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

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

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Ran Duchin
Ross School of Business
University of Michigan
duchin@umich.edu

Denis Sosyura
Ross School of Business
University of Michigan
dsosyura@umich.edu

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Abstract

Using hand-collected data on segment executives at the S&P 500 firms, we study the role of divisional managers in internal capital budgeting. Managers with social ties to the CEO receive more capital. The effect of informal ties outweighs measures of formal influence, such as board membership and seniority, and persists after controlling for endogeneity. The impact of connections on investment efficiency depends on the tradeoff between agency and information asymmetry. When governance is weak, connections reduce investment efficiency and erode firm value by fostering favoritism. When information asymmetry is high, managerial ties increase investment efficiency and firm value, arguably by facilitating information transfer. Overall, we offer evidence on formal and informal managerial influence in capital investment decisions.

Keywords: internal capital markets, divisional managers, social ties, social networks, agency, asymmetric information

JEL classification: G31, G32

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Introduction

The theory of internal capital markets offers diverging views on the efficiency of resource distribution across a firm's operating units. The efficient hypothesis posits that internal capital markets benefit from stronger control rights and superior information quality, which enable the CEO to make better allocation decisions.[1] The alternative hypothesis states that internal capital markets suffer from multi-layered agency motives of divisional managers and the CEO, who pursue their private interests via rent-seeking, empire building, or entrenching.[2] Despite the key role of divisional executives in the theory of internal capital markets, there is little empirical evidence on what influence, if any, they have on capital budgeting and firm value of conglomerates.

We construct a comprehensive dataset of divisional executives at the S&P 500 firms in 2000-2008 and provide empirical evidence on their role in internal capital markets. The rich set of managerial characteristics enables us to evaluate their involvement in the firm via various channels, ranging from formal, such as board membership and seniority, to informal, such as ties to top management via prior employment, educational institutions, and nonprofit organizations. The broad selection of firms in our sample enables us to investigate the cross-sectional implications of divisional managers for firm value and operating efficiency. We construct a detailed network of internal connections between divisional executives and top management, applying social networks techniques to the study of internal capital markets. This setting allows

[1] The "bright side" of internal capital markets, broadly referred to as "winner-picking", has been proposed in Alchian (1969), Weston (1970), Williamson (1975), and Donaldson (1984). More recently, this theory is discussed in Gertner, Scharfstein, and Stein (1994), Li and Li (1996), 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), Meyer, Milgrom, and Roberts (1992), Scharfstein and Stein (2000), Rajan, Servaes, and Zingales (2000), Ozbas and Scharfstein (2010), and Wulf (2009). For an overview of theories of internal capital markets, see Stein (2003) and Maksimovic and Philips (2007).

us to provide evidence on the different hypotheses about internal capital allocation proposed in the theoretical literature.

One view, which we refer to as the *agency* hypothesis, is that divisional managers attempt to attract more capital to their divisions in order to extract private rents, such as personal benefits, higher status, and better job security (Scharfstein and Stein 2000; Rajan, Servaes, and Zingales, 2000). If internal connections allow managers to have greater influence on capital budgeting, this view predicts higher capital allocations to divisions of well-connected executives and a negative effect on investment efficiency and firm value. An alternative agency hypothesis is offered by Xuan (2009). Under the "bridge building" hypothesis, the CEO entrenches himself by allocating capital to unconnected divisional managers in an effort to win their support. This hypothesis predicts higher capital allocation to unconnected managers and a negative effect on investment efficiency.

Another conjecture, which we label the *information* hypothesis, posits that divisional executives possess valuable information about their segments. Yet the CEO cannot take advantage of this private information, because managers tend to overstate their investment opportunities due to overconfidence (Heaton 2002; Malmendier and Tate, 2002) and preferences for empire building (Jensen 1986, 1993; Stulz 1990; Hart and Moore, 1995). In equilibrium, the CEO adjusts divisional capital allocation downward to account for possible overstatement of investment prospects.[3] Therefore, if social connections facilitate information transfer (Cohen, Frazzini, and Malloy, 2008, 2010; Engelberg, Gao, and Parsons, 2010) and reduce information asymmetry, they are likely to result in a positive impact on investment efficiency and firm value.

[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 underinvestment as a response to information asymmetry.

A third possibility is that characteristics of divisional managers and internal connections play little role in resource allocation. For example, career concerns of executives under close monitoring (e.g., Fama 1980) represent one mechanism limiting the efficacy of managerial ties. Alternatively, governance mechanisms such as independent boards of directors, compensation contracts, and large shareholders may also render managerial lobbying ineffective. This hypothesis predicts no relation between managerial connections and capital allocation, and is consistent with efficient investment driven by divisions' investment opportunities.

Last, since executives' characteristics can have opposite effects on resource allocation and firm value, we may observe that different effects prevail in different settings. For instance, connections might play a positive role when information asymmetry is high and a negative role when agency problems are severe. In this case, we are interested in identifying the conditions under which a particular effect dominates.

Our empirical results indicate that managers with informal connections to the CEO are allocated more capital. These results persist across various measures of divisional investment and various types of social connections, such as ties via prior employment, education, and nonprofit organizations. We find that a one standard deviation increase in a divisional manager's ties to the CEO is associated with 19.1 percent more capital allocated to his or her division.[4] For a manager overseeing a division with average sample characteristics, this effect translates into $20.1 million of extra capital per year. We also find similar results when we study divisional managers' turnover: when an unconnected manager is replaced by a connected manager, capital allocation to manager's division increases, and vice versa. Connections to the CFO and the board have a weak positive effect.

[4] Our measures of informal connections are adjusted for the average number of connections between divisional managers and the top management within a firm. The magnitude of the effects varies across different connection types, as we discuss below.

Our dataset also enables us to compare the relative impact of managers' informal connections with proxies of their formal influence within the firm. We find that the effect of internal ties on capital allocation dominates measures of managers' formal power, such as board membership, tenure, seniority, and compensation. One explanation for this finding is that social ties provide managers with a better access to the CEO and that interaction via informal channels is more effective or more difficult to monitor.

An important consideration in interpreting our evidence is the inherent endogeneity in internal capital allocation. In particular, one challenge in identifying the impact of managerial ties 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 the divisional manager's tenure at the firm and all connections with ambiguous or missing dates, and obtain similar results.

Another endogenous decision is the appointment of managers across the firm's divisions. In particular, it is possible that CEOs appoint well-connected managers to divisions expected to receive capital in the future. In general, this scenario is consistent with our finding that better-connected managers receive more capital, and represents an additional channel of fund allocation. To disentangle the effect of managerial appointment from capital distribution, we focus on divisional managers who became segment presidents before the arrival of the incumbent CEO. We find that managers connected to the CEO receive extra capital even if they were appointed well before the CEO assumed his position at the firm. This evidence suggests that well-connected managers get extra funds even after controlling for the appointment process. Edward and Hadlock (2004) and Cichello, Fee, Hadlock, and Sonti (2009) offer detailed analysis of the appointment process of managers across the vertical hierarchy and identify key factors that drive managerial turnover.

Greater capital allocations to connected managers may be consistent with both the agency and the information hypotheses. To distinguish between these views, we investigate the effect of managerial ties on investment efficiency and firm value. At firms with weaker governance, as proxied by the Gompers, Ishii, Metrick (2003) index, low managerial equity ownership, and low institutional holdings, managerial connections are associated with lower investment efficiency, consistent with the agency hypothesis. In conglomerates with high information asymmetry, as measured by the dispersion in Tobin's Q, the number of segments, and segment size, managerial ties are positively related to investment efficiency, consistent with the information asymmetry hypothesis. We also study the relation between managerial ties and the cross section of firm values, as measured by Berger and Ofek's (1995) excess value, and find that connections enhance value when information asymmetry is high, and destroy value when agency problems are severe.

The central contribution of this article is to provide evidence on formal and informal managerial influence in internal capital budgeting. We are among the first to study social networks across the vertical managerial hierarchy and to document their dual effect on investment efficiency. The composition of our data also allows us to provide novel evidence on the relation between managerial connections and the cross section of firm values. Overall, this paper identifies new factors explaining the variation in the efficiency and valuation of multidivisional firms – managerial interaction and informal executive networks.

