It's personal, not strictly business: The role of personal relationships in the supply chain

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Abstract

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1 Introduction

The business environment over the last twenty years has seen significant growth in outsourcing and specialization along the supply chain. These trends have led to significant efficiency improvements, but also engender a significant increase in information asymmetry and increase the difficulties of coordination outside the firm. One prominent example outlined by Kouvelis, Chambers, and Wang (2006) is the "bullwhip effect" whereby informational inefficiencies, order-batching, promotional campaigns and gaming behavior cause order variability to increase as orders move upward through the supply chain. Kouvelis et al.'s (2006) review of this phenomenon concludes that some form of information sharing is the most direct way to control for "bullwhip effect" induced distortions in the supply chain.

In this paper we examine the unique role of personal relationships between the supplier CEO and major customer executives and board members. Personal relationships have the potential to mitigate information asymmetry problems between the customer and the supplier because existing personal relationships encourage trust and communication between the two parties. CEOs with such relationships are more willing to share information with their supply chain partners, and also more willing to accept shared information as true, rather than an attempt to dissemble. The uncertainty surrounding shared information can have significant costs. One aspect of these costs is outlined in Beer, Ahn, and Leider (2018) who suggest that in order to identify as a trustworthy supplier, the supplier can invest in costly relationship-specific investments without a long-term contract. We contend that an effective substitute to such costly signalling is a pre-existing personal relationship between customers and suppliers. A personal relationship, wherein trust and clear communication is already established, can lead to greater integration between the two firms. We hypothesize that this integration is reflected in certain measurable variables such as the sales between the two parties, and the sharing of innovation activity between the two firms.

We identify personal relationships between supplier CEOs and their major customers prior to the establishment of their business relationship using the BoardEx database.[1] We assume that a

[1] A number of recent papers have used BoardEx to examine the impact of social networks on corporate financial policies (Fracassi and Tate, 2012; Engelberg, Gao, and Parsons, 2013).

personal relationship exists when a supplier CEO has a network connection with the CEO, the directors or the senior executives of their major customer. Since the executives in the two firms are already connected through their business relationship, we identify personal networks that exist in addition to these business relationships and examine differences between a customer-supplier relationship with a personal connection against customer-supplier relationships without such a connection.[2] We conjecture that business relationships between suppliers and their customers can be enhanced through personal relationships. In particular, supplier CEOs can utilize personal relations to communicate with customer executives, which reduces information asymmetry. Personal relationships can also bring about greater trust and long-term stability, which allows the supplier firms to invest in customer specific innovation and business processes generating significant economic benefits.

The network of personal relationships we develop is most closely related to the networks desrcibed in Fracassi (2017) and Shue (2013). Shue (2013) examines how peer networks affect managerial decision making using random assignment of MBA students. Fracassi (2017) expands the personal network ideas developed in Shue (2013) to examine the question of whether networks influence the debt level of a firm. While these two papers show that communication between networked individuals occurs and can affect corporate policy, the scope for personal networked individuals to exchange information could be much broader than the settings these papers investigate. Our focus in this paper is in communication along the supply chain. We identify an important supply chain connection between two firms using the Compustat Customer Segment Files that defines major customers as those who account for at least 10% of the sales of the supplier firm.[3] Many of these business relationships will not have personally connected principals, but others will.

We find several notable results that are indicative of the impact of personal networks on firm

[2]Since we focus on personal relationships that were forged prior to the development of a business relationship between two firms, one of the advantages of our relationship variable is that it does not rely on the length or the intensity of the relationship between the two firms which can arise endogenously.

[3] Firms are required to disclose customers that individually account for 10 percent or more of their revenues. However, some firms voluntarily identify customers accounting for less than 10 percent of sales if the customer is important to their business (Patatoukas 2012). Therefore, we include any customer whose name and sales that the supplier discloses in our sample. Although we show that personal relationships affect sales, and therefore could increase the number of personally connected firms that must report at the exogenous 10% threshold level, nevertheless comparisons between these two groups should not be affected by the exogenous threshold.

outcomes over and above the ties that come naturally from supply chain business relations. We begin by estimating the impact of personal networks on supplier-customer sales. We find that after controlling for several factors that influence the strength of the sales relation between suppliers and customers, there is a persistent and significant positive relation between sales and personal networks. Personal networked supplier-customer pairs have about 3.9 percent higher sales than all other supplier-customer relationships.[4] The sample mean of the dollar value of supplier-customer pairs sales is $227 million, which implies that a networked supplier-customer pair has, on average, $8.85 million (3.9% x $227 million) more in sales.

The increase in sales to connected customers is robust to a number of alternative specifications. For suppliers that report more than one major customer, we compare sales made to customers with whom the supplier CEO has a personal relationship to sales made to the supplier's other major customers. We find that sales are significantly higher when there is a personal connection to the customer firm. We also examine the impact on sales when a supplier firm gains or loses a personal connection to a customer. We find on average a 2% increase in sales when a personal connection begins. To ensure that our results are not driven by omitted variables that could affect both the financial health of the major customers as well as supplier CEO departures, we examine only voluntary turnovers and instrument for supplier CEO departures using voluntary turnovers at other firms operating within the same industry following Fee et. al (2013) and Karolyi (2018). Our findings using the instrumental variable approach are consistent with our initial results, verifying that personal connections significantly lead to higher sales along the supply chain.

