Divisional Managers and Internal Capital Markets

Ran Duchin
Stephen M. Ross School of Business
University of Michigan

Denis Sosyura
Stephen M. Ross School of Business
University of Michigan

Ross School of Business Working Paper
Working Paper No. 1144
February 2012

Divisional Managers and Internal Capital Markets

RAN DUCHIN and DENIS SOSYURA*

Journal of Finance, forthcoming

ABSTRACT

Using hand-collected data on divisional managers at the S&P 500 firms, we provide one of the first studies of their role in capital budgeting. Divisional managers with social connections to the CEO receive more capital. Connections to the CEO outweigh measures of managers' formal influence, such as seniority and board membership, and affect both managerial appointments and capital allocations. The effect of connections on investment efficiency depends on the tradeoff between agency and information asymmetry. Under weak governance, connections reduce investment efficiency and firm value via favoritism. Under high information asymmetry, connections increase efficiency and value via information transfer.

JEL classification: G31; G32

Keywords: diversification, social networks, agency, information asymmetry, capital budgeting, conglomerates

* Ran Duchin and Denis Sosyura are at the Ross School of Business, University of Michigan. We thank an anonymous referee, Associate Editor, John Graham (Coeditor), Cam Harvey (Editor), Kenneth Ahern, Joey Engelberg, Ted Fee, Cesare Fracassi, Byoung-Hyoun Hwang, Roni Kisin, John Matsusaka, Oguzhan Ozbas, conference participants at the 2011 Society for Financial Studies (SFS) Cavalcade, the 2011 Financial Intermediation Research Society (FIRS) Annual Meeting, the 2011 Geneva Conference on Financial Networks, the 2011 SunTrust-FSU Spring Conference, the 2010 Financial Research Association (FRA) Annual Meeting, and seminar participants at Hebrew University, Michigan State University, Ohio State University, Tel-Aviv University, the University of Michigan, the University of New South Wales, the University of Queensland, the University of Technology - Sydney, and the University of Sydney for helpful comments.

Divisional managers play an important role in theories of internal capital markets. The bright side view posits that internal capital markets benefit from stronger control rights and superior information provided by divisional managers, which enable the CEO to make better allocation decisions.[1] The dark side view states that internal capital markets suffer from agency motives of divisional managers and the CEO, who pursue their private interests.[2] The importance of divisional managers in the theoretical literature is also supported by recent survey evidence. Graham, Harvey, and Puri (2010) find that the CEO's opinion of a divisional manager is the second most important factor in internal capital allocation after the NPV rule. Yet we know relatively little about how the interactions between the CEO and divisional managers affect capital budgeting.

In this paper, we provide this evidence by constructing a hand-collected dataset of divisional managers at the S&P 500 firms and studying the effect of managers' characteristics and connections to the CEO on capital allocation decisions. In particular, we evaluate the involvement of divisional managers in the firm via various channels, ranging from formal, such as board membership and seniority, to informal, such as social connections to the CEO via prior employment, educational institutions, and nonprofit organizations.

Our analysis uncovers the mechanisms through which divisional managers affect investment efficiency and firm value, thus helping to reconcile some of the mixed evidence on the efficiency of internal capital markets and the value of diversification in prior research. A number of studies such as Servaes (1996), Lins and Servaes (1999) and Denis, Denis, and Yost (2002) show that diversification erodes firm value. Others argue that diversification increases

[1] The "bright side" of internal capital markets, broadly referred to as "winner-picking", has been proposed in Alchian (1969) and Weston (1970). More recently, this theory is discussed in Gertner, Scharfstein, and Stein (1994), Stein (1997), Matsusaka and Nanda (2002), and Maksimovic and Philips (2002), among others.

[2] The "dark side" of internal capital markets has been discussed in Milgrom (1988), Milgrom and Roberts (1988), Scharfstein and Stein (2000), Rajan, Servaes, and Zingales (2000), and Wulf (2009). For an overview of theories of internal capital markets, see Stein (2003) and Maksimovic and Philips (2007).

firm value, resulting in better capital allocation (Khanna and Tice, 2001) and higher investment efficiency (Kuppuswamy and Villalonga, 2010). We study how divisional managers affect capital allocation decisions and identify firm-level factors that determine whether these effects improve or erode efficiency.

We consider several non-mutually exclusive hypotheses. The first view, which we label the *favoritism* hypothesis, is that the CEO attempts to extract private benefits by allocating more capital to divisional managers connected to the CEO. This scenario would be consistent with the view that CEOs use their discretion in capital allocation decisions for self-benefitting purposes (e.g., Denis, Denis, and Sarin, 1997). This hypothesis predicts higher capital allocations to divisional managers connected to the CEO and a negative effect on investment efficiency and firm value, as in Scharfstein and Stein (2000) and Rajan, Servaes, and Zingales (2000).

The second hypothesis, to which we refer as *bridge building,* following Xuan (2009), posits that the CEO uses capital allocation to build rapport with divisional managers. Under this scenario, the CEO allocates more capital to *unconnected* divisional managers in an effort to win their support. This hypothesis predicts higher capital allocation to divisional managers unconnected to the CEO and a negative effect on investment efficiency and firm value.

A third hypothesis, which we label the *information* hypothesis, posits that the CEO allocates capital across divisions in an effort to maximize firm value, but has imperfect information about divisions' investment opportunities. All else equal, the CEO allocates more capital to divisions with a higher precision of information signal about investment opportunities.[3] If social connections between the CEO and divisional managers increase the quality of information about divisions' investment opportunities, they are likely to improve investment

[3] The setting in which information asymmetry within a firm introduces frictions in capital allocation is modeled in Harris, Kriebel and Raviv (1982); Antle and Eppen (1985); Harris and Raviv (1996, 1998); Bernardo, Cai and Luo (2001, 2004). These models generally predict a negative relation between the information asymmetry about the division's investment opportunities and the amount of capital investment.

efficiency in the firm. This hypothesis predicts higher capital allocations to divisional managers connected to the CEO and a positive effect on investment efficiency and firm value. More broadly, this hypothesis is consistent with the role of social connections as a channel of information transfer (Cohen, Frazzini, and Malloy, 2008, 2010; Engelberg, Gao, and Parsons, 2010).

A fourth possibility is that characteristics of divisional managers and their connections to the CEO play little role in resource allocation. For example, career concerns of managers (e.g., Fama 1980), as well as governance mechanisms such as boards of directors, compensation contracts, and large shareholders may render the effect of managerial connections ineffective. This hypothesis predicts no relation between managerial connections and capital allocation, and is consistent with efficient investment driven by divisions' investment opportunities.

Our empirical results indicate that managers with social connections to the CEO are allocated more capital, controlling for divisions' size, performance, proxies of investment opportunities, and other characteristics. This result persists across various measures of divisional investment and various types of social connections, such as connections via prior employment, education, and nonprofit organizations. We find that a one standard deviation increase in a divisional manager's social connections to the CEO is associated with 9.2 percent more capital allocated to his division or approximately $5.3 million in additional annual capital expenditure in a division with median characteristics. Connections to the CFO and the board have a weak positive effect.

We study two channels through which connected divisional managers may receive capital: (1) appointment of connected managers to capital-rich divisions (the *appointment* channel) and (2) extra capital allocations to connected managers after the appointment (the *capital allocation* channel).

To capture the effect of the appointment channel, we focus on the turnover of divisional managers and investigate the relation between divisional managers' characteristics and their assignment to divisions. We find that divisional managers connected to the CEO are appointed to divisions which historically receive somewhat more capital, as measured by capital expenditure in the year immediately preceding the manager's appointment. This effect is smaller, and accounts for about one third of our estimates of the extra capital allocated to divisions run by connected managers. We find no evidence that connected divisional managers are assigned to larger divisions or to divisions in the core business of the firm.

To disentangle the capital allocation channel from the appointment channel, we exploit the shock to managerial connections at the time of the CEO turnover. In particular, our tests focus on the change in the amount of capital allocated to divisional managers after their connections to the CEO change, but their appointment at the division remains constant. This identification strategy also allows us to control for unobservable characteristics of a divisional manager that could be correlated with social connections, to the extent that these characteristics remain unchanged within a short time window around the CEO turnover. However, some CEO turnovers may be caused by poor performance or capital misallocation, which may confound our empirical inference. To minimize the confounding effects, we use a subset of CEO turnovers that represent natural causes (death or illness), planned retirements, or scheduled succession plans.

We estimate that the effect of the capital allocation channel is about twice as large as that of the appointment channel. This evidence suggests that well-connected managers get extra funds even after controlling for the appointment process.

Greater capital allocations to connected managers are consistent with both the favoritism and the information hypotheses. To distinguish between these views, we investigate the effect of social connections on investment efficiency and firm value. Following the literature (e.g., Billett

and Mauer, 2003; Ozbas and Scharfstein, 2010), we measure investment efficiency as the relation between a division's capital expenditure and its relative investment opportunities (division's imputed Tobin's Q relative to the imputed Q of the other divisions). To estimate the effect on firm value, we use the excess value of the conglomerate relative to single-segment firms in the same industries (e.g., Berger and Ofek, 1995; Ahn and Denis, 2004).

We find that at firms with weaker governance, proxied by the Gompers, Ishii, and Metrick (2003) index, low managerial ownership, and low institutional holdings, social connections between divisional managers and the CEO are associated with lower investment efficiency and lower firm value, consistent with the *favoritism* hypothesis. At firms with high information asymmetry, as measured by industry relatedness across divisions, the dispersion of operations across divisions (divisions' Herfindahl index), and the distance from the headquarters to divisions, social connections between divisional managers and the CEO are positively related to investment efficiency and firm value, consistent with the *information* hypothesis.

An important consideration in identifying the impact of connections on capital allocation lies in accounting for potential reverse causality, a scenario in which managers who receive more funds develop stronger connections with the CEO. To address this issue, we exclude all connections formed during a divisional manager's tenure at the firm and all connections with ambiguous or missing dates, and obtain similar results.

Another important concern is that divisional managers' connections may proxy for managerial skill. For example, if CEOs are more likely to have attended top universities, a divisional manager who shares an educational connection with the CEO may possess better skill and receive more capital on the basis of higher ability. To account for managerial skill, we collect the data on divisional managers' previous jobs and use their relative performance record in the previous position as a proxy for ability. We also explicitly control for a division's relative

operating performance, as well as for the manager's seniority, education level, and the quality of educational institution. Our results are robust to these specifications.

Our paper contributes to the literatures on internal capital markets, corporate governance, and social networks. Although internal capital budgeting is often viewed as one of the most important financial decisions of the firm, it remains one of the least understood (Stein 2003). Our paper makes a step toward a better understanding of this decision by studying the role of divisional managers – the key agents that drive the dichotomous predictions in the theoretical literature but have remained unexplored to date.

We also add to the literature on corporate governance and executive decision-making. The research in this field acknowledges that the majority of day-to-day decisions in the firm are made by managers outside the executive suite and that these managers form the core of internal governance of a firm (Acharya, Myers, and Rajan, 2011). However, despite their key role in theories of corporate governance, we know very little about mid-level managers. We fill this gap by demonstrating that mid-level managers influence the valuation of large firms and by identifying the mechanisms through which these valuation effects operate.

Finally, we contribute to the literature on social networks by offering the first study of the intra-firm social connections across the vertical managerial hierarchy (i.e. connections between top management and lower ranked executives). This analysis also enables us to compare the role of social networks to formal channels of influence and to quantify the effect of networks in a novel setting – internal capital markets.

The rest of the paper is organized as follows. Section I describes the data. Section II examines the effect of divisional managers on capital allocation. Section III studies investment efficiency and firm value. Section IV shows robustness tests and extensions. A summary follows.

I. Sample and Data

A. Firms and Divisions

We begin constructing our sample with a set of all firms included in the S&P 500 index during any year in our sample period, January 2000 to December 2008. We start our sample in 2000, since BoardEx coverage in earlier years is very limited. Following the literature, we exclude financials firms (SIC codes 6000-6999) and utilities (SIC codes 4900-4949), as well as any divisions that operate in these sectors because they are subject to capital structure regulations.

Since we are interested in studying the role of divisional managers in capital allocation across divisions, we exclude single-segment firms and firms whose financial data at the level of business segments are unavailable on Compustat.[4] We also exclude divisions with zero sales, such as corporate accounts, and various allocation adjustments, such as currency translations. Finally, we exclude firms with missing data on divisional managers, as discussed in section C.

Our final sample includes 224 firms, 888 divisions, and 2,936 firm-division-year observations, whose summary statistics are shown in Table I. An average (median) conglomerate owns book assets valued at $19.4 ($6.3) billion, has a Tobin's Q of 1.71 (1.53), operates in 3.4 (3) business segments, and has annual capital expenditures of 4.2 (3.3) percent of book assets.

