firm.

Our analysis uses a unique, hand-collected dataset covering 2004-2007 that details the residential locations of over 4,000 individual board members of companies that belong to the S&P 1500. We construct this dataset via a multi-stage procedure that uses information on individuals' birthdates (obtained from various public sources) to identify addresses of primary residence from the *LexisNexis Person Locator* database. Combining this information on residential locations with data on director, board, and firm characteristics, we are able to ascertain where directors lived vis-à-vis corporate headquarters during the time of their active board service. Because these data identify director locations much more precisely than county- or state-level measures, they enable us to better capture the economic implications of physical distance for the board members' role as monitors of top management.

We examine the distance from headquarters at both the individual director level and the board level and uncover several strong associations between director distance and the nature of a firm's assets. Controlling for the availability of local director talent and other firm and board characteristics, we find that directors are more likely to be located within 100 miles of headquarters when the industry is characterized by low capital intensity or high asset intangibility. This suggests that soft information collection by directors becomes critical when asset structures are not tangible enough to yield sufficient hard, decision-relevant information to the board.

We then analyze how the directors' distance from headquarters influences two major governance decisions of the board: non-routine CEO turnover and CEO compensation. Consistent with the premise that distant directors rely more heavily on hard information, we find that the sensitivity of non-routine CEO turnover to industry-adjusted stock price performance increases when the board has more distant directors. Moreover, boards with more geographically

distant directors use larger equity-based CEO compensation packages with higher levels of pay-for-performance sensitivity. We find no difference in cash-based or total CEO compensation levels based on director distance. Although we cannot rule out the possibility that the relationship between the board and the CEO is influenced by cronyism or CEO power, robustness tests provide compelling evidence that neither cronyism nor CEO power drive our results. Thus, taken together, the results for CEO turnover and compensation consistently support the premise that distant directors rely more heavily on hard information when making decisions or designing governance mechanisms and directors who reside closer to headquarters rely more heavily on soft information.

In addition to providing support for the idea that geography determines the relative use of hard and soft information by boards, the findings of our study also contribute to several other lines of research. First, we identify geographic location as a salient board characteristic that is not simply subsumed by board size or board composition. Hence, our work adds to an emerging literature that explores new aspects of board structure, including social ties among directors and CEOs (Hwang and Kim (2008)), the outside labor market for directors (Mobbs (2009), Masulis and Mobbs (2009)), or busy directors (Fich and Shivdasani (2006)). Moreover, our results reinforce recent studies that conclude that the same set of board characteristics is not optimal for all firms (e.g., Coles, Daniel, and Naveen (2008); Linck, Netter, and Yang (2008)). Second, our work complements the literature on how soft information influences corporate policy (e.g., Stein (2002); Marino and Matsusaka (2005)). Third, we extend the literature on the economic consequences of distance (e.g., Petersen and Rajan (1994, 2002); Lerner (1995); Coval and Moskowitz (1999, 2001); Degryse and Ongena (2005); Malloy (2005); Butler (2008)) to the domain of corporate governance. Fourth, we supplement studies on CEO compensation (e.g.,

Mehran (1995); Core, Holthausen, and Larcker (1999)) and CEO turnover (e.g., Weisbach (1988); Parrino (1997)) by identifying geographic distance as an important factor that helps to explain such phenomena.

In Section I, we develop the conceptual background for the study. We discuss our data collection process, sample construction, and method in Section II. Section III presents our analysis of the determinants of director and board distances from headquarters. Sections IV and V contain our analyses of CEO turnover and compensation, respectively. Section VI concludes.

I. Conceptual Development

A primary role of the board of directors is to monitor management on behalf of shareholders to obtain specific information that it can use to hire, fire, and set the compensation of top management (Fama and Jensen (1983)). As fiduciaries of shareholders, boards are charged with making decisions in an informed manner and exercising reasonable diligence in gathering and considering all material information. Indeed, recent theoretical models of board-of-director monitoring highlight the importance of information acquisition and its relation with board activity and board structure (Hermalin and Weisbach (1998); Raheja (2005); Adams and Ferreira (2007); Harris and Raviv (2008)).¹ In these models, directors obtain information that is relevant to monitoring decisions either by exerting costly effort to acquire private information or by communicating with corporate management and other insiders.

¹ Although we focus on the monitoring role of boards, Adams and Ferreira (2007) show that the acquisition and transmission of firm-specific information are also essential to the dual board roles of jointly monitoring and advising managers.

The precise manner in which a board gathers and uses information is likely to be related to the underlying nature of that information. Petersen (2004) argues that information about firms can be usefully distinguished into two types: hard information and soft information. Hard information (e.g., stock price performance) is easily quantifiable and easily transmitted across time and distance. Furthermore, its use can be separated from its collection. In contrast, soft information requires that the user be involved in the collection process. For example, an individual might only be able to obtain soft information about a firm from direct observation of the firm's operations or from face-to-face interactions with company employees.

When soft information is critical for effective monitoring by the board, outside directors need to spend more personal time talking with officers, touring the facilities, or forming impressions through personal observations. Survey evidence (Finkelstein and Moody, 2003) suggests that board-related travel imposes non-trivial costs on outside directors. This implies that the board's collection of soft information is likely to be constrained by physical distance. Physical proximity to headquarters could reduce the time costs associated with gathering soft information via on-site inspections or face-to-face meetings with executive officers. Hence, the greater is the need for a firm's directors to have timely access to soft information, the more advantageous it is for them to reside close to headquarters. In equilibrium, then, the distance from an outside director's primary residence to corporate headquarters should be a function of the general cost and difficulty of obtaining soft, firm-specific information. Accordingly, we expect that, controlling for board size, board composition, and the availability of local director talent (see Knyazeva and Knyazeva (2008)), distances between outside directors' primary residences and firm headquarters should vary systematically with the nature of the firm's assets.

The distinction between hard and soft information is also likely to govern how distance is related to one of the key monitoring decisions by boards, namely, whether and when to remove a CEO. Theoretical work (e.g., Hermalin and Weisbach (1998)) suggests that directors will use both public and private information when deciding whether to retain or dismiss top management. Numerous empirical studies suggest that hard, public information about performance (e.g., quantitative stock and accounting performance) is an important determinant for non-routine CEO turnover.² Although the findings from these studies have largely been taken to indicate the efficacy of governance mechanisms, there is a lack of empirical evidence on the relation between non-routine CEO turnover and soft information possessed by the board. Our analysis of the connection between board distance and CEO turnover provides a means for examining the role of soft information in CEO dismissal decisions. Based on the above discussion, we expect that the probability of non-routine CEO turnover will be more sensitive to hard information (i.e., stock price performance) when directors are more distant from headquarters.

Distance should also be related to the use of equity-based compensation for the CEO. A central tenet in the optimal compensation literature is that when an agent's actions are unobservable, principals should rely on costly compensation that is sensitive to observable measures of output or performance (Holmstrom (1979); Shavell (1979)). Supporting this premise, a large volume of empirical evidence indicates that the use of incentive compensation, particularly equity-based compensation tied to the hard information in stock prices, is positively associated with proxies for information asymmetry and monitoring difficulty.³ Equity-based pay

² See, e.g., Coughlan and Schmidt (1985), Warner, Watts, and Wruck (1988), Weisbach (1988), Gilson (1990), Blackwell, Brickley, and Weisbach (1994), Kaplan (1994), Borkohovich, Parrino, and Trapani (1996), Denis, Denis, and Sarin (1997), and Huson, Parrino, and Starks (2001).

³ See, e.g., Smith and Watts (1992), Gaver and Gaver (1993, 1995), Mehran (1995), Core and Guay (1999), Bryan, Hwang, and Lilien (2000), and Ryan and Wiggins (20001).

entails a compensation cost, however, and so it represents an imperfect alternative to direct discipline by the board. Thus, to the extent that a firm's directors are close to headquarters and can easily obtain useful soft information about top management, one would expect less reliance on CEO equity-based incentive plans tied to hard information. On the other hand, a firm with a board comprised of geographically distant directors should make greater use of equity-based incentives and have a correspondingly higher pay-for-performance sensitivity.

II. Data and Method

A. Sample

We first compile a list of all firms included in the S&P 1500 as of the end of 2004. To keep the costs of hand-collection of data manageable while ensuring that our sample adequately captures small, medium, and large firms, we sort the S&P 1500 firms by descending market capitalization as of December 31, 2004 and retain every third firm, starting with the largest. For each of the retained firms, we gather the full names and ages (as disclosed in proxy statements) of individuals who served on the board of directors at some point during the 2004 to 2007 period. The resulting initial sample consists of 4,354 people who served as directors at 497 firms during 2004 to 2007.

Our procedure for gathering data on directors' locations of residence consists of two stages. In the first stage, we use various publicly-available data sources to determine individuals' dates of birth. The main sources we use for this purpose are *PeopleFinders* (www.peoplefinders.com) and the Corporate Library's *Board Analyst* database. *PeopleFinders* is a keyword-searchable, online database containing information on birthdates, addresses, business

affiliations, and telephone numbers for the large majority of adult residents in the United States.⁴ *Board Analyst* is a machine-readable database that compiles proxy-statement data and sometimes includes directors' basic contact information (e.g., phone number, business address, and mailing address). In addition to using these two sources, we also rely on a number of other online sources to obtain birthdate information, including company proxy statements, insider trading filings, *Google*, *ZoomInfo*, *Wikipedia*, *NNDB.com*, *BusinessWeek.com*, and *Forbes.com*. For the large majority of the remaining individuals, we are able to obtain birthdate information. The Appendix describes in greater detail the procedures we use to obtain birthdates for a total of 4,157 U.S.-based⁵ individuals (95.5% of the initial sample).

In the second stage of data collection, we use individual birthdates to search in LexisNexis' *Person Locator* database for addresses of residence. The LexisNexis database is compiled from public and non-public sources and contains over 280 million data records pertaining to over 150 million individuals currently residing in the United States. Data records include some or all of the following information: full name, birth month, birth year, partial social security number, addresses for up to the past 30 years, dates of occupancy, phone number, and known relatives.⁶

The address data in LexisNexis offer two basic advantages for the purposes of our study. First, reported addresses include a street name and number as well as a 9-digit zip code. This level of detail enables us to construct precise measures of distance between individual directors and corporate headquarters. Second, reported addresses represent residential addresses rather

⁴ PeopleFinders is compiled from various public sources, including county courthouse records, utility company records, and over 4,300 telephone directories.

⁵ Although our analysis focuses on U.S.-based directors, we identify 110 individuals among the initial sample who resided outside of the U.S. as of December 2008. In additional robustness tests, we confirm that including these foreign directors does not change our qualitative results.

⁶ The main sources for LexisNexis's address and birthdate information include telephone directories, utility companies, driving records, county courthouse records, credit bureau header data, property tax assessment records, mortgages, deeds, bankruptcy filings, UCC filings, and the U.S. Post Office.

than business addresses. With the exception of P.O. boxes (which are reported only rarely in LexisNexis), the addresses in LexisNexis represent owner-occupied housing or apartments of residence. In contrast, other public sources for individual addresses (e.g., SEC Form 4 insider trading filings) typically report mailing or business addresses that do not necessarily indicate where a director resides.

Our empirical tests rely on being able to correctly associate directors with residential addresses that were valid at the time of active board service. In the LexisNexis database, address information is reported along with dates of occupancy. Because each address record reports a beginning date as well as an ending date (or a designation as being a “current” address), one possible approach would be to attempt to use reported occupancy dates to construct a chronological history of address changes. We do not, however, adopt such an approach because the beginning and ending dates in LexisNexis do not indicate actual relocation events with complete accuracy.⁷ Instead, in order to minimize the possibility of linking a directorship with an outdated location, we focus on the address designated as “current” by LexisNexis, and we use the move-in date for that address to conservatively establish a contiguous time interval of residence up to the present (i.e., December 2008). We also check whether individuals moved to the current address from another location within the same zip code. When the current and second-most-recent addresses share the same zip code, we use the move-in date of the earlier address to further extend the time period of known geographic location.⁸

⁷ According to LexisNexis representatives, reported beginning and ending dates for an address may lag actual relocation dates due to the fact that some public records may not be updated immediately after an individual moves. For example, there may be a delay in starting a new mail delivery service, connecting utilities, or notifying various parties (e.g., credit card companies or motor vehicle authorities) of a change of address.