The rest of the paper is organized as follows. Section 1 reviews related literature. Section 2 describes the data. Section 3 presents main empirical results. Section 4 provides tests of endogeneity and robustness. Section 5 discusses investment efficiency and firm value. Section 6 offers extensions. The article concludes with summary and commentary.

1. Related Literature

Internal capital budgeting is a fundamental corporate decision, but, as Stein (2003) points out, it remains one of the least understood in corporate finance. In particular, there is an ongoing debate in the literature about the managerial involvement in capital allocation – one of the drivers of the opposite predictions in the theories of capital markets. For example, Meyer, Milgrom, and Roberts (1992), Rajan, Servaes, and Zingales (2000), and Scharfstein and Stein (2000) build theoretical models in which divisional managers erode firm value through lobbying and rent seeking. In contrast, Wulf (2009) models a setting in which divisional managers have private information about their divisions and, under proper incentive structure, can supply valuable signals about investment opportunities.

Despite the recognized importance of divisional managers in internal capital markets, there has been little empirical evidence on their role in capital budgeting. Two recent exceptions are Glaser, Lopez-de-Silanes, and Sautner (2009) and Cremers, Huang, and Sautner (2010), which study the internal capital markets of one firm. Glaser, Lopez-de-Silanes, and Sautner (2009) examine an internal capital market of a European conglomerate and show that managerial influence, inferred from the variables collected in an internal survey, plays an important role in the distribution of cash windfalls. Cremers, Huang, and Sautner (2010) investigate the internal capital market of a European banking group. The authors do not study divisional managers but rather measure the internal power of corporate segments as the deviation from one-share-one-vote and find that more influential divisions receive more capital within this banking group. Taken together, these two case studies stress the importance of a systematic examination of managerial influence inside the firm.

The goal of our paper is to examine the effect of formal and informal influence of divisional managers on investment efficiency and firm value. Our second goal is to study

whether and how this influence varies with internal governance and information asymmetry, thus directly testing the predictions of the theory of internal capital markets. These research questions require detailed data on divisional managers from a large cross-section of firms, a limitation that explains why we know relatively little about these fundamental questions in internal capital budgeting. To bridge this gap, we collect one of the most comprehensive datasets on divisional managers in the S&P 500 firms and empirically test the bright and dark views on the interaction between segment executives and the CEO. By looking across firms and industries, we are also able to distinguish the settings in which this interaction can have opposite effects on firm value and to identify the conditions when a particular effect dominates. This analysis helps reconcile diverging theoretical predictions in the prior literature.

Our analysis of managerial influence on firm value adds to prior research on the valuation of multidivisional firms. The empirical findings regarding the overall investment efficiency and value of conglomerates are mixed. Earlier work by Lang and Stulz (1994), Berger and Ofek (1995) and others suggests that diversified firms are discounted relative to their standalone counterparts, thus implying that diversification destroys value. However, Campa and Kedia (2002) and Villalonga (2004) raise important methodological issues and show that after controlling for endogeneity and selection bias, the diversification discount disappears or reverts to a premium. Whited (2001) and Colak and Whited (2007) highlight another key factor in measuring the effects of diversification by stressing the importance of accurate measurement of Tobin's Q.

We refrain from drawing conclusions about the overall value of diversification. Rather, we focus on the marginal impact of managerial interaction and internal power on firm value. However, to mitigate the effect of potential measurement error resulting from imperfect inferences based on single-segment firms, we exploit time-series variation in managerial

influence within each conglomerate, such as the turnover of divisional managers and the changes in managerial connections. To the extent that the changes in internal managerial ties within conglomerates are not correlated with the measurement error in Tobin's Q, the admittedly imperfect proxies for investment opportunities would bias us against identifying the effect of managerial influence on capital allocation and investment efficiency.

Our evidence on the role of managerial influence in capital allocation complements prior research on the drivers of capital distribution in multidivisional firms and on the benefits and costs of internal capital markets. Some of the benefits of internal markets include more effective reallocation of capital in response to competitive threats (Khanna and Tice, 2001), internal risk sharing (Khanna and Yafeh, 2005), intra-firm liquidity provision (Gopalan, Nanda, and Seru, 2007), and support of distressed segments (Gopalan and Xie, 2008), among others. Further, Kuppuswamy and Villalonga (2010) document significant gains in the relative value of multidivisional firms during the 2008-2009 financial crisis, a result that the authors link to debt coinsurance and more efficient investment of multidivisional firms.

In contrast, conglomerates also face various agency costs and frictions in the capital budgeting process. Campello (2002) finds evidence of inefficient cross-subsidization in capital-constrained financial conglomerates, in contrast to unconstrained conglomerates, which make efficiency-enhancing capital allocations. The author concludes that investment inefficiencies in conglomerates are driven by the frictions between conglomerate headquarters and external markets. In a recent study, Ozbas and Scharfstein (2010) find that conglomerates exhibit lower sensitivity of investment to Q than stand-alone firms. The authors show that this difference is larger for conglomerates in which the management has a small ownership stake and attribute their results to agency problems at multidivisional firms.

Our paper adds to this literature by identifying two key firm-level characteristics critical for evaluating the tradeoffs in corporate diversification – information asymmetry and internal corporate governance. In this respect, we identify an important channel through which internal governance affects firm value, thus adding to the research on governance and performance (e.g., Cremers and Ferrell, 2009, among many others).

Our analysis of managerial interaction also adds to the growing literature on social networks in finance. Prior studies document the importance of social networks for key corporate decisions, such as executive compensation (Engelberg, Gao, and Parsons, 2009; Hwang and Kim, 2009a), financial policy (Fracassi 2008), governance (Fracassi and Tate, 2009), 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, 2009b), and acquisition activity (Cai and Sevilir, 2009; Ishii and Xuan, 2009; Schmidt, 2009).

These prior studies on social networks focus on the connections between the board members and CEOs, either within a firm or across companies. Yet many key operating decisions are made by executive managers at lower levels of seniority, such as chief financial officers, executive vice presidents, and divisional managers. We fill this gap by providing evidence on social networks between the top management and other senior executives and studying their effect on investment efficiency and firm value. To our knowledge, this paper is also the first comparative analysis of formal and informal influence within the firm.

2. Sample and Data

2.1 Firms and Divisions

We begin constructing our sample with a set of all firms included in the S&P 500 index during any year of our sample period, January 2000 to December 2008. We start our sample in 2000,

since the coverage of BoardEx in earlier years is very limited.[5] Following the empirical literature on capital allocation, we exclude financial firms and regulated utilities, since they are subject to capital structure regulations. Since we are interested in capital allocation across business segments, we exclude firms that have only one division and firms whose financial data at the level of business segments are unavailable on Compustat.[6] We also exclude divisions with zero sales, such as corporate accounts, and various allocation adjustments, such as currency translations. After applying these filters, we end up with an initial sample of 363 multidivisional firms.

Next, we collect data on divisional managers responsible for each business segment by reading biographical sketches of our firms' executives in annual reports. 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 particular business segment during a respective time period. 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.

For example, 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

[5] Other researchers using BoardEx typically begin their sample period in 2000 for similar reasons (Fracassi and Tate, 2009 and Engelberg, Gao, and Parsons, 2009).

[6] 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.

from form 10-K with executive biographies from the Forbes Executive Directory, Reuters, and Marquis's Who's Who databases, as well as a search of 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 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.

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 that do not provide data on their divisional executives in any of the following sources: annual reports, corporate executive directory, management information on the firm's web site, executive databases, and press releases about appointments of divisional managers.

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 of $19.4 ($6.3) billion, has a Tobin's Q of 1.71 (1.53) and operates in 3.4 (3) business segments.

2.2 Capital Allocation

To ensure robustness of our results to various specifications, all of our tests use the three most common measures of capital allocation: (1) capital expenditures, (2) industry-adjusted capital expenditures, and (3) firm- and industry- adjusted capital expenditures. We provide detailed definitions of each capital investment variable in Appendix A. The data on divisional capital expenditures and book assets are collected from Compustat segment files.