B. Capital Allocation

We use the three most common measures of capital allocation in all of our tests: (1) capital expenditures, (2) industry-adjusted capital expenditures, and (3) firm- and industry-adjusted capital expenditures. Detailed definitions of these variables appear in Appendix A. The data on divisional capital expenditures and book assets come from Compustat segment files.

[4] For a year-firm-division observation to be included in our sample, we require that at least CapEx and book value of assets be reported.

Our simplest measure, capital expenditure, is the annual amount of divisional capital expenditure scaled by book assets. Table I shows that the average (median) division reports expenditures of $198 ($58) million, which represents 3.5 (2.6) percent of book assets.

Our second measure of capital allocation – industry-adjusted capital expenditure – is the divisional capital expenditure (scaled by book assets) minus the average capital expenditure ratio for the industry in which the division operates (proxied by the capital expenditure of single-segment firms with the same three-digit SIC code).[5] The purpose of this adjustment is to control for industry-level effects common to the entire sector rather than specific to the firm. As shown in Table I, the average (median) values of industry-adjusted capital expenditures are 1.7 (0.6) percent, and there is a lot of cross-sectional variation in this measure, suggesting that some divisions get substantially more or less capital than their industry peers.

Our third measure of divisional capital allocation is the industry- and firm-adjusted divisional capital expenditure. In addition to the industry adjustment described above, this measure, first introduced in Rajan, Servaes, and Zingales (2000), also controls for the overall over- or underinvestment at the firm level. As shown in Table I, the average (median) values of the industry- and firm-adjusted capital expenditures are close to zero. However, this measure has a high standard deviation of 5.9 percent, suggesting that there is substantial heterogeneity in divisional capital allocation relative to industry peers and general investment level at the firm.

[5] To calculate a division's industry-adjusted capital expenditure, we require a minimum of five pure-play firms with the same three-digit SIC code. Our sample consists of 3,054 division-year observations of unadjusted capital expenditure. However, when we compute the industry-adjusted and industry-firm adjusted capital expenditure, we lose 118 observations due to an insufficient number of pure-play firms (fewer than five) in some industries. Therefore, for these measures, our sample consists of 2,936 firm-division-year observations.

C. Divisional Managers

Our sample of executives consists of 3,842 people. This group includes 1,105 divisional managers, 299 CEOs, and 2,438 other senior managers and board members who served at our sample firms between 2000 and 2008. To collect biographical information on divisional managers, other executives, and directors, we use the following databases: BoardEx, Reuters, Forbes Executive Directory, Marquis Who's Who, and Notable Names Database (NNDB). We also manually clean the BoardEx data for our sample by correcting errors and duplicates.[6]

We cross-check the date of a divisional manager's appointment reported in the above sources by searching the firm's press releases that typically provide the manager's exact starting date. We consider a manager to be in charge of a division if he or she is the highest-level executive with direct responsibility over the business segment during the respective time period. The Internet Appendix provides further details about the identification of divisional managers.[7]

Panel A of Table II shows summary statistics for our sample of divisional managers. An average divisional manager is 51.5 years old, has a firm tenure of 12.7 years, and earns a base salary of $852,000.[8] The vast majority (91.9 percent) of divisional managers are male, 97.6 percent hold a bachelor's degree, 62.1 percent have a master's degree, and 4.3 percent have a PhD. The most popular graduate degree is in business. More than one third of the managers have an MBA and an additional 11.4 percent have attended executive education programs.

[6] For example, the Stern School of Business appears in BoardEx under five different names, all of which are assigned distinct IDs. We standardize these data by assigning them a common ID, which we link to the home university – NYU.

[7] The Internet Appendix is available at http://www.afajof.org/supplements.asp.

[8] We obtain data on the compensation of divisional managers from ExecuComp, which covers approximately 57 percent of manager-year observations in our sample. The average salary data are shown for the subset of divisional managers covered by ExecuComp, and thus reflect the average earnings of the managers listed among the firm's top earners in the database.

D. Measures of Social Connections and Formal Influence

Individuals who share social connections through mutual qualities or experiences have been shown to have more frequent contact, a greater level of trust, and better mutual understanding (Cross, 2004). If these attributes facilitate information sharing among connected managers, social connections can result in more informed capital budgeting decisions and save resources on producing verifiable hard information. On the other hand, social connections may introduce favoritism and result in a bias known as homophily – an affection for similar others (McPherson, Smith-Lovin, and Cook, 2001). If social connections introduce favoritism, they are likely to cause agency-type distortions in capital allocation. This dual role of social connections, which offers diverging predictions for investment efficiency, provides a useful setting in which we can distinguish between the information and favoritism hypotheses in internal capital budgeting.

The conjecture that social connections may affect capital budgeting decisions is supported by earlier work, which shows that social networks influence corporate outcomes, such as executive compensation (Engelberg, Gao, and Parsons, 2009; Hwang and Kim, 2009; Shue 2010), financial policy (Fracassi 2008), governance (Fracassi and Tate, 2012), access to capital (Hochberg, Ljungqvist, and Lu, 2007; Engelberg, Gao, and Parsons, 2010), incidence of fraud (Chidambaran, Kedia, and Prabhala, 2010), earnings management (Hwang and Kim, 2011), and acquisition activity (Cai and Sevilir, 2009; Ishii and Xuan, 2009; Schmidt, 2009; Shue 2010).

Our main focus is on the social connections between divisional managers and the CEO, since the ultimate responsibility for the firm's investment strategy rests with the CEO. However, we also study divisional managers' connections to the CFO, the board of directors, and other divisional managers, who may plausibly assist the CEO with resource allocation. Consistent with prior literature, we define three types of social networks: connections via education, previous employment, and nonprofit organizations. Panel B of Table II provides a summary of divisional

managers' social connections via each of the three networks. Next, we briefly discuss the measures of connections.

Two managers are connected via *Nonprofit Organizations* if they share membership in the same nonprofit. These organizations typically include social clubs, religious organizations, philanthropic foundations, industry associations, and other nonprofit institutions defined in BoardEx as manager's other activities. These connections are specific to the organization's local chapter (e.g., Greenwich Country Club, United Way of Greater Toledo, the First Presbyterian Church of New Canaan, etc.). This level of granularity results from the highly detailed classification of nonprofit organizations in BoardEx, which includes over 15,000 local organizations for our sample of executives. In our sample, 3.8 percent of divisional managers share a nonprofit connection with the CEO, 0.8 percent are connected to the CFO, 10.5 percent are linked to one of the board members, and 5.1 percent are linked to at least one other divisional manager.

Educational connections foster a sense of belonging to a common group, which is evidenced by alumni clubs, donations to the home school, and college sports. We define two managers as connected via an *Educational* tie if they belong to the same alumni network, i.e. if they earned degrees from the same university. Using this type of connections, approximately 5.2 percent of divisional managers are connected to the CEO, 3.9 percent are connected to the CFO, 23.8 are connected to a board member, and 16.3 percent are connected to another divisional manager.

We define two executives as connected via *Previous Employment* if they worked together at another firm or served on the same board of directors. Panel B of Table II shows that 16.3 percent of divisional managers share this connection with the CEO, 8.8 percent are connected to the CFO, nearly 30 percent are linked to a board member, and 23.4 percent are connected to

another divisional manager. The majority of connections (65 percent) come from the employment during overlapping time, and all results hold under this more restrictive definition.

To measure the effect of social connections, we would also like to capture the uniqueness of a particular tie for a given firm, since the evidence in sociology suggests that social connections have a stronger effect when they are rare. For example, if a divisional manager worked with the CEO at another firm, we expect the effect of this connection to be stronger if no other managers share this type of connection. Therefore, to measure the effect of social connections on capital allocation, we evaluate connections of each divisional manager relative to those of other divisional managers in the same firm. This approach also parallels measuring capital allocation of a particular division relative to the allocations of other divisions within the same firm.

Our measure of social connections for each divisional manager in a given year is defined as the average number of connections between the divisional manager and the CEO based on education history, nonprofit work, and prior employment, adjusted for the average number of connections between all divisional managers and the CEO within the same firm:

$$Social\ connections_j = connection_j - \frac{\sum_{k=1}^{n}(connection_k)}{n}$$

where:

n – number of divisional managers in the firm in a given year;

$connection_j$ – average number of social connections between manager j and the CEO in a given year. [9]

[9] For example, suppose that a divisional manager went to the same school as the CEO and is also a member of the same nonprofit organization, but has no connection to the CEO via prior employment. In this case, the average number of connections for this manager, $connection_j$ = 0.67 (i.e. (1+1+0)/3). Also, suppose that the average number of connections to the CEO for all divisional managers for this firm and this year is 0.2. In this case, the variable *Social Connections* for this divisional manager is: 0.67 – 0.2 = 0.47.

The aggregation of connections formed via various networks into a summary measure is widely used in the social networks literature (e.g., Fracassi, 2008; Hwang and Kim, 2009, 2011; Schmidt, 2009; Fracassi and Tate, 2012). In section IV, we also disentangle the effects of each network and offer additional detail on the drivers of social connections within each network type.

In addition to social connections, which represent informal connections between divisional managers and the CEO, we would also like to capture measures of formal influence of divisional managers within the firm. We introduce the following 4 measures of formal influence: (1) board membership, (2) professional tenure at the firm, (3) seniority (as proxied by title), and salary rank. The details about the construction of these variables are summarized in Appendix A. The goal of this analysis is to compare the relative influence of formal authority to informal access to the CEO. Following a similar approach to that used for social connections, we measure formal influence of divisional managers relative to that of other divisional managers in the same firm. Our results are also similar if we use raw measures of formal influence and social connections without the adjustment for the average level of connections, as discussed in the robustness section.

II. Empirical Results

A Social Connections, Formal Influence, and Capital Allocation

We begin our analysis by presenting univariate results on the relation between divisional managers' social connections to the CEO and divisional capital allocation. Panels A and B of Table III report the tests of difference in means (t-test) and medians (Wilcoxon rank sum test), respectively. The relation between divisional managers' connections to the CEO and capital allocation to their division is uniformly positive and nearly always significant across all three measures of capital allocation and across multiple specifications – at the level of the firm-year,

industry-year, or entire sample. The magnitudes are also economically significant. For example, based on Panel A of Table III, the differences in the average industry-adjusted capital expenditure between divisions overseen by managers with high vs. low social connections to the CEO constitute 56.5% and 77.1% of the mean values for the industry-year and firm-year estimates, respectively. This evidence suggests that better-connected managers receive significantly more capital. Next, we proceed with formal regression analysis of this relation.

Panel C of Table III shows the results of panel regressions of divisional capital expenditure on the social connections of the divisional manager to the CEO and a set of division-level and manager-level controls. To control for firm-level characteristics and time effects, all regressions include firm- and year-fixed effects. Since capital allocations to one division likely affect capital allocations to other divisions at a firm, we cluster standard errors at the firm level.

In addition to the measures of informal influence (social connections), we also include proxies for the divisional manager's formal influence within a firm – board membership, professional tenure at the firm, seniority, and status as one of the firm's top paid executives listed on Execucomp.

We would also like to control for the skill of divisional managers. While managerial ability is inherently difficult to measure, we introduce several proxies for managerial skill. One measure, which we include in our main specification (Columns (1) – (3)), is the manager's relative performance, defined as the difference between the industry-adjusted ROA of the manager's division and the average industry-adjusted ROA of other divisions in the firm. This proxy is computed analogously to the relative performance measure in Billet and Mauer (2003).

The above measure, however, may capture division-level attributes that are correlated with capital allocation but unrelated to managerial skill. To mitigate this effect, we also measure the manager's performance record in his *previous* job. To construct this variable, we obtain the

history of managers' professional appointments from their executive biographies in BoardEx. This approach allows us to ascertain the immediately preceding position of 73% of the divisional managers in our sample. The most popular previous jobs of divisional managers include General Manager (38.3%), Divisional Manager (31.9%), and Functional Area President (11.4%).

To ensure consistency in measuring managerial performance in the previous professional position, we focus on the managers who were formerly employed as divisional managers in a different division of the same firm or at other firms in our sample (513 division-year observations). For this subset of managers, we measure managerial ability as the difference between the industry-adjusted ROA of the manager's division and the average industry-adjusted ROA of other divisions in the firm during the manager's previous professional appointment. Since this performance record is available only for a subset of managers, we do not adopt it as our main specification but rather present this evidence in Columns (4) – (6).

We complement these measures with indirect proxies of skill used in prior research. These measures include the average SAT score of the undergraduate institution attended by the divisional manager and a dummy indicating attendance of an Ivy League university.[10] This approach follows earlier studies that document a strong positive correlation between average SAT scores and managerial skill (Chevalier and Ellison, 1999; Li, Zhang, and Zhao, 2011).

