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THE STRATEGIC IMPETUS FOR SOCIAL NETWORK TIES: RECONSTITUTING BROKEN CEO FRIENDSHIP TIES

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Research on organization–environment relations has focused primarily on formal linkages between organizations such as board interlock ties as a strategy for managing resource dependence. This study examines whether top corporate executives may maintain more informal ties to executives of other firms in order to manage uncertainty arising from resource dependence. Our point of departure is prior research on boards of directors that has examined whether so-called 'broken board ties' (i.e., ties that are disrupted due to executive turnover) tend to be reconstituted, and whether resource dependence explains the likelihood of reconstitution. These studies have generally provided little evidence that corporate board ties are used to manage resource dependence. We draw from theory and research on social embeddedness and friendship to suggest that, as a strategy for managing dependence, the maintenance of friendship ties between top executives provides benefits that are comparable to the supposed benefits of board cooptation, while imposing fewer constraints on the organization. Our theory leads to the contention that, despite limited prior evidence that resource dependence determines the formation of formal board ties, corporate leaders may nevertheless reconstitute informal (i.e., friendship) ties to leaders of other firms that have the power to constrain their firms' access to needed resources when those ties have been disrupted (e.g., due to turnover of the CEO's friend). We test our hypotheses with a unique dataset that includes survey data from U.S. corporate leaders collected at two points in time, thus permitting an assessment of whether top executives reconstitute broken social ties to leaders of other firms, and whether various sources of resource dependence predict the likelihood of reconstitution. We discuss implications for strategic perspectives on inter-organizational relations and the sociological literature on embeddedness.

INTRODUCTION

Scholars in organization theory and strategic management have long been interested in how corporate leaders secure access to needed resources from their external environments. A central theme in strategic perspectives on organization–environment relations is that firms actively manage their resource environments by maintaining external linkages to organizations on which they depend for critical resources (Pfeffer and Salancik, 1978; Burt, 1983; Finkelstein, 1997). In particular, the focus in this literature has been on *formal* linkages as a strategy for managing resource dependence; such linkages include board interlock ties, whereby a focal firm attempts to co-opt another firm on which it depends for critical resources by appointing a leader from that firm to serve on the focal board (Pfeffer, 1972; Burt, 1983; Lang and Lockhart, 1990; Scott, 1992).

In this study we consider whether corporate leaders may maintain *informal* ties to leaders of

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other organizations in order to reduce uncertainty about access to needed resources. Our theoretical framework draws from theory and research on social embeddedness (Granovetter, 1985) and social psychological perspectives on friendship (Krackhardt and Stern, 1988; Clark and Mills, 1982; Silver, 1990) to suggest that, as a strategy for managing resource dependence, the maintenance of friendship ties between corporate leaders may provide advantages that are comparable to the putative benefits from board cooptation, but without the costs to organizational autonomy and institutional constraints that attend board interlock ties. Our study contributes to theory and research on inter-organizational relations by addressing how corporate leaders may use informal social ties to executives of other firms as a strategic mechanism for managing resource dependence. Strategic perspectives on inter-organizational relations have given little attention to how executives may use informal vs. formal network ties to manage such relations. Sociological perspectives on embeddedness, while recognizing the potential value of informal network ties, tend not to address how strategic imperatives (i.e., the management of resource dependencies) may determine the formation or maintenance of such ties. Thus, our study contributes to the literature on inter-organizational relations by suggesting how social network ties between top managers can have a strategic impetus.

Resource dependence and board cooptation

Resource dependence theory suggests that firms actively manage their dependencies on other organizations for critical resources. To the extent that a buyer or supplier organization provides inputs, services, or other resources that are critical to a focal firm's survival and there are few alternative exchange partners available, the focal firm will attempt to reduce uncertainty about the availability of the needed resources by establishing linkages to the resource provider (Thompson and McEwen, 1958; Pfeffer and Salancik, 1978; Burt, 1983). Such linkages range from merger, in which the firm assumes ownership over an organization upon which it is dependent, to linkages that partially absorb sources of dependence such as board cooptation. With cooptation, a key decision maker from an organization that provides critical resources is invited to serve on the focal firm's board (Selznick, 1949; Pfeffer, 1972). By virtue of their appointment and subsequent participation in board decision making, the co-opted individual will come to identify with the organization and 'concern himself with its problems,' and will thus be more likely to 'support the organization, favorably present it to others, and try to aid it' (Pfeffer and Salancik, 1978: 163). As a consequence, the board appointee is expected to favor (or at least not oppose) the interests of the focal firm in decision making and negotiations, resulting in a more stable relationship and better terms of trade with the director's home company.

In comparison to ownership-based strategies for managing resource dependence, board cooptation is relatively inexpensive, flexible, and low risk (Pfeffer and Salancik, 1978; Burt, 1983). Directors who prove unreceptive to cooptation can be removed at relatively little cost. At the same time, there are substantial problems with cooptation as a strategy for managing dependence. First, cooptation entails a loss of organizational autonomy (e.g., Selznick, 1949; Scott, 1992; Davis and Mizruchi, 1999). The socialization and identification processes that underlie cooptation take time to operate. In the meantime, the appointed individual, who has been placed in a position of formal authority over top management, may seek to advance the interests of his or her home organization, act out of personal interests, or impose some other extraneous agenda on the focal firm. A second problem with board cooptation relates to norms and expectations for board conduct: boards are increasingly expected by institutional investors and other external stakeholders to exert independent control over management (Westphal and Zajac, 1997). Thus, firms now experience substantial pressure to appoint directors who are independent of the focal firm and its management. SEC guidelines state that independent directors should lack affiliations with the focal firm as a supplier, creditor, or commercial banker within the past two years, and firms that appoint directors who have such affiliations face an increasing risk of shareholder lawsuits (Johnson, Daily, and Ellstrand, 1996). Thus, firms are now confronted with institutional pressures against using board cooptation as a strategy for managing resource dependence.

Empirical evidence that resource dependence determines board appointments is mixed at best (Mizruchi, 1996; Zajac, 1988). As Mizruchi (1996: 274) noted, the lack of empirical evidence is highlighted by the so-called ‘broken-tie studies.’ These studies examined the frequency with which board interlock ties between firms that were broken ‘accidentally,’ as when a director leaves their primary employer, were reconstituted by inviting another manager from the same firm to serve on the focal board. Other research has examined the determinants of such reconstitution. Studies in this literature have revealed a generally low frequency of reconstitution, ranging from 6 percent to 15 percent for ties to nonfinancial institutions (e.g., Koenig, Gogel, and Sonquist, 1979; Palmer, 1983; Palmer, Friedland, and Singh, 1986), and Palmer *et al*. (1986) provided evidence that resource dependence does not explain the likelihood of reconstitution.

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Vertical resource dependence and the reconstitution of broken friendship ties

Given the limitations to board cooptation as a strategy for managing resource dependencies, we consider whether executives might maintain more informal linkages (i.e., friendship ties) to top managers of other firms to deal with their firms’ dependencies.[1] As with board ties, the maintenance of friendship ties between top managers to manage resource dependencies involves less expense and lower risk to the focal firm than strategies such as merger or joint ventures that entail ownership ties between firms. At the same time, while firms face institutional constraints on the use of boards as a cooptation mechanism, executives are relatively unfettered in forming friendship ties with other managers. Whereas board cooptation entails a loss of organizational autonomy, moreover, the maintenance of friendship ties entails no such costs.

While the costs of maintaining friendship ties between corporate leaders are relatively low in comparison to alternative strategies for managing resource dependence, the maintenance of such ties can provide benefits that are comparable to the supposed benefits of board interlock ties. When a focal firm is dependent on another firm—say a buyer—for critical resources, it is relatively vulnerable to opportunism by that firm. The buyer has more alternative suppliers than the supplier has alternative buyers and thus, all else equal, the buyer will be more inclined and better able to breach its contract with the supplier or renege on informal understandings to lower its input prices or otherwise improve its terms of trade. Friendship ties between top managers of the buyer and supplier organizations should reduce the likelihood of such opportunistic behavior. The growing literature on social embeddedness suggests that social ties between managers of different firms can blunt opportunism in economic exchange relationships (Granovetter, 1985; Uzzi, 1996; Baker, Faulkner, and Fisher, 1998; Ingram and Roberts, 2000). Uzzi (1999: 489) notes that embeddedness, resulting in large part from friendship ties, ‘infuses a business tie with social values and attitudes that ... shift actors’ motives away from the narrow pursuit of ... economic gains.’ Friendship ties are governed by ‘communal’ norms in which persons are obliged to look after each other’s interests, rather than exchange-based norms in which parties are concerned with reciprocation of benefits or arm’s-length transacting in which parties seek only to maximize benefits to themselves (Clark and Mills, 1982; Silver, 1990; Pahl, 2000). Thus, norms of friendship discourage a more powerful party in an economic exchange relationship from exploiting their position of power at the expense of the other party when they are connected by a friendship tie. Cook and Emerson (1978) noted that, in general, interpersonal commitments attenuate the use of power in exchange relationships.