We drill deeper into the nature of the personal relationship and find that not all types of relationships impact sales the same way. We find that education connections have no significant effects on supplier-customer sales, but CEOs that have previously worked together with the customer firm's executives at either listed or unlisted firms have significantly higher sales. It appears that previous working connections dominate education connections in this framework.

Our conjecture is that a high level of trust and communication between personally connected

[4] We compute the economic significance of our inferences as follows. The increase in ln (1+PCT SALES) of 0.038 log points corresponds to an increase in PCT SALES of $e^{0.038} - 1 = 3.87\%$. We use this method throughout the paper to interpret estimates of our inferences.

CEOs increases the level of sales across the two business units. CEOs with a personal connection apparently consider their supplier colleagues more reliable and depend on them more in the supply chain, presumably at the expense of alternate suppliers. Correspondingly, a high level of trust between the parties encourages the supplier firm to make the firm-specific investments necessary to expand the business relationship (Irvine, Park, Yıldızhan 2016; Beer, et al. 2018). Consistent with this conjecture, using the vertical integration measure of Fresard et al. (2020), we find that personally connected firms have greater levels of vertical vertical integration along the supply chain.

If this elevated level of personal communication exists, then the resulting information asymmetry reduction between the two firms should be visible in other ways as well. One of the prominent ways this connection could manifest itself is through joint efforts in research and development. To examine this possible channel for cooperation, we estimate the frequency of cross-citation in patents, whereby patents filed by one firm are cited in the patents of the other. We find cross citations of patents in supplier-customer pairs with connected CEOs are significantly higher than cross citations in other supplier-customer pairs.

While the communication benefits and higher level of trust between the two CEOs can potentially benefit both firms, the opportunity for cronyism is apparent. Connected managers may simply concentrate sales towards their friends in order to entrench themselves and to the detriment of shareholders (Shleifer and Vishny, 1989). The potential for entrenchment of connected CEOs become greater if the supplier has undertaken customer specific projects and investments that require an ongoing personal relationship and communication with the supplier executives.

Prior studies, such as Shue (2013) and Fracassi (2017) show that corporate policies are influenced by social networks. In particular they document that firms learn from each other through social connections and implement corporate policies similar to those implemented by firms led by their friends. However, the evidence is mixed on whether CEO personal relationships lead to value creation. On the positive aspect, Cohen et. al (2008) find that mutual fund managers invest more and perform significantly better on stock holdings when the mutual fund manager and the company board member have attended the same school. Conversely, Fracassi and Tate (2012) show that firms

with more powerful CEOs are more likely to appoint directors with ties to the CEO, and that firms with more CEO-director ties engage in more value-destroying acquisitions.

We empirically test to see how personal connections to a major customer affect valuations of the supplier and customer firms by examining the stock price reaction to CEOs turnovers that disrupt personal relationships. Specifically, we examine supplier stock price reactions to the announcement that the supplier firm is replacing its connected CEO. If CEO departures disrupt the a value enhancing customer–supplier relationships, then supplier shareholders should react negatively to the announcement that the supplier firm is losing its connected CEO. We find evidence consistent with this view. We do not find a similar negative market reaction for customer firms, consistent with supplier firms capturing most of the value-added that arises from personal connections.

The findings in this paper contribute to the literature that examines impact of social connections on information flow. Cao et al. (2015) show that social connections help independent directors gain access to private bad news information from firms' senior executives as they document that independent directors socially connected to their firms' senior executives earn significantly higher returns than unconnected independent directors in stock sale transactions. Jagolinzer et al. (2020) suggest that, during the 2008 financial crisis, corporate insiders obtained information on the details of the Troubled Asset Relief Program (TARP) from their connections at the Federal government. This flow of information resulted in elevated insider trading activity by connected insiders in advance of cash infusions to particular firms from the TARP. Thus, as several of these papers suggest, there is significant potential for value-destroying cronyism in the presence of prominent personal connections between the two firms. We contribute to this literature by showing that personal connections are overall, value enhancing along the supply chain, in direct contrast to the cronyism hypothesis.

Our paper also contributes to two strands of the literature on supplier and customer relationships. Prior studies suggest that suppliers learn from their customer's accounting information about factors that may adversely affect their important customers' sales, profitability and operations. The quality of this accounting information is important in helping suppliers better assess their investment decisions (Raman and Shahrur 2008; Hui et al. 2012; Dou et al. 2013; Radhakrishnan et al. 2014; Chen et al. 2019; Chiu et al. 2019). Informative accounting disclosure is thus, one channel that can

reduce the information asymmetry between business partners. But clearly, there are limits to the subtlety of information that can be transmitted through accounting information. We contribute to this literature by showing that CEOs use personal connections to improve information sharing with their customers.