Other independent variables include a set of the following controls: the division's relative Tobin's Q (defined as the difference between the industry-median Tobin's Q corresponding to the division and the asset-weighted average of Tobin's Q for other divisions in the same firm), the segment's cash flow, the correlation of the segment's cash flows with those of the firm, the

[10] Using the data from the College Board, we collect the college-average SAT scores reported in 1974 (when the average divisional manager likely applied to colleges) and 2004 (the middle of our sample). While the overall scores have increased significantly over this period, the relative rankings of colleges based on these scores are very similar. Since our results are similar for the scores in 1974 and 2004, we report results based on the 2004 data, since these data are more complete. For managers with foreign undergraduate degrees (approximately 8% of our sample), we use average scores in our sample.

absolute and relative measures of segment size, and the CEO stock ownership in the firm. These variables, described in Appendix A, are motivated by previous research on the determinants of capital allocation inside a firm (e.g., Shin and Stulz, 1998; Rajan, Servaes, and Zingales, 2000; Billet and Mauer, 2003; and Ozbas and Scharfstein, 2010).

The empirical results in Panel C of Table III indicate a positive relation between capital investment and divisional managers' social connections to the CEO, as captured by the variable *Social Connections*. This relation is consistently significant at the 5% level or better across all measures of divisional CapEx. The economic magnitudes are substantial and comparable in size across all columns: a one standard deviation increase in relative social connections of a divisional manager to the CEO is associated with a 9.2 percent increase in division's capital allocation. For a manager overseeing a division with median characteristics, this effect is associated with an extra $5.3 million in capital per year.[11] Our evidence suggests that divisional manager's social connections to the CEO capture a significant effect beyond managerial ability. As expected, the most direct measure of managerial ability – manager's relative performance (or performance record in the previous job for columns (4) - (6)) – is significantly positively related to division's capital allocation.

In contrast to the strong positive effect of social connections, measures of formal influence, such as manager's board membership, tenure, seniority, or high salary, are not significantly related to divisional capital allocation. Our results are also similar if we repeat the analysis with any one measure of formal influence or if we combine all measures of formal influence into an index (we discuss this in detail in the robustness section). Overall, our evidence suggests that informal connections via social networks dominate formal channels of influence.

[11] These estimates are based on Column (1) of Panel C and are calculated by multiplying the regression coefficient on *Connected* by the standard deviation of *Connected* (0.30), and dividing by the median *CAPEX* (0.026) to obtain the percent increase (9.2%), or multiplying by the median divisional book assets ($58 million) to obtain the dollar increase ($5.3 million).

We believe that several factors explain the weak influence of formal connections under both the favoritism and the information views. Under the favoritism view, divisional managers could use their formal influence, such as their board seat or greater seniority, to lobby the CEO for more capital in order to extract private rents. However, proxies of formal influence of top executives inside the firm are easily observed and monitored. The relative transparency with which formal connections can be monitored diminishes their potential role as a tunneling mechanism.[12] In contrast, informal connections via social networks, such as memberships in the same country club or joint participation in a particular non-profit, are much more subtle and opaque.

Under the information view, formal connections could serve as a channel of information transfer, which may enable the CEO to get valuable information from connected managers and make more efficient capital allocation decisions. At the same time, however, executives with strong formal influence typically have many other responsibilities within the firm in addition to their role as divisional managers. For example, divisional managers who serve on the firm's board devote their effort to various executive committees. Similarly, divisional managers who have a more senior title and earn a higher salary often hold another executive position within the firm (e.g. divisional manager and director of manufacturing). In fact, these shared responsibilities are often the reason why these managers have a more senior title or earn a compensation premium.

A number of studies show that multitasking by executives reduces the effort they devote to their primary professional role and diminishes their effectiveness (e.g., Ferris, Jagannathan, and Pritchard, 2003; Fich and Shivdasani, 2006; Agarwal and Ma, 2011). Under this interpretation, senior divisional managers, who perform other executive functions in the firm,

[12] For example, Tirole (2006) presents a model in which lower monitoring costs lead to a lower likelihood of agency-driven behavior.

can devote less time and effort to new investment projects. Therefore, the informational value of divisional managers' formal influence is likely offset by the negative effect of multitasking on a manager's productivity. In this case, a CEO would optimally choose not to allocate more capital to divisions of managers with greater formal influence, consistent with our evidence.

An analysis of other control variables suggests that divisional capital allocation is strongly positively related to division's Tobin's Q. This result is consistent with previous research (e.g., Shin and Stulz, 1998; Gertner, Powers, and Scharfstein, 2002; Maksimovic and Phillips 2002; Ozbas and Scharfstein, 2010). Our results also suggest that conglomerates invest more in larger segments, as measured by their relative size (assets) compared to other segments within the firm. Last, the effect of segment cash flow on divisional investment is generally positive, but the significance of this result varies across specifications.

In Columns (7) - (9) of Table III, we remove all division-year observations for which the operating segment reported on Compustat does not correspond to one operating division overseen by one divisional manager, as defined in the firm's organizational structure. The quantitative and qualitative conclusions remain very similar in this subsample.

In summary, managers with social connections to the CEO are allocated more capital. The effect of social networks reliably dominates measures of formal influence and persists after controlling for division-level factors, investment opportunities, and proxies for managerial skill.

B. Channels of Extra Investment Funds: Appointment and Capital Allocation

To capture the effect of the appointment channel, we investigate the relationship between divisional managers' attributes and observable characteristics of the divisions to which they are appointed. To test this relation, we focus on segment-year observations in which the divisional manager has changed (new appointments) but the CEO has not. In this regression analysis, the

dependent variable is one of the division's characteristics measured during the year preceding the manager's appointment. Division's characteristics include three measures of lagged CapEx (raw, industry-adjusted, and industry-firm adjusted), relative and absolute size of the division based on book assets, and two proxies for division's importance within the firm: (i) a dummy equal to one if the division is the largest division within the conglomerate and (ii) a dummy equal to one if the division operates in the core line of business of the firm, as proxied by the three-digit SIC code.

The independent variables include measures of the newly-appointed manager's social connections to the CEO, manager's formal influence in the firm, and manager's ability, each measured in the year of the appointment and defined analogously to the previous specification. As before, all regressions include firm and year fixed effects and use standard errors clustered at the firm level.

The results in Table IV indicate that managers with social connections to the CEO are appointed to divisions that historically received more capital, as measured by the lagged values of CapEx in the year preceding the appointment. These results are statistically significant at the 10 percent level for raw and industry-adjusted CapEx, and insignificant at conventional levels for industry-firm adjusted CapEx. To estimate the economic magnitude of this channel, we compute the fraction of extra capital allocated to a connected divisional manager during his tenure via this channel. According to the results in Table III, a one standard deviation increase in a divisional manager's social connections to the CEO corresponds to $5.3 million in extra annual CapEx. Based on the starting and ending dates of divisional managers' tenures, we estimate that the average tenure of a divisional manager is 5.7 years, and that connected divisional managers receive approximately $5.3 million $\cdot$ 5.7 years = $30.2 million in extra capital during their tenure. Based on Column (1) of Table IV, an increase of one standard deviation in connections to the CEO corresponds to $10.9 million more in lagged CapEx, suggesting that the appointment

channel accounts for approximately 10.9 / 30.2 = 36% of the extra capital allocated to connected divisional managers.

We do not find reliable evidence on the relation between managers' social connections to the CEO and assignment to larger divisions or core divisions of the firm. Among other variables, we find a positive and significant relation between managers' compensation and their appointments to larger divisions. There is also some weaker evidence that managers with arguably stronger educational backgrounds, as measured by the SAT scores of their undergraduate institutions, are assigned to divisions that historically received more investment funds.

Our specification in Table IV was developed under the assumption that appointments of divisional managers are based on historical characteristics of divisions. It is also possible that appointments of divisional managers incorporate forward-looking information about divisions. For example, well-connected divisional managers may be appointed to the divisions that are expected to receive more capital in the near future. In this case, our estimates of the economic magnitude of the appointment channel likely represent a lower bound for the amount of extra capital obtained by connected divisional managers via this channel.

To capture the effect of the capital allocation channel incremental to the appointment channel, we focus on CEO turnovers, a setting in which a manager's assignment to a division remains constant, but managerial connections experience a shock as a result of the CEO change. An important issue in this analysis is that some CEO turnovers may be driven by a change in the firm's investment opportunities or by the poor performance of the departing CEO, which may confound our tests. To mitigate this concern, we use a subset of CEO turnovers that are the least likely to be associated with managerial performance or a change in investment opportunities. In particular, we focus on the CEO turnovers that meet one of the following conditions:

1) The departing CEO dies, departs due to an illness, reaches the pre-specified age defined in the firm's succession plan, or is at least 60 years old.

2) The media article or the firm's press release explicitly states that the CEO change is part of the firm's succession plan.

These turnovers occur either unexpectedly or as part of the firm's management succession plan, and are unlikely to be caused by underperformance or capital misallocation. To classify CEO turnovers, we follow the approach of Huson, Parrino, and Starks (2001) and read the article in *The Wall Street Journal* and the firm's press release associated with the CEO change for the specific mentioning of the reasons for turnover. We also collect the CEO's age at the time of the turnover from BoardEx. We find that 69 percent of CEO turnovers in our sample satisfy these criteria, consistent with the frequency of voluntary CEO turnovers estimated in the literature (e.g., Yermack, 2006; Jenter and Kanaan, 2010; Falato, Li, and Milbourn, 2011).

Table V reports estimates from first-difference regressions, in which the dependent variable is the annual change in division's capital expenditure, for division-year observations where the CEO has changed from the previous year but the divisional manager has not. In columns (1) - (3), we use all CEO turnovers. In columns (4) – (6), we report the results for a subset of CEO turnovers that represent natural causes (death or illness), planned retirements, or succession plans, as defined above.

The test specification in Table V also mitigates the effect of omitted or unobservable characteristics of a divisional manager. To the extent that these characteristics remain constant within a short time window around the CEO turnover, this approach captures the effect of a change in managerial connections, while controlling for all other time-invariant managerial attributes.

The results in Table V suggest that when a divisional manager's social connections to the CEO increase as a result of the CEO change, the manager's division receives more capital. Similarly, when the connections weaken, the manager gets less capital. These results are statistically significant at the 5 percent level or better across all measures of CapEx and hold with similar magnitudes and significance levels for the subset of CEO turnovers unrelated to performance (columns (4) – (6)). Since the divisional manager remains unchanged and the new CEO is unlikely to have influenced the appointment of the divisional manager, which occurred well before the CEO's arrival, these results indicate that social connections affect capital allocation over and above the appointment channel.

To estimate the economic magnitude of the capital allocation channel, we calculate the fraction of extra capital allocated to a connected divisional manager during his tenure through this channel. Based on Column (1) of Table V, an increase of one standard deviation in social connections to the CEO corresponds to $21.6 million more in CapEx, thus suggesting that the capital allocation channel accounts for approximately 21.6 / 30.2 = 72% of the extra capital allocated to connected divisional managers.[13] In comparison to the appointment channel, the capital allocation channel appears to be about twice as important in internal capital markets.[14]

III. Managerial Connections, Investment Efficiency, and Firm Value

The evidence so far indicates that managers connected to the CEO receive larger capital allocations. These findings are consistent with both the favoritism and information hypotheses. In this section, we distinguish between these hypotheses by studying the effect of social

[13] It is possible that the newly-appointed CEO has less discretionary power in capital allocation during her first year of tenure, either because of planned budgets or because it takes time to learn the inner workings of the firm. Thus, our estimates likely represent a lower bound on the effect of connections on capital allocation around turnovers.

[14] Note that the economic magnitudes for both the appointment and capital allocation channels represent only rough approximations, since they are estimated using different specifications in samples of different size. For these reasons, the sum of the two magnitudes does not equal 100% of the extra funds received by connected divisional managers. These magnitudes are provided only to illustrate the relative importance of the two channels.

connections on investment efficiency and firm value. If social connections fuel favoritism, they are likely to have a negative effect on investment efficiency and firm value. On the other hand, if social connections foster information sharing, they can reduce information asymmetry and result in more efficient investment. If both effects play a role, we are interested in understating the conditions under which a particular effect dominates.

To disentangle the favoritism hypothesis from the information view, we interact the divisional managers' social connections with measures of agency and information asymmetry. To facilitate equitable comparison, we construct standardized indexes for each of the two attributes. The information asymmetry index combines three measures of information asymmetry: (1) dispersion of divisions across industries, measured as the percentage of a firm's divisions that operate in industries with non-overlapping two-digit SIC codes; (2) the Herfindahl index of the fraction of divisional sales in a firm's total sales; (3) geographic dispersion of business segments, calculated as the weighted-average straight-line distance between the firm's headquarters and its business segments, where the weight of each division is equal to the share of division's sales in total firm sales. The index averages a firm's percentile ranking in the sample according to each measure. We then scale the index to range from 0 (low) to 1 (high).