The mechanism by which friendship ties between leaders neutralize resource dependence is analogous to the effects of board cooptation. Pfeffer and Salancik (1978) suggested that managers become co-opted as they take on the role of director at a dependent firm and the expectations of that role influence their decision making: as a director, they feel obligated at some level to protect the

[1] A premise of our theory is that executives can maintain social ties that have the critical elements of friendship when the relationship is initiated (at least in part) for strategic reasons. There is considerable theory and evidence to support this assumption from a range of disciplines, including philosophy, psychology, sociology, and marketing, (e.g., Hays, 1985; Fine, 1986; Price and Arnould, 1999; Ingram and Roberts, 2000; Long, 2003). Individuals often enter into personal relationships for instrumental reasons ranging from companionship to status enhancement, but once the relationship has formed they tend naturally to acquire a concern for the other person’s welfare, allowing trust, loyalty and commitment to develop regardless of the original impetus for the relationship. As discussed below, this premise was supported by our pre-test interviews and data from our large sample survey of CEOs.

interests of the dependent firm in negotiating the exchange relationship. Similarly, normative expectations associated with the role of 'friend' oblige an executive who has been befriended by the top manager of a dependent firm to consider the interests of that person in negotiations, which should tend to result in more favorable terms of trade for the dependent firm, and reduce the likelihood that the powerful firm will defect to a competitor. Montgomery (1998) presents theory and experimental evidence suggesting that simply framing an individual's role in a dyadic exchange relationship as 'friend' rather than (or in addition to) 'businessperson' reduces the likelihood of defection (i.e., opportunistic behavior) apart from any concerns about reputational costs to the focal actor. In effect, when a manager is in a position of power due to resource dependence, friendship ties create conflict between the manager's role as friend and the manager's role as businessperson or agent of their employer, thus reducing the manager's propensity to exploit their firm's position of power. Such role conflict again mirrors the mechanism by which board interlock ties are thought to neutralize the effect of resource dependence.

Personal ties can also facilitate information transfer between corporate leaders. Friends are more prone to trust each other with sensitive information (Krackhardt, 1992; Westphal, 1999; Pahl, 2000). Thus, information from personal ties can provide unique insight into the strategy of a powerful exchange partner and provide early access to information about that firm's planned strategic moves (Gulati, 1995; Uzzi, 1996). This enables the dependent firm to make proactive adjustments to its strategy in order to stay aligned with the powerful firm's plans. Thus, friendship ties may provide access to information that helps the focal firm compete for critical but scarce resources provided by a buyer or supplier. In this respect, the anticipated benefits of friendship ties are again similar to the putative benefits of board interlock ties. Burt (1983: 77) notes that interlock ties can provide 'insider information on developments being undertaken' in buyer or supplier industries, thus increasing a firm's ability to anticipate future developments in those sectors and adapt its strategy accordingly.

Thus, friendship ties between executives of buyer and supplier firms have the potential to deter executives of more powerful exchange partners from defecting to a competitor or initiating other actions that would harm the interests of the more dependent firm. While the salutary effects of friendship ties are comparable to the supposed benefits from having board interlock ties, informal linkages such as friendship ties are relatively free of the risks and institutional constraints that attend the maintenance of (formal) board ties. Accordingly, while there is little evidence that firms seek to maintain board interlock ties to powerful exchange partners, we believe that executives may maintain informal social ties to fellow top executives of companies that have the power to control the focal firm's access to critical resources.

This suggests an initial set of hypotheses. Specifically, we hypothesize that when a friendship tie between the top executives of two firms (A and B) is 'accidentally' broken (i.e., due to the turnover of either person), the extent of A's resource dependence on B will predict the likelihood that A's CEO will seek to reconstitute the broken tie by initiating a friendship with B's CEO. Specifically:

Hypothesis 1: The greater the vertical resource dependence of focal firm A on another firm B (defined as dependence on exchange with a buyer or supplier firm), the greater the likelihood that a broken friendship tie between the CEO of A and the CEO of B will be reconstituted by A's CEO, where the broken tie results from turnover of either CEO.

Capital dependence and the reconstitution of broken friendship ties

Resource dependence theory suggests that firms also maintain external linkages to financial institutions to ensure access to needed capital (Pfeffer and Salancik, 1978; Burt, 1983). From this perspective, just as firms co-opt buyers and suppliers on which they depend for critical resources by inviting top managers to serve on their boards, as discussed above, so firms in need of external financing may use board appointments to co-opt financial institutions. While there is relatively little evidence that resource dependence in vertical exchange relationships predicts board appointments, there is more evidence that capital dependence predicts board interlock ties with financial institutions. Board ties to financial institutions are more likely to be reconstituted when broken (Stearns and Mizruchi, 1986), and there is some evidence that a firm's need for financing predicts the likelihood of reconstituting broken interlock ties to financial institutions (Palmer *et al*., 1986). As several authors have noted, however, these findings are subject to alternative explanations. Financial institutions may seek board appointments at their client firms in order to monitor their investments; such ties may indicate 'infiltration' by capital providers rather than cooptation by capital dependent firms (Palmer *et al*., 1986; Mizruchi and Stearns, 1994; Davis and Mizruchi, 1999). This reflects the more general limitation to board cooptation as a strategy for managing resource dependence, namely the loss of organizational autonomy.

Our theoretical argument suggests that firms may seek to manage their capital dependence by maintaining informal linkages to officers of financial institutions. Such ties may yield benefits to the focal firm that parallel the potential benefits of board cooptation, but without the threats to organizational autonomy. Given the norms of friendship discussed above, officers of financial institutions who have been befriended by the top executive of a capital dependent firm may feel obligated to help their friend's firm gain access to needed capital on relatively favorable terms. Uzzi's (1999) qualitative work on social embeddedness suggested that firms were able to obtain lower interest rates on loans when managers had 'social attachments' to their lenders (also Baker, 1990). Given some degree of subjectivity in assessing the capabilities and prospects of potential clients (Uzzi, 1999; Mizruchi and Stearns, 1994), lenders may be more inclined to trust information about firm capabilities, prospects, and performance when that information is provided by managers with whom they have friendship ties.

Moreover, given that friendship implies trust, when exchange relationships between financial institutions and client firms are embedded in personal friendship ties, lenders may engage in less vigilant monitoring of their investments than would be dictated by an economically rational consideration of agency costs. Thus, while friendship ties with officers of financial institutions may facilitate access to capital on relatively favorable terms, thus providing benefits that are analogous to the supposed benefits of board cooptation, they may do so at relatively low cost to the organization in terms of diminished autonomy. Therefore, while there is limited evidence that top managers use board ties to manage capital dependence, we believe that they may maintain informal friendship ties with officers of financial institutions on which the focal firm is dependent for capital. This suggests a second set of hypotheses, which parallels the first:

Hypothesis 2: The greater the dependence of a focal firm (A) on financial institutions for capital, the greater the likelihood that a broken friendship tie between the CEO of A and an officer of a financial institution will be reconstituted by A's CEO, where the broken tie results from: (i) turnover of the focal firm's CEO or (ii) turnover of the officer.