⁸ Although this procedure leads to a somewhat larger sample, our main empirical results are not sensitive to expanding the sample in this manner. Moreover, since we use zip codes to construct all of our distance measures, our distance estimates for individual directors do not change.

As detailed in the Appendix, after excluding P.O. Box addresses, we have from LexisNexis a U.S. residential location (and a contiguous period of occupancy up to December 2008) for 3,922 individuals, or about 90.1% of the initial sample. Upon combining this location data with information on when a director was active during 2004-2007, we obtain an unbalanced panel consisting of 14,180 director-years of data corresponding to 497 firms. The total number of director-years does not equate to the number of person-years in the sample because individuals may hold multiple directorships in a given year.

B. Distance

The basic measure of distance that we use in the paper is the physical distance between a director and headquarters. We determine the locations of individual directors and of corporate headquarters by matching zip codes with latitudes and longitudes as reported in the U.S. Census Bureau's Gazetteer Files (2000 version). Following previous work on geography and distance (e.g., Coval and Moskowitz (1999)) we compute distances as geodesic distances between two points on the Earth's surface.⁹

Most of the subsequent analysis requires firm-level measures of distance that capture the overall tendency for a particular board of directors (or a subset of a board) to be located close to headquarters. We construct these firm-level distance measures as means or medians of director-level distance measures. In aggregating these individual measures, we exclude firm-years in

⁹ Specifically, we compute distance according to the standard formula based on the spherical law of cosines, which approximates the shortest distance between two locations on the Earth's surface as the great-circle distance between points on a sphere:

Distance_{a,b} = $r \times \arccos[\sin(a_{lat})\sin(b_{lat}) + \cos(a_{lat})\cos(b_{lat})\cos(a_{long} - b_{long})]$
 where r is the Earth's approximate radius (3,963 miles) and where a_{lat} , a_{long} , b_{lat} , and b_{long} are the latitudes and longitudes of the two points (in radians).

which location data are available for fewer than fifty percent of board members.¹⁰ Imposing such a cutoff ensures that undue influence is not given to firms for which only sparse information on director locations is available.

Table 1 reports descriptive statistics for our director-level and board-level distance measures. As shown in Panel A, the average distance between directors and headquarters in our sample is 513 miles, and the median distance from headquarters is 165 miles. The large degree of skewness prompts us to use the log of one plus distance in our empirical tests. Distances exhibit considerable cross-sectional variation (the standard deviation for the overall sample is 675 miles; the coefficient of variation is 1.32). The average distance has risen steadily over the sample period, perhaps reflecting improvements in communications technology or firms' increasing need to look for qualified directors outside of local labor markets. Panel B shows summary statistics for distances measured at the firm level. As expected, inside directors tend to be located in close proximity to headquarters: for the median firm, insiders on average reside only 15 miles away (compared to an average of 516 miles for outside directors). Likewise, the typical CEO resides less than 13 miles from headquarters. Somewhat surprisingly, however, the average CEO-to-headquarters distance in our sample is more than 200 miles, suggesting that a non-negligible fraction of CEOs commute long distances or work remotely.¹¹ For the median firm, slightly less than half of the directors live within 100 miles of headquarters, and fewer than 10 percent of firms have at least four-fifths of board members residing within 50 miles.

¹⁰ Although this cutoff level is arbitrary, we have verified that our main qualitative results are similar when we do not exclude firm-years according to this criterion.

¹¹ For instance, Gary Rodkin, CEO of ConAgra Foods, commutes from his home in Greenwich, Connecticut to corporate headquarters in Omaha, Nebraska (see "The Commuter CEO", *Wall Street Journal*, May 22, 2006).

C. Firm, Board, and CEO Characteristics

Based on the theoretical discussion in Section I, the location of board members relative to corporate headquarters can be understood in terms of two information-related considerations. On the one hand, firms will seek to obtain director talent that is well-suited to the specialized monitoring and advisory needs within the organization. If the requisite director talent is scarce in local labor markets, a firm may choose to appoint directors from more remote geographic regions. On the other hand, the fundamental nature of a firm's assets and investment opportunities can affect the type of information (i.e., hard or soft) that is most useful to directors in monitoring the firm and the top management team. When hard information is not readily available, access to soft information becomes critical for effective monitoring by the board, and hence there is a greater cost to having directors located far from headquarters. In view of these considerations, the proximity of a firm's board to corporate headquarters should be systematically related to (1) the depth of the local labor market for directors and (2) how easily directors can acquire hard, firm-specific information that is relevant to their decision-making.

To measure the depth of the director labor market for a given firm, we use the geodesic distance between the firm's headquarters and the center of the nearest large Metropolitan Statistical Area (MSA) in the United States. Urban areas with large populations not only offer more individuals who are willing and able to serve as directors, but they also contain a greater number of firms, universities, and non-profit organizations from which to draw specialized director expertise (see, e.g., Knyazeva and Knyazeva (2008)) We define an MSA to be large if it was included among the top fifty most populous MSAs according to the U.S. Census 2000. Because some MSAs encompass many zip codes, we compute an effective center for each MSA by averaging together the latitudes and longitudes across all zip codes within the MSA.

We use two distinct variables to proxy for the ease with which directors can gather hard, decision-relevant information. First, we include in our regressions a variable related to the capital intensity of a firm's assets. Specifically, we calculate the three-year average ratio of net property, plant, and equipment (net PP&E) to total assets. Net PP&E (Compustat Item 8) includes land, buildings, motor vehicles, office equipment, and computers. Because these components of a firm's asset structure are fixed assets designed to be used for over one year, they are generally stable and cannot be easily liquidated. Hence, firms with high ratios of Net PP&E to total assets are likely to give rise to larger amounts of hard, quantifiable information regarding productive capacity, asset efficiency, and overall firm performance. We use net PP&E rather than gross PP&E because the latter overstates the importance of capital assets that were purchased in the distant past and that are possibly even no longer in service.

Our second measure captures another aspect of a firm's asset structure, namely, the degree of asset tangibility. We compute the three-year average ratio of a firm's other intangible assets (Compustat Item 352) to the total book value of assets. Although it excludes goodwill, this variable includes blueprints, copyrights, patents and trademarks, licenses, and operating rights. By definition, intangible assets are non-monetary assets that lack physical substance, cannot be seen or touched, and cannot be easily evaluated. Therefore, the presence of intangibles in a firm's asset structure is likely to increase the importance of acquiring soft information by directors. Note that intangible assets are not simply the complement of PP&E: the latter includes some classes of fixed intangible assets (e.g., computer software or mineral exploration rights).

In addition to the main explanatory variables described above, we use several firm-level variables to control for other possible determinants of distance. From Compustat, we gather information on a firm's total book value of assets, equity market value, firm age (i.e., the number

of years from initial founding), and number of employees. These four measures of the scope and complexity of operations may be related to a firm's need to search for director talent outside of its local geography. We also obtain Compustat data on long-term debt and free cash flow and scale these measures by total book value of assets. The two variables serve to capture a firm's financial risk and potential agency problems, thereby controlling for distance effects related to the ostensible need for board monitoring.

We also use a number of variables that control for heterogeneity in board structures and CEO characteristics. For each firm in our sample, we obtain data from *Board Analyst* on the firm's board size and composition, the age and tenure of the CEO and of other board members, and whether or not a non-CEO serves as board chairman. In addition, we determine from *Board Analyst* whether or not each CEO was a founder of the firm or a member of the founding family.

Table 2 reports summary statistics for our main explanatory variables of interest as well as for the various controls related to firm, board, and CEO characteristics. Sample firms have total assets of \$25.18 billion on average and \$2.0 billion at the median. Although most firms are headquartered close to a top-50 MSA, the distance varies considerably (the average distance is 39 miles, and the standard deviation is 190 miles). The median board has nine directors. Most board members in the sample do not work as firm employees: the average board has about 83% outside directors, and the median board has more than 85% outsiders. On average, the typical (i.e., median) director is about 63 years of age and has served on the board for close to nine years. CEOs tend to be younger than other directors, but they typically have served on the board longer. Slightly more than one-third of the observations have a non-CEO chairman, and about six percent of firms have a CEO who belongs to the founding family.

III. Determinants of Distance

A. *Distance, Firm Size, and Board Size*

As a prelude to our analysis of how board geography depends on the importance of obtaining soft information, we first examine whether a simpler alternative story can explain observed patterns in distances. Specifically, consider the possibility that directors' information acquisition costs do play any role at all in a firm's choice of board members and that directors are instead chosen solely to minimize labor search costs and fulfill the need for certain types of board talent. Under this scenario, firms that grow over time would require additional, specialized board expertise that cannot be found in local labor markets, implying that distances should exhibit a univariate and increasing relation with firm size and board size.

Table 3 reports univariate summary statistics, by firm size and by board size, for two board-level measures of distance: the median distance of outside directors to headquarters (in miles) and the fraction of outside directors within 100 miles of headquarters. From the table, it is clear that median distances vary widely within each firm size quintile or board size category. For example, among firms in the bottom quintile of total assets, the standard deviation in median distances is 602.1 miles, which exceeds both the mean and the median of the distribution. As is to be expected, standard deviations generally decline with increasing board size or increasing firm size (which is highly correlated with board size). Notably, however, the central tendency of median distances does not appear to be related to firm size or board size in any obvious way. Likewise, the mean fraction of outside directors residing within 100 miles of headquarters appears to be largely unrelated to firm size and board size, varying only within a small range of 0.49 to 0.51 across all of the size strata. Overall, then, there is little to indicate that distance to

headquarters is merely a function of firm size or board size, and we conclude that there are likely to be other factors at play besides labor search costs and scarcity of director talent.

Anecdotal evidence provides a further indication that the distance between outside directors and headquarters is not simply a proxy for firm size or board size. Consider, for example, a comparison of two firms in our sample: the Ryland Group, Inc. and Avery Dennison Corporation. The two firms share a number of similarities in terms of firm size, board structure, and headquarters location. Both firms are Fortune 500 companies listed on the NYSE. Both firms are headquartered in Southern California: Ryland Group is based in Calabasas, approximately 20 miles northwest of downtown Los Angeles, while Avery Dennison is headquartered in Pasadena, about 10 miles northeast of downtown Los Angeles. In 2007, both firms had moderate-sized boards consisting of 10 directors (of which 9 were outside directors). As of year-end 2007, Ryland had total assets of \$3.42 billion, and Avery Dennison had \$4.29 billion in total assets.

Despite their similarities, the two firms differ dramatically in terms of where their boards are located relative to headquarters. For instance, in 2007 the median distance between Ryland's outside board members and corporate headquarters was 871.21 miles. In contrast, the median distance to headquarters of Avery Dennison's outside directors in 2007 was 48.53 miles. Given that the two firms' boards were identical with regards to size and outsider representation, what accounts for the striking difference in board distances? One clue is offered by the fact that the two firms operate in very different industries and thus have very different asset structures. Ryland Group, a homebuilder and provider of financial services related to home buying, obtains most of its revenues from the sale of completed homes. The bulk of Ryland's assets consist of housing inventories; only a negligible amount of its assets are intangibles. In contrast, Avery Dennison produces a wide variety of specialized labels and pressure-sensitive materials for use

in office products, durable goods, and industrial applications. The firm depends heavily on basic research and innovation to develop new products, patents, and intellectual property. Thus, not surprisingly, about twenty percent of Avery Dennison's total assets consist of intangibles.