The agency index combines the following three measures in a similar way: (1) the Gompers, Ishii, and Metrick (2003) governance index; (2) the percentage of shares held by institutional investors; (3) the fraction of shares held by the top managers (for the latter two, the reverse ranking is used). Details on these variables are provided in Appendix A.

A. Investment Efficiency

To evaluate the aggregate effect of managerial connections on investment efficiency, we study the relation between social connections and the sensitivity of a firm's capital expenditures to investment opportunities of a division relative to investment opportunities in other divisions, as

proxied by division's relative Tobin's Q. A division's relative Tobin's Q is computed as the difference between the median Tobin's Q of the division and the asset-weighted average of these measures for other divisions of the firm, analogously to Rajan, Servaes, and Zingales (2000) and Billett and Mauer (2003). We use a relative, firm-specific Tobin's Q as proxy for investment opportunities, since most firms rarely invest in industries outside of their business segments. Our results remain very similar if we use an absolute rather than relative value of Tobin's Q.

Panel A of Table VI presents the results of pooled regressions in which the dependent variable is one of the measures of divisional capital investment. There are two independent variables of interest. The first is the interaction term of social connections with the agency and information asymmetry indexes. This term captures whether the association between social connections and capital investment varies with agency and information asymmetry. The second variable of interest is the triple interaction term of social connections, relative Tobin's Q, and the indexes of agency and information asymmetry. This term captures the effect of social connections on the sensitivity of capital allocation to investment opportunities, as proxied by the relative Tobin's Q of the division's industry. The sensitivity of investment to industry-level Q is a common measure of investment efficiency in the research on conglomerates (e.g., Billett and Mauer, 2003; Ozbas and Scharfstein, 2010). Other independent variables include the agency and the information asymmetry indexes, their interaction terms, CEO ownership and its interaction with relative Q, and the same set of controls as in our main specification. As before, we include year- and firm-fixed effects.

The interaction terms of managers' social connections and measures of agency and information asymmetry are positive and significant for all measures of capital investment. This evidence suggests that social connections have a stronger effect on capital investment both in settings characterized by higher information asymmetry and in firms with more severe agency

problems. The coefficients on the triple interaction term *Social Connections x Relative Q x Index* suggest that in settings with weaker governance (higher agency index), managerial connections are associated with a lower investment efficiency and a weaker response of capital expenditures to investment opportunities, as predicted in Rajan, Servaes, and Zingales (2000). This negative effect persists uniformly across all measures of capital investment. In contrast, in environments characterized by high information asymmetry, managerial connections are associated with a positive effect on investment efficiency, consistent with the theoretical predictions in Stein (2002). This effect is also uniform across all measures of capital investment.

We also find that the interaction term *CEO ownership x Relative Q* is positive and mostly statistically significant at the 10 percent level or better. These findings imply that CEO incentives matter. In particular, in the context of internal capital allocation, our findings suggest that higher CEO stock ownership, typically interpreted as a proxy for better incentive alignment between the CEO and shareholders, increases the sensitivity of capital investment to relative investment opportunities. These results are consistent with prior studies such as Ozbas and Scharfstein (2010).

In Panel B of Table VI, we estimate regressions separately for low Q and high Q divisions, defined as divisions with lower or higher Tobin's Q, respectively, compared to the firm-wide median Q of all divisions. These results paint a similar picture and refine our evidence. Managerial connections appear to skew capital from low Q to high Q divisions at firms with high intra-firm information asymmetry: the coefficient on the term *Social Connections x Information Asymmetry Index* that correspond to low Q (high Q) divisions is negative (positive). In contrast, at firms with poor governance, managerial connections are associated with more capital inflows into both low Q and high Q divisions, as shown by the positive and significant

coefficients on the term *Social Connections x Agency Index* across both high Q and low Q divisions.

Overall, the evidence in this section documents a dual effect of social connections on capital allocation and provides empirical support for both the favoritism and the information asymmetry hypotheses, associated with the opposite effects on investment efficiency. Next, we analyze the impact of social connections on firm value.

B. Firm Value

To study the value implications of social connections, we examine the relation between the variation in divisional managers' social connections across firms and their market value. In particular, we construct a firm-level measure of the overall level of intra-firm social connections. This variable, which we label *firm connectedness*, is the asset-weighted average number of social connections between all divisional managers and the CEO for a given firm in a given year.[15] We conjecture that a higher overall level of connectedness between divisional managers and the CEO may amplify both the favoritism and the information sharing effects on firm value.

To study the effect of connections on firm value, we follow Lang and Stulz (1994) and Berger and Ofek (1995) and define the excess value of a conglomerate as the natural logarithm of the ratio of the conglomerate's actual value to its imputed value. A firm's actual value is the sum of the book value of debt, liquidation value of preferred stock, and market value of equity. A firm's imputed value is the sum of the imputed values of its segments, where each segment's imputed value is equal to the segment's book assets multiplied by the median ratio of the market to book ratio for single-segment firms in the same industry (same three-digit SIC code).

[15] More formally, our measure of firm-level average *unadjusted* connections in a given year is defined as the asset-weighted average number of connections between all the divisional managers and the CEO based on education history, nonprofit work, and prior employment.

It should be noted that using single-segment firms as a benchmark for the valuation of conglomerates' segments is subject to the self-selection bias (i.e. the firm's endogenous decision to diversify). Graham, Lemmon, and Wolf (2002) empirically document this effect by showing that a large part of the difference in value between single-segment firms and their diversified peers can be explained by the decisions of conglomerates to acquire discounted firms. Campa and Kedia (2002) and Villalonga (2004) raise similar methodological issues and show that after controlling for selection, the diversification discount disappears. Hoberg and Philips (2011) show that the traditional matching of conglomerates to pure play firms by industry SIC codes can be imprecise, and propose an alternative matching scheme based on the textual analysis of firms' business descriptions. Whited (2001) and Colak and Whited (2007) stress the importance of accurate measurement of Tobin's Q. However, to the extent that the dispersion in managerial connections within each conglomerate is not correlated with the measurement error in Tobin's Q, these issues are less likely to affect our results.

Table VII presents the results of pooled regressions of conglomerates' excess values on firm connectedness and its interaction terms with the agency and information asymmetry indexes. Other independent variables include a set of controls, such as firm size, cash flow, CEO stock ownership, and the intra-firm dispersion in Tobin's Q across its segments.

The variables of interest are the interaction terms of the average number of managers' social connections inside the firm (*Firm connectedness*) and the indexes of agency and information asymmetry. The interaction term of *Firm connectedness* and the agency index is negative and statistically significant at the 1 percent level, suggesting that social connections are associated with lower value at firms with weak governance. The magnitude of the effect is nontrivial: based on Column (4), for firms in the top quartile on agency issues, a one standard deviation increase in connectedness is associated with a 5.6 percent reduction in excess value.

This is consistent with theoretical frameworks in Meyer, Milgrom, and Roberts (1992), Rajan, Servaes, and Zingales (2000), and Scharfstein and Stein (2000), which predict that managerial influence generates rent-seeking and resource misallocation. In our sample the value eroding effect of managerial connections arises at firms with more severe agency issues.

A different set of conclusions emerges when we focus on firms with high information asymmetry. The interaction term of *Firm connectedness* and the asymmetry index is positive and statistically significant at the 10 percent level or better. The economic magnitude is also substantial: based on Column (3), for firms in the top quartile on information asymmetry, a one standard deviation increase in connectedness is associated with a 3.4 percent increase in excess value. One possible explanation for this finding is that in environments characterized by high information asymmetry, social connections create value by fostering information sharing and reducing the cost of information verification, thus addressing a key factor determining a firm's investment efficiency in the theoretical framework of Wulf (2009).

In summary, the effect of social connections on firm value and investment efficiency depends on internal governance and intra-firm information asymmetry. When governance is weak, social connections erode investment efficiency and firm value, likely as a result of more severe favoritism and rent-seeking. When information asymmetry is high, social connections are positively associated with investment efficiency and firm value, consistent with facilitating the transfer of valuable information from the divisional managers to the CEO.

These results complement Glaser, Lopez-de-Silanes, and Sautner (2010), who study the internal capital market of a single European conglomerate, and show that managerial connections likely improve investment efficiency by reducing underinvestment via the distribution of cash windfalls. Our study finds a similar efficiency-improving effect of managerial connections and links this outcome to the reduction in the information asymmetry between the CEOs and

divisional managers in complex firms. One advantage of the cross-sectional analysis in our study is that we are able to identify firm-level factors that determine the value of managerial connections, namely, firm complexity and internal governance.

IV. Robustness and Extensions

A. Alternative Measures of Managerial Connections

Our main specification evaluates connections of each divisional manager relative to those of other divisional managers in the same firm. To assess the robustness of our results to alternative measures of divisional managers' connections, we also test two alternative specifications.

In the first alternative specification (Columns (1) – (3) in Panel A of Table VIII), we use the raw number of a divisional manager's social connections to the CEO, unadjusted for the average number of connections of other divisional managers within the same firm.[16] For consistency, we also use unadjusted measures of formal influence. As shown in Columns (1) – (3), we obtain the results that are very similar to those in our main specification. Unadjusted measures of divisional managers' social connections to the CEO have a positive effect on all three measures of CapEx and are statistically significant at the 1 percent level.

In the second alternative specification (Columns (4) – (6) of Panel A of Table VIII), we use an aggregate measure of a manager's formal influence inside the firm. While our previous results suggest that each individual measure of a manager's formal influence does not have a significant effect on capital allocation, it is possible that this effect, if any, could be identified by using an aggregate index of formal influence. To construct an index of a divisional manager's

[16] For example, if a divisional manager went to the same school as the CEO and is also a member of the same nonprofit organization, but has no connection to the CEO via prior employment, the unadjusted level of social connections would be 0.67 (i.e. (1+1+0)/3).

formal influence, we compute the average of the manager's dummy variables for board membership, seniority, long tenure, and high salary.

The results in Columns (4)-(6) are similar to those in our main specification. In particular, the aggregate measure of a manager's social connections to the CEO (variable *Social Connections*) is positively related to all three measures of divisional CapEx. This relation is significant at the 1 percent level and comparable in economic magnitude to the main specification. In contrast, the index of formal influence is insignificant across all specifications.

B. Reverse Causality between Social Connections and Capital Investment

It is also possible that managers of divisions that receive more capital end up developing closer connections with the CEO. Such a scenario would be consistent with a positive relation between social connections and capital investment, but would reflect the opposite causal direction.

To address this conjecture, we eliminate all connections that were established after the arrival of a divisional manager at the firm of interest. This filter eliminates approximately 18 percent of managerial connections, indicating that the vast majority of connections with available dates were formed before a particular divisional manager began work at a given firm. As an additional filter, we eliminate all managerial connections with ambiguous and missing dates. While most connections with missing dates were almost certainly formed before the appointment of a divisional manager, this filter provides a conservative robustness check for the possible reverse causality between managerial connections and capital allocation, even when this possibility is remote.

Columns (7) – (9) in Panel A of Table VIII present the results of our main specification estimated after imposing the requirement that all connections via education, membership in nonprofit organizations, and employment have a starting date that precedes the tenure of a

particular divisional manager in a given firm. After imposing this filter, we find a consistently positive relation between a divisional manager's social connections to the CEO and capital allocation to his division, a result that persists across all three measures of capital investment.

The magnitude of the effect is both economically and statistically significant. For example, based on Column (7), an increase of one standard deviation in social connections to the CEO corresponds to an increase of $4.0 million in divisional CapEx, significant at the 5 percent level. This evidence indicates that our findings are unlikely to be explained by reverse causality.

C. Which Connections Matter?

So far, our analysis has focused on the connections between divisional managers and the CEO. Next, we consider the effect of social connections to the CFO, the board of directors, and other divisional managers. To measure these connections, we use the same methodology as in our main analysis.

Panel B of Table VIII presents results of pooled regressions of divisional capital investment on divisional managers' social connections to the board, the CFO, and other divisional managers, measures of formal influence, and a vector of controls. The effect of connections to the board is positive and reliably significant for all measures of capital investment, except for raw CapEx, where the coefficient is significant at the 10 percent level.

The effect of connections to the CFO is positive but statistically insignificant. One interpretation of this evidence is that the CFO has less discretionary power to tilt a firm's capital allocation toward particular divisions. This evidence corroborates the findings in Graham, Harvey, and Puri (2010), who show that the primary decision-making authority in internal capital budgeting rests with the CEO rather than the CFO, and that CFOs rely significantly less in their decisions on the input from divisional managers. Consistent with both of these premises, we find

that connections between divisional managers and CFOs have much weaker effects on capital allocations both in magnitude and statistical significance.