Our simplest measure, capital expenditure, is the annual amount of divisional capital expenditure scaled by book assets. Table I shows that the average (median) business segment reports capital 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 a particular segment operates (proxied by the capital investment of single-segment firms operating in the same three-digit SIC code). The purpose of this adjustment

is to control for industry-level effects in order to remove fluctuations in investment common to the entire sector rather than specific to the particular firm. As shown in Table I, the average (median) values of industry-adjusted capital expenditures are 1.7 (0.6) percent, and there is substantial 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. For example, if a conglomerate overinvests in all divisions relative to their industry peers, this measure adjusts for this firm-level overinvestment in order to capture only the within-firm tilt toward a particular division. As shown in Table I, the average (median) values of the industry- and firm- adjusted capital expenditures are close to zero. However, the standard deviation is significant and equals 5.9 percent, suggesting that there is substantial heterogeneity in divisional capital allocation relative to the industry and company peers.

2.3 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 of Management Diagnostics Limited, Reuters, Forbes Executive Directory, Marquis Who's Who, and Notable Names Database (NNDB). The combination of these sources allows us to resolve ambiguous and inconsistent entries to ensure data integrity. We also we manually clean the

BoardEx data for our sample by correcting errors and duplicates. For example, the Stern School of Business appears in BoardEx under five different names, all of which are assigned distinct IDs.[7] We standardize these data by assigning them a common ID, which we link to the home university – NYU. As a result of cross-verification and manual cleaning, we believe to have highly accurate and complete managerial data.

Panel A of Table II provides summary statistics for our sample of divisional managers. An average divisional manager is 51 years old, has a firm tenure of 12.1 years, and earns a base salary of $854,000. The vast majority (92 percent) of divisional managers are male, 97 percent hold a bachelor's degree, 65 percent have a master's degree, and 5 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 10 percent have attended executive education programs. Compared to CEOs and directors, divisional managers tend to be more specialized in their educational background, with fewer than 4 percent holding professional degrees in law or medicine combined.

2.4 Measures of Connections

Individuals who share social ties 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 ties can result in more informed capital budgeting decisions and save resources on producing verifiable hard information. On the other hand, social ties may introduce favoritism and result in a bias known as homophily – an affection for similar others (McPherson, Smith-Lovin, and Cook, 2001). If social networks introduce favoritism, they are likely to cause agency-type

[7] For example, all of the following appear as different institutions in BoardEx: New York University School of Business; New York University Graduate School of Business Administration; Leonard Stern School of Business, New York University; New York University Graduate School – MBA; and New York University – MBA.

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 asymmetry and the agency hypotheses in internal capital budgeting.

Our main focus is on the social ties between divisional managers and the CEO, since the ultimate responsibility for the firm's investment strategy rests with the CEO. We also evaluate the influence of the CFO and the board of directors, who may assist the CEO with strategic resource allocation. Given the central role of the CEO in capital allocation, we use connections to this top executive as our main specification, and provide evidence on the ties to the CFO and the board as extensions of our base results. Consistent with prior literature, we define three types of social networks: ties via education, previous employment, and nonprofit organizations. Panel B of Table II provides a summary of divisional managers' social ties via each of the three networks.

Nonprofit Organizations

Two managers are connected via this measure 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. In our sample, approximately 3.8 percent of divisional managers share a nonprofit connection with the CEO. Further, about 0.8 percent are connected to the CFO, and 10.5 percent are linked to one of the board members. To provide a more refined analysis of nonprofit ties, we also categorize them based on organization type. The purpose of this classification is to evaluate how the relative strength of nonprofit ties depends on the organization focus (e.g., ethnic, religious, professional, or philanthropic, among others). We offer a detailed analysis of nonprofit connections in Section 6.

Education

Educational ties foster a sense of belonging to a common group, which is evidenced by alumni clubs, donations to the home school, and college sports, among other activities. 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. In our sample, approximately 5.2 percent of divisional managers are connected to the CEO, 3.9 percent are connected to the CFO, and 23.8 are connected to a board member via an alumni network. The most common universities attended include Harvard, Princeton, the University of Wisconsin, and the University of Michigan.

Some studies have used more restrictive definitions of an educational link by requiring that the individuals earn the same degree in the same year. Although these restrictions dramatically reduce statistical power due to the much lower probability of overlap (about 0.7 percent in our sample), they may be particularly helpful in studies that seek to establish a connection between otherwise unrelated executives working at different firms. The main purpose of these restrictions has been to increase the probability that executives in different firms know each other as a result of a potential encounter in college or in business school. However, since we study connections within one firm, we already know that divisional managers regularly interact with the CEO and the board, and our goal is to investigate the impact of a shared educational link, if any, on information sharing and agency conflicts.

Previous Employment

We define two executives as connected via prior 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, approximately 8.8 percent are

connected to the CFO, and nearly 30 percent have a connection to a board member. The vast majority of connections (around 70 percent) come from the employment during overlapping time periods, and all our results hold if we use this more restrictive definition.

Measuring Internal Connections

To measure the effect of internal 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 ties have a stronger effect if 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 ties 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.

To control for the average level of connections within a firm, we define the level of connections for each divisional manager as the difference between the number of his or her connections to the CEO and the average number of connections to the CEO possessed by other divisional managers in the same firm. Intuitively, this approach measures the extent to which a particular manager is better connected to the CEO than other divisional presidents in the same firm. More formally, our measure of 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:

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

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.

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 connected variable for this divisional manager is: 0.67 – 0.2 = 0.47. This variable takes on positive (negative) values when a divisional manager is more (less) connected to the CEO than other divisional presidents in the same firm in a given year.

The approach of aggregating connections formed via various networks into a summary measure is widely used in the social networks literature (e.g., Fracassi, 2008; Fracassi and Tate, 2009; Hwang and Kim, 2009a, 2009b; Schmidt, 2009; Cai and Sevilir, 2009, among others). However, in addition to our main specification, which relies on an index, we also disentangle the effects of each network. Moreover, we offer additional detail on the drivers of connections within each network by analyzing, for example, how the effect of educational networks varies with degree type and how the strength of nonprofit networks changes depending on the focus of the organization. We provide this additional analysis in Section 6. Overall, we find that connections formed via various networks have the same directional influence on capital allocation, and that our results hold separately for each of the three networks (education, employment, and nonprofits). This evidence is consistent with Engelberg, Gao, and Parsons

(2009), who find that connections formed via various networks have similar directional effects on another aspect of corporate policy – CEO compensation.

3. Empirical Results

3.1 Internal Connections and Capital Allocation

We begin our analysis by presenting univariate results on the relation between managerial connections and divisional capital allocation. Panel A of Table III presents nonparametric evidence on the relation between connections of divisional managers to the CEO and the amount of capital allocated to their division. The relation 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. While this evidence is suggestive of a positive association between social ties to the CEO and divisional capital allocation, it considers variables in isolation and does not account for their interaction. Next, we provide regression evidence to examine the effect of managerial ties after controlling for an array of other factors affecting capital allocation.

Panel B of Table III presents results of pooled regressions of various measures of divisional capital expenditure on the connections of the divisional manager to the CEO. In addition to the measures of social connections, we also include proxies for the divisional manager's formal influence within a firm – board membership, tenure, seniority, and status as one of the firm's top paid executives listed on Compustat.

We would also like to control for the skill and ability of divisional managers. While managerial ability is inherently difficult to capture, we use the average SAT score of the

undergraduate institution attended by the divisional manager. This approach follows several earlier studies that document a strong positive correlation between average SAT scores and managerial skill in other settings (e.g., Chevalier and Ellison, 1999; Li, Zhang, and Zhao, 2010). 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. As another proxy for the type of undergraduate institution that may be correlated with managerial ability, we also introduce a dummy indicating whether a manager attended an Ivy League college.

Other independent variables include a set of the following controls: the median Tobin's Q for the division's industry, the segment's cash flow, and the absolute and relative measures of segment size. Details on these variables are summarized in Appendix A.

The empirical results in Panel B of Table III indicate a positive relation between capital investment and divisional managers' informal ties to the CEO. This relation is consistently significant at the 1% level across all measures of divisional capital investment. The economic magnitudes are also substantial: a one standard deviation increase in connections of a divisional manager to the CEO is associated with a 19.1 percent increase in division's capital allocation.

For a segment manager overseeing a division with average characteristics, this effect is associated with an extra $20.1 million in capital per year.

In contrast to the strong positive effect of social ties, 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, suggesting that the results are unlikely to be explained by correlation among these measures. Overall, our evidence suggests that informal connections dominate formal channels of influence. One possible explanation is that the interaction in informal settings provides managers with a more effective access to the CEO. Another possible explanation is that social ties are less transparent than the measures of formal influence and are thus more difficult to monitor. In the following sections, we provide additional detail on the interpretation of our results and their effect on investment efficiency and firm value.