Within this strand of the literature most closely related to our paper is Chen, Lehavy, Martin and Shalev (2020) who examine the role of personal relationships in customer firms' vendor choice. They find that vendors who have principals connected to customer principals are more likely to win the supply contract. However, the valuation impact of this tendency is unclear. Chen et al. (2020) speculate that personally connected CEOs tend to select each other because of the potential to reduce information asymmetries between the supplier-customer pair. Their paper provides a number of empirical facts that make this speculation more likely to be true. Yet, the potential for cronyism detrimental to operations and valuation is obvious. CEOs could choose suppliers based on personal relationships instead of other suppliers that are better suited to be the best choice for customer firm operations. From the supplier perspective, when the supply chain relationship exists due to the personal connection, as Chen et al. (2020) contend, the reliance of the supplier firm on sales to their connected major customer could entrench the supplier CEO. To resolve this question of value, we examine the frequency of the personal connections in the supply chain, identify a source of information asymmetry reduction, and present evidence suggesting that the personal connections add value to the supplier.

The paper also brings together the large and growing analysis of supplier-customer business relationships with the literature on personal networks. There is a large literature that examines how customer-supplier relationships impact supplier firms' performance and valuation (Patatoukas 2012; Ak and Patatoukas 2016; Irvine, Park, and Yildizhan 2016) as well as their corporate financing decisions (Kale and Shahrur 2007; Banerjee, Dasgupta, and Kim 2008, Wang 2012). The disruption in this relationship has also been shown to have negative consequences for the supplier firm (Fee and Thomas 2004; Hertzel et al. 2008; Kolay et al. 2016; Intintoli, Serfling, and Shaikh 2017). We show how personal connections can enhance the business relationship, but also document the consequences of when such a tight relationship between firms is severed.

While we focus on CEO connections, personal ties in general have been shown to facilitate transfer of information among corporate decision makers. Personal connections can lead to better analyst performance (Cohen, Malloy, and Frazzini 2010), improved portfolio manager performance (Cohen, Frazzini, and Malloy 2008), better IPO outcomes (Cooney, Madureira, Singh and Yang 2015), and higher M&A synergies (Cai and Sevilir 2012; Ishii and Yuan 2013). A number of papers have shown that personal connections can result in significant economic benefits for corporate executives. In particular, connected CEOs receive higher compensation (Butler and Gurun 2012; Engelberg, Gao and Parsons 2013,) and receive better loan terms (Engelberg, Gao, and Parsons 2012). Personal connections of CEOs to their firm's directors have also been shown to influence monitoring by board members (Chidambaran, Kedia and Prabhala 2012; Fracassi and Tate 2012). Our paper demonstrates how personal relationships can lead to collaboration in innovative activities, strengthen vertical integration between business partners and improve firm value.

The rest of the paper is organized as follows. In Section 2, we develop main hypothesis tested in the paper. Section 3 describes the data and outlines our empirical approach. In Section 4 we report empirical results and in Section 5 we conclude.

2 Hypothesis Development

A number of papers have documented that social ties between executives, analysts and investors lead to greater information sharing between the parties involved. There is empirical evidence of information sharing amongst stock analysts and company managers (Cohen, Malloy, and Frazzini 2010), investors and company managers (Cohen, Frazzini, and Malloy 2008), investment bankers and entrepreneurs (Cooney, Madureira, Singh and Yang 2015), managers involved in mergers and acquisitions (Cai and Sevilir 2012; Ishii and Yuan 2013) and executives and directors at the same firm (Cao et al. 2015). Improved information sharing leads to better assessment of expected firm performance by analysts, higher returns to personally connected fund managers, better integration of acquiring firms and targets when the firms are personally connected through common auditors, higher fees to connected investment bankers as well as higher returns to connected entrepreneurs. Personal ties amongst executives have also been shown to influence corporate policy making in

acquisitions, capital structure, and investments emphasizing the role that information flows through personal relationships can play in the making and execution of firm policy (Shue 2013; Fracassi 2017).

Business-to-business relationships between customers and suppliers have been shown to impact supplier firms' performance and valuation (Patatoukas 2012; Ak and Patatoukas 2015; Irvine, Park, and Yildizhan 2016) as well as their corporate financing decisions (Kale and Shahrur 2007; Banerjee, Dasgupta, and Kim 2008, Wang 2012). These papers also show that supplier firms make significant customer specific investments. While these customer specific investments improve efficiency along the supply chain, they also increase supplier firms' dependence on their customers. Higher dependence on major customers results in larger operating leverage, higher demand risk and demand uncertainty as well as less efficient deployment of cash due to higher liquidity provision as a precautionary motive. Disruptions in supplier-to-customer relationships have unsurprisingly been shown to have severe negative consequences for the supplier firm further emphasizing the critical nature of these supply chain links for the supplier firms (Fee and Thomas 2004; Hertzel et al. 2008; Kolay et al. 2015; Intintoli, Serfling, and Shaikh 2017).