We also find a positive, albeit relatively small and marginally statistically significant effect of social connections to other divisional managers on capital allocation. This outcome is consistent with the conjecture that divisional managers may be involved in the capital allocation process, and likely reflects weaker cash flow control rights of managers lower in the intra-firm hierarchy.

Next, we study the individual effects of each type of social networks: prior employment, nonprofits, and education. Panel A of Table IX presents the results of pooled regressions of divisional capital allocation on measures of social connections, broken down by the type of network. This analysis repeats our base specification, with the exception that connections to the CEO are constructed using only one type of network: education, employment, or nonprofits. The evidence paints a consistent picture: managers with social connections to the CEO are allocated more capital. This result holds uniformly across all network types and across all measures of capital investment, and is statistically significant at the 5 percent level or better in 8 of the 9 specifications.

The economic influence of social connections formed via various channels is also comparable. A one standard deviation increase in social connections via an educational network is associated with a 4.6 percent increase in annual CapEx to the average division. A one standard deviation increase in connections via prior employment is related to a 5.3 percent increase in the division's investment funds. A one standard deviation increase in nonprofits connections is associated with an 8.3 percent increase in the division's annual investment. The greater effect of connections via nonprofits, such as social clubs or charities, is intuitive, since these interactions

allow for closer and more informal contact. Next, we offer more detail on the type of connections within social networks.

To provide more refined evidence, we distinguish the following types of managerial degrees: PhD, MBA, Executive education, MD, Law (JD, LLM, LLB, etc.), other master's, and bachelor's. Panel B of Table IX provides the results of our base regressions of capital expenditures on managerial connections via educational networks, in which these connections are broken down by university degree. The results indicate that the effect of educational connections is driven primarily by graduate-level training. MBA connections have the strongest effect, followed by executive education, perhaps because these connections were formed more recently and represent smaller and more selective groups. For example, an increase of one standard deviation in connections to the CEO via an MBA network is associated with an 12.1 percent increase in capital expenditures.

Next, we examine nonprofit activities in more detail. In particular, we classify nonprofit organizations into the following groups: (1) ethnic and national, (2) education and science, (3) philanthropy, (4) social and sports clubs, (5) religious, (6) professional, and (7) hobbies. These categories cover 57 percent of organizations in our sample, with 38.9 percent of managers holding membership in at least one of the organizations. The remaining nonprofits, which we classify as other organizations, represent infrequent categories or have objectives that are broad or ambiguous. The details on our classification methodology appear in the Internet Appendix.

Panel C of Table IX presents the results of our base regressions of capital investment on social connections via nonprofits, in which these connections are broken down by organization category. We find that the strongest connections are formed via philanthropic activities and social clubs, such as golf, tennis, or country clubs. One interpretation of this evidence is that

these organizations foster stronger connections as a result of closer interaction based on shared interests (Cross, 2004).

Conclusion

This article examines the role of divisional managers in internal capital allocation. We distinguish among several theories of internal capital markets, according to which divisional managers can act as rent seekers, information providers, and CEO advocates. Our empirical findings suggest that the impact of divisional managers on internal capital investment depends on the richness of intra-firm information environment and the strength of corporate governance.

At firms characterized by high information asymmetry, where divisional managers are likely to possess valuable information about investment opportunities, social connections between divisional managers and the CEO are associated with higher investment efficiency and firm value. On the other hand, at firms with weak governance, which are more prone to agency-driven favoritism, managerial connections are negatively related to investment efficiency and firm value.

A large body of empirical research has focused on the analysis of chief executive and financial officers. Our evidence indicates that corporate managers at lower levels of hierarchy – vice presidents and divisional managers – play an important role in a firm's investment strategy and operating efficiency. Further analysis of this managerial group can provide new insights into firms' financial decisions and improve our understanding of the internal functioning of a firm.

References

Acharya, Viral, Stewart Myers, and Raghuram Rajan, 2011, The internal governance of firms, *Journal of Finance* 66, 689-720.

Agarwal, Vikas and Linlin Ma, 2011, Managerial multitasking in the mutual fund industry, Working paper.

Alchian, Armen Albert, 1969. Corporate Management and Property Rights, in: H. Manne, ed., Economic Policy and the Regulation of Corporate Securities (American Enterprise Institute, Washington, DC), 337–360.

Ahn, Seoungpil and David Denis, 2004, Internal capital markets and investment policy: evidence from corporate spinoffs, *Journal of Financial Economics* 71, 489-516.

Antle, Rick, and Gary D. Eppen, 1985, Capital rationing and organizational slack in capital budgeting, *Management Science* 3, 163-174.

Berger, Philip G., and Eli Ofek 1995, Diversification's effect on firm value, *Journal of Financial Economics* 37, 39-65.

Bernardo, Antonio E., Hongbin Cai, and Jiang Luo, 2001, Capital budgeting and compensation with asymmetric information and moral hazard, *Journal of Financial Economics* 61, 311−344.

Bernardo, Antonio E., Hongbin Cai, and Jiang Luo, 2004, Capital budgeting in multidivision firms: information, agency, and incentives, *Review of Financial Studies* 17, 739−767.

Billett, Matthew T., and David C. Mauer, 2003, Cross-subsidies, external financing constraints, and the contribution of the internal capital market to firm value, *Review of Financial Studies* 16, 1167-1201.

Cai, Ye and Merih Sevilir, 2009, Board connections and M&A transactions, working paper, University of North Carolina at Chapel Hill.

Campa, Jose and Simi Kedia, 2002, Explaining the diversification discount, *Journal of Finance* 57, 1731-1762.

Chevalier, Judith and Glenn Ellison, 1999, Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance, *Journal of Finance* 54, 875–899.

Chidambaran, N.K., Simi Kedia, and Nagpurnanand Prabhala, 2010, CEO-director connections and corporate fraud, working paper, Fordham University, Rutgers University, and the University of Maryland.

Cohen, Lauren, Andrea Frazzini, and Christopher J. Malloy, 2008, The small world of investing: board connections and mutual fund returns, *Journal of Political Economy* 116, 951-979.

Cohen, Lauren, Andrea Frazzini, and Christopher J. Malloy, 2010, Sell side school connections, *Journal of Finance* 65, 1409-1437.

Colak, Gonul and Toni Whited, 2007, Spin-offs, divestitures, and conglomerate investment, *Review of Financial Studies* 20, 557-595.

Cross, Robert, 2004. The Hidden Power of Social Networks: Understanding How Work Really Gets Done in Organizations (Harvard Business Press).

Denis, David, Diane Denis, and Atulya Sarin, 1997, Agency problems, equity ownership, and corporate diversification, *Journal of Finance* 52, 135-160.

Denis, David, Diane Denis, and Keven Yost, 2002, Global diversification, industrial diversification, and firm value, *Journal of Finance* 57, 1951-1980.

Engelberg, Joseph, Pengjie Gao, and Christopher A. Parsons, 2009, The value of a rolodex: CEO pay and personal networks, working paper, University of North Carolina and University of Notre Dame.

Engelberg, Joseph, Pengjie Gao, and Christopher A. Parsons, 2010, Friends with money, working paper, University of North Carolina and University of Notre Dame.

Falato, Antonio, Dan Li, and Todd Milbourn, 2011, To each according to his ability? CEO pay and the market for CEOs, working paper, Washington University in St. Louis.

Fama, Eugene, 1980, Agency problems and the theory of the firm, *Journal of Political Economy* 88, 288–307.

Ferris, Stephen P., Murali Jagannathan, and A.C. Pritchard, 2003, Too busy to mind the business? Monitoring by directors with multiple board appointments, *Journal of Finance* 58*,* 1087–1111.

Fich, Eliezer and Anil Shivdasani, 2006, Are busy boards effective monitors? *Journal of Finance* 61, 689-724.

Fracassi, Cesare, 2008, Corporate finance policies and social networks, working paper, University of Texas at Austin.

Fracassi, Cesare, and Geoffrey Tate, 2012, External networking and internal firm governance, *Journal of Finance* 67, 153-194.

Gertner, Robert, Eric Powers, and David Scharfstein, 2002, Learning about internal capital markets from corporate spin-offs, *Journal of Finance* 57, 2479-2506.

Glaser, Markus, Florencio Lopez-de-Silanes, and Zacharias Sautner, 2010, Opening the black box: internal capital markets and managerial power in conglomerates, working paper, University of Mannheim, EDHEC Business School, and University of Amsterdam.

Gompers, Paul A., Joy L. Ishii, and Andrew Metrick, 2003. Corporate governance and equity prices, *Quarterly Journal of Economics* 118, 107-155.

Graham, John R., Campbell R. Harvey, and Manju Puri, 2010, Capital allocation and delegation of decision-making authority within firms, working paper, Duke University.

Graham, John R., Michael L. Lemmon, and Jack J. Wolf, 2002, Does corporate diversification destroy value? *Journal of Finance* 57, 695-720.

Harris, Milton, and Arthur Raviv, 1996, The capital budgeting process: incentives and information, *Journal of Finance* 51, 1139-1174.

Harris, Milton, and Artur Raviv, 1998, Capital budgeting and delegation, *Journal of Financial Economics* 50, 259-289.

Harris, Milton, Charles H. Kriebel and Arthur Raviv, 1982, Asymmetric information, incentives and intra-firm resource allocation, *Management Science* 28, 604-620.

Hoberg, Gerard, and Gordon Philips, 2011, Conglomerate industry spanning, working paper, University of Maryland.

Hochberg, Yael V., Alexander Ljungqvist, and Yang Lu, 2007, Whom you know matters: venture capital networks and investment performance, *Journal of Finance* 62, 251-301.

Huson, Mark, Robert Parrino, and Laura Starks, 2001, Internal monitoring mechanisms and CEO turnover: a long-term perspective, *Journal of Finance* 56*, 2265-2297.*

Hwang, Byoung-Hyoun and Seoyoung Kim, 2009, It pays to have friends, *Journal of Financial Economics* 93, 138-158.

Hwang, Byoung-Hyoun and Seoyoung Kim, 2011, Earnings management and social connections, working paper, Purdue University.

Ishii, Joy and Yuhai Xuan, 2009, Acquirer-target social connections and merger outcomes, working paper, Stanford University and Harvard University.

Jenter, Dirk and Fadi Kanaan, 2010, CEO turnover and relative performance evaluation, *Journal of Finance*, forthcoming.

Khanna, Naveen and Sheri Tice, 2001, The bright side of internal capital markets, *Journal of Finance* 56, 1489-1531.

Kuppuswamy, Venkat and Belen Villalonga, 2010, Does diversification create value in the presence of external financing constraints? Evidence from the 2008–2009 financial crisis, working paper, Harvard University.

Lang, Larry, René Stulz, 1994, Tobin's Q, corporate diversification, and firm performance, *Journal of Political Economy* 102, 1248–1280.

Li, Haitao, Xiaoyan Zhang, and Rui Zhao, 2011, Investing in talents: manager characteristics and hedge fund performances, *Journal of Financial and Quantitative Analysis* 46, 59-82.

Lins, Karl and Henri Servaes, 1999, International evidence on the value of corporate diversification, *Journal of Finance* 54, 2215-2240.

Maksimovic, Vojislav, and Gordon Phillips, 2002, Do conglomerate firms allocate resources inefficiently across industries? Theory and evidence, *Journal of Finance* 57, 721-767.

Maksimovic, Vojislav, and Gordon Phillips, 2007. Conglomerate Firms and Internal Capital Markets, in Handbook of Corporate Finance, 1: Empirical Corporate Finance, edited by B. Espen Eckbo.

Matsusaka, John G., and Vikram K. Nanda, 2002, Internal capital markets and corporate refocusing, *Journal of Financial Intermediation* 11, 176–211.

McPherson, Miller, Lynn S. Smith-Lovin, and James M. Cook, 2001, Birds of a feather: homophily in social networks, *Annual Review of Sociology* 27, 415-444.

Meyer, Margaret, Paul Milgrom and Donald Roberts, 1992, Organizational prospects, influence costs, and ownership changes, *Journal of Economics and Management Strategy* 1, 10-35.

Milgrom, Paul, 1988, Employment contracts, influence Activities, and efficient organization design, *Journal of Political Economy* 96, 42-60.

Milgrom, Paul and Donald John Roberts, 1988, An economic approach to influence activities in organizations, *American Journal of Sociology* 94, 154-179.

Ozbas, Oguzhan and David S.Scharfstein, 2010, Evidence on the dark side of internal capital markets, *Review of Financial Studies* 23, 581-599.

Rajan, Raghuram, Henri Servaes, and Luigi Zingales, 2000, The cost of diversity: the diversification discount and inefficient investment, *Journal of Finance* 55, 35-80.

Scharfstein, David S., and Jeremy Stein, 2000, The dark side of internal capital markets: divisional rent seeking and inefficient investment, *Journal of Finance* 55, 2537-2564.

Schmidt, Breno, 2009, Costs and benefits of friendly boards during mergers and acquisitions, working paper, Emory University.