An analysis of other control variables suggests that divisional capital allocation is strongly positively related to the industry-level Tobin's Q, a proxy for investment opportunities. Our results also suggest that conglomerates invest less in smaller segments, as shown by the negative coefficient on segment size. Last, the effect of segment cash flow on divisional investment is generally positive, but the significance of this result varies across specifications. The evidence on control variables is consistent with the findings in earlier studies on conglomerates.

In summary, managers with greater informal ties to the CEO are allocated more capital. The effect of informal connections reliably dominates measures of formal influence, even after controlling for a wide array of fundamentals and proxies for managerial skill.

3.2 Turnover of Divisional Managers

If managerial connections are associated with capital allocation, a change in the connections of a divisional manager to the CEO should be positively related to the amount of capital received by the manager's division. To the extent that the changes in managerial connections inside the firm are not correlated with measurement error in Tobin's Q and other proxies that may affect our panel regressions, the study of internal managerial turnover can provide a cleaner test of the influence of managerial ties on divisional capital investment.

Table IV presents evidence on the relation between the changes in divisional managers' ties to the CEO and the changes in divisional capital allocation. The main variable of interest, *ΔConnected*, is a dummy equal to 1 (-1) if the divisional manager's ties to the CEO increase (decrease) as a result of the change in divisional presidency, and zero otherwise. Other variables are constructed in the same way (as dummies taking on the values of -1, 0, and 1) and include the same set of independent variables as in our main specification.

The results on managerial influence in Table IV are consistent with the evidence from pooled regressions. An increase (decrease) in divisional manager's social connections to the CEO is associated with a higher (lower) capital allocation to the manager's division across all measures of capital investment. In contrast, the changes in measures of formal influence and

seniority (e.g., becoming a board member) do not appear to be significantly related to capital allocation, controlling for other factors.

To interpret the evidence from managerial turnover, it is important to distinguish between two possible scenarios: (1) better-connected managers are appointed to divisions that are expected to receive more capital, and (2) divisions of better-connected managers receive more capital, holding managerial positions constant. We address this issue in the next section.

4. Endogeneity

An important issue underlying the capital allocation process is the inherent endogeneity in capital budgeting decisions. In this section, we consider two possible scenarios: (1) the appointment of connected managers to favored divisions and (2) the reverse causality between capital allocation and managerial connections.

4.1 Appointment of Connected Managers to Favored Divisions

It is possible that CEOs appoint well-connected managers to divisions expected to receive more capital. In general, this scenario is consistent with our argument that better-connected managers receive more capital, and represents an additional channel of fund allocation. To disentangle the effect of managerial appointment from capital distribution, we study capital allocations to divisional managers who were not appointed by the incumbent CEO. In particular, we identify managers that assumed their position as a divisional president prior to the appointment of the current CEO.

Table V shows the results of our base specification (the relation between managerial influence and divisional capital allocation) for two subsamples of divisional managers. Columns 1, 2, and 3 provide evidence on the managers appointed as divisional presidents prior to the arrival of the incumbent CEO. The effect of managerial ties to the current CEO is uniformly positive across all specifications, and this influence persists in the substantially reduced sample.

The effect of connections in Columns 1-3 is still economically and statistically significant, yet smaller than in the full sample. For example, based on Column 3, an increase of one standard deviation in a manager's social connections to the CEO corresponds to an increase of 3.8 percent (or $3.4 million) in capital allocation. Furthermore, for all 3 measures of capital investment (Columns 1-3), the effects are statistically significant at the 10 percent. Taken together, these results suggest that managers connected to the current CEO get extra funds even after controlling for the appointment process.

4.2 Reverse Causality between Social Ties and Capital Investment

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

To address this conjecture, we exploit the variation in the dates when social connections were established. In particular, we require that social ties be formed before the beginning of divisional manager's tenure at the current firm. We also eliminate all social ties with ambiguous or missing dates. We repeat our base regression with these measures of connections and report

our results in columns 4, 5, and 6 of Table V. Even after a significant reduction in the number of connections, we still find a consistently positive relation between managerial ties formed prior to manager's tenure and capital allocation to his division, a result that persists across all three measures of capital investment.

The magnitude of the effects is again both economically and statistically significant. For example, based on Column 6, an increase of one standard deviation in connections to the CEO corresponds to an increase of 4.2 percent (or $3.6 million), and the effect is statistically significant at the 10 percent level. Overall, this evidence indicates that our findings are unlikely to be explained by the reverse causality. In particular, our evidence suggests that social ties to the CEO result in greater capital allocations to connected managers.

5. 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 agency and information views. In this section, we distinguish between the agency and the information hypotheses by studying the effect of connections on investment efficiency and firm value. If social ties fuel favoritism, they are likely to have a negative effect on investment efficiency and 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 outcome prevails and identifying the dominant effect.

To disentangle the agency hypothesis from the information view, we interact the variables of internal connections with the 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: segment size, the number of segments, and the standard deviation of Tobin's Q across conglomerate's divisions. For each segment, we aggregate these measures in an index by computing the average of segment's percentile rankings in our sample based on each of the three attributes.[8] The agency index is constructed by combining the following three measures in a similar way: the Gompers, Ishii, and Metrick (2003) index, the percentage of shares held by institutional investors, and the fraction of shares held by the top managers.[9] Details on each variable are provided in Appendix A.

To evaluate the aggregate effect of managerial ties on investment efficiency, we study the relation between internal connections and the sensitivity of a firm's capital expenditures to investment opportunities, as proxied by Tobin's Q. Table VI presents 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 managerial ties with agency and information asymmetry indexes. This term captures whether the association between managerial connections and capital investment varies with agency and information asymmetry. The second variable of interest is the triple interaction term of connections, Tobin's Q, and indexes of agency and information asymmetry. This term captures the effect of connections on the sensitivity of capital allocation to investment opportunities, as proxied by the Tobin's of the division's industry. The sensitivity of investment to industry-level Q is a common measure of investment efficiency that has been widely used in other research on

[8] Segment size is aggregated based on a reverse ranking.
[9] Institutional ownership and management stock ownership are aggregated based on a reverse ranking.

conglomerates (e.g., Shin and Stulz, 1998). Other independent variables include the agency and the information asymmetry indexes, their interaction terms, and the same set of independent variables as in our main specification.

The interaction terms of managerial connections and measures of agency and information asymmetry are positive and significant for all measures of capital investment. This evidence suggests that managerial connections have a stronger effect on capital investment both in settings characterized by higher information asymmetry and in firms with more severe agency problems. These results are consistent with an initial conjecture that managerial ties can play a dual role and amplify each of the two effects.

The coefficients on the triple interaction of social ties, imputed Tobin's Q, and the indexes of agency and information asymmetry provide key evidence on the effect of managerial ties on investment efficiency. In particular, 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 impact on investment efficiency, consistent with the theoretical predictions in Stein (2002). This effect is also uniform across all measures of capital investment.

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

To study the value implications of managerial ties, we examine the relation between the variation in divisional managers' connections across firms and the market value of the conglomerate. In particular, we construct a firm-level measure of the overall level of managerial connections inside a particular conglomerate. This variable, which we label *firm connectedness*, is the asset-weighted average number of connections between all divisional managers and the CEO for a given firm in a given year.[10] The intuition is that a higher overall level of connectedness between divisional managers and the CEO is likely to amplify the effects of agency and information asymmetry 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 market value of equity to the imputed value. 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).

Admittedly, the approach of 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) and the measurement error in 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, our approach mitigates these issues.

Table VII presents results of pooled regressions of conglomerates' excess values on firm connectedness and its interaction terms with the agency and information asymmetry indexes.

[10] More formally, our measure of firm-level average *unadjusted* connection 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.

Other independent variables include a set of controls, such as firm size, cash flow, the number of segments, and the intra-firm dispersion in Tobin's Q across its segments.

The primary variables of interest are the interaction terms of the average number of managerial connections inside the firm (i.e. firm connectedness) and the indexes of agency and information asymmetry. Both of these terms are reliably significant at the 5 percent level or better, but have opposite signs. The interaction term of the connectedness and the agency index is negative, suggesting that the internal connections have a negative impact on value at firms with weak governance. This evidence is consistent with theoretical frameworks in Meyer, Milgrom, and Roberts (1992), Rajan, Servaes, and Zingales (2000), and Scharfstein and Stein (2000), which predict that internal managerial influence can erode value as a result of rent-seeking and resource misallocation. In our sample, this effect of managerial connections reliably arises for firms with more severe agency problems.