This anecdotal comparison, while simple, suggests that distances between directors and headquarters do not simply capture other, well-studied aspects of board structure (i.e., board size or board composition). Instead, board distances seem to exhibit meaningful independent variation, and this variation may be related to differences in the specific nature of firms' asset structures or investment opportunities. Accordingly, in the next section we turn to a multivariate analysis that explores the linkage between board distances and asset structures after controlling for board size, board composition, and other salient board, CEO, and firm characteristics.

B. Multivariate Analysis of the Determinants of Distance

In our multivariate analysis of the determinants of distance, we use two financial ratios to proxy for the relative importance of soft information in directors' information-gathering activities: asset capital intensity (the ratio of Net PP&E to total assets) and asset intangibility (the ratio of other intangibles to total assets). To mitigate the effect of idiosyncratic accounting distortions that arise from firm-level discretion, we compute averages of these ratios over the prior three years.¹² The regressions also include the log of the distance between headquarters and the closest large (top 50) MSA to capture the depth of a firm's nearby labor market and a dummy variable that indicates whether the CEO resides within 50 miles of headquarters. We also control for a variety of other firm, CEO, and board characteristics including firm age, firm size, NYSE or Nasdaq listing, leverage, unaffiliated block ownership, free cash flow, board size, board

¹² In untabulated regressions, we have confirmed that our main qualitative results hold if we use 3-digit SIC industry median ratios instead of firm-specific ratios.

composition, directors' ages and tenures, whether the CEO founded the firm, and whether a non-CEO director chairs the board.

Table 4 shows the results of our multivariate probit analysis of the distances between individual directors and their firms' headquarters. The dependent variable in each regression is a binary variable equal to one if a particular director resides more than 100 miles from corporate headquarters. The first four regressions use the entire sample of non-CEO board members, and include a dummy variable to indicate whether a board member is an outside director. The last four regressions use the smaller subsample of board members who are outside directors. Each regression also includes year dummies as well as dummies that capture the 48 Fama-French industry classifications (Fama and French (1997)). To avoid problems associated with unobserved firm effects, we use robust standard errors with clustering at the firm level.

The base specification in Column (1) provides some first evidence that geographic distance is a potentially important factor in the choice of non-CEO directors. The regression shows that the probability a non-CEO director is located far from headquarters is increasing in the distance between headquarters and the nearest large (top 50) MSA. The estimated marginal effect of 0.037 is highly statistically significant (z -statistic = 3.93). Furthermore, the probability a non-CEO board member is far away from headquarters is increasing in firm size, board size, and the fraction of board outsiders (the respective estimated effects have z -statistics of 2.92, 2.21, and 2.83). Taken together, these results suggest that when firms face a scarcity of requisite director talent in local labor markets, they turn to more distant labor markets for outside director talent as their operations and boards grow in size.

In Columns (2) and (3) of Table 4, we introduce the two financial ratios into the regression as explanatory variables. We include each ratio in a separately-estimated regression in

order to avoid the problem of attenuation due to excessive multicollinearity. The regressions provide consistent evidence to suggest that individual non-CEO director geography depends on the relative availability of soft information. The marginal effect on the 3-year average of capital intensity is 0.262 (z-statistic = 2.41), implying that a 0.10 increase in the ratio of PP&E to total assets is associated with an approximately 2.6% increase in a director's probability of residing far from headquarters. The marginal effect on the 3-year average of asset intangibility is significant and negative (z-statistic = -2.35), in line with the view that directors are more likely to reside near headquarters when hard information is relatively unavailable.

Among the other control variables, the CEO characteristics do not enter significantly into the regression. However, across all regressions the log of director age has a positive and significant estimated marginal effect, and the log of director tenure has a negative and highly significant marginal effect. These results are also consistent with an explanation based on scarce director talent. Older directors may have more established reputations and specialized skill sets, and hence they may be more heavily sought out by geographically distant firms. Long-tenured board members are likely to be individuals who were added to the board at an early stage in a company's history—before there was a need to seek out qualified directors in more distant labor markets. We also find that, in most specifications, the log of stock ownership by unaffiliated block holders is positive and significant at conventional levels. This suggests that, when blockholders have the capability and incentives to perform a monitoring role, they can serve as a substitute governance mechanism when directors' soft information acquisition is costly.

Columns (4) through (6) show that the main qualitative results are similar when we include only outside directors. There is no change in the signs and significance levels on our key explanatory variables, and the estimated marginal effects are similar in magnitude. Among the

control variables, the log of director age has qualitatively different estimates: the estimated marginal effects are no longer significant at the 5 percent level. However, the estimates for the other control variables are mostly unchanged. Given that our results are broadly similar whether we consider non-CEO directors or outside directors, throughout the rest of the analysis we focus on distance measures for the subset of outside directors.

To further examine how geographic distance varies with directors' information acquisition costs, we estimate regressions at the level of the firm-year. If individual director distances depend in equilibrium on a firm's asset structure, growth opportunities, and access to local labor markets, then the overall distance of a board to headquarters should be shaped by these factors as well. In these pooled OLS regressions, the dependent variable equals a board's median log distance between outside directors and headquarters. To ensure that our results do not result from outliers, we include only firm-years in which distance can be calculated for at least half of all board members. Most of the control variables are the same as those used in Table 4, except that we can no longer control for individual director age and director tenure.

The results of these firm-level regressions appear in Table 5. The log of distance between headquarters and the closest large MSA is again significant at the 5 percent level, further supporting the view that scarcity in the director labor market drives remotely-located firms to look farther afield for board members. In Columns (2) and (3), both proxies for the importance of soft information are again significant, and their signs are consistent with the view that directors' costs of acquiring hard and soft information are a key driver of board location. Most of the control variables have the same signs and significance levels as in the individual-director regressions in Columns (5) and (6) of Table 4. The exception is that CEO tenure is now negative and significant at the five percent level, suggesting indirectly that long-tenured CEOs may be

able to influence the geographic composition of the board over time to bring them into closer proximity. It is important to note, however, that CEO influence over board geography per se cannot explain the relation between board distance and our proxies for the costs of soft information acquisition. We further explore the possibility that CEOs wield influence over board geography in additional tests in Sections IV and V.

IV. Board Distance and CEO Turnover

The evidence in Section III suggests that distance between a firm's board and its headquarters is closely tied to the relative availability of hard and soft information about the firm. In this section, we provide further evidence on the connection between board distance and information by examining how distance affects the probability of CEO turnover. Of the various actions that boards undertake, the hiring and dismissal of top management are arguably among the most important since they have potentially long-term and far-ranging implications for a firm. To the extent that directors use both hard and soft information in assessing the ability and performance of top management, geography should matter for dismissal decisions. For instance, directors living close to headquarters can readily obtain soft information about the CEO in a variety of ways, including meeting with employees on the company property, forming impressions by personal observation, or perhaps interacting in a social setting with the CEO himself. In contrast, directors who live far from headquarters cannot easily obtain soft information on a regular basis because their observations and face-to-face interactions with key firm employees will be limited. Consequently, we expect directors who are geographically distant to rely mainly on hard, objective information (i.e., stock returns) when assessing CEO ability and performance.

To carry out the empirical tests, we first identify instances of CEO turnover that are likely to have involved discipline by the board. Because newly-hired top management may not be subject to normal disciplinary mechanisms, we restrict attention to firm-years in which a CEO has been in place for two years or more. For each firm-year, we check proxy statements to determine whether the individual who was CEO at the end of the prior fiscal year is still CEO at the end of the current fiscal year. We use Standard and Poor's *Register of Corporations, Directors, and Officers* to verify departure events. Next, following Denis, Denis, and Sarin (1997), we attempt to determine from news stories and press releases whether CEO turnover events were routine or non-routine. Specifically, we classify a turnover as routine if (1) the departure involved a health-related reason (i.e., death or illness); or (2) the stated reason for the departure was normal retirement or succession and the individual was between 64 and 66 years old. All other cases of CEO departure are considered to be non-routine.¹³

Over the sample period, there are 133 non-routine CEO turnover events representing an annual turnover frequency of about 7.9%. This is higher than the 5.9% turnover frequency documented in Denis, Denis, and Sarin (1997), but it is roughly comparable to the 7.7% annual rate of turnover found by Weisbach (1988) and the 9.3% annual rate documented by Denis and Denis (1995). The turnover frequency fluctuates somewhat across the sample years, equaling 5.8%, 8.6%, 10.5%, and 6.6% in 2004, 2005, 2006, and 2007, respectively.

Table 6 shows the results of probit models that estimate probabilities of non-routine turnover based on industry-adjusted stock performance, board distance, and board composition. The dependent variable in these regressions equals one if a firm experiences a non-routine CEO turnover in a given fiscal year, and zero otherwise. The industry-adjusted stock return is denoted

¹³ Our main qualitative results are robust to using the more stringent procedure described in Parrino (1997) to identify forced turnover events from news articles.

by *ADJ_RET*, and it is calculated as the firm's raw annual stock return over the fiscal year minus the median contemporaneous stock return among all firms in the same SIC 3-digit industry. The regressions include as controls the natural log of total assets and the ratio of free cash flow to total assets. In addition, each regression controls for board size, whether the board has a non-CEO director, the extent of unaffiliated block shareholders, and CEO characteristics (age, tenure, foundership status, and proximity to headquarters). To account for time series dependence due to unobserved firm effects, we compute robust standard errors that are clustered at the firm level.

Column (1) of Table 6 shows that, as expected, the probability of non-routine turnover is negatively related to industry-adjusted stock performance. The estimated marginal effect for *ADJ_RET* is -0.046 (t-statistic = -2.14). Among the other variables, only the log of unaffiliated block ownership enters significantly into the regression. The positive estimated marginal effect on this variable (t-statistic = 1.90) is consistent with the view that unaffiliated blockholders help to support the board's use of dismissal as a disciplinary device for top management.

In column (2), we add to the regression *DISTANT*, a binary variable equal to one if the physical distance between a particular firm's board and headquarters is above the sample median distance. As in Section II, we compute board-level distance as the median distance across individual outside directors, and we exclude a firm-year if location cannot be ascertained for at least half of the board's directors. Contrary to the view that directors who reside closer to headquarters (and, presumably, closer to the CEO) are more reluctant to dismiss top management on average, the estimated marginal effect for *DISTANT* is negative and significant at the 5 percent level. The magnitude of the point estimate indicates that, *ceteris paribus*, the annual probability of non-routine CEO turnover is about two and a half percentage points higher when the board is close to headquarters. However, this finding by itself does not establish whether

being close to headquarters influences directors to weight certain performance measures more or less heavily when evaluating the CEO.

To examine how directors' geographic distance affects the sensitivity of non-routine turnover to stock price performance, we introduce a variable equal to the interaction between *DISTANT* and *ADJ_RET*. The regression results, reported in column (3) of Table 6, show that turnover is more sensitive to stock performance when outside board members are more physically remote from headquarters. Indeed, the estimated marginal effect on the interaction is negative and significant at the one percent level (t-statistic = -2.84). This result provides our central finding on the linkage between turnover sensitivity and board distance. It is consistent with the idea that large geographic distances make it difficult for outside directors to acquire soft information, thereby influencing them to rely more heavily on hard information (i.e., stock price performance) in evaluating top management.

One might wonder whether the association between *DISTANT* and the probability of CEO turnover is simply a statistical relation arising from the fact that different firms have differing degrees of board independence. To be sure, board independence has been shown in previous studies (e.g., Weisbach (1988)) to affect the stock-return sensitivity of CEO turnover. We examine this issue by defining a binary variable, *OUTSIDE*, equal to one if at least 75% of a firm's board members in a given year are outside directors.