Servaes, Henri, 1996, The value of diversification during the conglomerate merger wave, *Journal of Finance* 51, 1201- 1225.

Shin, Hyun-Han and René M. Stulz, 1998, Are internal capital markets efficient? *Quarterly Journal of Economics* 113*,* 531-552.

Shue, Kelly, 2010, Executive networks and firm policies: evidence from the random assignment of MBA peers, working paper, the University of Chicago.

Stein, Jeremy, 1997, Internal capital markets and the competition for corporate resources, *Journal of Finance* 52, 111-133.

Stein, Jeremy, 2002, Information production and capital allocation: decentralized vs. hierarchical firms, *Journal of Finance* 57, 1891−1921.

Stein, Jeremy, 2003. Agency, Information and Corporate Investment, in Handbook of the Economics of Finance, edited by George M. Constantinides, Milton Harris and René M. Stulz, Elsevier, 111-165.

Tirole, Jean, 2006. The Theory of Corporate Finance, *Princeton University Press, Princeton*.

Villalonga, Belen, 2004, Does diversification cause the 'diversification discount'? *Financial Management* 33, 5-27.

Weston, J. Fred, 1970. Mergers and Acquisitions in Business Planning, *Rivista Internationale di Scienze Economiche e Commerciali*, 309-320.

Whited, Toni, 2001, Is it inefficient investment that causes the diversification discount? *Journal of Finance* 56, 1667-92.

Wulf, Julie, 2009. Influence and inefficiency in the internal capital market, *Journal of Economic Behavior and Organization* 72, 305-321.

Xuan, Yuhai, 2009, Empire-building or bridge-building? Evidence from new CEOs' internal capital allocation decisions, *Review of Financial Studies* 22, 4919-4948.

Yermack, David, 2006, Golden handshakes: separation pay for retired and dismissed CEOs, *Journal of Accounting and Economics* 41, 237-256.

Appendix A: Variable Definitions

1. Financial Variables

Note: All names in parentheses refer to the annual Compustat item name.

Capital expenditure – annual capital expenditure of the division (capx) divided by the division's book assets (at).

Industry-adjusted capital expenditure - annual capital expenditure of the division adjusted for the industry-specific variation in investment, as proxied by the median capital expenditure of pure-play firms in the division's industry. Formally,

$$Industry\ adjusted\ capital\ expenditure = \frac{CAPEX_j}{Assets_j} - \frac{CAPEX_j^{ss}}{Assets_j^{ss}}$$

where j = 1...N denotes segment j, and *ss* refers to single-segment firms in the particular industry based on the 3-digit SIC code.

Industry-firm-adjusted capital expenditure – Industry-adjusted capital expenditure further adjusted for the conglomerate's average investment across all divisions. Formally,

$$Industry - firm\ adjusted\ capital\ expenditure = \frac{CAPEX_j}{Assets_j} - \frac{CAPEX_j^{ss}}{Assets_j^{ss}} - \sum_{j=1}^{N} w_j \left(\frac{CAPEX_j}{Assets_j} - \frac{CAPEX_j^{ss}}{Assets_j^{ss}} \right)$$

where j = 1...N denotes segment j, and *ss* refers to single-segment firms in the particular industry based on the 3-digit SIC code, and w_j is the ratio of segment assets to firm assets.

Tobin's Q – market value of assets (book assets (at) + market value of common equity (csho*prcc) – common equity (ceq) – deferred Taxes (txdb)) / (0.9*book value of assets (at) + 0.1*market value of assets)

Industry-median Tobin's Q – the median Tobin's Q across all single-segment firms in the segment's 3-digit sic code industry.

Relative Tobin's Q of a division – the difference between the industry-median Tobin's Q of the division and the asset-weighted average of these measures for other divisions of the firm.

High Q (Low Q) division – division whose industry-median Tobin's Q is higher (lower) than the industry-median Q of all divisions in the firm.

Segment size and *Firm size* – the natural logarithm of the book assets (at) at the beginning of the year for the segment or for the firm, respectively.

Segment relative size – book value of segment's assets (at) divided by the sum of book assets across all segments of the firm. Book values are computed as of the beginning of the year.

Segment cash flow and *firm cash flow* – annual net sales (sale) divided by book assets (at) as of the beginning of the year, with variables computed at the segment level or at the firm level, respectively.

Segment ROA = annual operating profit of a segment (ops) divided by its book assets (at) as of the beginning of the year.

Relative ROA – the difference between the industry-adjusted ROA of the division and the average industry-adjusted ROA of other divisions in the firm. Industry-adjusted ROA of a division is the difference between the ROA of the division and the median ROA of single-segment firms in the division's industry (3-digit SIC code).

Largest segment – an indicator that equals 1 if the division is the largest division within the conglomerate, as measured by book assets at the beginning of the year.

Core segment – an indicator that equals 1 if the three-digit SIC code for the division matches the three-digit SIC code of the conglomerate.

CEO ownership – percent of a firm's outstanding common stock held by the CEO at the beginning of the year.

Cash flow correlation – the coefficient of correlation between segment cash flow and firm cash flow over the past 10 years.

Excess value – the natural logarithm of the ratio of the conglomerate's actual value to its imputed value. A firm's actual value is the sum of the book value of debt, liquidation value of preferred stock, and market value of equity. A firm's imputed value is the sum of the imputed values of its segments, where each segment's imputed value is equal to the segment's book assets multiplied by the median ratio of the market to book ratio for single-segment firms in the same industry (same three-digit SIC code).

Tobin's Q heterogeneity – the standard deviation of the industry-median Q of all divisions in the firm.

2. Demographic Variables

Board member - an indicator that equals 1 if the divisional manager is a member of the board of directors.

Senior – an indicator that equals 1 if a manager's role description on BoardEx includes "senior" or "executive".

Long tenure - an indicator that equals 1 if the divisional manager has been with the company more than 10 years.

High salary - an indicator that equals 1 if the divisional manager is listed among the firm's five highest-compensated executives on ExecuComp.

Ivy league - an indicator that equals 1 if the divisional manager holds a degree from an Ivy league school.

High avg. SAT score - an indicator that equals 1 if the divisional manager attended an undergraduate institution where the average SAT score in 2004 (median year in our sample) was above the sample median.

Social connections - summary measure of social connections of a divisional manager relative to other divisional managers in the same conglomerate. It is defined as the average connection between the divisional manager and the CEO based on education history, nonprofit work, and prior employment, adjusted for the average number of connections between divisional managers and the CEO within a firm. Formally,

$$Social\ Connections_j = connection_j - \frac{\sum_{k=1}^{n}(connection_k)}{n}$$

where:

n – number of divisional managers in the firm in a given year;
$connection_j$ – average number of connections between manager j and the CEO in a given firm in a given year.

Firm Connectedness – asset-weighted average number of social connections between all divisional managers and the CEO for a given firm in a given year.

Formal connections index – average value of the divisional manager's dummy variables for board membership, seniority, long tenure, high salary, attendance of an Ivy League university, and high SAT scores.

3. Information Asymmetry and Governance

Information asymmetry index – an index combining three measures of information asymmetry: (1) dispersion of divisions across industries, measured as the percentage of a firm's divisions that operate in industries with non-overlapping two-digit SIC codes; (2) the Herfindahl index of the fraction of divisional sales in a firm's total sales; (3) geographic dispersion of business segments, calculated as the weighted-average straight-line distance between the firm's headquarters and its business segments, where the weight of each division is equal to the share of division's sales in total firm sales. The index averages a firm's percentile ranking in the sample according to each measure. We then scale the index to range from 0 (low) to 1 (high).

Agency index – an index combining the following three measures of agency in a similar way to the information asymmetry index: (1) the Gompers, Ishii, and Metrick (2003) index; (2) the percentage of shares held by institutional investors; (3) the fraction of shares held by the top managers (for the latter two, the reverse ranking is used).

Internet Appendix*

A. Identifying Divisional Managers

Divisional managers typically have the title of divisional president, executive vice president, or senior vice president. In many cases, divisional managers' responsibilities are relatively transparent from their job title, biographic summary, the firm's organizational structure, and the description of segments in the annual report. To match divisional managers to firm's divisions, we use the following data sources: annual and quarterly reports, press releases, BoardEx, Reuters, Forbes Executive Directory, Marquis Who's Who, and Notable Names Database.

The following example illustrates matching managers to operating divisions based on a firm's annual report. According to Compustat, ADC Telecommunications (ADCT) had three business segments in 2008: Connectivity, Professional Services, and Network Solutions. By referencing the annual report of ADCT, we find that Patrick O'Brien, President, Connectivity, was in charge of the connectivity division in 2008. Next, we collect the starting and ending dates of each manager's divisional presidency. To obtain these dates, we supplement the annual data from form 10-K with executive biographies from the Forbes Executive Directory, Reuters, and Marquis's Who's Who databases, as well as a firms' press releases, to determine the month and year of each manager's appointment.

In some cases, there is no one-to-one correspondence between divisional managers in the annual report and the segment data in Compustat. These differences arise when a firm's segment reporting on Compustat is done at a more aggregate level compared to its divisional structure (e.g., by combining several divisions into one reporting unit). For example, Crane Company reports financial data for five segments in 2008, including a segment called Aerospace and

* Citation format: Duchin, Ran, and Denis Sosyura, 2012, Internet Appendix to "Divisional Managers and Internal Capital Markets," Journal of Finance, http://www.afajof.org/IA/2012.asp. Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing material) should be directed to the authors of the article.

Electronics. By reading the sections on executive management and segment reporting in Crane's annual report, we find that the Aerospace unit and the Electronics unit, while combined in financial reporting, are each overseen by their own divisional president: David Bender, Group President, Electronics and Gregory Ward, Group President, Aerospace. In this case, we assign both group presidents to the Aerospace and Electronics division. We manually reconcile each such difference to ensure accurate matching and to avoid the loss of observations. Situations in which multiple managers are assigned to the same division reported on Compustat are relatively rare and constitute 14 percent of our sample. Our results are unchanged if we remove these observations. These results are presented in Columns (7) – (9) of Panel C in Table III.

If more than one manager is assigned to a segment reported on Compustat, our empirical tests use the average level of connections for divisional managers in a particular segment. Our results are also similar if we use the maximum level of connections across the divisional managers assigned to a segment.

Last, some firms use a functional organization structure to define the responsibilities of their executives. At such companies, executives are assigned to functional roles, such as vice president of marketing, vice president of operations, and vice president of finance, and each executive supervises his or her entire functional area across all business units. Since we are unable to establish a clear correspondence between the executive and the business segment, we exclude these firms from our sample. We also eliminate companies for which we are unable to identify divisional managers based on any of our data sources, as discussed above.

B. Classification of Nonprofit Organizations

Methodology

To provide additional detail on managerial connections via nonprofit organizations, we classify these organizations into seven broad categories based on their focus. Our choice of classification categories (described below) is guided by the most prevalent organization types. Using these most common organization categories, we are able to classify 7,763 nonprofit organizations in our sample (57 percent of our sample). The remaining institutions represent less frequent organization types or organizations with objectives that are too broad or ambiguous. We classify these institutions as other organizations.

The classification is implemented by using a combination of key word searches for unambiguous entries (e.g. “golf club”, “tennis club” or “country club”) and manual classification based on reading the declared objective of the particular institution on its web page. One organization can be classified into several categories. For example, the Association of Black Engineers overlaps two categories: ethnic and professional. The classification groups are described in Table IA-I.

TABLE I

Summary Statistics

This table reports summary statistics for the sample, which consists of all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The values reported are time-series averages over the sample period. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A.

Variable	Mean	25th percentile	Median	75th percentile	Standard deviation
Company Level					
Tobin's Q	1.705	1.236	1.533	1.959	0.673
Cash flow/assets	0.086	0.059	0.095	0.129	0.102
Market value, $millions	34,089	5,539	11,055	28,344	87,257
Book assets, $millions	19,409	3,019	6,303	17,205	59,034
Number of business segments	3.425	2.000	3.000	4.000	1.359
Capital expenditure/assets	0.042	0.021	0.033	0.050	0.040
Segment level					
Connected	0.000	-0.167	0.000	0.143	0.304
Relative Q	-0.028	-0.289	-0.039	0.259	0.357
Relative ROA	0.002	-0.036	0.002	0.024	0.434
Capital expenditure, $millions	198	19	58	155	477
Capital expenditure/assets	0.035	0.021	0.026	0.039	0.028
Sales, $millions	3,892	710	1,767	4,139	6,109
Book assets, $millions	3,612	627	1,505	3,613	6,264
Industry adjusted capital expenditure	0.017	-0.011	0.006	0.033	0.072
Industry-firm adjusted capital expenditure	0.000	-0.014	-0.001	0.013	0.059

TABLE II

Divisional Managers

This table describes the 1,105 divisional managers in our sample, which consists of all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A. Panel A describes personal characteristics related to the divisional managers' employment in the company, as well as educational background and nonprofit activity. Panel B describes the frequency of social connections of the divisional managers to the company's top management and other divisional managers. Details on our nonprofit category classification are available in the Internet Appendix. Each observation in this table corresponds to a unique year-firm-segment-manager combination.