Competitive uncertainty and the reconstitution of broken friendship ties

Thus far we have suggested that executives may seek to maintain friendship ties with leaders of other firms in order to reduce uncertainty about their access to needed resources from suppliers, buyers, and financial institutions. Resource dependence theorists also suggest that firms may establish linkages to other firms in order to reduce uncertainty from competitive interaction (Pfeffer and Salancik, 1978; Burt, 1983; Palmer *et al*., 1995). As in the management of vertical resource dependence, firms are thought to maintain board interlock ties with competitors as a relatively flexible, low-cost tactic for managing competitive uncertainty (i.e., in comparison to ownership ties). Such ties are presumed to facilitate tacit coordination of firm activities, thus reducing the likelihood or intensity of price wars, bidding wars for inputs, and other forms of competition for resources. Yet, there are several limitations to board ties as a strategy for managing competitive interdependence. Most obviously, direct interlock ties between competitors where the manager of one firm sits on the board of a competitor are prohibited by anti-trust regulations. While nondirectional interlock ties between competitors, where the same person serves as outside director on the boards of competitors, are not prohibited by law, they may still contribute to the perception of collusive behavior among stakeholders, thus inviting closer scrutiny from regulators and ultimately increasing the likelihood of other forms of anti-trust regulation (Burt, 1983). Aside from these problems, board ties to competitors suffer from the general limitations to board cooptation as a strategy for managing resource dependence discussed above, namely, the loss of some organizational autonomy, and the risk that an outside director may act out of the interests of his or her home company. Due perhaps to these limitations, available evidence suggests that firms seldom use board interlock ties as a strategy for managing competitive uncertainty (Zajac, 1988; Mizruchi, 1996).

Our theoretical perspective would again suggest that executives may seek to manage their competitive environment by maintaining more informal ties of friendship to fellow CEOs of competitor firms. As a mechanism of reducing competitive uncertainty, friendship ties between executives avoid the primary disadvantages of board interlock ties noted above: they are not formally regulated; they are less visible to stakeholders, and thus do not give the appearance of collusive behavior; and they do not compromise organizational autonomy by giving the CEO of a competitor formal authority over the affairs of the firm. At the same time, such ties promise benefits to firms with respect to the reduction of competitive uncertainty that are analogous to the putative benefits of board interlocks. The norms of reciprocity and interpersonal trust that characterize friendship ties should facilitate the exchange of strategic information between corporate leaders (Ingram and Lifschitz, 2003), thus reducing competitive uncertainty. Communication of strategic information between CEO–friends should tend to be more frequent and timely, and less prone to misunderstanding, than communication between acquaintances (Gulati and Westphal, 1999). As a result, each party should have a better understanding of the general 'strategic disposition' and specific strategic plans of the other party (Ingram and Roberts, 2000: 389). Such mutual knowledge facilitates tacit coordination between firms (Porter, 1998).

Moreover, a CEO will be more willing to lead a price increase if they can trust the CEO of a competitor to follow. Friendship ties between CEOs provide the foundation for such trust, thus facilitating tacit cooperation and reducing competitive uncertainty. Accordingly, the anticipated benefits of friendship ties between CEOs of competitors are analogous to the potential benefits of board interlock ties. In discussing the possible effects of interlock ties between competitors and the rationale for regulating such ties, Burt (1983: 75) quotes an FCC report: 'a director of two competing corporations cannot in good conscience recommend that either shall undertake a type of competition that is likely to injure the other ... Thus, the inherent tendency of interlocking directorates between ... competitors is to blunt the edge of rivalry between [them].' An executive's friendship tie to the CEO of a competitor firm, by facilitating information exchange and the development of mutual understandings and trust, should similarly blunt the impetus toward competitive action, benefiting both firms.

Thus, given the potential benefits to be derived from friendship ties to CEOs of competitor firms, and the relatively low risks and barriers to the maintenance of such ties in comparison to more formal linkages such as board interlocks, CEOs may be inclined to maintain friendship ties to the leaders of competitor firms in order to manage competitive uncertainty. Thus, we expect CEOs to make efforts to reconstitute accidentally broken friendship ties to CEOs of competitors when competitive uncertainty is relatively high. Resource dependence theory suggests that competitive uncertainty is highest when industry concentration is intermediate: As concentration increases, the effect of any one firm's actions on its competitors increases, thus increasing competitive uncertainty; yet, at very high levels of concentration, uncertainty is reduced, either due to monopolistic conditions or because firms can tacitly coordinate their actions and thus reduce the intensity of competition without interfirm linkages (Pfeffer and Salancik, 1978; Pennings, 1980; Palmer *et al.*, 1995). This discussion leads to the following, additional hypothesis:

Hypothesis 3: The greater the competitive uncertainty (as determined by the level of industry concentration), the greater the likelihood that a broken friendship tie between the CEOs of competitor firms will be reconstituted, where the broken tie results from turnover of either CEO.

METHOD

Sample and data

The sample frame consisted of 600 companies randomly selected from the Forbes index of large and medium-sized U.S. industrial and service firms. To examine the reconstitution of broken CEO friendship ties, we surveyed corporate leaders at two points in time. Moreover, we not only surveyed

CEOs about their friendship ties to top managers of other firms, but we also surveyed inside directors about the CEO's friendship ties. Pretest interviews suggested that high-level top managers may often be knowledgeable about the CEO's social ties to leaders of other firms and aware of efforts by the CEO to build such ties. Thus, in January of 1999 a survey questionnaire was sent to all CEOs in the sample frame, and at the same time a questionnaire about the CEO's friendship ties was sent to all inside directors in the sample frame. Three years later, we sent a second survey to CEOs at companies where a CEO had responded to the initial survey (i.e., either the same CEO or the CEO's successor) and to inside directors at those companies. To assess interrater reliability of the friendship measure, we also sent questionnaires to top managers and officers rated as friends by the responding CEOs (this survey is discussed in the Measures section below).

We sought to maximize the response rate by following procedures that have been used successfully in recent surveys of top managers (see Zajac, 1990; Fowler, 1993; Westphal, 1999). Perhaps most importantly, we revised the questionnaires extensively based on feedback from an in-depth pretest that included detailed interviews with 23 board members, most of whom had experience as an inside director. Pretest participants filled out a preliminary version of the questionnaire and provided feedback on the individual questions, as well as the format and instructions of the questionnaire. The objective was not only to increase the validity of the survey items, but also to make the questionnaire more appealing and easier to fill out. Moreover, in soliciting participation in the cover letter, we linked the study to prior surveys in which many other high-level managers and directors had participated. In addition, we sent two additional waves of questionnaires to CEOs and one additional wave to inside directors, with the last wave accompanied by an endorsement of the study by two directors at a major consulting firm.

The response rate to the initial CEO survey was 42 percent, and the response rate to the initial inside director survey was 44 percent. The response rates for the repeat surveys were 59 percent for CEOs and 48 percent for inside directors. In all, we obtained repeat responses from CEOs at the same company for 152 firms (25%) ('Respondent Sample 1'), and responses from at least one knowledgeable insider (i.e., the CEO or an insider director who claimed knowledge of the CEO's social ties) at both points in time for 293 firms (49%) ('Respondent Sample 2').[2] We used the Komogorov–Smirnov (KS) two-sample test to assess whether nonresponse bias is present in the data. This procedure tests for differences between respondents and nonrespondents with respect to the distribution of a given variable. We compared companies in each sample defined above with companies in the larger sample frame on a variety of characteristics, including industry concentration, return on equity, debt/equity level, and retained earnings. Results indicated that neither companies in Respondent Sample 1 nor companies in Respondent Sample 2 were significantly different from companies in the larger sample frame of Forbes companies on these characteristics (p-values range from 0.144 to 0.830). We also compared respondents and nonrespondents on several individual characteristics, including organizational tenure and tenure in position. Results again indicated that neither responding CEOs nor responding inside directors were significantly different from nonrespondents on these characteristics, with the exception that responding inside directors had significantly longer tenure in position than nonrespondents (other p-values ranged from 0.356 to 0.938). Responding CEOs were not significantly different from nonrespondents on any of the archival measures that we examined in the study. Overall, the results of these analyses provided consistent evidence that sample selection bias is absent from Sample 1, and limited in Sample 2.

We obtained input/output data to measure industry constraint from the Bureau of Economic Analysis. Data on CEO and director characteristics came from proxy statements, *Standard and Poor's Register of Corporations, Directors, and Executives*, and *The Dun and Bradstreet Reference Book of Corporate Management*. We obtained data on firm performance from *COMPUSTAT*. Data on strategic alliances were obtained from *Predicast's Funk and Scott Index*, and we obtained ownership data from Compact Disclosure.

[2] In the questionnaire we asked respondents to 'please check here if you are the CEO . . . if you are filling out the survey on behalf of the CEO, please indicate your position in the organization.') All respondents in the final sample indicated that they were the CEO.