In column (4) of Table 6, we exclude the distance variables but include *OUTSIDE* as well as its interaction with stock performance. The regression results show that neither *OUTSIDE* nor its interaction has a statistically significant effect on the turnover probability.¹⁴ Furthermore, as

¹⁴ The insignificance of the interaction variable involving *OUTSIDE* stands in contrast to the finding of Weisbach (1988) that forced CEO turnover is more sensitive to performance when a firm's board is dominated by outsiders. Perhaps the most straightforward explanation for the difference in results is that the nature of CEO discipline and

column (5) shows, when *DISTANT*, *OUTSIDE*, and their respective interactions are all included in the regression, *OUTSIDE* and its interaction continue to be insignificant. But the estimates for *DISTANT* and its interaction are significant and virtually identical to those in column (3). These results suggest that geographic distance, not independence, is the key aspect of board structure in our regressions that affects the likelihood and sensitivity of non-routine CEO turnover.

To gauge the economic significance of the effects of board distance, we can calculate probabilities of CEO turnover implied by the probit model estimates in Column (5) of Table 6. In these calculations, we set *DISTANT* equal to zero or one and consider a change in the industry-adjusted performance measure as all other independent variables (including year and industry dummies) are held at their sample means. The results of these calculations indicate that board distance has an economically meaningful effect on CEO turnover sensitivity. For example, when boards are far from headquarters (*DISTANT* = 1), a change in the industry-adjusted stock return from the 25th percentile to the 75th percentile is associated with a reduction in the implied annual turnover probability by more than half (from 5.3% to 2.1%). In contrast, when board distances are short (*DISTANT* = 0), turnover is relatively insensitive to performance: a change in adjusted stock return from the 25th to the 75th percentile causes the implied turnover probability to drop from 6.8% to 6.7%. Taken together, these facts support the view that geographic distance affects how much directors rely on hard information in making their dismissal decisions.

The regressions in Table 6 suggest that the CEO dismissal decisions of distant boards are more sensitive to stock performance than are the dismissal decisions of close boards. However, the regressions do not reveal whether this result is driven by dismissals following good stock performance or dismissals following poor stock performance. Based on the information-

CEO turnover changed fundamentally between the sample period covered by Weisbach's study and the sample period considered here (2004-2007).

gathering story outlined in Section I, distant boards rely more heavily on stock prices because physical distance increases the difficulty of obtaining soft information. The constraint that distance places on soft information acquisition applies to both favorable and unfavorable information. Thus, if the information-gathering story is true, then distant boards, compared to close boards, should be more responsive to poor stock performance and also more responsive to good stock performance.¹⁵

Table 7 shows the results of probit regressions designed to test this implication. In column (1), we report a regression similar to that in column (5) of Table 6 except that $DISTANT*ADJ_RET$ is replaced by the interaction $DISTANT*\min[0,ADJ_RET]$. This interaction captures the marginal effect of poor (i.e., negative) stock performance at firms with distant boards. As expected, the interaction has a negative and significant estimate (t-statistic = -2.28), indicating that a distant board responds more to poor stock performance compared to that of a close board. When we use instead the interaction $DISTANT*\max[0,ADJ_RET]$ in column (2), we see that this interaction also has a negative and significant coefficient, suggesting that the higher sensitivity associated with greater physical distance is not limited to the case of poor stock performance. Furthermore, when both interactions involving $DISTANT$ are included in column (3), they are each negative and statistically significant at 5 percent, as is $DISTANT$ itself. Thus, boards that are geographically farther from headquarters place more emphasis on hard measures of performance (good as well as bad performance), yet they are less willing overall to dismiss the

¹⁵ If distant boards exhibit a heightened sensitivity to only one type of stock price information (e.g., poor stock performance), then other explanations would seem to be more plausible. For example, one such explanation is that of “cronism” between CEOs and outside directors. Suppose that residing close to headquarters makes outside directors more susceptible to being influenced by top management (whether because of greater personal familiarity with the CEO, fear of direct reprisal, the desire to avoid stigma within the local business community, et cetera). In this case, distant directors, being relatively free of the CEO’s influence, would be more willing to dismiss the CEO after poor stock price performance.

CEO. These findings together provide additional support in favor of the information-gathering story as opposed to other explanations.

The CEO turnover results are robust to data availability (the percentage of directors on a board for whom residence is known), and a number of empirical issues. These include using average log distance rather than median log distance, measuring stock performance as market-adjusted performance, including foreign directors, and excluding financial companies.

V. Board Distance and CEO Compensation

In this section, we examine the relation between board distance and the structure of CEO compensation. The literature on executive compensation argues that CEO pay schemes, particularly equity-based pay, provide a mechanism that may effectively substitute for board monitoring and other governance mechanisms. In addition, research has documented that the use of managerial compensation is associated with a firm's growth opportunities (Smith and Watts (1992)), which is consistent with the idea that incentive schemes are particularly useful when it is difficult to obtain soft information about a firm. It follows, therefore, that geographic distance may be directly related to the usefulness of stock-based incentives. When directors are geographically close to headquarters, they have ready access to soft information, and hence the use of equity incentives is not as critical. But when directors are distant from headquarters, the costs of soft information are prohibitive, and thus the firm may find it optimal to provide strong stock-based incentives despite the associated compensation costs borne by shareholders.

If distance is related to the costs of acquiring soft information (as seems to be the case based on our empirical results in Sections III and IV), then we expect that board geography can affect CEO compensation in two ways. First, we expect a geographically distant board to rely

more heavily on equity-based compensation components, such as option grants and restricted stock grants. Second, being in close proximity to board members might enhance a CEO's influence over the pay-setting process itself, allowing him to directly or indirectly extract higher levels of compensation. These two possibilities motivate us to explore how board distance affects the total amount of CEO pay, the fraction of pay coming from equity-based components, and the pay-to-performance sensitivity of CEO compensation.

Our main source of data on CEO compensation is the S&P ExecuComp database. Data on the various compensation components are available for most companies in our sample. However, data are missing in a small number of firm-years, and so for these cases we try to supplement the ExecuComp data with data from proxy statements (where available). For our empirical tests, we match each fiscal year's compensation data with the distance and structure of the board that was most recently elected. This ensures that, for most cases, a board was in place for nearly one year before the end of the fiscal year over which compensation was granted.

A. Distance and Compensation Levels

We estimate multivariate regressions in which the dependent variable is the level of total CEO pay or the level of one of the two major pay components, namely, cash-based pay or equity-based pay. Following much of the literature on executive compensation, we define cash-based pay to be the sum of salary and bonus. Equity-based pay is defined as the sum of the values of option grants and restricted stock grants. To value option grants, we use a Black-Scholes approach, modified for dividend payouts. We value restricted stock grants based on the stock price at the close of the fiscal year. Total pay equals the sum of all reported compensation elements, including cash-based pay, equity-based pay, LTIP payouts, and other compensation.

As with the analysis of Section IV, the primary explanatory variable of interest in our regressions is the median log distance from headquarters, computed across all outside directors on a board. In our regressions, we also include controls for industry-adjusted stock performance (*ADJ_RET*), firm size, firm age, volatility, ownership by unaffiliated blockholders, board characteristics (size, composition, and the presence of a non-CEO chairman) and CEO characteristics (age, tenure, distance from headquarters, and founder status). We also control for firm and industry effects.

Table 8 reports the regression results. The OLS regressions in columns (1) and (2) show that board distance is largely unrelated to either total pay or cash-based pay. In the regression of total pay, the coefficient on the board distance variable is 0.031, which is not significantly different from zero (t-statistic = 1.20). Likewise, in the regression of cash-based pay, the coefficient is negative but insignificant, both economically and statistically. Among the control variables, the log of total assets has a positive and highly significant coefficient in the total pay and cash-based pay regressions (t-statistic = 9.14 and 7.08, respectively), which is consistent with the common finding in the literature that firm size is the chief determinant of CEO pay levels.

Column (3) shows the results for equity-based pay. We use a tobit specification to account for the fact that some CEOs receive zero equity-based grants in a given firm-year. From the coefficient estimates, it is apparent that distance has a strikingly different association with equity compensation than it does with cash or total compensation. The estimated coefficient on the distance variable is positive and significant at better than the 1 percent level (t-statistic = 3.31). This finding supports the notion that stock-based compensation increases in importance when soft information collection by the board is hampered by large geographic distances.

B. Distance and Pay-Performance Sensitivity

To further examine the degree to which CEO pay is tied to hard information, we focus on the intensity of incentives provided by grants of options and restricted stock. Because options and restricted stock are tied directly to hard information (i.e., the stock price) and their contract terms are known in advance, they represent a source of incentives that are publicly observable at the time of the grant. Hence, we follow the recent compensation literature and quantify the *ex ante* incentives provided by these compensation elements rather than the *ex post* revaluations of options and shares.

We use two measures of the intensity of the CEO's incentive-based pay. First, we use the fraction of total pay value derived from option grants (or, alternatively, grants of options plus grants of restricted stock). Second, following much of the literature on pay-performance sensitivity, we use the sensitivity of grant values to a 1% change in the underlying stock price. To construct the latter measure, we adopt the approach of Yermack (1995) and calculate, for each individual option, the derivative of the option's Black-Scholes value (modified for dividends) with respect to the stock price. This is then multiplied by 0.01 times the stock price at fiscal year-end, yielding a measure of the individual option's sensitivity to a 1% change in stock price. For a restricted share, the sensitivity is simply set equal to 0.01 times the stock price at fiscal year-end. Aggregating the individual sensitivities across all options (or equity securities) granted during the fiscal year, we obtain an overall sensitivity for a CEO's grant for the year.

Table 9 shows the results of regressions that examine how board distance relates to the relative importance of equity-based compensation and its pay-performance sensitivity. In columns (1) and (2), we estimate regressions to explain the fraction of total pay that consists of

options (or of options plus restricted stock) in terms of outside directors' median log distance to headquarters. For these regressions, we use the fractional logit model (Papke and Wooldridge (1996)) to account for the fact that the dependent variable lies between 0 and 1 and often takes on the boundary values. The results of both regressions show that distance is positively and (highly) significantly related to the fractions of option-based and equity-based pay, which suggests again that boards rely more heavily on stock-based incentives when soft information is difficult to obtain.

Among the control variables, the log of total assets has a positive and significant estimate, which is in line with the finding in Table 8 that firm size has a larger effect on the level of equity-based pay compared to the level of cash-based pay. The only other control variable that is significant in both regressions is the log of CEO age. The negative coefficient estimate indicates perhaps that boards tilt the mix of compensation away from options and shares for older CEOs because such CEOs already have powerful equity-based incentives in the form of shareholdings that have been built up over time.

Columns (3) and (4) report the results of tobit regressions that explore the effect of distance on the pay-performance sensitivity of option-based pay and equity-based pay. Because boards may use option and equity grants to re-optimize equity incentives or move toward a target level of overall incentives, it is important to account in our regressions for the incentives arising from the CEO's previously-granted options and shares. Hence, we add a control variable equal to the approximate sensitivity of the CEO's share and option portfolio (see Core and Guay (2002) for details on this approach). The regressions show that board distance is positively and significantly related to both the option-grant sensitivity and the equity-grant sensitivity. Thus, the

results again support the notion that geographically distant boards rely heavily on equity-based pay to provide CEOs with incentives tied to hard information.

C. Alternative Explanations

We now investigate several other potential explanations for our results in Tables 8 and 9. First, consider the possibility that directors' geographic locations in fact depend endogenously on the structure of the CEO's compensation. For example, suppose that firms with poor corporate governance tend to make inadequate use of equity-based compensation. To the extent that CEOs at such firms do not maximize shareholder value and are able to influence the structure of the board,¹⁶ they may choose directors who are geographically close to headquarters and easily controlled. As a result, our multivariate regressions might exhibit a spurious positive relation between distance and pay-performance sensitivity. In order to shed light on the plausibility of this explanation, we estimate our tests on pay composition and pay-performance sensitivity in Table 9, except that we compute the distance measure using only those directors whose tenures on the board exceed that of the CEO. Such directors are "non-coopted" (Coles, Daniel, and Naveen (2008)), and thus their geographic locations are unlikely to be the outcome of any influence the CEO might wield over the director nomination process. Table 10 shows that the main results are largely unchanged: the median log distance continues to be positively and significantly related to the fractions of pay deriving from option and equity grants. Moreover, distance is again positively and significantly related to the pay-performance sensitivities of both

¹⁶ Shivdasani and Yermack (1999) document evidence that CEOs may be able to mold the structure of the board by influencing the director nomination process. Hermalin and Weisbach (1998) argue theoretically that the CEO may gain bargaining power vis-à-vis the board over time and thus be able to affect the board's structure and degree of independence.

types of grants. We therefore conclude that selection of board members by the CEO is not able to explain our key results.