Personal relationships developed through work and non-work related interactions lead to better mutual understanding, stronger friendships and as such build life-long trust between the parties. This trust between individuals, in turn can help facilitate more timely, more transparent and more efficient flow of information between the businesses. We conjecture that personally connected supplier CEOs (to the major customer firm) can facilitate better communication and information flows between the supplier and customer firms leading to much tighter integration with the major customer firm. Thus, our initial hypothesis predicts that suppliers whose managers have personal connections to the decision makers at their major customers will command greater trust from their major customers. This, in turn will lead to the major customer sourcing a larger share of their inputs from the connected supplier firm. Hence our first hypothesis is as follows:

Hypothesis 1: Personal connections between the supplier CEO and executives of the major customer are associated with higher sales from the supplier firm to the customer firm compared to sales to major customers where the supplier CEO has no personal connections.

If personal connections between suppliers and their customer result in reduction in information asymmetry and greater levels of customer-specific investments, then we would expect these effects to manifest in two key testable channels. In particular, we conjecture that greater information sharing should lead to cooperation in research and development activities, closely aligning the innovation activities of the supplier and the customer firms. Second, we conjecture that greater customer-specific investments along with information sharing should lead to greater vertical integration along the supply chain. Hence our hypothesis 2 is as follows:

Hypothesis 2: Personal connections between the supplier firm CEO and the decision makers at the customer firm will lead to better cooperation on innovative activities and will result in higher vertical integration.

The length of the business relationship between the supplier and the customer firms, as well as, the larger information environment in which they operate are likely to influence how personal relationships affect the sales of the supplier firm. The length of the business relationship between the supplier and the customer firm have been shown to impact financial and operational decisions at these firms. Continued interactions can lead to development of greater trust and familiarity leading to greater customer-specific investments (Irvine et al. 2016). Customers are also more likely to purchase products that are not easily substitutable from suppliers (Brown et al. 2009; Intintoli et al. 2017).

Similarly, we would expect the influence of personal connections be higher when there is greater information asymmetry between the firms. That is, when there is significant information already available to customers firms about their suppliers and when the customer has interacted with the supplier or has observed the supplier firm interact with other customers in the product market, the incremental value of information coming from personal relationships should be smaller. Our third hypothesis is:

Hypothesis 3: Personal connections will lead to higher sales when there is less information available about operations of the supplier firm and there has been limited business interactions between the two firms.

Our first two hypotheses suggest that personal connections lead to greater economic benefits for the supplier firm. At the same time, greater concentration in sales and greater reliance on the supplier CEO can have negative consequences for the supplier. While connected supplier CEOs may help generate larger sales to major customers through better information sharing, it could also be that cronyism could be at play and connected managers may simply concentrate sales towards their friends in order to entrench themselves and to the detriment of shareholders (Shleifer and Vishny, 1989).

In addition, there is also the possibility that a personally connected supplier CEO may become too powerful and entrench herself, further threatening shareholder value. This threat is more evident when the supplier has undertaken customer specific projects and investments. A break in the personal relationship can result in costly realignment of supplier operations to serve alternative customers. While ultimately an empirical question, we hypothesize that the benefits of personal links manifested in larger sales to the connected customer, stronger vertical integration between the firms and increased collaboration in research and development will outweigh the adverse effects of relying too much on the connected supplier CEO. Thus our fourth hypothesis conjectures that the net effect of personal links on supplier firms will be value enhancing.

Hypothesis 4: Supplier firm value would be enhanced by the personal links between the supplier firm CEO and the decision makers at the customer firm.

Empirically, we test hypothesis 4 by investigating the market reaction to supplier CEO turnovers, specifically focusing on the differential reaction to departure of connected supplier CEOs compared to departures of those supplier CEOs that don't have known personal links to their major customers.

3 Data

3.1 Supplier-customer relations

In this study we examine the economic impact of personal relationships of a supplier CEO to the senior executives or board members of the supplier's major customers. This requires us to

identify supplier-customer pairs as well as gathering biographical information about supplier CEOs, customer executives and board members to determine if a personal relationship exists prior to the appointment of the supplier CEO. FASB accounting standards require all public companies to disclose the identities of their major customers representing more than 10% of their total sales. We extract the identities of each major customer from the Compustat Customer Segment Files for the period between 2000 and 2016. For each firm Compustat Customer Segment Files provide the names of its major customers, revenue derived from sales to each major customer, and the type of each major customer. We then use a phonetic string matching algorithm to match firm names to their corresponding CRSP permanent company numbers (PERMNO). Where the algorithm fails to deliver an exact match, we manually match the firm names to their corresponding permanent company numbers.