Measures

Vertical resource dependence

Our measure of vertical resource dependence is based on Emerson's (1962) classic conception of dependence power (also Cook *et al.*, 1983). From this perspective, the dependence of actor A on resource provider B increases as (1) the value of the resource to A increases and (2) alternative providers of the resource decrease. To assess the availability of alternative partners, the survey asked respondents to list the firm's primary inputs and distribution channels (if more than one). For each input/channel, the respondent is then asked to list their primary partners (up to five for each input/channel). We assigned NAICS (North American Industry Classification System) codes to each partner and calculated four-firm concentration ratios for each partner's industry (NAICS was developed as an improvement on the Standard Industrial Classification [SIC] codes; perhaps most importantly given our sample, NAICS includes more fine-grained and relevant classifications for service companies; Sabroski, 2000). Higher concentration ratios indicate fewer alternative sources of supply for a particular input or channel (Burt, 1983; Palmer *et al.*, 1995; Porter, 1998) (*Concentration of supplier/buyer industries*).

We developed a survey scale to assess the value of resources provided by exchange partners. Items in the scale are drawn from Cool and Henderson's (1998) measure of dependence power in supply chains. For each input/channel, respondents answered four questions about the impact of the input (or services provided by buyers) on differentiation of the focal firm's products and services (e.g., the impact of this input on your product or service differentiation is [weak ... strong]; to what extent are the services provided by partners in this channel important to differentiating your products or services [not very important ... extremely important]). As defined in the survey, differentiation can derive from a low price position as well as from perceived quality or other attributes. We conducted a principal components factor analysis with varimax rotation, which showed that each set of items loaded on a single factor with acceptable reliability ($\alpha = 0.87$). We used the regression method to estimate factor scores (*Perceived value of resources provided by exchange partner*). Based on Emerson and Cook's conception of dependence power, vertical resource dependence of a focal firm on a supplier or buyer organization is given by the interaction of these two variables. That is, resource dependence on another firm increases to the extent that there are relatively few alternative providers of the resource *and* the resource is relatively important to the focal firm's strategic position. We used the product term method to test the interaction.

We assessed the interrater reliability of the survey scale by comparing responses to each item for companies that had two or more respondents ($N = 209$). We used the weighted kappa coefficient, which adjusts for the expected level of chance correlation between respondents. Values exceeding 0.75 can be interpreted as indicating excellent agreement, and values between 0.4 and 0.75 are thought to suggest fair to good agreement (Fleiss, 1981). Kappas for the survey items ranged from 0.77 to 0.93, and the overall kappa for the scale was 0.84.

In measuring resource dependence, we did not include indicators of the extent or concentration of resource exchange with a particular partner, as concentration of resource exchanges with another organization does not necessarily indicate dependence power. If the focal organization buys a particular input from only one supplier, but several other suppliers are available, then the focal organization is not necessarily dependent on the supplier. As noted below, we did include a control variable for the concentration of resource exchange with a particular partner. We also elected not to use Burt's (1983) measure of industry constraint as an indicator of resource dependence in our primary analyses. As several authors have noted, a weakness of this measure is that it relies on industry-level data; that is, all companies in the focal firm's industry receive the same constraint score. Constraint also does not directly assess the value of resources provided by exchange partners. Our measure partially corresponds with the constraint measure, as both measures use concentration of the supplier/buyer industry to capture the availability of alternative exchange partners. Moreover, we ran separate analyses using the constraint measure (see Burt, 1983; Palmer *et al.*, 1995; Gulati and Westphal, 1999). We calculated constraint scores from 1997 input/output data (i.e., these data were released in 2002 and reflect resource flows in 1997). We found that the hypothesized results presented below were substantively unchanged using constraint as a measure of vertical resource dependence.

Dependence on financial institutions

Following many prior studies, we used the *debt/equity ratio* as an indicator of dependence on financial institutions for capital (e.g., Pennings, 1980; Mizruchi and Stearns, 1988; Lang and Lockhart, 1990; Davis and Mizruchi, 1999). In separate analyses we used the debt/assets ratio, and the results were unchanged. Mizruchi and Stearns (1994) also noted that the availability of internal funds determines a firm's dependence on financial institutions for capital; thus, we included *retained earnings* as an additional indicator of financial dependence. We adjusted for firm size by dividing this measure by total assets (Mizruchi and Stearns, 1994). This measure is inverted so that higher values signify lower retained earnings.

Competitive uncertainty

Competitive uncertainty is operationalized as the *mean-deviated concentration level of the focal firm's primary industry*, again following many prior studies (Pfeffer and Salancik, 1978; Burt, 1983; Palmer *et al.*, 1995; Palmer and Barber, 2001). This variable takes on higher values when industry concentration is neither particularly low or not particularly high.

Reconstitution of broken friendship ties

The CEO survey asks respondents to consider individuals whom they know personally at buyer firms, supplier firms, financial institutions that provide capital to the focal firm, and competitors, and to (a) list their names and primary employers, and (b) indicate whether each person is (i) 'among your closest friends,' (ii) 'a friend, but not among your closest friends,' (iii) 'less than a friend but more than an acquaintance,' (iv) 'an acquaintance.' This approach to measuring friendship ties is common in the social network literature (Brass, 1984; Lin and Dumin, 1986; Stevenson and Gilly, 1991; Burt, 1992; Ibarra and Andrews, 1993). Prompting respondents to distinguish between friends and acquaintances is thought to promote a more valid assessment of friendship (Burt, 1992; Westphal, 1999). For each individual rated as a friend (i.e., a friend or a close friend), the respondent is also asked to indicate (a) who initiated the relationship, and (b) in the follow-up survey, the year in which they became friends with that person.

The inside director survey first asked directors to indicate how knowledgeable they were about the CEO's friendships with managers of buyer firms, supplier firms, financial institutions, and competitors. If directors indicated that they were knowledgeable to very knowledgeable (4–5 on a 5-point scale), then they were asked to list the CEO's acquaintances and friends, and provide the other information asked of CEOs. As noted above, the pretest interviews revealed that inside directors may often be quite knowledgeable about the CEO's friendship ties to managers of trade partners and competitors, and in fact 77 percent of responding inside directors indicated that they were knowledgeable about such ties. Moreover, for cases with a responding CEO and at least one responding inside director, there was a high level of correspondence between the CEO's list of friends and the director's list (93% overlap on average).

Among friendship ties to CEOs (or officers of financial institutions) at time t, a tie is classified as reconstituted if the following conditions hold: (1) the person identified as a friend (X) at time t leaves their primary employer (A) during the 3-year period between surveys or the focal CEO leaves his or her firm during that time; and (2) the focal CEO at time $t+3$ has a friendship tie to the CEO of A (or to an officer of A, in the case of a financial institution), and that tie was initiated by the focal CEO since the tie to X was broken. This definition excludes friendship ties that were initiated by focal CEOs prior to assuming the CEO position (i.e., when they were a lower-level manager of the focal firm or manager of another firm). There were very few such ties in the sample, and the results were robust to the inclusion or exclusion of these cases. Figure 1 provides a visual example of the reconstitution of friendship ties.

Given the importance of our measure of friendship ties to the study, we also distributed an additional questionnaire to assess interrater reliability of this measure. Specifically, 3 months after the second round of surveys was distributed to CEOs, we sent questionnaires to top managers and officers of companies where a CEO friendship tie (as reported by a responding CEO at time t) had been accidentally broken. The questionnaire asked respondents to consider their relationship to the focal CEO (i.e., the CEO in 2001 of the company whose CEO in January of 1999 had rated the manager as a friend). The response rate to