Another possibility is that CEOs wield influence over their pay simply by being in close geographic proximity to other directors. A recent strand of the literature argues that CEOs are able to extract excess levels of compensation due to their entrenched and powerful positions within the firm (Bebchuk and Fried (2005)). If geographic proximity enhances the CEO's power over other board members, we would expect to see an inverse relation between pay levels and board distance. Note that such an effect could arise even if directors are non-coopted, i.e., were appointed to the board prior to the CEO. The evidence in Table 8, however, already suggests that this type of overt CEO influence is not likely to be important in our sample. Indeed, as shown in columns (1) and (2), neither total pay nor cash-based pay is significantly related to our measure of board distance. Furthermore, the estimated coefficients on the variable capturing the CEO's distance from headquarters indicate that physically proximate CEOs do not receive conspicuously higher levels of total or cash-based pay.

A third possibility is that CEOs who are geographically close to other board members—whether these members are co-opted or not—might be able to alter more subtle aspects of their compensation. The literature on contract theory and CEO pay-performance sensitivity implies that, holding pay levels constant, risk-averse CEOs prefer lower pay-performance sensitivity (Aggarwal and Samwick (1999)). Thus, a CEO who is geographically close to other board members might seek to use his influence to cause a shift in the composition of his pay towards cash-based elements and away from options and restricted stock. To examine whether such a story could explain the findings of Table 9, we replicate our regressions for the subsample of independent outside directors who do not serve on the compensation committee. The results,

shown in Table 11, indicate that our measures of pay-performance sensitivity and equity-based pay fractions continue to be positively and significantly related to director distance.

Finally, it could be the case that other economic factors, such as changing business conditions, cause director distances and pay packages to be simultaneously and endogenously determined. For example, a national economic boom could give rise to a tight labor market, resulting in a greater use of option-based compensation for retaining key employees (Kedia and Rajgopal (2009)). At the same time, local directors might benefit from additional employment opportunities elsewhere, causing them to relocate to more distant labor markets. If such an effect were driving our results, we would not expect director distances and options usage to exhibit a multivariate relation for the subsample of “non-movers,” i.e., those directors who did not relocate at all over the entire sample period. In untabulated regressions, we find that our key qualitative conclusions continue to hold for the subsample of non-movers.

VI. Conclusions

This paper builds on the insight of Petersen (2004) that firm-specific information can be categorized as “hard” or “soft” and that the latter type can only be obtained through personal observation or face-to-face interactions. The constraints that physical distance places on soft information acquisition suggest that a consideration of board geography is necessary to fully understand how boards fulfill their roles as monitors of corporate management.

Using a unique, hand-collected dataset on the residential locations of over 4,000 individual board members, we examine the acquisition and use of hard and soft information by directors. We find that when a firm has more intangible assets or lower capital intensity, directors are significantly more likely to reside close to headquarters. We also find strong

associations between board-level distance measures and the board's primary governance decisions. Specifically, having a board that is distant from headquarters does not lead to a higher overall probability of non-routine CEO turnover, but it does lead to a greater sensitivity of turnover to objective measures of performance. Furthermore, the board's distance from headquarters is not associated with the CEO's total compensation or cash compensation, but it is positively related to the level and pay-to-performance sensitivity of equity-based pay.

Although our paper is most directly relevant to corporate governance, our aim differs from that of recent papers that refine the notion of director independence to account for director networks or social ties between directors and management (e.g., Larcker, Richardson, Seary, and Tuna (2005), Hwang and Kim (2008)). We do not claim that outside directors who reside farther from headquarters are more independent than their counterparts. Instead, we argue that distance explains how directors acquire and use information. Our analysis indicates that more distant directors rely more on hard information, whereas more proximate directors acquire and use more soft information. The results of our tests also reveal that distance does not simply reflect well-studied measures of board structure, such as board size or board independence. Rather, board geography is a distinct characteristic that should be explicitly accounted for when studying the effects of board structure on board decisions.

From a broader perspective, our findings suggest that boards can be viewed as intermediaries that gather and process hard and soft information about managers on behalf of clients (shareholders). Hence, our work is related to the established literature that links the geography of financial intermediaries to their lending and financing decisions. Indeed, Diamond (1984, 1991) argues that a key difference between the private lending and public debt markets is the ability of lenders to gather and process information. Petersen and Rajan (1994, 2002) study

both local and distant banking relationships, and they find that the former are based more on soft information factors, while the latter are a “formula driven” exercise in the transmission of hard information. Lerner (1995) finds that venture capital firms tend to reside closer to client firms when the information environment is more complex. Our findings on the link between distance and information acquisition are similar to the results in these articles, and thus they are of relevance to our understanding of the overall role of geographic distance in financial intermediation and the provision of capital.

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Table 1: Director-Level and Firm-Level Distance Measures

This table shows summary statistics for measures of geographic distance between directors' locations of residence and firm's headquarters. The sample consists of directors who served during 2004-2007 on the boards of 497 firms drawn from the S&P 1,500. Residential locations are determined from the LexisNexis Person Locator database. Distances are calculated from individual zip codes using a formula as described in the text (see footnote 9). In Panel A, the sample consists of 14,182 director-year observations over the 2004-2007 period. Panel B reports firm-level statistics for 1,834 firm-year observations over 2004-2007.

	Obs.	Mean	S.D.	Percentiles		
				10 th	50 th	90 th
Panel A: Director-Level Distance from Headquarters (in Miles)						
<i>Year</i>						
2004	3,412	502.4	685.8	3.2	120.1	1,485.9
2005	3,662	505.1	672.7	3.6	150.3	1,457.9
2006	3,635	517.3	667.9	3.8	182.3	1,452.9
2007	3,473	528.7	675.5	3.6	197.4	1,475.9
2004-2007	14,182	513.3	675.3	3.6	165.0	1,466.4
Panel B: Firm-level Distance Measures						
Avg. distance to headquarters—all directors	1,834	517.4	355.3	107.8	472.7	969.4
Avg. distance to headquarters—inside directors	1,671	230.9	475.3	0	15.4	892.3
Avg. distance to headquarters—outside directors	1,829	575.9	400.8	111.3	516.4	1,085.1
% of board within 50 miles from headquarters	1,834	41.5	25.6	10.0	40.0	77.8
% of board within 100 miles from headquarters	1,834	47.1	25.5	14.3	44.4	83.3
% of board more than 200 miles from headquarters	1,834	47.6	25.8	14.3	50.0	83.3
Distance between CEO and headquarters	1,610	215.9	495.5	0	12.4	891.7

Table 2: Summary Statistics on Firm, Board, and CEO Characteristics

This table reports summary statistics for a panel of 1,834 firm-year observations corresponding to 497 firms belonging to the S&P 1,500 at year-end 2004. The sample covers 2004-2007 and includes firm years for which directors' locations of residence could be determined. Residential locations are obtained from the LexisNexis *Person Locator* database. Distances between headquarters locations and Metropolitan Statistical Areas (MSAs) are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). An MSA is considered to be a large MSA if it was among the fifty most populous MSAs according to the 2000 U.S. Census. Net PP&E to assets is the three-year average ratio of Net Property, Plant, and Equipment (Compustat item #8) to total book value of assets. Intangibles to assets is the three-year average ratio of Other Intangibles (Compustat item # 352) to total assets. Free cash flow to assets is the ratio of total free cash flow to total assets. Leverage is computed as the ratio of long-term debt to total assets. For each firm-year corresponding to the election and service of board members, all Compustat data on firm characteristics are measured as of preceding fiscal-year-end. Board and CEO characteristics are drawn from SEC proxy filings and from the *Board Analyst* database. Outside directors are board members who are not current firm employees. Independent outside directors are outside directors who are not past employees of the firm, are not founders or members of the founding family, and have no current or past business ties to the firm.

	Firm-years	Mean	S.D.	Percentiles		
				10 th	50 th	90 th
<u>Firm Characteristics</u>						
Market value of equity (\$M)	1,825	9,240.0	27,636.9	443.5	2,116.7	17,593.7
Total assets (\$M)	1,826	25,178.6	129,332.9	340.6	2,004.1	26,939.0
Number of employees ('000s)	1,813	22.0	49.6	0.75	5.8	52.0
Net PP&E to assets	1,762	0.25	0.22	0.02	0.19	0.58
Intangibles to assets	1,401	0.037	0.059	0.000	0.012	0.106
FCF to assets	1,761	0.088	0.096	0.013	0.086	0.181
Leverage	1,818	0.176	0.151	0	0.158	0.384
Firm age (yrs. from founding)	1,704	48.7	39.3	8	36	105
Distance from headquarters to closest large MSA (miles)	1,813	38.8	189.8	1.70	10.81	86.6
<u>Board and CEO characteristics</u>						
% of outside directors	1,832	83.17	8.76	70.00	85.71	91.67
% of independent outside directors	1,832	72.31	13.81	53.85	75	90
Board size	1,832	9.56	2.57	7	9	13
Average age of directors (years)	1,834	62.61	3.65	58.18	62.50	67.22
Average director tenure on the board (years)	1,833	8.86	3.87	4.50	8.25	13.73
Non-CEO chairman	1,834	0.36	0.48			
CEO age (years)	1,789	57.5	6.7	49	58	66
CEO tenure on the board (years)	1,786	9.86	8.21	1	8	21
CEO is company founder	1,834	0.06	0.25			

Table 3: Summary Statistics for Distance Measures, By Firm Size and Board Size

This table reports summary statistics, by firm size and by board size, for distances between corporate headquarters and directors' residential locations. Only outside directors are included in the distance calculations. The sample consists of a panel of 1,801 firm-year observations over 2004-2007 corresponding to 497 S&P 1,500 firms. The sample includes firm years for which directors' locations of residence could be determined from the LexisNexis *Person Locator* database. Only outside directors are included in computing distance measures. Distances between directors and headquarters are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Firm-size quintiles are calculated on the basis of total book value of assets across all firm-years in the sample.