3.2 Personal relationship data

We use the biographical background information in the BoardEx database to establish personal relationships between executives of supplier and key decision makers of their major customers. BoardEx provides biographical information of top executives and board members of U.S. public firms including education and past work experience. A growing number of recent papers have used BoardEx to examine the impact of social networks on corporate financial policies (Cohen, Frazzini, and Malloy, 2008; Fracassi and Tate, 2012; Engelberg, Gao, and Parsons, 2013). BoardEx provides a comprehensive coverage of senior executives and board members of US public companies. For each person, BoardEx provides his/her current and past associations with others in the BoardEx universe through professional activities such as employment or board of directors' membership, social organizations, education and other activities. Since BoardEx's coverage of U.S. firms is extremely limited prior to 2000, we limit our sample period to the years between 2000 and 2016.

To measure manager personal relationship, we use the BoardEx database to determine whether the supplier CEO has a connection with key personnel (top executives and board members) of their customer firms. We take three distinct approaches to determine a personal connection between the supplier CEO and the customer. First, for each supplier-customer pair, we identify a personal

connection between the supplier CEO and the key personnel of the customer by checking whether they worked together at a third company, distinct from the supplier or the customer, at the same time, prior to the formation of the business link between the supplier and the customer firms. Specifically, we check whether they worked together in a public, private or not-for-profit company. Second, we determine whether the supplier CEO and any key personnel overlapped in the same undergraduate or graduate program. Finally, we check whether the supplier CEO and any key personnel overlap in other social organizations such as golf clubs, churches, synagogues, mosques, or other religious and spiritual centers. We define the supplier's CEO as personally connected with the key personnel of the customer if she has at least one personal connection through any of the possible channels investigated. An indicator variable, Network, takes on the value of one if a supplier's CEO is personally connected to the customer firm.[5]

We make certain assumptions in our analyses. First, our empirical tests assume that the personal relationship exists. In fact, we have no direct evidence that the CEO ever met the major customer's key decision makers at school or at a previous employer. Second, we assume that the personal relationship matters. It could be that an alternative CEO could establish an identical working relationship with the major customer so that the personal relationship as a manager-specific investment is of no particular value to the supplier CEO. However, if our assumptions fail to hold, then our hypothesis that personal relationships add economic value would not be true and our empirical tests would fail to reject the null.

3.3 CEO turnover data

We conduct several analyses to investigate whether our results are robust. Specifically, we identify the turnover of a supplier CEO as a disruptive event that results in suppliers losing personal relationships with their customers. Following Peters and Wagne (2014), we obtain the CEO turnover data from Execucomp. We further utilize the data provided by Peters and Wagner (2014) to determine the nature of CEO turnover - whether it is voluntary or forced. For our market-reaction analysis surrounding CEO turnovers, we manually collect the announcement date of CEO departures from

[5]We do not consider common alumni status sufficient to determine a personal connection, the principals' attendance periods must overlap.

press releases using the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) from the Security Exchange Commissions (SEC).

3.4 Patent citations and vertical integration data

As predicted in Hypothesis 2, increase in cooperation in innovative activities and stronger product market vertical integration are two channels through which the supplier firm value can be enhanced. In order to test the level of cooperation in innovative activities we obtain patent citations from Kogan et al. (2017). The authors collect patent and citation data from The US Patent and Trademark Office. The dataset includes cross-citations of patents across firms. For our analyses, we focus on the frequency of cross citations between suppliers and customers.

In order to measure the level of vertical integration across different supplier-customer pairs We obtain product market vertical relatedness data from Fresard et al. (2020). The authors create a measure of vertical relatedness between firm-pairs by linking product vocabularies from the Bureau of Economic Analysis and input-output tables to firms' 10-K product descriptions. They use textual analyses to create vertically related scores for each pair of firms. Fresard et al.(2020) perform various tests that provide external validation of their data.

3.5 Supplier-Customer Sample

Following the methodology of Intintoli et al (2017), we match each customer to its suppliers from the first year a supplier reports sales to the customer to 2 years after the customer–supplier relationship ends. We extend the data to 2 years after the last year the supplier reports positive sales to the customer and set sales in last two years to 0 because we would like to account for the relationship deteriorating rather than just disappearing. For years when sales to customers are missing between the first and last years of relationships, we set sales to 0. Our sample size is smaller for the analyses that require turnover information as ExecuComp has information only for S&P 1500 firms, while our main sample includes all firms tracked by Compustat and BoardEx jointly. We exclude financial firms from our analyses as their accounting items are not comparable to those of other firms. Our final sample for the main analysis consists of 19,298 supplier-customer year observations.

The key variables for the empirical tests in the paper are outlined in Table 1. Panel A presents summary statistics for the sample. For a given supplier-customer pair, Network is a dummy variable that equals one if the CEO of the supplier firm has a personal connection with at least of the key personnel of its major customer. Network connection is comparatively rare, as only 9.1% of the 19,298 supplier-customer year observations in the sample have a supplier CEO connected to a major customer through a personal relationship.

We include a number of firm-specific variables as controls in the analyses. We obtain conventional accounting-based items and stock return variables from the merged CRSP- Compustat database. The control variables are described in Appendix A.