Panel A: Characteristics of Divisional Managers

Continuous Variables	**Mean**	**Standard deviation**	**N_obs**
Tenure with the company	12.66	10.90	2,936
Age	51.54	6.00	2,936
Salary ($000), managers on ExecuComp	852	699	1,672
Indicator Variables	**Number**	**Percentage**	**N_obs**
General			
Male	2,698	91.89	2,936
Board member	385	13.11	2,936
Senior	1,542	52.52	2,936
Education			
Bachelor's degree	2,864	97.55	2,936
Masters degree	1,823	62.09	2,936
PhD degree	125	4.26	2,936
MBA degree	1,081	36.82	2,936
Executive education	336	11.44	2,936
Law degree	76	2.59	2,936
MD degree	11	0.37	2,936
Nonprofit work			
Ethnic or national	226	7.70	2,936
Education and science	1,016	34.60	2,936
Philanthropy	789	26.87	2,936
Social or sports clubs	181	6.16	2,936
Religious	52	1.77	2,936
Professional	234	7.97	2,936
Hobbies	263	8.96	2,936

Panel B: Social connections between Divisional Managers and Top Management or Other Divisional Managers

Connection type	CEO	CFO	Any board member	Other divisional managers
Education				
Same university	5.18%	3.88%	23.75%	16.34%
Same degree	43.13%	36.42%	72.25%	58.13%
Same university and degree	1.35%	1.84%	10.78%	7.96%
Same university and graduation date	0.69%	0.19%	3.03%	0.78%
Nonprofit work				
Same organization	3.83%	0.83%	10.52%	5.07%
Same category	28.43%	13.92%	39.57%	26.65%
Other employment				
Worked for the same company	16.26%	8.79%	29.95%	23.39%
Worked for the same company at the same time	10.64%	6.03%	17.87%	8.83%

TABLE III

Social Connections of Divisional Managers and Internal Capital Allocation

This table presents evidence on the relation between social connections of divisional managers to the CEO and the ratio of segment-level capital expenditure to book assets. The key variable of interest is *Social Connections*, defined as the average connection between the divisional manager and the CEO based on education history, nonprofit work, and prior employment, adjusted for the average number of connections between divisional managers and the CEO within a firm. Panel A presents difference-in-means estimates, whereas Panel B presents median estimates. Panel C presents estimates from panel regressions. In Panel A (B), the sample-wide estimates compare between the average (median) CAPEX across segments divided around the median sample-wide level of adjusted social connections. The firm-year estimates compare between segments divided around the median level of adjusted connections in their firm for each year. The industry-year estimates compare between segments divided around the median level of adjusted social connections in their industry for each year. In Panel C, Columns (4)-(6) exclude segment-year observations that do not correspond to one operating division overseen by one divisional manager. Columns (7)-(9) report the *Relative ROA* of the previous division overseen by the divisional manager. The sample consists of all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A. All the regressions in Panel C include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the division level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A: Univariate Evidence about Means

Estimate	Investment measure	Low social connections	High social connections	Difference	t-statistic
Sample wide	CAPEX	0.0521	0.0524	0.0003	0.0969
	Industry-adjusted CAPEX	0.0163	0.0173	0.0010	0.3571
	Industry- firm-adjusted CAPEX	-0.0010	0.0052	0.0062	2.4261***
Firm-year	CAPEX	0.0502	0.0604	0.0102	3.1980***
	Industry-adjusted CAPEX	0.0143	0.0273	0.0131	3.9693***
	Industry- firm-adjusted CAPEX	0.0006	0.0115	0.0109	3.5503***
Industry-year	CAPEX	0.0502	0.0570	0.0068	2.4304***
	Industry-adjusted CAPEX	0.0140	0.0235	0.0096	3.3283***
	Industry- firm-adjusted CAPEX	0.0008	0.0074	0.0066	2.4913***

Panel B: Univariate Evidence about Medians

Estimate	Investment measure	Low social connections	High social connections	Difference	Wilcoxon rank sum (Prob > |z|)
Sample wide	CAPEX	0.0382	0.0395	0.0013	0.0009
	Industry-adjusted CAPEX	0.0063	0.0069	0.0006	0.0002
	Industry- firm-adjusted CAPEX	-0.0005	0.0000	0.0005	0.0001
Firm-year	CAPEX	0.0385	0.0386	0.0001	0.1373
	Industry-adjusted CAPEX	0.0060	0.0087	0.0027	0.0014
	Industry- firm-adjusted CAPEX	-0.0002	0.0009	0.0011	0.0002
Industry-year	CAPEX	0.0386	0.0388	0.0003	0.0219
	Industry-adjusted CAPEX	0.0056	0.0090	0.0035	0.0001
	Industry- firm-adjusted CAPEX	-0.0001	0.0000	0.0001	0.0004

Panel C: Regression Evidence

Dependent variable	CAPEX	Industry-adjusted CAPEX	Industry- Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry- Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry- Firm-adjusted CAPEX
Sample		Full Sample		Managers with information about prior performance			Exclude managers overseeing multiple divisions		
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Social connections	0.008**	0.011***	0.011***	0.008**	0.009**	0.012***	0.007**	0.007***	0.008***
	[1.977]	[2.703]	[2.823]	[2.446]	[2.474]	[2.659]	[2.383]	[2.611]	[2.793]
Relative Q	0.005**	0.009**	0.009***	0.019*	0.027*	0.029**	0.005**	0.007***	0.008***
	[2.064]	[2.573]	[2.620]	[1.849]	[1.885]	[2.047]	[2.493]	[2.619]	[3.001]
Segment size	-0.026***	-0.026***	-0.024***	-0.023**	-0.022*	-0.023**	-0.015***	-0.016***	-0.014***
	[9.067]	[8.845]	[8.456]	[2.113]	[1.908]	[2.076]	[6.627]	[6.586]	[6.267]
Segment relative size	0.108***	0.079***	0.080***	0.217***	0.212***	0.205***	0.067***	0.038***	0.039***
	[8.183]	[5.925]	[6.127]	[3.878]	[3.697]	[3.688]	[6.430]	[3.564]	[3.855]
Segment cash flow	0.010	0.001	-0.003	-0.003	-0.001	-0.001	-0.006	0.005	0.001
	[1.011]	[0.226]	[0.560]	[1.170]	[0.429]	[1.055]	[1.505]	[1.304]	[0.367]
Relative ROA	0.069***	0.064***	0.065***	0.034**	0.030**	0.033*	0.025***	0.020***	0.020***
	[7.105]	[5.533]	[6.235]	[2.853]	[2.755]	[1.825]	[7.700]	[5.955]	[6.319]
CEO ownership	0.009	0.022	0.002	0.012	0.008	0.009	0.018	0.013	0.009
	[0.155]	[0.385]	[0.030]	[0.587]	[0.312]	[0.466]	[0.416]	[0.279]	[0.214]
Cash flow correlation	0.006**	0.006**	0.005*	0.006	0.006	0.005	0.006***	0.006***	0.005**
	[2.102]	[2.133]	[1.805]	[0.582]	[0.614]	[0.460]	[2.770]	[2.715]	[2.393]
Board member	-0.011	-0.009	-0.009	0.044	0.036	0.042	-0.009	-0.007	-0.007
	[1.013]	[1.498]	[1.548]	[1.243]	[1.010]	[1.199]	[1.042]	[1.434]	[1.506]
Senior	0.006	0.005	0.005	-0.020	-0.020	-0.022	0.003	0.001	0.002
	[1.334]	[1.022]	[1.032]	[0.808]	[0.795]	[0.914]	[0.805]	[0.399]	[0.476]
Long tenure	-0.003	0.000	0.000	-0.003	-0.004	-0.001	0.000	0.002	0.003
	[0.837]	[0.049]	[0.065]	[0.138]	[0.168]	[0.046]	[0.166]	[0.790]	[0.889]
High salary	-0.002	-0.004	-0.004	0.012	0.014	0.013	-0.004	-0.006	-0.006
	[0.508]	[1.038]	[1.055]	[0.771]	[0.885]	[0.809]	[1.504]	[1.068]	[1.077]
Ivy league	-0.014	-0.008	-0.008	-0.032	-0.024	-0.023	-0.007*	-0.002	-0.001
	[1.482]	[1.511]	[1.512]	[0.994]	[0.739]	[0.703]	[1.668]	[0.369]	[0.199]
High avg. SAT score	0.001	0.000	0.000	-0.009	-0.007	-0.007	0.001	0.000	-0.001
	[0.424]	[0.131]	[0.086]	[0.398]	[0.327]	[0.312]	[0.355]	[0.015]	[0.195]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.317	0.288	0.217	0.708	0.693	0.701	0.362	0.322	0.181
N_obs	3,054	2,936	2,936	513	513	513	2,626	2,525	2,525

TABLE IV

The Appointment Channel

This table presents estimates from panel regressions, in which the dependent variable is one of the characteristics of a division to which a particular manager is assigned at the time of turnover. The sample includes segment-year observations where the divisional manager has changed from the previous year but the CEO has not changed. The base sample includes all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A. All regressions include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the division level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Dependent variable	CAPEX, lagged	Industry-adjusted CAPEX, lagged	Industry-firm-adjusted CAPEX, lagged	Size, lagged	Largest segment dummy, lagged	Relative size, lagged	Core segment
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social connections of incoming divisional manager	0.024* [1.755]	0.026* [1.703]	0.021 [1.377]	-0.092 [0.855]	-0.093 [1.227]	-0.029 [0.885]	-0.040 [0.543]
Board member	-0.016 [0.828]	-0.019 [0.912]	-0.019 [0.873]	0.006 [0.027]	-0.080 [0.566]	0.001 [0.022]	-0.043 [0.393]
Relative ROA	-0.015 [0.643]	-0.003 [0.135]	-0.007 [0.292]	-0.006 [0.032]	-0.083 [0.592]	-0.010 [0.176]	-0.165 [1.205]
Senior	0.001 [0.067]	0.006 [0.303]	0.009 [0.491]	0.164 [1.101]	-0.098 [0.929]	-0.036 [0.773]	-0.157 [1.528]
Long tenure	0.009 [0.776]	0.010 [0.765]	0.007 [0.551]	0.164 [1.409]	0.084 [1.015]	0.044 [1.332]	0.134* [1.670]
High salary	-0.002 [0.157]	-0.002 [0.182]	-0.006 [0.453]	0.251** [2.165]	0.237*** [2.870]	0.070** [2.092]	0.042 [0.529]
Ivy league	-0.017 [0.853]	-0.029 [1.326]	-0.039* [1.797]	-0.032 [0.173]	-0.097 [0.742]	-0.019 [0.361]	0.183 [1.444]
High avg. SAT score	0.018 [1.529]	0.025* [1.916]	0.027** [2.068]	0.077 [0.693]	0.058 [0.732]	0.034 [1.081]	-0.091 [1.182]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.571	0.592	0.382	0.812	0.542	0.582	0.550
N_obs	221	221	221	221	221	221	221