	<i>N</i> = 1,801	Firm-years	Median Distance from Headquarters			Fraction of Directors within 100 Miles of Headquarters		
			Mean	Median	SD	Mean	Median	SD
<i>Firm Size (total assets)</i>								
Quintile 1 (smallest)			491.2	251.8	602.1	0.50	0.50	0.24
Quintile 2			458.8	265.1	548.4	0.49	0.50	0.23
Quintile 3			435.1	320.9	427.2	0.49	0.50	0.22
Quintile 4			446.7	334.0	451.8	0.51	0.50	0.24
Quintile 5 (largest)			426.7	258.4	421.7	0.49	0.47	0.19
<i>Board Size (# of outside directors)</i>								
6 or fewer		522	479.1	289.6	572.6	0.51	0.50	0.24
7		314	462.0	225.3	562.9	0.48	0.43	0.22
8		255	441.7	314.3	446.5	0.48	0.50	0.23
9		237	487.2	383.3	466.4	0.52	0.56	0.22
10		193	452.3	372.3	387.4	0.52	0.50	0.19
11 or more		280	367.8	213.5	374.4	0.49	0.45	0.21

Table 4: Determinants of Director Distance from Corporate Headquarters

Reported are estimated marginal effects from probit regressions explaining distances between corporate headquarters and individual directors' residential locations. The dependent variable in each regression equals 1 if a director resides within 100 miles of headquarters in a given year and equals 0 otherwise. The regressions in Columns (1) through (4) are based on the pooled sample of director-years involving all non-ceo directors, while regressions in Columns (5) through (8) are based on the pooled sample of director-years involving outside directors. An MSA is considered to be large if it is among the top 50 most populous MSAs according to the 2000 U.S. Census. Net PP&E to assets is the three-year average ratio of Net Property, Plant, and Equipment (Compustat item #8) to total book value of assets. Intangibles to assets is the three-year average ratio of Other Intangibles (Compustat item #352) to total assets. Free cash flow to assets is the ratio of total free cash flow to total assets. The Exchange = NYSE or Nasdaq variable is a binary variable equal to 1 if a firm was listed on the NYSE or Nasdaq exchanges at the end of the preceding fiscal year. Unaffiliated block ownership is the total fraction of shares held in 5% blocks or larger by outside shareholders who have no business ties with the firm. All other variables are as described in Table 2. Each regression includes year dummies and indicators for the 48 Fama-French industry classifications (Fama and French (1997)). T-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	Non-CEO Directors			Outside Directors		
	(1)	(2)	(3)	(5)	(6)	(7)
CEO near headquarters (within 50 miles)	-0.049* (-1.95)	-0.048* (-1.90)	-0.048* (-1.68)	-0.040 (-1.58)	-0.039 (-1.52)	-0.040 (-1.42)
Log(Distance between headquarters and closest large MSA)	0.037*** (3.93)	0.038*** (4.12)	0.045*** (4.47)	0.037*** (3.91)	0.038*** (4.10)	0.045*** (4.42)
Net PP&E to Assets		0.262** (2.41)			0.241** (2.25)	
Intangibles to Assets			-0.663** (-2.35)			-0.757*** (-2.63)
Individual is an Outside director	0.297*** (7.03)	0.299*** (7.01)	0.286*** (6.47)			
Log(Total Assets)	0.030*** (2.92)	0.031*** (3.02)	0.040*** (3.68)	0.031*** (3.06)	0.033*** (3.15)	0.027** (2.52)
Log(Company age)	0.0003 (0.02)	0.001 (0.07)	-0.004 (-0.27)	-0.0002 (-0.02)	0.0005 (0.04)	0.008 (0.57)
FCF/total assets	0.004 (0.03)	-0.063 (-0.42)	-0.005 (-0.03)	-0.006 (-0.04)	-0.069 (-0.46)	0.006 (0.04)

Continued

Table 4, continued

Independent Variable	Non-CEO Directors			Outside Directors		
	(1)	(2)	(3)	(5)	(6)	(7)
Exchange = NYSE or Nasdaq	0.017 (0.51)	0.005 (0.15)	0.002 (0.06)	0.005 (0.14)	-0.006 (-0.17)	-0.007 (-0.21)
CEO is founder	0.041 (0.74)	0.030 (0.52)	0.030 (0.50)	0.055 (1.01)	0.045 (0.81)	0.042 (0.72)
Log(CEO age)	0.037 (0.33)	0.014 (0.13)	0.009 (0.08)	0.061 (0.54)	0.044 (0.39)	0.032 (0.27)
Log(CEO tenure)	-0.011 (-0.68)	-0.007 (-0.41)	-0.017 (-0.96)	-0.017 (-1.10)	-0.014 (-0.85)	-0.023 (-1.32)
Log(unaffiliated block ownership)	0.247** (2.38)	0.231** (2.16)	0.140 (1.22)	0.270** (2.56)	0.254** (2.35)	0.144 (1.24)
Log(Director age)	0.205*** (2.58)	0.228*** (2.83)	0.227*** (2.64)	0.131 (1.59)	0.156* (1.86)	0.152* (1.70)
Log(director tenure)	-0.081*** (-6.50)	-0.084*** (-6.68)	-0.080*** (-5.82)	-0.074*** (-5.67)	-0.077*** (-5.88)	-0.073*** (-5.12)
Non-CEO chairman	-0.042 (-1.52)	-0.040 (-1.44)	-0.052* (-1.72)	-0.049* (-1.78)	-0.047* (-1.71)	-0.058* (-1.93)
Log (board size)	0.136** (2.21)	0.132** (2.18)	0.145** (2.26)	0.133** (2.15)	0.131** (2.14)	0.142** (2.24)
Fraction of outsiders on the board	0.404*** (2.83)	0.395*** (2.74)	0.372** (2.52)	0.436*** (3.12)	0.428*** (3.03)	0.382*** (2.67)
Observations	9,807	9,686	7,674	9,163	9,050	7,172
Pseudo-R ²	0.087	0.089	0.095	0.067	0.068	0.078

Table 5: Determinants of Distance Between Directors and Headquarters: Firm-Level Regressions

This table reports the results of OLS regressions explaining the distance between a firm's headquarters and its outside directors. Firm-years are pooled over the 2004-2007 period. For a given firm-year, the dependent variable equals the median of log distances (from headquarters) across the board's individual outside directors. Distances from individuals to headquarters are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Regressions include only firm-years for which a distance can be calculated for at least half of active board members. An MSA is considered to be large if it is among the top 50 most populous MSAs according to the 2000 U.S. Census. Net PP&E to assets is the three-year average ratio of Net Property, Plant, and Equipment (Compustat item #8) to total book value of assets. Intangibles to assets is the three-year average ratio of Other Intangibles (Compustat item #352) to total assets. Free cash flow to assets is the ratio of total free cash flow to total assets. The Exchange = NYSE or Nasdaq variable is a binary variable equal to 1 if a firm was listed on the NYSE or Nasdaq exchanges at the end of the preceding fiscal year. Unaffiliated block ownership is the total fraction of shares held in 5% blocks or larger by outside shareholders who have no business ties with the firm. Each regression includes year dummies and indicators for the 48 Fama-French industry classifications (Fama and French (1997)). All other variables are as described in Table 2. T-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	(1)	(2)	(3)
Log(Total Assets)	0.173*** (2.75)	0.181*** (2.87)	0.167** (2.52)
CEO near headquarters (within 50 miles)	-0.368** (-2.35)	-0.350** (-2.22)	-0.353** (-2.12)
Log(Min. distance between headquarters and large MSA)	0.152** (2.37)	0.157** (2.44)	0.210*** (3.22)
Net PP&E to Assets		1.283* (1.90)	
Intangibles to Assets			-5.110*** (-2.72)
Log(Company age)	0.011 (0.13)	0.014 (0.17)	-0.021 (-0.24)
FCF/total assets	-0.571 (-0.76)	-0.889 (-1.23)	-0.621 (-0.81)

Continued

Table 5, continued

	(1)	(2)	(3)
CEO is founder	0.224 (0.59)	0.215 (0.55)	0.170 (0.41)
Log(CEO age)	-0.167 (-0.24)	-0.308 (-0.43)	-0.317 (-0.42)
Log(CEO tenure)	-0.205** (-2.07)	-0.200** (-1.98)	-0.241** (-2.32)
Log(unaffiliated block ownership)	1.225* (1.94)	1.371** (2.18)	0.508** (0.76)
Exchange = NYSE or Nasdaq	-0.219 (-0.98)	-0.311 (-1.37)	-0.318 (-1.39)
Non-CEO chairman	-0.458*** (-2.74)	-0.468*** (-2.80)	-0.542*** (-3.17)
Log (board size)	0.791** (1.97)	0.873** (2.18)	0.749* (1.80)
Fraction of outsiders on the board	2.680*** (2.88)	2.370*** (2.60)	2.265** (2.31)
Observations	1,423	1,407	1,108
R ²	0.230	0.233	0.284

Table 6: Board Distance, Board Composition, and the Probability of Non-routine CEO Turnover

This table reports estimated marginal effects from probit regressions explaining the annual likelihood of non-routine CEO departure over 2004-2007 for our sample of 497 firms. The dependent variable in each regression equals 1 if a firm experienced a non-routine CEO turnover over the fiscal year, and it equals zero otherwise. We define non-routine CEO turnover events as in Denis, Denis, and Sarin (1997) and identify such events from proxy statements and news articles. To ensure that our results are not being driven by turnover events involving newly-hired CEOs, we include only firm-years where the CEO has already served on the board for two or more years. *ADJ_RET* is the firm's total stock return over the current fiscal year minus the contemporary median stock return among all firms in the same SIC 3-digit industry. *DISTANT* is a binary variable equal to 1 if and only if the median log distance between a firm's headquarters and its outside directors exceeds the median of medians across firm-years in the sample. Distances from individuals to headquarters are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Zip codes for individuals' residential locations are obtained from the LexisNexis *Person Locator* database. Regressions include only firm-years in which distance information is available for at least half of the board's directors. *OUTSIDE* is a binary variable equal to 1 if and only if at least 75% of a firm's board members in a given year are outside directors. Each regression includes year indicators as well as industry indicators that capture the 48 Fama-French industry classifications (Fama and French (1997)). All other variables are as described in Table 2. Z-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	(1)	(2)	(3)	(4)	(5)
<i>ADJ_RET</i>	-0.046** (-2.14)	-0.047** (-2.19)	0.003 (0.11)	-0.020 (-0.44)	0.0002 (0.00)
CEO near headquarters (within 50 miles)	-0.021 (-1.54)	-0.024* (-1.72)	-0.023* (-1.80)	-0.020 (-1.52)	-0.023* (-1.81)
<i>DISTANT</i>		-0.025** (-2.28)	-0.024** (-2.30)		-0.024** (-2.30)
<i>DISTANT</i> × <i>ADJ_RET</i>			-0.107*** (-2.84)		-0.108*** (-2.79)
<i>OUTSIDE</i> × <i>ADJ_RET</i>				-0.032 (-0.62)	0.004 (0.09)
<i>OUTSIDE</i>				0.010 (0.62)	0.012 (0.74)
Log(Board size)	-0.038 (-1.25)	-0.035 (-1.14)	-0.034 (-1.16)	-0.041 (-1.35)	-0.037 (-1.26)
Log(Total assets)	0.001 (0.20)	0.002 (0.44)	0.002 (0.53)	0.001 (0.18)	0.002 (0.47)
FCF/Total assets	-0.087 (-1.10)	-0.089 (-1.11)	-0.074 (-1.03)	-0.078 (-1.05)	-0.072 (-1.03)
CEO is founder	-0.023 (-1.02)	-0.021 (-0.93)	-0.023 (-1.09)	-0.023 (-1.04)	-0.023 (-1.08)
Log(CEO tenure)	-0.008 (-0.73)	-0.009 (-0.87)	-0.008 (-0.79)	-0.007 (-0.65)	-0.007 (-0.68)
Log(CEO age)	0.064 (0.87)	0.056 (0.79)	0.063 (0.90)	0.065 (0.88)	0.062 (0.89)
Non-CEO chairman	0.013 (0.99)	0.012 (0.90)	0.015 (1.20)	0.015 (1.11)	0.017 (1.33)
Log(unaffiliated block ownership)	0.104* (1.90)	0.107** (2.01)	0.104** (2.08)	0.102* (1.89)	0.098** (1.99)
Observations	1,186	1,186	1,186	1,186	1,186
Pseudo R ²	0.100	0.107	0.121	0.101	0.122

Table 7: Distance and the Sensitivity of Non-Routine CEO Turnover to Good Stock Performance and Bad Stock Performance