4 Results

4.1 CEO personal connections and supplier sales

We begin our analyses by showing that personal connections do help the supplier-firms increase their sales to major customers. In particular, we examine the effect of CEO $Network$ on the percentage of sales attributed to their connected customer ($\%Sales$) using the following regression:

$$ln(1 + PCT\ Sales)_{i,c,t} = \beta_0 + \beta_1\ Network_{i,c,t} + \Gamma Controls_{i,t} + IndustryFE + YearFE + \epsilon_{i,t} \quad (1)$$

In Equation (1), $PCTSALES_{i,c,t}$ is sales from supplier i to customer c in year t scaled by the supplier's total sales in year t (in percent). Our independent variable of interest, $Network_{i,c,t}$, is an indicator variable set equal to 1 if a CEO has a personal connection with at least one of the key personnel of the major customer c in year t. The coefficient of interest, β_1, captures whether a CEO's personal connection is associated with higher sales.

$Controls_{i,t}$ is a vector of observable and time-varying control variables that have been shown as important determinants of sales to the customer firm (Banerjee et al. 2008; Patatoukas 2012; Irvine et al. 2016; Intintoli et al. 2017). These controls include both firm and customer characteristics. Specifically, we include return on assets (ROA) , sales growth ($SALES\_GROWTH$), supplier

age (AGE), return volatility (Vol_exret), selling, general, and administrative expense (SGA), research development expenditure (RD), capital expenditure ($CAPEX$), leverage ($LEVERAGE$), a dummy variable that equals one if the firm pays a dividend ($DIVIDEND\_PAYER$) and ownership characteristics ($BLOCKHOLDER$) as firm level control variables. We also control for customer level variables such as the length of business relationship between the supplier-customer pair (REL_LENGTH), the log of customer total sales ($CUST\_lnSales$), profitabilty ($CUST\_ROA$), leverage ($CUST\_LEVERAGE$), research and development expenses ($CUST\_RD$), asset sales ($CUST\_Chg\_ASSETS$) and prior stock performance ($CUST\_STOCK\_RET$).

We correct for heteroskedasticity and serial correlation within supplier-customer pairs by clustering standard errors at the supplier-customer level. We also include year fixed effects to account for time varying economic factors, such as macroeconomic conditions, that may affect supplier sales to customers. We also control for the industry fixed effects as customer concentration can vary based on industries in which suppliers operate. In supplementary analysis reported in Table 4, we also control for supplier, customer as well as supplier-customer pair fixed effects for robustness.

Table 2 presents the results of our main analysis. In column 1 of Table 2, we see that the estimated coefficient β_1 on Network from a univariate regression (without controls and fixed effects) is 0.028 (standard error 0.008) which suggests that CEOs' personal connection is associated with a 2.8 percent higher sales to that supplier's major connected customer. Using the sample mean of $PCTSALES$ (10.6%) and the dollar value of supplier sales ($ 227 million), this result suggests that suppliers, on average, generate an additional $6.4 million in sales to personally connected customers. column 2 of Table 2 adds controls for firm and customer level characteristics, column 3 includes all controls and year fixed effects while column 4 includes all controls, year fixed effects and industry fixed effects. The coefficient estimate remains positive and statistically significant with similar economic magnitudes. In particular, estimated coefficient β_1 on Network from column 4 (with controls, industry and fixed effects) is 0.038, which implies that a networked supplier-customer pair has, on average, $8.85 million (3.9% [6] x $227 million) more in sales.

Next, we examine the type of personal connections that lead to higher sales to the connected

[6] $e^{0.038} - 1 = 3.87\%$

customer. As discussed earlier, personal connections can arise through common work experience in public, private or not-for-profit companies, as well as through attendance at the same undergraduate or graduate program and participation in same social organizations. To test which type of connection is more important, we run the same regression specified in (1) above, but include each network type separately. Table 3 reports the results from this regression. In columns 1 to 5 of Table 3, we report the results of the estimating each network type separately and in column 6 we report results where all networks type are included in the same regression. The results suggest that the personal connections results are primarily driven by common experiences working together at public and private companies. The magnitude of the network coefficients reported in columns 1 and 3 are significantly higher. Personal connections gained through common work experiences lead to 5% to 6% higher sales to connected customers. These findings are different from the ones of Shue (2013) who finds that education is an important network channel, but similar to Chen et al. (2020), who also find a stronger result for work connections relative to educations connections in their study of vendor choice.

We perform a number of robustness checks to address potential concerns of omitted variables that could be driving the results that we report. Specifically, our results could be driven by time-invariant but firm-specific variables, such as headquarter location of the firm, that may drive both the personal connections of supplier CEOs as well sales to their major customers. To address this concern, in column 1 of Table 4, we control for supplier fixed effects rather than industry fixed effects.

It is also possible that our results could be driven by time-invariant omitted supplier-customer characteristics, such as contract specifications, that could differ across supplier-customer pairs. We address this concern by conducting within supplier-customer pair analysis that examines the changes in sales to a customer over time. column 2 of Table 4 reports the results controlling for supplier-customer fixed effects. Supplier-customer fixed effects allow us to examine the impact on sales when a supplier CEO gains or loses a personal connection to a major customer. As an example, supplier, S, may have have two major customers – C1 and C2. The supplier CEO has a personal connection to C1 for two years, but not to C2. With supplier-customer fixed effects, we would be examining

the impact of supplier replacing its connected CEO on sales to its connected customer C1 next year (i.e without a personal connection to C1).