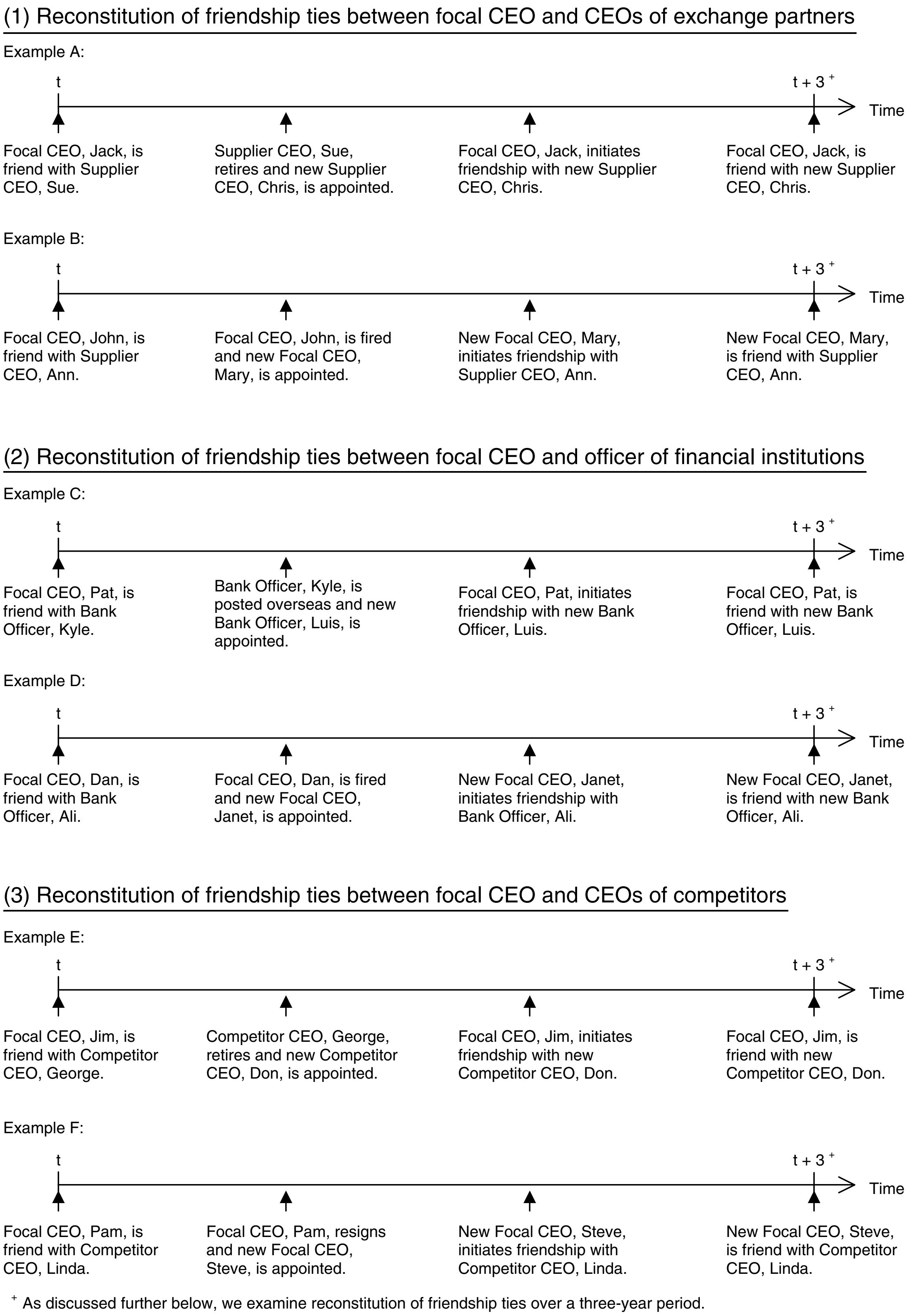

Figure 1. Reconstitution of CEO friendship ties

the survey was 39 percent ($N = 359$). We used responses to this survey to assess interrater agreement about the reconstitution of broken friendship ties. The weighted kappa coefficient for the friendship scale was 0.82, indicating a high level of agreement about whether broken friendship ties between firms' CEOs had been reconstituted (Fleiss, 1981).

The survey included additional questions that assess key features of friendship ties discussed above (cf. Hays, 1985; Krackhardt, 1992; Price and Arnould, 1999), including trust (e.g., 'to what extent do you feel you can trust this person?'), disclosure of personal information (e.g., 'to what extent do you feel comfortable disclosing personal information to this person'), personal loyalty and commitment (e.g., 'to what extent do you believe this person is committed to continuing a personal relationship with you regardless of what firm you work for?'). These questions were adapted from survey items developed and validated by Price and Arnould (1999). Responses to each question were highly correlated with our measure of friendship (correlations ranged from 0.72 to 0.86), providing additional evidence for construct validity of the friendship measure.

Control variables

We controlled for a number of variables that could influence the likelihood of reconstituting a broken CEO friendship tie. First, we controlled for firm performance, measured as *return on equity*. CEOs of poorly performing firms might perceive a greater need to maintain friendship ties with trade partners, competitors, and financial institutions. Alternatively, CEOs of such firms may be consumed with internal matters and have less time and attention to devote to maintaining external ties. In separate models we used market-to-book value of equity as a measure of performance, and the results were unchanged. We also controlled for the number of *common board appointments* between managers, as a focal CEO may be more likely to form a friendship tie with another executive to the extent that they have an opportunity to interact with each other on other boards. Palmer *et al*. (1986) found that firms were more likely to reconstitute broken board ties if they had formal, firm-level ties, e.g., joint ventures, interfirm stockholding, or common ownership. Thus, we included a dichotomous control variable to indicate whether such relationships existed at any time between and including the years of the survey (*Formal tie between firms*).

It might be argued that if a particular buyer represents a relatively large portion of the firm's total purchasing, then the focal CEO may naturally tend to develop a social tie to the buyer's CEO in the course of doing business (i.e., without any strategic intent). Thus, for analyses that include buyer and supplier firms, we controlled for the concentration of resource exchange with a particular partner. As noted above, for each input/channel, the survey respondent is asked to list their primary partners (up to five for each input/channel). The respondent is also asked to indicate the percentage of total purchasing (sales) represented by each supplier (buyer). Interrater reliability of responses to these questions was acceptably high (weighted kappa coefficients ranged from 0.79 to 0.86). Accordingly, we included this measure as a control variable in models of broken friendship ties to CEOs of buyer and supplier firms (*percentage of purchasing/sales represented by exchange partner*).

We also included a control variable for the length of *time since the friendship tie was broken* (in years), as the passing of time may strengthen a relationship. We also controlled for whether the tie was broken due to turnover of the focal CEO vs. turnover of the other manager (*turnover of focal CEO vs. alter*). A new CEO could be less prone to maintaining external ties in general, so that reconstitution may be less likely for ties that are broken due to turnover of the focal CEO. Moreover, given that normative expectations regarding the maintenance of personal ties with managers of other firms may differ across industries, we included dummy variables for the $N - 1$ NAICS codes in the sample (to conserve space, coefficients for these variables are not reported in the tables). Although firm size is typically included as a control variable in research on interorganizational networks, it is not obvious why firm size would affect the likelihood of reconstituting a friendship tie, and separate analyses confirmed that size (measured as sales or assets) is not significant in any of the models and does not affect the hypothesized results. Separate analyses also showed that corporate diversification was consistently insignificant in predicting reconstitution. Given that these variables had insignificant effects, and the rationale for including them was unclear in this study, we did not include firm size or diversification in the models. As noted above, our measure of CEO friendship ties displayed very high interrater reliability. As a result, there were very few cases in which the focal CEO (X) reported a friendship with another CEO (Y), but Y (or a knowledgeable insider at Y's firm) did not report a friendship with X. Thus, it did not seem necessary to control for whether friendship ties were reciprocated (Ingram and Roberts, 2000). Nevertheless, in separate analyses we did control for reciprocation of friendship ties, and the hypothesized results were unchanged. Finally, in separate models we controlled for whether firms were headquartered in the same city (Palmer *et al.*, 1986), and again the results were unchanged.

Analysis

We used Heckman selection models to estimate reconstitution of broken friendship ties. The sample of broken friendship ties could be unrepresentative of the larger sample of friendship ties in a variety of ways. For instance, poorly performing firms tend to have a higher rate of CEO turnover (and thus a higher rate of broken friendship ties); to the extent that firm performance affects the likelihood of reconstitution, as suggested above, sample selection bias would be present in the data. The Heckman model is a two-staged procedure that corrects for such bias (Heckman, 1979). The selection model estimates the likelihood of broken friendship ties, and parameter estimates from that model are added to a second-stage regression model to estimate reconstitution. Both models are estimated with probit regression (Van de Ven and Van Pragg, 1981). Thus, while the second-stage model is based on the reduced sample of broken friendship ties, the two-staged procedure uses data on all friendship ties reported by respondents.

In addition, we used the Huber/White/sandwich estimator for clustered data (Johnston and DiNardo, 1997). This procedure generates robust variance estimates when cases are not independent from one another due to clustering. In this case, dyads that include the same person are not independent. The Huber/White/sandwich estimator corrects for such nonindependence by essentially treating each cluster (i.e., observations that include the same person) as a 'super-observation' that contributes to the estimate of variance. We estimated three sets of models: (i) reconstitution of broken friendship ties to CEOs of buyer and supplier firms; (ii) reconstitution of broken friendship ties to CEOs of competitor firms; and (iii) reconstitution of broken friendship ties to officers of financial institutions. We ran all models separately for the two respondent samples noted above: (i) friendship ties assessed by the focal CEO at both points in time; (ii) friendship ties assessed by at least one knowledgeable insider (i.e., the CEO or an insider director who claimed knowledge of the CEO's social ties) at both points in time.