A different set of conclusions emerges at firms with high information asymmetry. The interaction term of the average connection and the asymmetry index is reliably positive. One possible explanation for this finding is that in environments characterized by high information asymmetry, social ties create value by fostering information sharing and saving on costly 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 ties on firm value and investment efficiency depends on internal governance and intra-firm information asymmetry. When governance is weak, internal connections erode investment efficiency and firm value, likely as a result of more severe agency issues and rent-seeking. When information asymmetry is high, social ties are positively associated with investment efficiency and firm value, possibly as a result of facilitating the transfer of valuable information from the divisional managers to the CEO.

6. Which Connections Matter?

So far, we have used an aggregate measure of social ties between divisional managers and the CEO. In this section, we study the individual effects of each type of social networks: prior employment, nonprofits, and education. We also provide a more refined analysis of social ties by identifying the drivers of influence within each network. Finally, we examine the effect of social ties to the CFO and the board.

Panel A of Table VIII presents the results of pooled regressions of divisional capital allocation on measures of social ties 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 networks: education, employment, or nonprofits. All three types of networks paint a consistent picture: managers with social ties to the CEO are allocated more capital. This result holds uniformly across all network types and across all measures of capital investment, and it is statistically significant at the 5 percent level or better in 8 of the 9 specifications.

The economic influence of social ties formed via various channels is also comparable. A one standard deviation in social ties formed via an educational network is associated with an 18.3 percent increase in annual capital allocation to the average division. A one standard deviation increase in connections via prior employment is related to a 19.1 percent increase in the division's investment funds. A one standard deviation increase in ties via nonprofits is associated with a 20.1 percent increase in the division's annual investment. To provide another perspective, the effect of a one standard deviation in social ties to the CEO on capital allocation ranges between $19.5 million and $21.3 million in annual capital funds for the average division, depending on the type of the network. The effect of social ties via nonprofits, such as social clubs or charitable foundations, is marginally greater, perhaps because these interactions allow

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

We begin with further analysis of educational ties. 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 VIII provides the results of our base regressions of capital expenditures on managerial connections via educational networks, in which these ties are broken down by degree type. The results indicate that the effect of educational ties is driven primarily by graduate-level training. MBA ties have the strongest effect, followed by executive education. One explanation for the strength of graduate education ties is that these connections were formed more recently and represent much smaller and more selective groups, which likely foster tighter connections and a stronger sense of common belonging. For example, an increase of one standard deviation in connections to the CEO via an MBA network is associated with a 33.9 percent increase in capital expenditures or an extra $38.4 million in investment funds. This effect is stronger than that of any other educational connection.

Next, we examine nonprofit activities in more detail. To provide a more refined analysis of connections, we classify nonprofit organizations into the following seven groups: (1) ethnic and national, (2) education and science, (3) philanthropy, (4) social and sports clubs, (5) religious, (6) professional, and (7) hobbies. Our choice of categories is guided by the most frequent organization types. 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 nonprofit institutions, which we classify as other organizations, either represent infrequent categories or have objectives that are too broad or ambiguous. Appendix B provides details on our classification methodology and criteria for each organization group.

Table B-I shows the proportion of each category of nonprofits in our sample. The most popular nonprofit categories among executives in our sample include education and science (24.9 percent), philanthropy (18.5 percent), ethnic and national organizations (5.4 percent), and social and sports clubs (4.2 percent). Next, we examine which organization category fosters the strongest connections, as measured by their effect on internal capital allocation.

Panel C of Table VIII presents the results of our base regressions of capital investment on managerial connections via nonprofits, in which these ties are broken down by organization category. We find that the strongest connections are forged via philanthropic activities and social clubs, such as golf, tennis, or country clubs. One interpretation of this evidence is that these organizations foster stronger ties as a result of closer, less formal interaction based on shared interests and beliefs.

The economic magnitude of these connections is substantial. For example, a one standard deviation increase in connections via philanthropic activities is associated with a 9.2 percent increase in capital expenditures, an amount equivalent to $12.8 million in extra annual investment funds for the average division. Our findings on the relative strength of social ties are consistent with evidence from sociology that common interests and informal environments amplify the strength of social interactions, compared, for example, to the ties forged in more formal settings, such as such as professional nonprofit organizations and industry associations. If shared interests foster greater trust among the managers and allow for closer and more frequent interaction (Cross, 2004), these findings identify one possible mechanism through which social networks facilitate information sharing and potential collusion.

So far, our analysis has focused on the connections between divisional managers and the CEO. Next, we consider the effect of social ties to the CFO and the board of directors. While the main decision-making power regarding capital allocation typically rests with the CEO, it is

likely that the CFO and the board can provide input into these decisions. To evaluate the effect of divisional managers' connections to the CFO and the board, we use the same methodology as in measuring connections to the CEO.

Table IX presents results of pooled regressions of division-level capital investment on divisional managers' connections to the CFO and the board, measures of formal influence, and a vector of controls. The effect of connections to the board is positive and significant for all but one measure of capital investment. However, the economic magnitude of this effect is much smaller, possibly because the board of directors is less involved in capital allocation decisions. Based on Columns 3 of Table IX, an increase of one standard deviation in social connections between a divisional manager and the board is associated with a 3.0 percent increase in annual investment.

Last, the effect of connections to the CFO is positive but statistically insignificant. One interpretation of this evidence is that the CFO has substantially less discretionary power to tilt a firm's capital allocation toward particular divisions.

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.

We provide empirical evidence on both the bright and the dark side theories of internal capital markets and demonstrate the conditions under which a particular effect dominates. At

firms characterized by high information asymmetry, where divisional managers are most likely to possess valuable information about investment opportunities, social ties between divisional managers and the CEO are associated with higher investment efficiency and higher firm value. On the other hand, at firms with weak governance, which are more prone to agency issues and empire building, managerial ties 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. The results in this paper indicate that corporate managers at lower levels of hierarchy – vice presidents and divisional heads – play an important role in a firm's investment strategy and operating efficiency. So far, we know relatively little about senior managers outside of the executive suite. Further analysis of this managerial group can provide new insights into firms' financial decisions and improve our understanding of the internal functioning of a corporation. We view this area as a promising direction for future research.

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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 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.

Standard deviation of segments' Tobin's Q – standard deviation of segments' industry-median Tobin's Q.

Segment size – the natural logarithm of the segment's book assets (at) at the beginning of the year.

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 – annual net sales (sale) divided by book assets (at) as of the beginning of the year.

Excess value – the natural logarithm of the ratio of the conglomerate's market value of equity to the conglomerate's imputed value, computed as the sum of the imputed values of its segments. The imputed value for each segment 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 segment's industry (same three-digit SIC code).

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 one of the top five paid executives in the company.

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 went to school whose average SAT scores in 2004 (median year in our sample) were above the sample median.

Connected - summary measure of internal 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,

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

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 connections between all divisional managers and the CEO for a given firm in a given year.

3. Information Asymmetry and Governance

Information asymmetry index – an index of three measures: segment size, number of segments, and the standard deviation of Tobin's Q across conglomerate's segments. The index is computed as an average of segment's percentile rankings in our sample based on each of the three attributes. Segment size is aggregated based on a reverse ranking. High values of the index correspond to high information asymmetry.

Agency index – an index of three measures: governance metric developed in Gompers, Ishii, and Metrick (2003), percentage of shares held by institutional investors, and fraction of shares held

by the top managers. The index is computed as an average of conglomerate's percentile rankings in our sample based on each of the three attributes. Institutional ownership and management stock ownership are aggregated based on a reverse ranking.

Appendix 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. Table B-I describes our classification groups.