We further strengthen our results by utilizing the fact that some suppliers have more than one major customer in a given year, which enables us to conduct within supplier-year analysis. In particular, supplier fixed effects allow us to examine the relative level of sales to connected customers compared to supplier firms' other major customers if the supplier reports more than one major customer in a given year. Going back to our previous example, supplier, S, may have has two major customers – C1 and C2. As before, the supplier CEO has a personal connection to C1 but not to C2. With the supplier-year fixed effects, we would be examining the difference in percentage of sales made to customer C1 and C2 in a given year. The results using supplier×year fixed effects are reported in column 3 of Table 4. Finally, we include both high-dimension fixed effects (supplier × year and supplier-customer fixed effects) in column 4. In all specifications, our results remain economically and statistically significant (coefficient ranges from 0.012 to 0.035; P-value are below 1% across all four specifications).

Supplier×year fixed effects result shows a significant impact of changes in personal connections to major customers. We examine this disruption in the personal relationships in more detail by analyzing CEO turnovers. First, we create a sample of all supplier CEO turnovers in our dataset. We then calculate percentage change in sales after a CEO turnover, for each of the firm's customers. In particular, we calculate the log percentage change in total sales made to a particular customer next year (t+1) and the prior (t-1). We exclude the turnover year as there is a possibility that departing and the incoming CEOs may overlap. Similarly, we calculate changes in the control variables from t-1 to t+1 and estimate the following changes regression:

$$\Delta ln(1 + PCT\ Sales)_{i,c,t} = \beta_0 + \beta_1\ \Delta Network_{i,t} + \Gamma \Delta Controls_{i,t} + \epsilon_{i,t} \tag{2}$$

In this specification, $\Delta ln(1+PCT\ Sales)_{i,c,t}$ is the log change in percentage sales of the supplier-firm i to a major customer c from year t-1 to t+1 around a supplier firm CEO's turnover in year t. $\Delta Network_{i,t}$ is the change in the network dummy variable. If the supplier firm loses a connection

when a personally connected CEO leaves the supplier firm, then $\Delta Network_{i,t}$ takes on a value of -1. Likewise, when the incoming CEO has a personal connection to a major customer, then $\Delta Network_{i,t}$ takes on a value of +1. $\Delta Network_{i,t}$ equals to zero if there is no change of personal connection. We also examine separately the impact of gaining a personal connection and losing a personal connection.

Table 5 reports the results from this difference analysis. The variable of interest is $Chg\_Network$. The coefficient on this variable reflects the effect of a connected CEO relative to a non-connected on sales to customer for the same firm. The estimated coefficient on $Chg\_Network$ in column 1 of Table 5 is positive and statistically significant, suggesting that supplier CEO's personal network is a significant driver of sales to connected customers. The next two columns present the results for gaining and losing personal connections separately as a result of supplier CEO turnover. We define two dummy variables $Gain\_Network$ that takes on a value of one if the $Chg\_Network$ is positive and $Loss\_Network$ that takes on a value of one if the $Chg\_Network$ is negative. We include these dummy variables separately in the regression specified in (2). The results are reported in columns 2 and 3 of Table 5. We find that gaining a personal connection results in higher sales and losing a personal connection results in a significant reduction in sales. There is some asymmetry with the reduction percentage sales (-3.4%) when there is a loss in personal connection being more significant than an increase in sales (2%) when there is a gain in a personal connection.

It is possible that there may be omitted variables that may drive both the loss of a personal connection through a turnover as well as a decline in sales to the connected customer. We should note that since we are examining changes in sales to both connected and non-connected customers for the same supplier firm, the omitted variables would have to drive the sales to only the connected customer when there is a turnover. For instance, deteriorating performance of the supplier firm resulting in both loss of sales to customers and the supplier CEO being dismissed for poor performance would not be a viable explanation, as we would expect deteriorating performance to affect sales at customer firms where the supplier CEO has no personal connection. Similarly, if the supplier firm has multiple major customers, we would expect deteriorating performance to affect sales of all customers not just customer with whom the supplier CEO has a personal connection. Nonetheless, to rule out any

possibility of endogeneity arising from omitted variables, we instrument for supplier CEO departures.

Specifically, following prior literature (Fee et al. 2013; and Karolyi 2018), we instrument for CEO departures using turnovers at other firms operating within the same industry. Turnovers at other firms in the same industry serve as a demand shock in the market for executives. Increase in demand in the executive market would increase the likelihood of the supplier CEO voluntarily departing for exogenous reasons. We use only voluntary turnover of peers in the industry. This additional restriction ensures that we are not capturing some industry wide trend that affects turnover due to performance. Each year, We calculate industry average voluntary CEO turnover ($CEO\_v\_turnover$). We then regress $Loss\_Network$ variable on $CEO\_v\_turnover$ in the first stage of the IV analyses. In the analyses, we focus on the loss of CEO connections after turnover because hiring of a personally connected CEO is more likely to be endogenous.