TABLE V

The Capital Allocation Channel: CEO Turnover

This table presents estimates from first-difference regressions, in which the dependent variable is the annual change in the ratio of segment-level capital expenditure to book assets, for segment-year observations where the CEO has changed from the previous year but the divisional manager has not changed. Columns (4)-(6) correspond to turnovers in which the CEO departed as part of a succession plan, due to health reasons (including deaths), or retired at the age of 60 or older. The base sample includes all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A. The regressions include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the division level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Dependent variable	ΔCAPEX	ΔIndustry-adjusted CAPEX	ΔIndustry-Firm-adjusted CAPEX	ΔCAPEX	ΔIndustry-adjusted CAPEX	ΔIndustry-Firm-adjusted CAPEX
Turnovers	All			Succession/Health/Age		
Model	(1)	(2)	(3)	(4)	(5)	(6)
ΔSocial connections	0.040** [2.318]	0.045*** [2.705]	0.045*** [2.755]	0.036** [2.436]	0.039*** [2.678]	0.041*** [2.733]
ΔRelative Q	0.010 [1.152]	0.019* [1.968]	0.015* [1.714]	0.011* [1.676]	0.007* [1.808]	0.012* [1.703]
ΔSegment size	-0.026 [1.586]	-0.029 [1.569]	-0.022 [1.308]	-0.026 [1.363]	-0.024 [1.147]	-0.020 [1.019]
ΔSegment relative size	-0.018 [0.230]	-0.021 [0.235]	-0.046 [0.565]	-0.007 [0.076]	-0.036 [0.346]	-0.088 [0.920]
ΔSegment cash flow	0.057 [0.740]	0.062 [0.813]	0.054 [0.709]	0.019 [0.434]	0.019 [0.395]	0.038 [0.837]
ΔRelative ROA	0.081*** [3.554]	0.080*** [3.648]	0.078*** [3.361]	0.068** [2.251]	0.075** [2.377]	0.081*** [3.192]
ΔCEO ownership	1.240* [1.664]	1.297* [1.737]	1.307* [1.745]	1.098 [0.712]	1.283 [1.005]	1.132 [0.714]
ΔCash flow correlation	0.021* [1.922]	0.022* [1.897]	0.024** [2.135]	0.013** [2.206]	0.014** [2.106]	0.021** [2.328]
ΔBoard member	0.001 [0.072]	-0.006 [0.356]	-0.007 [0.424]	0.002 [0.143]	-0.005 [0.258]	-0.005 [0.329]
ΔSenior	-0.004 [0.457]	-0.004 [0.370]	-0.004 [0.405]	-0.004 [0.353]	-0.003 [0.269]	-0.003 [0.265]
ΔLong tenure	0.009 [1.098]	0.006 [0.746]	0.005 [0.676]	0.007 [0.800]	0.005 [0.525]	0.004 [0.458]
ΔHigh salary	-0.005 [1.290]	0.005 [0.864]	0.006 [0.978]	0.005 [0.716]	0.007 [0.980]	0.012 [0.756]
ΔIvy league	0.031 [0.748]	0.035 [0.772]	0.027 [0.641]	0.020 [0.314]	0.017 [0.248]	0.015 [0.241]
ΔHigh avg. SAT score	0.011 [0.245]	0.011 [0.242]	0.008 [0.177]	0.024 [1.177]	0.033 [1.467]	0.011 [0.539]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.534	0.543	0.571	0.546	0.557	0.587
N_obs	306	306	306	211	211	211

TABLE VI

Information Asymmetry, Agency, and Allocation Efficiency

This table presents estimates from panel regressions, in which the dependent variable is the ratio of segment-level capital expenditure to book assets. Subsidy is the difference between segment capital expenditures and after-tax cash flows, and is calculated similar to Billett and Mauer (2003). In Panel B, the regressions are estimated separately for *Low Q* (*High Q*) divisions, defined as divisions with lower (higher) Tobin's Q than the firm-wide median Q of all divisions. The sample includes all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A. All regressions control for *Segment size, Segment relative size, Segment cash flow, Board Member, Senior, Long tenure, High salary, and High avg. SAT score* (unreported for brevity). The regressions also include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the division level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A: Connections and the Sensitivity of Capital Allocation to Investment Opportunities

Dependent variable	CAPEX		Industry-adjusted CAPEX		Industry- Firm-adjusted CAPEX		Subsidy	
Index type	Information asymmetry	Agency	Information asymmetry	Agency	Information asymmetry	Agency	Information asymmetry	Agency
Social connections	0.031 [1.361]	-0.015 [0.580]	0.039 [1.529]	0.009 [0.341]	0.036 [1.632]	0.005 [0.208]	0.031 [0.997]	-0.003 [0.088]
Index	-0.021 [1.088]	-0.015 [0.827]	-0.009 [0.447]	-0.022 [1.220]	-0.022 [1.127]	-0.004 [0.227]	0.042** [2.503]	-0.059** [2.418]
Relative Q	0.034** [2.084]	0.011 [0.713]	0.026 [1.576]	0.036** [2.392]	0.026 [1.628]	0.039*** [2.671]	0.029 [1.262]	0.021 [1.030]
Social connections x Index	0.071*** [2.698]	0.073** [2.057]	0.066*** [2.839]	0.064** [2.114]	0.072*** [2.846]	0.059** [2.319]	0.034*** [2.901]	0.038** [2.512]
Social connections x Relative Q	0.025 [0.434]	0.024 [0.406]	0.031 [0.535]	0.029 [0.477]	0.024 [0.422]	0.012 [0.209]	-0.013 [0.162]	-0.021 [0.260]
Index x Relative Q	-0.053 [1.067]	-0.012 [0.458]	-0.023 [0.789]	-0.041 [1.542]	-0.023 [0.813]	-0.046 [1.007]	-0.044 [1.131]	-0.031 [0.866]
Social connections x Relative Q x Index	0.034** [2.532]	-0.026* [1.793]	0.027** [2.118]	-0.031*** [2.919]	0.035** [2.248]	-0.029** [2.394]	0.092** [2.285]	-0.069** [2.176]
CEO ownership	-0.035 [0.496]	-0.057 [0.770]	-0.036 [0.512]	-0.077 [1.043]	-0.057 [0.826]	-0.094 [1.299]	-0.021 [0.219]	-0.087 [0.878]
CEO ownership x Relative Q	0.034* [1.780]	0.060* [1.894]	0.085* [1.752]	0.147** [2.162]	0.087 [1.524]	0.153** [2.309]	0.066* [1.822]	0.132* [1.911]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.242	0.242	0.224	0.224	0.143	0.143	0.299	0.298
N_obs	3,054	3,054	2,936	2,936	2,936	2,936	2,936	2,936

Panel B: Connections and Capital Allocation to Low/High Q Divisions

Dependent variable	Industry-adjusted CAPEX				Industry- Firm-adjusted CAPEX			
Division's investment opportunities	Low Q		High Q		Low Q		High Q	
Index type	Information asymmetry	Agency	Information asymmetry	Agency	Information asymmetry	Agency	Information asymmetry	Agency
Social connections	0.017 [1.251]	-0.020 [1.146]	0.018 [1.511]	0.015 [0.234]	0.016 [1.261]	-0.013 [0.810]	0.018 [1.485]	0.024 [0.366]
Index	-0.010 [0.626]	-0.014 [1.026]	-0.098 [1.435]	-0.024 [0.471]	-0.020 [1.294]	0.003 [0.209]	-0.070 [1.026]	-0.001 [0.021]
Social connections x Index	-0.013* [1.708]	0.056** [2.379]	0.238** [2.131]	0.081* [1.725]	-0.012** [2.520]	0.043** [2.429]	0.231** [2.064]	0.101** [1.988]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.343	0.345	0.274	0.267	0.199	0.200	0.257	0.251
N_obs	1,468	1,468	1,468	1,468	1,468	1,468	1,468	1,468

TABLE VII

Social Connections of Divisional Managers and Value

This table presents estimates from panel regressions, in which the dependent variable is the firm's excess value. Firm connectedness is the asset-weighted average number of social ties between all divisional managers and the CEO for a given firm in a given year. All variable definitions are given in Appendix A. All regressions include year fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the firm level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Model number	(1)	(2)	(3)	(4)	(5)
Firm connectedness	0.137*** [2.655]	0.073** [2.448]	0.258** [2.385]	0.589*** [3.569]	0.525*** [2.588]
Information asymmetry index			-0.246 [1.477]		-0.211 [1.266]
Firm connectedness x Information asymmetry index			0.530** [2.186]		0.203* [1.710]
Agency index				-0.225* [1.821]	-0.222 [1.099]
Firm connectedness x Agency index				-1.035*** [3.242]	-1.085*** [3.363]
Tobin's Q heterogeneity		-0.705*** [7.230]	-0.811*** [7.394]	-0.708*** [7.279]	-0.826*** [7.562]
Cash flow		1.383*** [5.684]	1.467*** [5.951]	1.382*** [5.713]	1.481*** [6.044]
Size		0.036* [1.877]	0.030 [1.536]	0.046** [2.380]	0.038** [1.963]
CEO ownership		0.015*** [2.678]	0.015*** [2.801]	0.016*** [2.651]	0.017*** [2.827]
Year fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.024	0.117	0.121	0.129	0.134
N_obs	949	949	949	949	949

TABLE VIII

Robustness and Extensions

This table presents estimates from panel regressions, in which the dependent variable is the ratio of segment-level capital expenditure to book assets. The sample consists of all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A. The control variables are similar to those in Panel C of Table III (unreported for brevity). All regressions include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the division level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A: Robustness Tests

Description	Unadjusted managerial connections			Index of formal connections			Connections formed before current employment		
Dependent variable	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Social connections	0.011*** [3.537]	0.016*** [4.064]	0.014*** [3.911]	0.012*** [3.807]	0.015*** [4.121]	0.014*** [3.955]	0.011** [2.263]	0.008* [1.902]	0.009* [1.886]
Formal connections index				-0.003 [0.609]	-0.003 [0.513]	-0.004 [0.647]			
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.248	0.237	0.148	0.224	0.201	0.103	0.258	0.220	0.105
N_obs	3,054	2,936	2,936	3,054	2,936	2,936	3,054	2,936	2,936

Panel B: Social Connections to Board Members, the CFO, and other Divisional Managers

Connection type	Any board Member			CFO			Other divisional managers		
Dependent variable	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Social connections	0.005* [1.704]	0.010*** [2.785]	0.009*** [2.828]	0.002 [0.849]	0.008 [1.011]	0.006 [1.228]	0.004 [1.255]	0.006* [1.749]	0.007* [1.684]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.249	0.194	0.144	0.258	0.222	0.101	0.204	0.219	0.124
N_obs	3,054	2,936	2,936	3,054	2,936	2,936	3,054	2,936	2,936

TABLE IX
Connection Types of Divisional Managers and Internal Capital Allocation

This table presents estimates from panel regressions, in which the dependent variable is the ratio of segment-level capital expenditure to book assets. The table presents evidence on the effect of various types of social networks on internal capital allocation. Panels A, B, and C provide evidence broken down by network category, university degree, and the type of nonprofit organization, respectively. The classification of nonprofit organizations is provided in the Internet Appendix. The sample includes all industrial companies in the S&P 500 index, which operate in at least two business segments and provide data on segment capital expenditures and book assets. The sample period is from 2000 to 2008. All variable definitions are given in Appendix A. All regressions include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the division level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A: Breakdown into Education, Nonprofit, and Employment Connections

Connection type	Education			Nonprofit			Other employment		
Dependent variable	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX
Column number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Social connections	0.004* [1.812]	0.007** [2.254]	0.007** [2.207]	0.010** [2.546]	0.013*** [2.980]	0.013*** [3.118]	0.005** [2.464]	0.005** [2.544]	0.004** [2.315]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.235	0.203	0.135	0.208	0.223	0.130	0.242	0.180	0.121
N_obs	3,054	2,936	2,936	3,054	2,936	2,936	3,054	2,936	2,936

Panel B: Educational Connections

Degree	Bachelor's	Masters	PhD	MBA	ExecEd	Law	MD
Social connections	0.004 [1.236]	0.000 [0.042]	-0.014 [0.858]	0.016*** [3.361]	0.012** [2.301]	-0.021 [0.944]	0.000 [0.031]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.115	0.136	0.103	0.098	0.151	0.124	0.105
N_obs	2,936	2,936	2,936	2,936	2,936	2,936	2,936

Panel C: Nonprofit Connections

Category	Ethnic or national	Education and science	Philanthropy	Social or sports clubs	Religious	Professional	Hobbies
Social connections	0.006 [0.994]	0.001 [0.071]	0.021*** [2.996]	0.030** [2.316]	0.000 [0.904]	0.006 [0.547]	0.007 [0.844]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.099	0.126	0.123	0.098	0.134	0.151	0.142
N_obs	2,936	2,936	2,936	2,936	2,936	2,936	2,936

Table IA-I: Categories of Nonprofit organizations

This table provides details on our classification of nonprofit organizations according to seven common categories. The classification covers 7,763 organizations (57% of all nonprofit organizations in our sample), which can be unambiguously classified into one or several of the most frequent categories.

Category	Description	Examples
Ethnic or national	Organizations with an ethnic, racial, or national focus	100 Black Men; Asian American Federation; Latin American Association; Canadian Club
Education and science	Primary and secondary schools; boards of trustees of colleges and universities; research and science institutes	New Visions for Public Schools; National Science Foundation; Social Science Research Council
Philanthropy	Charitable foundations; volunteer services; community service; health protection; environment protection	Salvation Army; End Hunger Network; Volunteers of America; Foundation for Fighting Blindness; Wildlife Conservation Society
Social or sports clubs	Tennis, golf, and country clubs; other sport clubs; private social clubs	Greenwich Country Club; Churchill Club; Pacific Union Club
Religious	Churches and religious	Church of God; Trinity Presbyterian Church; Christian Theological Seminary
Professional	Professional and industry associations	Software and Information Industry Association; Society of Logistics Engineers; Best Lawyers in America
Hobbies	Various special interest groups, such as art galleries; theater; ballet and dance clubs; wine yards; historical societies; photography; fashion clubs	Harbourfront Art Gallery; Dia Center for the Arts; International Wine & Food Society; Metropolitan Opera; Washington Ballet; No Limits Dance Club