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 sample period is from 2000 to 2008. All variable definitions are given in Appendix A. Tobin's *Q* is the market value of assets divided by the book value of assets. Cash flow is income before extraordinary items plus depreciation and amortization. The number of business segments is the number of business segments reported by the firm, excluding auxiliary business segments designed to capture residual operations (e.g., business segments with an identifier equal to 99). The industry-median Tobin's Q is the median Tobin Q across all single-segment firms in the segment's 3-digit SIC code industry. Industry-adjusted CAPEX is CAPEX adjusted for its industry median capital expenditure, formally defined as:

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

$j = 1...N$ denotes segment j, ss refers to single-segment firms. Industry-firm adjusted capital expenditure is industry-adjusted capital expenditure, further adjusted for the firm's average capital expenditure ratio across segments. Formally, it is defined as in Rajan, Servaes, and Zingales (2000):

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

where $j = 1...N$ denotes segment j, ss refers to single-segment firms, and w_j is the ratio of segment assets to firm assets.

Variable	Mean	25th percentile	Median	75th percentile	Standard deviation
Company Level					
Tobin's Q	1.705	1.236	1.533	1.959	0.673
Capital expenditure/assets	0.042	0.021	0.033	0.050	0.040
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
Segment level					
Industry median Tobin's Q	1.482	1.185	1.415	1.667	0.404
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 connections of the divisional managers to the company's top management. Details on our nonprofit category classification are available in appendix B. Each observation in this table corresponds to a unique year-firm-segment-manager combination.

Panel A: Characteristics

Continuous Variables	**Mean**	**Standard deviation**	**N_obs**
Tenure with the company	12.09	10.50	3,174
Age	50.74	6.18	3,103
Compensation ($, thousands)	854	748	3,346
Indicator Variables	**Number**	**Percentage**	**Total Number**
General			
Male	2,932	91.60	3,201
Board member	427	13.34	3,201
Senior	1,755	54.83	3,201
Education			
Bachelor's degree	3,438	97.34	3,532
Master's degree	2,289	64.81	3,532
PhD degree	174	4.93	3,532
MBA degree	1,380	39.07	3,532
Executive education	360	10.19	3,532
Law degree	122	3.45	3,532
MD degree	13	0.37	3,532
Nonprofit work			
Ethnic or national	257	7.28	3,532
Education and science	1,138	32.22	3,532
Philanthropy	843	23.87	3,532
Social or sports clubs	204	5.78	3,532
Religious	59	1.67	3,532
Professional	285	8.07	3,532
Hobbies	315	8.92	3,532

Panel B: Connections to Top Management

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

TABLE III

Connections of Divisional Managers and Internal Capital Allocation

This table presents evidence on the relation between connections of divisional managers to the CEO and the ratio of segment-level capital expenditure to book assets. Panel A presents difference-in-means estimates, whereas Panel B presents estimates from panel regressions. In Panel A, the sample-wide estimates compare between the average CAPEX across segments divided around the median sample-wide level of adjusted 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 connections in their industry for each year. 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. CAPEX is the ratio of segment-level capital expenditure to book assets. Industry-adjusted CAPEX is CAPEX adjusted for its industry median capital expenditure, formally defined as:

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

$j = 1...N$ denotes segment j, ss refers to single-segment firms. Industry-firm adjusted capital expenditure is industry-adjusted capital expenditure, further adjusted for the firm's average capital expenditure ratio across segments. Formally, it is defined as in Rajan, Servaes, and Zingales (2000):

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

where $j = 1...N$ denotes segment j, ss refers to single-segment firms, and w_j is the ratio of segment assets to firm assets.

Connected is the average connection between the divisional manager and the CEO based on education history, nonprofit work, and prior employment, and is adjusted for the average number of connections between divisional managers and the CEO within a firm. Formally, connected is defined as follows:

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

All the regressions in Panel B include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the segment level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Panel A: Nonparametric Evidence

Estimate	Investment measure	Low connections	High 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: Regression Evidence

Dependent variable	CAPEX		Industry-adjusted CAPEX		Industry- Firm-adjusted CAPEX	
Model	(1)	(2)	(3)	(4)	(5)	(6)
Connected	0.011*** [2.719]	0.011*** [2.774]	0.013*** [3.191]	0.014*** [3.382]	0.013*** [3.308]	0.014*** [3.403]
Industry-median Tobin's Q		0.000 [0.084]		0.017*** [3.607]		0.015*** [3.302]
Segment size		-0.028*** [10.562]		-0.027*** [9.873]		-0.024*** [8.977]
Segment relative size		0.079*** [6.493]		0.069*** [5.353]		0.063*** [5.027]
Segment cash flow		0.010** [2.125]		0.007 [1.367]		0.005 [0.937]
Board member		-0.009* [1.831]		-0.008 [1.576]		-0.007 [1.444]
Senior		0.002 [0.643]		0.004 [0.977]		0.001 [0.394]
Long tenure		0.002 [0.739]		0.004 [1.289]		0.003 [0.828]
High salary		0.001 [0.389]		0.000 [0.159]		0.000 [0.080]
Ivy league		-0.006 [1.142]		-0.005 [0.867]		-0.006 [1.189]
High avg. SAT score		0.002 [0.565]		-0.001 [0.315]		0.001 [0.164]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.194	0.230	0.179	0.216	0.096	0.129
N_obs	3,054	3,054	2,936	2,936	2,936	2,936

TABLE IV

The Turnover of Divisional Managers and Internal Capital Allocation

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 divisional manager has changed from the previous year. 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 firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the segment level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Dependent variable	ΔCAPEX		ΔIndustry-adjusted CAPEX		ΔIndustry- Firm-adjusted CAPEX	
Model	(1)	(2)	(3)	(4)	(5)	(6)
ΔConnected	0.019* [1.932]	0.018* [1.976]	0.010** [2.011]	0.020** [2.072]	0.006*** [2.980]	0.011*** [2.902]
ΔIndustry-median Tobin's Q		0.026 [1.284]		0.026 [1.244]		0.042** [2.242]
ΔSegment size		-0.016 [0.585]		-0.016 [0.580]		-0.024 [0.944]
ΔSegment relative size		0.015 [0.115]		0.049 [0.363]		0.087 [0.721]
ΔSegment cash flow		0.018 [0.356]		0.014 [0.262]		-0.008 [0.175]
ΔBoard member		0.007 [0.580]		0.008 [0.669]		-0.003 [0.252]
ΔSenior		-0.024*** [2.615]		-0.029*** [2.904]		-0.014 [1.548]
ΔLong tenure		-0.013 [1.541]		-0.014 [1.632]		-0.005 [0.609]
ΔHigh salary		-0.011 [1.260]		-0.010 [1.187]		-0.003 [0.342]
ΔIvy league		0.004 [0.373]		0.004 [0.382]		0.005 [0.470]
ΔHigh avg. SAT score		-0.018** [2.583]		-0.020** [2.604]		-0.007 [0.951]
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.452	0.532	0.463	0.553	0.495	0.532
N_obs	245	245	235	235	235	235

TABLE V

Endogeneity

This table presents estimates from panel regressions, in which the dependent variable is the ratio of segment-level capital expenditure to book assets. Columns (1)-(3) exclude observations in which the divisional manager was appointed under the current CEO. Columns (4)-(6) exclude connections that were formed during the manager's tenure with the company. 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 include year and firm fixed effects. The t-statistics (in brackets) are based on standard errors that are heteroskedasticity consistent and clustered at the segment level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Appointment/Connections period	Divisional manager appointed under previous CEO			Connections formed before current employment		
Dependent variable	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry- Firm-adjusted CAPEX
Model	(1)	(2)	(3)	(4)	(5)	(6)
Connected	0.003* [1.690]	0.007* [1.692]	0.007* [1.743]	0.010** [2.191]	0.009* [1.917]	0.009* [1.823]
Industry-median Tobin's Q	-0.001 [0.248]	0.017*** [3.584]	0.015*** [3.143]	0.000 [0.099]	0.017*** [3.574]	0.015*** [3.267]
Segment size	-0.016*** [5.331]	-0.013*** [4.252]	-0.010*** [3.304]	-0.028*** [10.583]	-0.027*** [9.899]	-0.024*** [9.001]
Segment relative size	0.035** [2.526]	0.010 [0.665]	0.004 [0.278]	0.079*** [6.475]	0.069*** [5.332]	0.063*** [5.002]
Segment cash flow	0.007 [1.307]	0.006 [1.104]	0.007 [1.232]	0.010** [2.162]	0.007 [1.427]	0.005 [1.000]
Board member	-0.005 [0.988]	-0.003 [0.551]	-0.001 [0.152]	-0.008* [1.707]	-0.007 [1.423]	-0.007 [1.291]
Senior	0.002 [0.394]	0.004 [0.932]	0.000 [0.071]	0.002 [0.643]	0.004 [1.010]	0.002 [0.429]
Long tenure	-0.001 [0.145]	0.001 [0.200]	0.001 [0.158]	0.002 [0.778]	0.004 [1.292]	0.003 [0.826]
High salary	-0.005 [1.580]	-0.008** [2.454]	-0.007** [2.247]	0.001 [0.313]	-0.001 [0.231]	0.000 [0.151]
Ivy league	-0.012** [2.057]	-0.008 [1.283]	-0.011* [1.748]	-0.006 [1.103]	-0.004 [0.789]	-0.006 [1.109]
High avg. SAT score	0.005 [1.575]	0.003 [0.735]	0.005 [1.552]	0.002 [0.666]	0.000 [0.043]	0.001 [0.459]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.363	0.340	0.161	0.229	0.214	0.126
N_obs	1,633	1,568	1,568	3,054	2,936	2,936