RESULTS

Descriptive statistics and bivariate correlations are provided in Table 1. Tables 2 and 3 display the results of Heckman selection models estimating the likelihood of reconstituting broken CEO friendship ties. The models in Table 2 are based on survey responses from CEOs about their friendship ties. The models in Table 3 are based on survey responses from the larger sample of knowledgeable insiders. The results provide strong support for Hypothesis 1. As discussed above, vertical resource dependence is operationalized as the interaction of concentration of a vertical exchange partner's industry and the perceived value of resources provided by the exchange partner. As shown in the second column of Tables 2 and 3, the interaction is significant at $\alpha = 0.001$. Thus, the lower the concentration of a vertical exchange partner's industry (i.e., the fewer alternative providers of a resource, such as an input provided by a buyer or a service provided by a supplier), the greater the likelihood that an 'accidentally' broken friendship tie between CEOs of the focal firm and the exchange partner will be reconstituted by the focal firm's CEO. This result holds up after controlling for whether the broken tie resulted from turnover of the focal CEO or turnover of the exchange partner's CEO, as well as the amount of time since the friendship tie was broken.

As noted above, one might argue that CEOs naturally tend to reconstitute social ties to powerful exchange partners without necessarily having any strategic intent because those partners tend to constitute a larger portion of the focal firm's purchases or sales (i.e., assuming that CEOs spend more time working with CEOs of their primary exchange partners and thus develop social relationships in the course of working together). This does not explain the results of our analyses, however, for two reasons. First, the results

Table 1. Descriptive Statistics and Pearson correlation coefficients: models of broken friendship ties to CEOs of buyer or supplier firms ($N = 341$)

Independent variable	Mean	S.D.	1	2	3	4	5	6	7	8
Models of broken friendship ties to CEOs of buyer or supplier firms ($N = 341$)										
1. Concentration of buyer/supplier industries	43.35	17.12								
2. Perceived value of resources provided by exchange partner	0.00	0.99	−0.04							
3. Percentage of purchasing/sales represented by exchange partner	0.19	0.18	0.31	−0.06						
4. Return on equity	0.12	0.09	−0.15	0.03	−0.04					
5. Common board appointments	1.20	1.05	−0.02	0.01	0.06	0.04				
6. Formal tie between firms	0.20	0.40	0.11	0.06	0.12	0.03	0.07			
7. Time since tie was broken	1.63	0.55	0.01	0.00	−0.02	−0.02	−0.03	−0.01		
8. Turnover of focal CEO vs. alter	0.50	0.50	0.03	0.01	−0.01	−0.02	0.00	0.00	0.02	
9. Reconstitution of broken friendship tie	0.34	0.48	0.19	0.05	0.07	−0.18	0.17	0.04	0.05	0.07
Models of broken friendship ties to CEOs of competitor firms ($N = 210$)										
1. Mean-deviated concentration level of focal firm's industry	0.14	0.98								
2. Return on equity	0.11	0.08	0.01							
3. Common board appointments	1.06	1.01	0.04	0.05						
4. Formal tie between firms	0.17	0.37	0.10	0.01	0.04					
5. Time since tie was broken	1.57	0.53	−0.06	−0.03	−0.01	−0.04				
6. Turnover of focal CEO vs. alter	0.51	0.50	0.02	−0.05	0.00	−0.02	0.01			
7. Reconstitution of broken friendship tie	0.36	0.48	0.29	−0.25	0.17	0.14	0.05	0.06		
Models of broken friendship ties to CEOs of officers of financial institutions ($N = 377$)										
1. Debt/equity level	0.38	0.21								
2. Retained earnings[a]	0.33	0.22	−0.16							
3. Return on equity	0.12	0.09	−0.31	0.21						
4. Common board appointments	0.74	0.67	−0.12	−0.04	0.07					
5. Formal tie between firms	0.16	0.37	0.03	−0.03	0.02	0.06				
6. Time since tie was broken	1.42	0.54	−0.02	0.00	−0.05	−0.01	−0.01			
7. Turnover of focal CEO vs. alter	0.62	0.49	0.01	−0.01	−0.01	0.03	−0.01	0.02		
8. Reconstitution of broken friendship tie	0.25	0.43	0.27	0.12	−0.08	0.07	0.18	0.04	0.11	

Statistics are based on data from CEO responses.
[a] Correlations reflect inverted values.

hold up after controlling for the percentage of purchasing/sales represented by the exchange partner. Second, we also examined the correlation between this measure and a survey measure of the extent to which the focal CEO works directly with the exchange partner's CEO (e.g., 'how often have you worked directly with the CEO of *X* during the past 12 months?'). The correlation was not significant ($r = 0.03$). Similarly, the results were not confounded by the presence of a joint venture between firms. CEOs were not more likely to reconstitute a friendship tie to the extent that their firms had formed a joint venture, and our analysis included a control variable for the presence of a formal tie between firms (i.e., joint venture, interfirm stockholding, or common ownership).

Hypothesis 2 predicted that greater dependence on financial institutions for capital would increase the likelihood that an accidentally broken friendship tie between the focal firm's CEO and an officer of a financial institution will be reconstituted by the focal firm's CEO. The results provide some support for this hypothesis. As shown in the fourth column of Tables 2 and 3 one indicator of dependence on capital providers—debt/equity level—is significantly related to the likelihood of reconstituting broken CEO friendship ties to officers of financial institutions. The other indicator of financial dependence (i.e., retained earnings) does not significantly predict the likelihood of reconstituting broken friendship ties.

Hypothesis 3 predicted that higher levels of competitive uncertainty, as indicated by intermediate levels of industry concentration, would increase the likelihood that an accidentally broken friendship tie between CEOs of competitor firms would

Table 2. Heckman selection models of the likelihood of reconstituting broken CEO friendship ties: data from CEO responses

Independent variables	Friendship ties to CEOs of buyer or supplier firms				Friendship ties to CEOs of competitors		Friendship ties to officers of financial institutions	
Concentration of buyer/supplier industries	0.036^{**}	(0.013)	0.034^{**}	(0.013)				
Perceived value of resources provided by exchange partner	0.141	(0.115)	0.286^{*}	(0.140)				
Concentration of buyer/supplier industries × Perceived value of resources			0.025^{***}	(0.008)				
Mean-deviated concentration level of focal firm's industry					0.290^{***}	(0.066)		
Debt/equity level							1.104^{***}	(0.339)
(Low) retained earnings							0.458	(0.334)
Percentage of purchasing/sales represented by exchange partner	0.286	(0.353)	0.311	(0.353)				
Return on equity	-0.052^{*}	(0.025)	-0.053^{*}	(0.025)	-0.049^{*}	(0.021)	−0.014†	(0.008)
Common board appointments	0.521^{**}	(0.188)	0.502^{**}	(0.190)	0.378^{*}	(0.187)	0.093	(0.096)
Formal tie between firms	0.215	(0.489)	0.259	(0.488)	0.608	(0.529)	0.522^{*}	(0.224)
Time since tie was broken	0.347	(0.259)	0.339	(0.257)	0.038	(0.255)	0.040	(0.138)
Turnover of focal CEO vs. alter	0.433	(0.362)	0.421	(0.366)	0.597†	(0.352)	0.212	(0.139)
Constant	−0.811	(0.778)	−0.918	(0.785)	−0.091	(0.959)	−0.706	(0.369)†
Wald χ^2	28.44^{***}		34.02^{***}		23.00^{***}		26.54^{***}	
N	341		341		210		377	

Standard errors in parentheses. † $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; significance levels are one-tailed for hypothesized effects.

be reconstituted. The results in column three of Tables 2 and 3 provide strong support for this hypothesis. The mean-deviated concentration level of the focal firm's industry is positively related to the likelihood of reconstituting a broken friendship tie between CEOs of competitor firms. This effect is significant at $\alpha = 0.001$ in both models.