Reported are marginal effects from probit regressions explaining the annual likelihood of non-routine CEO turnover over 2004-2007 for our sample of 497 firms. The dependent variable in each regression equals 1 if a firm experienced a non-routine CEO turnover over the fiscal year, and it equals zero otherwise. We define non-routine CEO turnover events as in Denis, Denis, and Sarin (1997) and identify such events from proxy statements and news articles. To ensure that our results are not being driven by turnover events involving newly-hired CEOs, we include only firm-years where the CEO has served on the board for two or more years. The variable *ADJ_RET* is the firm's total stock return over the current fiscal year minus the contemporary median stock return among all firms in the same SIC 3-digit industry. *DISTANT* is a binary variable equal to 1 if and only if the median log distance between a firm's headquarters and its outside directors exceeds the median of medians across firm-years in the sample. Distances from individuals to headquarters are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Zip codes for individuals' residential locations are obtained from the LexisNexis *Person Locator* database. Regressions include only firm-years in which distance information is available for at least half of the board's directors. *OUTSIDE* is a binary variable equal to 1 if and only if at least 75% of a firm's board members in a given year are outside directors. Each regression includes year indicators as well as industry indicators that capture the 48 Fama-French industry classifications (Fama and French (1997)). All other variables are as described in Table 2. Z-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	(1)	(2)	(3)
<i>ADJ_RET</i>	-0.005 (-0.12)	-0.011 (-0.28)	0.001 (0.02)
CEO near headquarters (within 50 miles)	-0.023* (-1.75)	-0.023* (-1.77)	-0.023* (-1.80)
<i>DISTANT</i>	-0.040*** (-2.84)	-0.013 (-1.13)	-0.028** (-1.97)
<i>DISTANT</i> × min[0, <i>ADJ_RET</i>]	-0.137** (-2.28)		-0.122** (-2.13)
<i>DISTANT</i> × max[0, <i>ADJ_RET</i>]		-0.113** (-2.29)	-0.091** (-2.08)
<i>OUTSIDE</i> × <i>ADJ_RET</i>	-0.014 (-0.33)	-0.010 (-0.21)	0.003 (0.07)
<i>OUTSIDE</i>	0.010 (0.62)	0.012 (0.79)	0.011 (0.73)

Continued

Table 7, continued

	(1)	(2)	(3)
Log(Board size)	-0.036 (-1.16)	-0.039 (-1.32)	-0.037 (-1.24)
Log(Total assets)	0.003 (0.65)	0.001 (0.28)	0.002 (0.51)
FCF/Total assets	-0.051 (-0.66)	-0.093 (-1.30)	-0.068 (-0.94)
CEO is founder	-0.022 (-1.03)	-0.022 (-0.99)	-0.023 (-1.08)
Log(CEO tenure)	-0.007 (-0.63)	-0.008 (-0.80)	-0.007 (-0.66)
Log(CEO age)	0.063 (0.87)	0.058 (0.83)	0.063 (0.90)
Non-CEO chairman	0.017 (1.28)	0.014 (1.11)	0.017 (1.34)
Log(unaffiliated block ownership)	0.095* (1.86)	0.106** (2.10)	0.098** (1.96)
Observations	1,186	1,186	1,186
Pseudo R ²	0.118	0.122	0.122

Table 8: CEO Pay Levels and the Distance Between Outside Directors and Headquarters

This table shows the results of multivariate regressions explaining the CEO's total, cash-based, and equity-based pay in terms of the distance between a firm's outside directors and headquarters. Cash-based compensation is the sum of salary and bonus. Equity-based compensation is the sum of stock option grant values (calculated using a Black-Scholes methodology, modified for dividends) and restricted stock grant values. Total pay is the sum of cash-based pay, equity-based pay, LTIP payouts, and other compensation. The main explanatory variable in each regression is the median log distance between corporate headquarters and individual residences, where the median is computed across outside directors at the board level. Distances are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Zip codes for individuals' residential locations are obtained from the LexisNexis *Person Locator* database. Regressions include only firm-years for which distances can be calculated for at least half of the board members. Models (1) and (2) are estimated across pooled firm-years using OLS, while Model (3) is estimated over pooled firm-years using a tobit regression. *ADJ_RET* is the firm's total stock return over the current fiscal year minus the contemporaneous median stock return among all firms in the same SIC 3-digit industry. Volatility is the annualized standard deviation of daily stock returns, calculated over a five-year period prior to the current year. Unaffiliated block ownership is the total fraction of shares held in 5% blocks or larger by outside shareholders who have no business ties with the firm. Each regression includes year indicators as well as industry indicators that capture the 48 Fama-French industry classifications (Fama and French (1997)). All other explanatory and control variables are as described in Table 2. T-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	Total Comp. (1)	Cash-based Comp. (2)	Equity Comp. (3)
Median log(distance from headquarters)	0.031 (1.20)	-0.006 (-0.28)	0.285*** (3.31)
CEO near HQ (50 miles)	-0.127 (-1.50)	-0.116* (-1.65)	0.344 (1.01)
<i>ADJ_RET</i>	0.172 (0.95)	0.157 (1.06)	-0.120 (-0.28)
Log(Total Assets)	0.366*** (9.14)	0.233*** (7.08)	0.589*** (3.54)
Log(Company age)	0.019 (0.38)	0.006 (0.15)	0.283* (1.81)
Log(Volatility)	-0.067 (-0.15)	-0.240 (-0.81)	-2.168 (-1.05)
CEO is founder	-0.371 (-1.21)	-0.308 (-1.12)	-0.350 (-0.52)
Log(CEO tenure)	-0.041 (-0.88)	-0.012 (-0.34)	-0.362 (-1.64)
Log(CEO age)	-0.339 (-0.90)	-0.062 (-0.21)	-3.558** (-2.35)

Continued

Table 8, continued

	(1)	(2)	(3)
Log(unaffiliated blockholder ownership)	0.079 (0.24)	0.075 (0.31)	-0.905 (-0.63)
Non-CEO chairman	-0.064 (-0.85)	-0.034 (-0.60)	0.069 (0.19)
Log(Board size)	0.205 (0.92)	0.222 (1.27)	0.709 (0.85)
Board dominated by outsiders	-0.088 (-0.87)	-0.019 (-0.20)	0.473 (1.10)
Observations	1,402	1,407	1,402
R ²	0.369	0.340	0.041

Table 9: Board Distance, CEO Pay Composition, and CEO Pay Sensitivity

This table shows the results of multivariate regressions explaining the composition of CEO pay (Columns (1) and (2)) and the pay-performance sensitivity of equity-based CEO pay (Columns (3) and (4)). Cash-based compensation is the sum of salary and bonus. Equity-based compensation is the sum of stock option grant values (calculated using a Black-Scholes methodology, modified for dividends) and restricted stock grant values. Total pay is the sum of cash-based pay, equity-based pay, LTIP payouts, and other compensation. Models (1) and (2) are estimated across pooled firm-years using the fractional logit model of Papke and Wooldridge (1996), while models (3) and (4) are estimated across pooled firm-years using tobit. The pay-performance sensitivity for an individual option, computed using the partial derivative of the Black-Scholes-Merton option price, equals the dollar change in option value given a 1% increase in the stock price (see Yermack (1996)). The sensitivity for an individual share of restricted stock is equal to 0.01 times the per-share price at the fiscal year-end. The total pay-performance sensitivity of option grants is calculated as the sum of all individual sensitivities of options granted during the fiscal year. The total sensitivity of equity grants is computed analogously. For a CEO's previously-granted options and shares, the portfolio sensitivity is computed from shareholdings and vested and unvested option holdings using the approximation method outlined in Core and Guay (2002). The main explanatory variable in each regression is the median log distance between corporate headquarters and individual residences, where the median is computed across outside directors at the board level. Distances are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Zip codes for individuals' residential locations are obtained from the LexisNexis *Person Locator* database. Regressions include only firm-years for which distances can be calculated for at least half of the board members. *ADJ_RET* is the firm's total stock return over the current fiscal year minus the contemporaneous median stock return among all firms in the same SIC 3-digit industry. Volatility is the annualized standard deviation of daily stock returns, calculated over a five-year period prior to the current year. Unaffiliated block ownership is the total fraction of shares held in 5% blocks or larger by outside shareholders who have no business ties with the firm. Each regression includes year indicators as well as industry indicators that capture the 48 Fama-French industry classifications (Fama and French (1997)). All other explanatory and control variables are as described in Table 2. T-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	Composition of Pay		Sensitivity of Pay (dollar Δ in shdd. wealth)	
	Option Pay/Total Pay (1)	Equity Pay/Total Pay (2)	Option Grants (3)	Option and Restricted Stock Grants (4)
Median log(distance from HQ), outsiders	0.119*** (4.11)	0.090*** (3.78)	0.070*** (2.92)	0.068*** (2.63)
CEO is near HQ (50 miles)	0.016 (0.14)	0.108 (1.12)	0.014 (0.19)	0.093 (0.87)
Sensitivity of old options and shares (dollar Δ in shareholder wealth)			1.33*10 ⁻⁷ (0.18)	-4.10*10 ⁻⁷ (-0.56)
<i>ADJ_RET</i>	-0.265* (-1.84)	-0.155 (-1.21)	0.400*** (3.20)	0.638*** (3.77)
Log(Total Assets)	0.106** (2.32)	0.171*** (3.85)	-0.043 (-1.62)	-0.060 (-1.53)
Log(Company age)	0.031 (0.56)	0.032 (0.71)	0.043 (1.26)	0.069 (1.26)
Log(Volatility)	-0.106 (-0.16)	0.266 (0.49)	-0.910** (-2.23)	0.641 (1.06)

Continued

Table 9, Continued

	(1)	(2)	(3)	(4)
CEO is founder	0.289 (1.49)	0.133 (0.76)	0.256 (1.61)	0.143 (0.68)
Log(CEO tenure)	-0.084 (-1.14)	-0.106* (-1.75)	-0.068 (-1.44)	-0.119* (-1.78)
Log(CEO age)	-1.086** (-2.16)	-1.272*** (-2.98)	-0.604* (-1.78)	-0.927* (-1.78)
Log(unaffiliated blockholder ownership)	-0.361 (-0.85)	-0.120 (-0.31)	-0.508* (-1.68)	0.004 (0.01)
Non-CEO chairman	0.048 (0.44)	0.061 (0.63)	-0.040 (-0.63)	-0.021 (-0.22)
Log(Board size)	-0.249 (-0.97)	-0.083 (-0.35)	-0.279* (-1.77)	-0.465* (-1.80)
Board dominated by outsiders	0.131 (0.94)	0.137 (1.11)	-0.026 (-0.28)	-0.022 (-0.17)
Observations	1,402	1,402	1,386	1,386
Pseudo R ²	--	--	0.068	0.042

**Table 10: Board Distance, CEO Pay Composition, and CEO Pay Sensitivity:
Directors Appointed Before the CEO**

This table shows the results of multivariate regressions explaining the composition of CEO pay (Columns (1) and (2)) and the pay-performance sensitivity of equity-based CEO pay (Columns (3) and (4)). Cash-based compensation is the sum of salary and bonus. Equity-based compensation is the sum of stock option grant values (calculated using a Black-Scholes methodology, modified for dividends) and restricted stock grant values. Total pay is the sum of cash-based pay, equity-based pay, LTIP payouts, and other compensation. Models (1) and (2) are estimated across pooled firm-years using the fractional logit model of Papke and Wooldridge (1996), while models (3) and (4) are estimated across pooled firm-years using tobit. The pay-performance sensitivity for an individual option, computed using the partial derivative of the Black-Scholes-Merton option price, equals the dollar change in option value given a 1% increase in the stock price (see Yermack (1996)). The sensitivity for an individual share of restricted stock is equal to 0.01 times the per-share price at fiscal year-end. The total pay-performance sensitivity of option grants is calculated as the sum of all individual sensitivities of options granted during the fiscal year. The total sensitivity of equity grants is computed analogously. For a CEO's previously-granted options and shares, the portfolio sensitivity is computed from shareholdings and vested and unvested option holdings using the approximation method outlined in Core and Guay (2002). The main explanatory variable in each regression is the median log distance between corporate headquarters and individual residences, where the median is computed across outside directors at the board level. Distances are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Zip codes for individuals' residential locations are obtained from the LexisNexis *Person Locator* database. Regressions include only firm-years for which distances can be calculated for at least half of the board members. *ADJ_RET* is the firm's total stock return over the current fiscal year minus the contemporaneous median stock return among all firms in the same SIC 3-digit industry. Volatility is the annualized standard deviation of daily stock returns, calculated over a five-year period prior to the current year. Unaffiliated block ownership is the total fraction of shares held in 5% blocks or larger by outside shareholders who have no business ties with the firm. Each regression includes year indicators as well as industry indicators that capture the 48 Fama-French industry classifications (Fama and French (1997)). All other explanatory and control variables are as described in Table 2. T-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	Composition of Pay		Sensitivity of Pay (dollar Δ in shdd. wealth)	
	Option Pay/Total Pay (1)	Equity Pay/Total Pay (2)	Option Grants (3)	Option and Restricted Stock Grants (4)
Median log(distance from HQ), outsiders	0.081*** (2.79)	0.062** (2.50)	0.065*** (2.64)	0.076*** (2.79)
CEO is near HQ (50 miles)	-0.025 (-0.23)	0.074 (0.77)	-0.018 (-0.26)	0.074 (0.71)
Sensitivity of old options and shares (dollar Δ in shareholder wealth)			6.30*10 ⁻⁷ (0.73)	2.79*10 ⁻⁷ (0.39)
<i>ADJ_RET</i>	-0.241 (-1.54)	-0.102 (-0.75)	0.360*** (3.03)	0.585*** (3.16)
Log(Total Assets)	0.100** (2.12)	0.157*** (3.42)	-0.050* (-1.79)	-0.086** (-2.27)
Log(Company age)	0.051 (0.84)	0.050 (1.05)	0.050 (1.37)	0.079 (1.36)
Log(Volatility)	-0.163 (-0.21)	0.419 (0.69)	-0.933** (-2.08)	1.113 (1.57)