TABLE VI

Information Asymmetry, Agency, and Investment Efficiency

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 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 information asymmetry index combines three separate measures of information asymmetry (segment size, number of segments, the standard deviation of Tobin's Q across segments) by averaging a segment's percentile ranking in the sample according to each measure (for the segment size, the reverse ranking is used). We then scale the index to range from zero (low) to one (high). The agency index combines the following three measures of agency in a similar way: the Gompers, Ishii, and Metrick (2003) index, the percentage of shares held by institutional investors, and the fraction of shares held by the top managers (for the latter two, the reverse ranking is used). 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 segment level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Dependent variable	CAPEX		Industry-adjusted CAPEX		Industry- Firm-adjusted CAPEX	
Index type	Information asymmetry	Agency	Information asymmetry	Agency	Information asymmetry	Agency
Connected	-0.149** [2.127]	-0.125 [1.508]	-0.143* [1.950]	-0.108 [1.258]	-0.170** [2.378]	-0.089 [1.052]
Index	0.008 [0.770]	-0.001 [0.102]	0.014 [1.411]	-0.001 [0.123]	0.014 [1.406]	-0.002 [0.159]
Industry-median Tobin's Q	0.018 [1.152]	0.001 [0.067]	0.052*** [3.180]	0.014 [0.894]	0.050*** [3.106]	0.011 [0.705]
Connected x Index	0.085*** [2.648]	0.076* [1.929]	0.082** [2.482]	0.067* [1.653]	0.094*** [2.902]	0.057** [2.428]
Connected x Industry-median Tobin's Q	0.072 [1.592]	0.052 [0.973]	0.066 [1.401]	0.057 [1.022]	0.082* [1.790]	0.043 [0.799]
Index x Industry-median Tobin's Q	-0.008 [1.216]	0.000 [0.049]	-0.015** [2.282]	0.001 [0.145]	-0.015** [2.305]	0.002 [0.248]
Connected x Industry-median Tobin's Q x Index	0.040* [1.957]	-0.032 [1.260]	0.037* [1.747]	-0.033** [2.259]	0.044** [2.125]	-0.026* [1.816]
Segment size	-0.028*** [10.225]	-0.027*** [10.437]	-0.028*** [9.816]	-0.027*** [9.798]	-0.025*** [8.951]	-0.024*** [8.911]
Segment relative size	0.073*** [5.985]	0.077*** [6.362]	0.062*** [4.781]	0.068*** [5.259]	0.056*** [4.422]	0.062*** [4.935]
Segment cash flow	0.011** [2.386]	0.010** [2.189]	0.008 [1.620]	0.008 [1.457]	0.006 [1.223]	0.005 [1.029]
Board member	-0.010* [1.933]	-0.009* [1.897]	-0.008 [1.601]	-0.008 [1.585]	-0.007 [1.466]	-0.007 [1.442]
Senior	0.002 [0.680]	0.002 [0.555]	0.004 [1.033]	0.003 [0.924]	0.002 [0.458]	0.001 [0.336]
Long tenure	0.002 [0.728]	0.002 [0.678]	0.004 [1.277]	0.004 [1.229]	0.003 [0.803]	0.003 [0.786]
High salary	0.001 [0.312]	0.001 [0.240]	-0.001 [0.206]	-0.001 [0.266]	0.000 [0.109]	-0.001 [0.179]
Ivy league	-0.004 [0.777]	-0.006 [1.203]	-0.003 [0.580]	-0.004 [0.850]	-0.005 [0.885]	-0.006 [1.189]
High avg. SAT score	0.001 [0.483]	0.002 [0.636]	-0.001 [0.358]	-0.001 [0.259]	0.000 [0.117]	0.001 [0.229]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.234	0.233	0.223	0.218	0.137	0.131
N_obs	3,054	3,054	2,936	2,936	2,936	2,936

TABLE VII

Connections of Divisional Managers and Excess Value

This table presents estimates from panel regressions, in which the dependent variable is the firm's excess value, defined as the natural logarithm of the ratio of a firm's actual value to its imputed value. A firm's imputed value is the sum of the imputed values of its segments, with each segment's imputed value equal to the segment's assets multiplied by its industry median ratio of market to book assets. Firm connectedness is the asset-weighted average number of connections between all divisional managers and the CEO for a given firm in a given year. All variable definitions are given in Appendix A. 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 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	0.167*** [3.116]	0.131** [2.553]	0.026 [0.191]	0.968*** [5.602]	0.789*** [3.466]
Information asymmetry index			-1.312*** [4.398]		-1.215*** [3.396]
Firm connectedness x Information asymmetry index			0.129** [2.431]		0.151** [2.426]
Agency index				-0.111** [2.004]	-0.148** [2.344]
Firm connectedness x Agency index				-0.565*** [5.498]	-0.576*** [5.646]
Tobin's Q heterogeneity		-0.753*** [7.472]	-0.780*** [7.712]	-0.761*** [6.743]	-0.790*** [6.952]
Number of segments		0.034** [2.040]	0.023 [1.381]	0.030 [1.536]	0.018 [0.919]
Cash flow		1.774*** [7.281]	1.854*** [7.655]	1.803*** [5.817]	1.907*** [6.168]
Size		0.025 [1.308]	0.311*** [4.408]	0.036 [1.486]	0.296*** [3.501]
Year fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.022	0.121	0.138	0.160	0.174
N_obs	1,016	975	975	975	975