We also conducted a parallel set of Heckman selection models that estimated the likelihood of reconstituting broken *board* ties between firms. The results of these models replicated prior evidence that major sources of inter-organizational dependence do not significantly predict the likelihood of reconstituting broken interlock ties. Specifically, the results indicated that (i) our measure of vertical resource dependence (concentration of buyer/supplier industries × perceived value of resources) did not significantly predict the likelihood of reconstituting broken board ties to buyer or supplier firms; (ii) our measure of competitive uncertainty did not significantly predict the likelihood of reconstituting broken board ties to competitor firms; and (iii) neither measure of financial dependence predicted the reconstitution of board ties to financial institutions.[3] Moreover, in separate models we estimated the reconstitution of broken friendship ties and broken board ties simultaneously using seemingly unrelated regression analysis, and the results were unchanged: the independent variables significantly predicted the reconstitution of broken friendship ties as reported above, but did not significantly predict the reconstitution of broken board ties.

Supplementary evidence

Further analyses of the survey data also provided evidence that appears to bolster our theoretical interpretation of the results. Specifically, we

[3] Consistent with prior research, the results did not depend on the 'directionality' of the broken board ties (see Palmer, 1983: 41): the independent variables did not predict reconstitution of 'sent' board ties (e.g., the CEO of the focal firm sits on the other firm's board), 'received' ties (e.g., the CEO of the other firm sits on the focal firm's board), or 'non-directional' ties (e.g., the same person serves as outside director on both boards).

Table 3. Heckman selection models of the likelihood of reconstituting broken CEO friendship ties: data from knowledgeable insiders

Independent variables	Friendship ties to CEOs of buyer or supplier firms				Friendship ties to CEOs of competitors		Friendship ties to officers of financial institutions	
Concentration of buyer/supplier industries	0.020*	(0.009)	0.020*	(0.009)				
Perceived value of resources provided by exchange partner	0.119	(0.077)	0.193*	(0.102)				
Concentration of buyer/supplier industries × Perceived value of resources			0.019***	(0.005)				
Mean-deviated concentration level of focal firm's industry					0.321***	(0.068)		
Debt/equity level							0.911**	(0.301)
(Low) retained earnings							0.323	(0.265)
Percentage of purchasing/sales represented by exchange partner	0.250	(0.221)	0.254	(0.221)				
Return on equity	−0.044**	(0.017)	−0.044**	(0.017)	−0.038***	(0.012)	−0.016*	(0.007)
Common board appointments	0.277**	(0.109)	0.289**	(0.109)	0.297*	(0.125)	0.085	(0.077)
Formal tie between firms	0.146	(0.287)	0.168	(0.285)	0.385	(0.360)	0.444**	(0.147)
Time since tie was broken	0.238	(0.159)	0.237	(0.158)	0.094	(0.170)	0.055	(0.093)
Turnover of focal CEO vs. alter	0.357†	(0.205)	0.340	(0.205)	0.312	(0.216)	0.227*	(0.101)
Constant	−0.186	(0.543)	−0.190	(0.549)	0.039	(0.450)	−0.605	(0.295)
Wald χ^2	36.08***		42.48***		28.99***		31.87***	
N	744		744		347		756	

Standard errors in parentheses. † $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; significance levels are one-tailed for hypothesized effects.

examined the relationship between our independent variables and a survey scale in the follow-up questionnaire that assesses the extent to which CEOs had made an effort to build or maintain a personal relationship with CEOs and officers of other organizations. The scale included three items (e.g., '[for CEOs/officers listed as personal contacts at another organization], to what extent have you worked at building or maintaining your personal relationship to this person [not at all ... very much so]'). Principal components factor analysis showed that the items loaded on a single factor with high reliability ($\alpha = 0.92$). We estimated factor scores using the regression method. We then examined whether this measure mediates the hypothesized relationships. That is, we examined whether dependence on another firm increased the likelihood of reconstituting a broken friendship tie to the leader of that firm *through* efforts by the focal CEO at building a personal relationship with the firm's leader. We used a variant of the procedure recommended by Baron and Kenny (1986) and Sobel (1982) to test for mediation. This test showed that, for each of the three types of dependence, the hypothesized effects were fully mediated by our measure of the extent to which CEOs made an effort to build or maintain a personal relationship with the other firm's CEO/officer ($z = 2.47$, 2.50, and 2.19 for vertical resource dependence, competitive uncertainty, and financial dependence [debt equity ratio], respectively). These results held up using data from knowledgeable insiders to measure the reconstitution of friendship ties.

In order to further corroborate findings from our large-sample survey data, we conducted in-depth interviews with 26 survey respondents, in which we asked CEOs about a friendship tie that they had initiated to an executive of another firm on which the focal firm is relatively dependent (i.e., more than one standard deviation above the mean on the dependence measure).[4] One question

[4] Interviews were conducted telephonically by the first author. Each interview lasted between 20 and 45 minutes. We used an interview guide that included a list of specific questions to

asked CEOs to comment on why they initiated the relationship: 'to what extent would you say you initiated this relationship for strategic reasons [not at all ... to a small extent ... to a significant extent...completely]?' Twenty-five of the 26 respondents said that they had initiated the relationship for strategic reasons to a significant extent (or completely). In explaining their answers, moreover, the CEOs typically invoked notions of resource dependence. For instance, one CEO said 'They [a buyer] could switch to another supplier pretty easily, so my having a good, personal relationship with [the CEO] is really critical for us.' Another CEO said 'it was very important that I develop that friendship. They're a key supplier ... [the component] is probably the most important purchase we make, and we need to get [the component] on the best possible terms.' Another said 'when [our prior CEO] left, we lost [our CEO's] personal connection to [a buyer's CEO], and there was concern about that. That connection helps us compete for [the buyer's] business ... so it was incumbent on me to rebuild the connection.' We discuss the implications of this supplementary evidence further below.

As noted above, our theoretical argument presumes that executives can maintain social ties that possess critical elements of friendship even when the impetus for the relationship is instrumental (i.e., to help manage resource dependencies). We assessed the validity of this assumption using our large-sample survey data, supplemented by qualitative data from the field interviews noted above. In particular, we regressed the survey measures of trust, willingness to disclose personal information, and loyalty/commitment (see method section for a discussion of these measures) on measures of dependence for all friendship ties between focal CEOs and (a) CEOs of buyer/supplier firms, (b) officers of financial institutions, and (c) CEOs of competitors. For each of the three samples of friendship ties, dependence of the other executive's firm on the focal CEO's firm did not significantly reduce (i) the focal CEO's level of trust in alter, (ii) the focal CEO's willingness to disclose personal information to alter, or (iii) the focal CEO's perception of alter's loyalty or commitment to the relationship. We found similar results for the subsample of friendship ties that were initiated by the dependent firms' executives.

In addition, in the follow-up interviews we asked CEOs about a friendship tie that was initiated by an executive of another firm that is relatively dependent on the focal CEO's firm (i.e., more than one standard deviation above the mean on the dependence measure). If the CEO had more than one such friendship tie, one tie was randomly selected. The CEO was first asked 'to what extent do you think [the executive] sought to develop a relationship with you in part for business purposes (in other words, because your firm is an important [buyer/supplier] for his/her firm)?' Nearly all CEOs (24 of 26) felt that this was a significant or very significant reason for initiating the relationship. We then asked those CEOs a series of follow-up questions: 'Given that [the executive] sought to develop a relationship with you in part for business purposes, does this affect the nature or strength of your friendship? Specifically, does it at all reduce the extent to which you (a) feel comfortable disclosing personal information to [the executive]? (b) discuss personal matters with [the executive]? (c) believe [the executive] is committed to your friendship? (d) believe [the executive] is committed to continuing a personal relationship with you regardless of what firm you work for?' Twenty-one of the 24 respondents answered 'no' to all four questions (two interviewees did not clearly answer the questions about personal information disclosure, and one said he did not disclose personal information to any colleagues and was unsure about whether the other executive was committed to maintaining a personal relationship). This supplementary evidence supports the view that the social ties examined in this study typically include key aspects of friendship, even though they are initiated for instrumental reasons. Stated differently, the formation of CEO social ties for strategic purposes does not hinder the development of trust or personal commitment in these relationships, nor does it reduce the willingness of executives to disclose personal information to each other.

Moreover, if the social ties examined in this study possess critical elements of friendship, then we would expect the ties to be maintained even after one of the tied-to executives leaves his or her firm. A separate analysis confirmed that in

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ensure that all issues were addressed in a consistent manner across interviews, although the discussions themselves were unstructured. Interviewees were not informed in advance about the hypotheses we wished to test.

94 percent of cases where a CEO (A) reported a friendship tie to another executive (B), and B left his or her position during the 3-year period following the initial survey, A still reported a friendship tie to B in the follow-up survey. This was also not contingent on the level of dependence between the two executives' firms.