Continued

Table 10, continued

	(1)	(2)	(3)	(4)
CEO is founder	0.294 (1.13)	0.015 (0.06)	0.352 (1.21)	0.286 (0.83)
Log(CEO tenure)	-0.085 (-1.03)	-0.086 (-1.27)	-0.053 (-1.07)	-0.068 (-0.92)
Log(CEO age)	-1.396*** (-2.69)	-1.449*** (-3.18)	-0.956*** (-2.66)	-1.297** (-2.25)
Log(unaffiliated blockholder ownership)	-0.153 (-0.33)	-0.448 (-1.07)	-0.600* (-1.69)	-0.727 (-1.41)
Non-CEO chairman	-0.005 (-0.04)	-0.010 (-0.10)	-0.088 (-1.23)	-0.104 (-0.96)
Log(Board size)	0.148 (0.52)	0.281 (1.10)	-0.117 (-0.69)	-0.223 (-0.81)
Board dominated by outsiders	-0.085 (-0.57)	-0.127 (-0.97)	-0.110 (-1.01)	-0.221 (-1.54)
Observations	1,161	1,161	1,147	1,147
Pseudo R ²	--	--	0.065	0.047

**Table 11: Board Distance, CEO Pay Composition, and CEO Pay Sensitivity:
Independent Directors not on the Compensation Committee**

This table shows the results of multivariate regressions explaining the composition of CEO pay (Columns (1) and (2)) and the pay-performance sensitivity of equity-based CEO pay (Columns (3) and (4)). Cash-based compensation is the sum of salary and bonus. Equity-based compensation is the sum of stock option grant values (calculated using a Black-Scholes methodology, modified for dividends) and restricted stock grant values. Total pay is the sum of cash-based pay, equity-based pay, LTIP payouts, and other compensation. Models (1) and (2) are estimated across pooled firm-years using the fractional logit model of Papke and Wooldridge (1996), while models (3) and (4) are estimated across pooled firm-years using tobit. The pay-performance sensitivity for an individual option, computed using the partial derivative of the Black-Scholes-Merton option price, equals the dollar change in option value given a 1% increase in the stock price (see Yermack (1996)). The sensitivity for an individual share of restricted stock is equal to 0.01 times the per-share price at fiscal year-end. The total pay-performance sensitivity of option grants is calculated as the sum of all individual sensitivities of options granted during the fiscal year. The total sensitivity of equity grants is computed analogously. For a CEO's previously-granted options and shares, the portfolio sensitivity is computed from shareholdings and vested and unvested option holdings using the approximation method outlined in Core and Guay (2002). The main explanatory variable in each regression is the median log distance between corporate headquarters and individual residences, where the median for each firm-year is computed across all independent directors not belonging to the compensation committee. Distances are calculated as geodesic distances using latitudes and longitudes corresponding to zip codes (see the formula described in footnote 9). Zip codes for individuals' residential locations are obtained from the LexisNexis *Person Locator* database. Regressions include only firm-years for which distances can be calculated for at least half of the board members. *ADJ_RET* is the firm's total stock return over the current fiscal year minus the contemporaneous median stock return among all firms in the same SIC 3-digit industry. Volatility is the annualized standard deviation of daily stock returns, calculated over a five-year period prior to the current year. Unaffiliated block ownership is the total fraction of shares held in 5% blocks or larger by outside shareholders who have no business ties with the firm. Each regression includes year indicators as well as industry indicators that capture the 48 Fama-French industry classifications (Fama and French (1997)). All other explanatory and control variables are as described in Table 2. T-statistics (reported in parentheses) are computed from robust standard errors that account for clustering at the firm level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Independent Variable	Composition of Pay		Sensitivity of Pay (dollar Δ in shdd. wealth)	
	Option Pay/Total Pay (1)	Equity Pay/Total Pay (2)	Option Grants (3)	Option and Restricted Stock Grants (4)
Median log(distance from HQ), outsiders	0.063** (2.29)	0.061** (2.51)	0.054** (2.02)	0.070** (2.31)
CEO is near HQ (50 miles)	-0.004 (-0.04)	0.132 (1.30)	-0.003 (-0.04)	0.147 (1.35)
Sensitivity of old options and shares (dollar Δ in shareholder wealth)			7.66*10 ⁻⁷ (0.70)	-7.79*10 ⁻⁹ (-0.01)
<i>ADJ_RET</i>	-0.242 (-1.51)	-0.125 (-0.90)	0.442*** (3.10)	0.699*** (3.88)
Log(Total Assets)	0.131*** (2.89)	0.189*** (4.20)	-0.025 (-0.95)	-0.056 (-1.52)
Log(Company age)	0.059 (1.08)	0.061 (1.40)	0.069** (2.15)	0.092* (1.69)
Log(Volatility)	0.188 (0.26)	0.586 (1.04)	-0.847** (-2.02)	0.981 (1.58)

Continued

Table 11, continued

	(1)	(2)	(3)	(4)
CEO is founder	0.273 (1.22)	0.139 (0.69)	0.138 (0.73)	0.001 (0.00)
Log(CEO tenure)	-0.054 (-0.69)	-0.080 (-1.27)	-0.049 (-0.96)	-0.104 (-1.47)
Log(CEO age)	-1.086** (-2.07)	-1.323*** (-2.99)	-0.555* (-1.68)	-0.738 (-1.46)
Log(unaffiliated blockholder ownership)	-0.542 (-1.24)	-0.320 (-0.82)	-0.539 (-1.59)	-0.138 (-0.29)
Non-CEO chairman	0.049 (0.43)	0.052 (0.51)	-0.029 (-0.46)	-0.002 (-0.02)
Log(Board size)	-0.069 (-0.24)	0.121 (0.45)	-0.240 (-1.29)	-0.267 (-1.04)
Board dominated by outsiders	0.114 (0.73)	0.081 (0.57)	-0.027 (-0.22)	-0.057 (-0.37)
Observations	1,279	1,279	1,264	1,264
Pseudo R ²	--	--	0.064	0.046

Appendix

Table A1 summarizes the basic steps we use to assemble our sample of individual directors' residential locations. In the initial step, we use *PeopleFinders* in conjunction with *Board Analyst* to search for birthdate information (i.e., month, day, and year) for each of the 4,354 individuals in our initial sample. Specifically, we perform keyword searches in *PeopleFinders* using individuals' full names and ages. When a search yields more than one possible matching birthdate in *PeopleFinders*, we attempt to cross-reference other available information in that database (e.g., business affiliation, telephone number, or mailing address) with information in *Board Analyst* to resolve the ambiguity. Using the two databases together, we are able to determine unique birthdates for 3,718 individuals who have, as of December 2008, a U.S. residential location. We eliminate 77 individuals who are identified as residing outside the U.S. as of December 2008.

For the remaining 559 uncertain cases in the initial sample, we attempt to obtain additional cross-referencing information from various public sources, including company proxy statements, insider trading filings, *Google*, *ZoomInfo*, *Wikipedia*, *NNDB.com*, *BusinessWeek.com*, *Forbes.com*, and LexisNexis' public records database. Using these sources, we determine that an additional 33 individuals were residing outside the U.S. as of December 2008. Out of the other 526 cases, 87 individuals have names that are too common to permit matching with unique birthdates, but 439 individuals can be associated unambiguously with birthdate information. Overall, then, we are able to determine birthdates for 4,157 U.S.-based individuals (about 95.5% of the initial sample).

We next use birthdates and names to search in LexisNexis' *Person Locator* database for directors' locations of residence. The extensive coverage of LexisNexis within the U.S. (over 150 million adult residents) enables us to obtain address information in the overwhelming majority of cases (4,155 out of 4,157). Usually, LexisNexis reports a single current address for an individual, but occasionally two current addresses are reported. For each individual, we attempt to gather information on the current address (or addresses) as of December 2008. We gather information on the street address (name and number), city, county, state, and 5-digit zip code. We also collect information on the earliest occupancy dates of each current address.

A small fraction of the current addresses reported in LexisNexis are not street addresses, but rather P.O. box numbers. Since it is unclear whether a given P.O. box is necessarily in close geographic proximity to a person's physical residence, we exclude these cases. In particular, we exclude 134 cases in which a single current address is reported and the address is a P.O. box number. We also exclude 41 cases in which two P.O. box locations are reported as current addresses.

Out of the remaining 3,980 individuals, 3,496 have one current street address in LexisNexis, while 484 have two current addresses (with at least one being a street address). Typically, when two current addresses are reported, they do not represent distinct physical locations. For example, the two street names may differ slightly (e.g., "RD" versus "LN"), or the street addresses and zip codes may coincide even though the city names differ. In 326 of the 484 dual-address cases, the two zip codes are identical. Because our measures of distance are constructed on the basis of zip codes (i.e., latitudes and longitudes), for these cases we simply retain the address with the earlier date of first occupancy. In 58 of the remaining dual-address cases, the two locations appear to be distinct. In particular, either the two locations are in different counties and zip code areas (36 cases), or the locations are in the same county but have different cities, zip codes, and street addresses (22 cases). We exclude these 58 cases because it is unclear whether one of the two addresses corresponds to a current summer or

winter home. For all of the remaining dual-address cases, we retain the address with the earlier move-in date. After applying these screens, we obtain an overall sample consisting of 3,922 individuals (about 90.1% of the initial sample) with valid U.S. residential locations as of December 2008.

Table A1—Sample selection criteria for data on individual locations of residence

	# of Individuals
Initial sample of individuals serving as board members (2004-2007)	4,354
Less:	
Individuals identified with <i>PeopleFinders</i> and <i>Board Analyst</i> as not residing in the U.S. (December 2008)	77
Individuals identified with <i>PeopleFinders</i> , <i>Board Analyst</i> , and other data sources* as not residing in the U.S.	33
Individuals residing in the U.S. for whom birthdate cannot be identified	87
Individuals residing in the U.S. for whom birthdate is available	4,157
Less:	
No current address information in <i>LexisNexis</i>	2
One current location reported in <i>LexisNexis</i> ; address is a P.O. Box	134
Two current locations reported in <i>LexisNexis</i> ; both addresses are P.O. Boxes	41
Two current non-P.O. Box locations in <i>LexisNexis</i> with different zip codes and counties	36
Two current non-P.O. Box locations in <i>LexisNexis</i> with matching counties but different zip codes, street addresses, and cities	22
Sample of individuals with current U.S. residential location as of December 2008	3,922

*Other data sources include corporate proxy statements, insider trading filings, *Google*, *ZoomInfo*, *Wikipedia*, *NNDB.com*, *BusinessWeek.com*, *Forbes.com*, and *LexisNexis*.