TABLE VIII

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 Appendix B. 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 segment 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)
Connected	0.005* [1.806]	0.006** [2.266]	0.006** [2.213]	0.010** [2.569]	0.013*** [3.110]	0.014*** [3.259]	0.005** [2.094]	0.003** [2.665]	0.003** [2.612]
Industry-median Tobin's Q	-0.007* [1.703]	0.007* [1.655]	0.008** [1.965]	-0.007* [1.713]	0.007* [1.681]	0.008** [1.995]	-0.007* [1.724]	0.006 [1.636]	0.008* [1.947]
Segment size	-0.024*** [9.599]	-0.023*** [8.950]	-0.020*** [7.800]	-0.024*** [9.479]	-0.023*** [8.754]	-0.019*** [7.601]	-0.024*** [9.561]	-0.023*** [8.861]	-0.020*** [7.712]
Segment relative size	0.065*** [5.529]	0.056*** [4.448]	0.048*** [3.906]	0.063*** [5.396]	0.052*** [4.204]	0.045*** [3.659]	0.064*** [5.436]	0.054*** [4.333]	0.046*** [3.795]
Segment cash flow	0.011** [2.418]	0.008 [1.581]	0.006 [1.266]	0.012** [2.566]	0.009* [1.781]	0.007 [1.466]	0.012** [2.533]	0.009* [1.679]	0.007 [1.359]
Board member	-0.011** [2.167]	-0.010** [1.996]	-0.009* [1.833]	-0.012** [2.350]	-0.011** [2.177]	-0.010** [2.025]	-0.011** [2.147]	-0.010** [1.992]	-0.009* [1.831]
Senior	0.002 [0.624]	0.004 [1.061]	0.003 [0.701]	0.002 [0.510]	0.003 [0.872]	0.002 [0.505]	0.002 [0.581]	0.004 [1.055]	0.003 [0.697]
Long tenure	0.003 [0.787]	0.005 [1.362]	0.003 [0.820]	0.002 [0.706]	0.004 [1.273]	0.002 [0.732]	0.002 [0.721]	0.004 [1.275]	0.002 [0.735]
High salary	0.002 [0.558]	0.000 [0.029]	0.000 [0.084]	0.001 [0.463]	0.000 [0.078]	0.000 [0.024]	0.001 [0.361]	0.000 [0.052]	0.000 [0.114]
Ivy league	-0.005 [1.050]	-0.004 [0.784]	-0.006 [1.233]	-0.005 [0.999]	-0.004 [0.777]	-0.006 [1.230]	-0.005 [0.974]	-0.004 [0.749]	-0.006 [1.200]
High avg. SAT score	0.002 [0.667]	0.000 [0.110]	0.001 [0.370]	0.003 [0.915]	0.001 [0.229]	0.002 [0.701]	0.003 [1.117]	0.001 [0.374]	0.003 [0.852]
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	0.216	0.203	0.116	0.217	0.204	0.118	0.215	0.202	0.115
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
Connected	0.004 [1.024]	0.000 [0.026]	-0.015 [0.991]	0.014*** [2.990]	0.011** [2.263]	-0.025 [1.094]	0.000 [1.361]
Industry-median Tobin's Q	0.015*** [3.216]	0.015*** [3.224]	0.014*** [3.173]	0.015*** [3.347]	0.015*** [3.272]	0.015*** [3.207]	0.015*** [3.225]
Segment size	-0.024*** [8.960]	-0.024*** [8.955]	-0.024*** [8.973]	-0.024*** [8.928]	-0.024*** [8.933]	-0.024*** [8.951]	-0.024*** [8.957]
Segment relative size	0.063*** [4.967]	0.062*** [4.936]	0.062*** [4.951]	0.063*** [4.999]	0.062*** [4.912]	0.062*** [4.924]	0.062*** [4.938]
Segment cash flow	0.005 [1.032]	0.005 [1.051]	0.005 [1.043]	0.005 [1.007]	0.005 [1.033]	0.005 [1.070]	0.005 [1.052]
Board member	-0.007 [1.351]	-0.007 [1.298]	-0.007 [1.298]	-0.006 [1.200]	-0.006 [1.215]	-0.007 [1.300]	-0.007 [1.298]
Senior	0.002 [0.427]	0.002 [0.445]	0.002 [0.451]	0.002 [0.459]	0.001 [0.398]	0.002 [0.425]	0.002 [0.444]
Long tenure	0.003 [0.778]	0.002 [0.732]	0.002 [0.734]	0.003 [0.775]	0.003 [0.779]	0.002 [0.744]	0.002 [0.732]
High salary	0.000 [0.125]	0.000 [0.123]	0.000 [0.094]	-0.001 [0.215]	0.000 [0.102]	0.000 [0.121]	0.000 [0.123]
Ivy league	-0.006 [1.159]	-0.006 [1.090]	-0.006 [1.080]	-0.005 [0.955]	-0.006 [1.101]	-0.006 [1.144]	-0.006 [1.093]
High avg. SAT score	0.002 [0.641]	0.003 [0.871]	0.003 [0.868]	0.001 [0.377]	0.003 [1.007]	0.003 [0.930]	0.003 [0.886]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.126	0.125	0.126	0.128	0.127	0.126	0.125
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
Connected	0.006 [0.674]	0.000 [0.085]	0.018*** [2.964]	0.013*** [3.223]	0.000 [0.510]	0.005 [0.494]	0.007 [0.810]
Industry-median Tobin's Q	0.015*** [3.262]	0.015*** [3.225]	0.015*** [3.261]	0.015*** [3.273]	0.015*** [3.225]	0.015*** [3.236]	0.015*** [3.208]
Segment size	-0.024*** [8.971]	-0.024*** [8.953]	-0.024*** [8.948]	-0.024*** [8.829]	-0.024*** [8.957]	-0.024*** [8.941]	-0.024*** [8.964]
Segment relative size	0.062*** [4.951]	0.062*** [4.928]	0.062*** [4.881]	0.061*** [4.815]	0.062*** [4.938]	0.062*** [4.933]	0.063*** [4.953]
Segment cash flow	0.005 [1.029]	0.005 [1.055]	0.005 [1.068]	0.006 [1.125]	0.005 [1.052]	0.005 [1.044]	0.005 [1.045]
Board member	-0.007 [1.362]	-0.007 [1.299]	-0.007 [1.437]	-0.008 [1.515]	-0.007 [1.298]	-0.007 [1.324]	-0.007 [1.379]
Senior	0.002 [0.417]	0.002 [0.439]	0.002 [0.515]	0.001 [0.278]	0.002 [0.444]	0.002 [0.423]	0.002 [0.447]
Long tenure	0.002 [0.744]	0.002 [0.734]	0.002 [0.556]	0.002 [0.725]	0.002 [0.732]	0.002 [0.764]	0.002 [0.742]
High salary	0.000 [0.150]	0.000 [0.122]	-0.001 [0.205]	-0.001 [0.173]	0.000 [0.123]	0.000 [0.107]	0.000 [0.143]
Ivy league	-0.005 [1.053]	-0.006 [1.096]	-0.005 [1.002]	-0.006 [1.144]	-0.006 [1.093]	-0.006 [1.096]	-0.006 [1.123]
High avg. SAT score	0.003 [0.892]	0.003 [0.881]	0.003 [0.827]	0.002 [0.708]	0.003 [0.886]	0.003 [0.885]	0.003 [0.872]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.125	0.125	0.128	0.126	0.125	0.125	0.126
N_obs	2,936	2,936	2,936	2,936	2,936	2,936	2,936

TABLE IX

Connections of Divisional Managers to Board Members and the CEO

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 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 segment level. Significance levels are indicated as follows: * = 10%, ** = 5%, *** = 1%.

Connection type	Any board Member			CFO		
Dependent variable	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX	CAPEX	Industry-adjusted CAPEX	Industry-Firm-adjusted CAPEX
Model	(1)	(2)	(3)	(4)	(5)	(6)
Connected	0.006 [1.625]	0.010*** [2.622]	0.010*** [2.792]	0.003 [0.598]	0.008 [1.408]	0.008 [1.356]
Industry-median Tobin's Q	0.000 [0.011]	0.016*** [3.493]	0.014*** [3.185]	0.000 [0.089]	0.017*** [3.599]	0.015*** [3.292]
Segment size	-0.027*** [10.454]	-0.027*** [9.722]	-0.024*** [8.821]	-0.028*** [10.498]	-0.027*** [9.822]	-0.024*** [8.928]
Segment relative size	0.077*** [6.312]	0.066*** [5.123]	0.060*** [4.789]	0.077*** [6.357]	0.067*** [5.211]	0.062*** [4.887]
Segment cash flow	0.011** [2.321]	0.008 [1.603]	0.006 [1.183]	0.011** [2.253]	0.008 [1.514]	0.006 [1.084]
Board member	-0.010* [1.924]	-0.009* [1.663]	-0.008 [1.547]	-0.009* [1.796]	-0.008 [1.464]	-0.007 [1.331]
Senior	0.002 [0.671]	0.004 [0.940]	0.001 [0.352]	0.003 [0.728]	0.004 [1.085]	0.002 [0.501]
Long tenure	0.002 [0.577]	0.004 [1.134]	0.002 [0.669]	0.002 [0.614]	0.004 [1.162]	0.002 [0.701]
High salary	0.001 [0.320]	-0.001 [0.228]	0.000 [0.151]	0.001 [0.316]	-0.001 [0.203]	0.000 [0.124]
Ivy league	-0.005 [1.074]	-0.004 [0.816]	-0.006 [1.140]	-0.005 [1.078]	-0.004 [0.809]	-0.006 [1.128]
High avg. SAT score	0.003 [1.014]	0.001 [0.214]	0.002 [0.695]	0.003 [1.141]	0.001 [0.362]	0.003 [0.857]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.228	0.215	0.128	0.228	0.213	0.126
N_obs	3,054	2,936	2,936	3,054	2,936	2,936

Table B-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. The frequency column provides the proportion of organizations falling into a particular category among the 7,763 classified organizations. Percent of managers involved is the fraction of executives in our sample (3,842 people) who are associated with at least one organization in the category. The sum of percentages does not equal 100 percent, since one organization can belong to several categories and one executive can be connected to several organizations across multiple categories or not hold membership in any nonprofits.

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