DISCUSSION

Overall, the results provided strong support for our theoretical perspective on the maintenance of friendship ties between corporate leaders. Analyses showed that different sources of strategic dependence in inter-organizational relationships affected the likelihood that CEOs would reconstitute friendship ties to top managers of other firms that had been broken accidentally due to executive turnover. In particular, the first set of results showed that CEOs were more likely to reconstitute broken friendship ties to executives of buyer or supplier firms to the extent that the focal firm was dependent on the exchange partner for critical resources. Thus, for instance, when an exchange partner provided an input or service that was critical to the focal firm's strategic positioning in the marketplace, the focal firm's CEO was more likely to reconstitute a broken friendship tie to the CEO of that firm. Additional results showed that CEOs were more likely to reconstitute broken friendship ties to officers of financial institutions to the extent that they were dependent on those organizations for capital. The third set of results suggested that CEOs were more likely to reconstitute broken friendship ties to top executives of competitor firms when the level of competitive uncertainty was relatively high, as indicated by the level of industry concentration. Accordingly, the results suggest that the maintenance of friendship ties between corporate leaders is influenced by three major sources of uncertainty in inter-organizational relationships that have been identified by resource dependence theorists: access to critical resources in vertical exchange relationships, access to needed financial resources, and the need to manage competition with rivals.

These findings indicate how corporate leaders may use informal social ties to managers of other organizations as a strategic mechanism for managing resource dependence. This interpretation was further supported by supplementary analyses of our survey data, which showed that the hypothesized effects were mediated by CEO efforts at building personal relationships with CEOs and officers of other organizations. That is, dependence on another firm increased efforts by the focal CEO to build a personal relationship with the CEO/officer of that firm, which in turn increased the likelihood of reconstituting a broken friendship tie to that firm's leader. Thus, our theory and supportive findings contribute to the strategic management literature on inter-organizational relations, which has focused primarily on *formal* linkages, such as the maintenance of board interlock ties, as a strategy for managing resource dependence. There has been little consideration of how executives use informal network ties to manage such relations. At the same time, our study also contributes to the growing sociological literature on embeddedness. While this literature recognizes the potential value of informal network ties to inter-organizational relationships, there has been little large-sample empirical work on how strategic factors such as dependence on exchange partners for critical resources could influence the formation or maintenance of informal ties. Studies in this literature either do not systematically examine the determinants of informal network ties between managers, or such ties are assumed to emerge naturally through the course of doing business. Our findings provide large-sample, systematic evidence that top managers are strategic in allocating their scarce time and attention to the maintenance of informal network ties (i.e., they are more likely to initiate the reconstitution of broken friendship ties to executives of other firms when the inter-firm relationship is strategically important to the focal firm). Accordingly, our theory and results would appear to contribute both to strategic management research on inter-organizational relations and the sociological literature on embeddedness.

Moreover, our supplemental analyses replicated past evidence that sources of inter-organizational dependence do not predict the reconstitution of broken board ties to other firms. While these results, together with the results of prior studies, provide little evidence that board interlock ties are used to manage resource dependence (cf. Mizruchi, 1996), our findings suggest that corporate leaders may instead maintain informal social ties to executives of other firms as a mechanism for managing resource dependencies. This is consistent with our theoretical perspective, which suggests that the maintenance of friendship ties between corporate leaders may have advantages that are comparable to the supposed benefits from board cooptation, but without the losses to organizational autonomy and the institutional constraints that may limit the use of board interlock ties as a strategic mechanism for managing dependencies.

From a methodological standpoint, our analysis relies on a unique dataset that includes survey data on the friendship ties of top managers from a large sample of firms collected at two points in time. We were able to collect these data with a satisfactory response rate, and to assess interrater reliability by surveying individuals who were listed as friendship ties by our primary respondents. We hope that the success of this empirical project will prompt further investigation into the informal network ties of top executives.

Future studies could extend this research in several ways. First, research is needed on the performance consequences of executives' informal network ties. Although many studies have examined how formal inter-firm ties such as board interlocks may impact firm performance, there is very little systematic research on the performance effects of informal ties such as friendship ties between executives. Moreover, while extant social network perspectives emphasize the benefits of having a large network of social ties to well-placed individuals (e.g., executives in positions of power), our theory suggests that social ties to leaders of other firms may vary in their strategic value to the focal firm. A future study could examine whether a CEOs' portfolio of friendship ties to executives of other firms may yield greater performance benefits to the extent that those ties are to CEOs of firms on which the focal firm is strategically dependent. From an empirical standpoint, in models of firm performance CEO friendship ties would be weighted by variables that indicate the extent of the focal firm's strategic dependence on the tied-to firm. Such research could also examine the mechanisms by which CEO friendship ties influence performance. While such ties may lead to performance benefits by improving the terms of trade in vertical business relationships or facilitating tacit coordination with competitors, as our theoretical arguments suggest, they may also help executives identify promising opportunities for strategic collaboration. In fact, Gulati and Westphal (1999) found some evidence that firms were more likely to form a joint venture if their CEOs were personal friends.

By extension, research on corporate governance could examine whether top managers are selected, compensated, and retained partly on the basis of whether they have social ties to firms on which the focal firm is strategically dependent. In effect, our theory suggests that managers' social capital does not necessarily generalize across firms, but is contingent on firms' particular strategic position and environmental constraints.

The findings of this study also raise important ethical questions. One question is whether the maintenance of friendship ties to CEOs of other firms could harm the interests of stakeholders other than the firm's shareholders. To the extent that friendship ties between the CEOs of competitors facilitate tacit coordination that results in higher prices or lower investments in product or service quality, customers suffer. Similarly, if a friendship tie to the CEO of a buyer causes that firm to forego more attractive terms of trade from alternative suppliers (e.g., higher-quality or lower-priced products), then the buyer firm's shareholders would suffer, and allocative efficiency would be compromised. Moreover, although collusive behavior such as price fixing is thought to be fairly rare among large U.S. firms (McAfee, 2002), friendship ties between CEOs of competitors could facilitate such illegal behavior.

At the same time, the embeddedness literature suggests that social ties such as those examined in our study may benefit stakeholders in a variety of ways. In his ethnographic study of women's apparel firms, Uzzi (1996) observed that friendship ties among top executives of buyer and supplier firms facilitate the exchange of private information that can lead to joint problem-solving and the exploitation of opportunities that benefit both firms, as well as the ultimate consumer (also Mohr and Nevin, 1990; Baker *et al*., 1998). CEO friendship ties may also reduce the likelihood that one party to an exchange relationship would breach their contract with the other party, or engage in deceptive behavior such as failing to disclose product flaws or incompatibilities. Moreover, friendship ties between CEOs of competitors may facilitate cooperative efforts that benefit consumers and the larger society, such as setting standards for new products, developing accessories or other complementary products, engaging in information-based advertising that educates the consumer, or jointly investing in product or process innovation that improves product quality or lowers costs (McAfee, 2002). Nevertheless, the net effect of maintaining friendship ties to CEOs of other firms on stakeholders other than the focal firm's shareholders is an open question. Research is clearly needed that examines whether and when the potential costs of such ties to consumers and other stakeholders may outweigh the benefits.

A related potential concern about CEO friendship ties pertains to their relative invisibility to external stakeholders. Unlike formal ties such as board interlocks, informal social ties between CEOs lie 'under the radar screen' of most external observers. Thus, it may be incumbent on boards of directors to ensure that CEOs use their social ties to executives of other firms in responsible ways, perhaps by designing incentive systems that reward executives for balancing the interests of various stakeholder groups in making strategic decisions.

Finally, while our findings suggest a strategic impetus for maintaining CEO friendship ties to executives of other firms, qualitative and survey research is needed on the micro-social processes by which CEOs build and maintain such ties. Qualitative data from our pretest interviews suggested that there may be strong norms about how executives should (and should not) develop social ties to each other, in terms of where social interaction should take place, what should be discussed, and at what time. Familiarity with such norms may be an important prerequisite of effective corporate leadership. The absence of research in this area reflects a more general void in the social network literature: network research has generally taken social network ties as a given and examined their consequences for individuals and organizations; there is a need for systematic research that examines the determinants of social network ties and the role of individual agency in building and maintaining such ties, as several authors have recently noted (Emirbayer and Goodwin, 1994; Stevenson and Greenberg, 2000). One could make an important contribution both to research on top executives and to the larger network literature by designing a study that attempts to explain variation in the extent to which executives appreciate the importance of social capital and understand the sources of social capital, as well as variation in managers' ability to develop and maintain social network ties.

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