Table 6 presents the results of the instrumental variable estimation. Column 1 of Table 6 shows first stage results. The coefficient on industry CEO turnover is significant at 5%. Using the predicted values of the $Loss\_Network$ variable, we re-estimate the regression specified in column 3 of Table 5. The results from the second-stage are reported in column 2 of Table 6. We find that the predicted value of loss of connection variable ($Loss\_Network\_predicted$) is negative and significant, suggesting that the departure of a connected CEO is detrimental to firm sales to the customer.

4.2 The effect of CEO personal connections on information sharing

Thus far we have shown that that sales increase because of CEO personal connections. In this section, we explore channels through which this increase in sales occurs. Specially, we investigate whether supplier CEOs' personal connections to their major customers facilitate information sharing and improve vertical integration along the supply chain. As discussed earlier, supplier CEOs can utilize personal relations to communicate more effectively with customer executives, which can reduce information asymmetry between the two firms. Personal relationships can also bring about greater trust and long-term stability, which allows the supplier firms to invest in customer specific innovation and business processes.

Following Irvine et al. (2016), we use the number of firm patents that are cited by their major customers ($ln\_related\_cites$) as a measure of the effectiveness of direct information sharing and customer specific investments in personally connected customer relationships. This variable enables us to test whether there is direct information sharing in crucial patented technology. We estimate the frequency of cross-citation in patents using the regression specified in (1) above, but use ($ln\_related\_cites$) by the customer as our dependent variable. We use customer cross citations of the suppliers' patents instead of supplier cross-citation of customers' because customer cross-citations are not under the direct control of supplier firms.

The results are reported in Table 7. In column 1 of Table 7, we show that the related patent activities of the personally connected customers are significantly higher than other customers after controlling for industry and year fixed effects. In regression results reported in column 2, we control for firm and year fixed effects. We control for supplier-customer and year fixed effects in regression results reported in column 3. We obtain similar results using these two alternative specifications. In terms of economic significance, personal connections lead to a 4.4% increase in citations by customer firms. Overall, these findings support the notion of technological information sharing in personally connected customer relationships.

The second proxy we use to measure effectiveness of information sharing and customer specific investments is the vertical relatedness measure of Fresard et al. (2020). Using textual analyses, they measure pairwise vertical relatedness scores that indicate the potential of a supplier firm's products to be vertically related to products sold by downstream customer firms. A higher score indicates greater relatedness amongst the two firms. We expect firms with connected CEOs to be more likely to be vertically integrated with their customers as a result of greater information sharing and greater levels of customer specific investments. We estimate the same regression specified in (1) but use the vertical integration score ($Vertscore$) as our dependent variable. Table 8 presents the results. Column 1 of Table 8 presents the results for industry and year fixed effect while column 2 and 3 present the results for firm and year, and supplier-customer pair and year fixed effects respectively. In all three specifications, the network variable significantly contributes to the vertical relatedness of the supplier-customer pair, consistent with our hypothesis that personal connections strengthen

vertical integration. The coefficients on the network dummy indicate that personal connections increase vertical integration score by 12% of its sample mean.[7]

Overall, the results of Tables 7 and 8 suggest that supplier CEO connections at the customer firm lead to improvement of information transfer among the major customer relationships. These information transfers contribute to the value of the supply chain pair.

4.3 Information environment and existing business relationships

Next, we examine cross-sectional variation of the impact of personal connections on sales. These analyses help shed light on potential mechanism by which personal connections enhance integration through the supplier chain. Specifically, we conjecture that the impact of personal relationships should depend on the length of the existing business relationship and the information environment in which the supplier and the customer firm operate. In particular, the marginal impact of personal connections should be greater when there is less information available about the supplier and there have not been long continuous business interactions between the two firms. That is, when there is significant information already available to customers firms about their suppliers and when the customer has interacted with the supplier or has observed the supplier firm interact with other customers in the product market,the incremental value of information coming from personal relationships should be smaller.

In our analyses, we consider four cross-sectional variables to measure information availability and strength of business relationships. First, is the length of the business relationship between the customer and supplier firms. As the business relationship between the supplier and the customer firm matures, customers place greater trust in the suppliers through continued interactions (Irvine et al. 2016). Because they have been buying from a particular supplier for a long time, customers are also more likely to require products that are not easily substitutable (Brown et al. 2009; Intintoli et al. 2017). Therefore, a longer relationship (REL_LENGTH) can attenuate the importance of CEO personal relationship.

[7]The sample mean of the dependent variable is 0.188 and the smallest coefficients among the three specifications is 0.024. We estimate the economic impact by dividing the coefficient by the sample mean (i.e. 0.024/0.188=12.8%).

The second cross-sectional measure we use is the size of the supplier firm, measured by total sales ($lnSales$). Larger firms face lower levels of information asymmetry and are more likely to have repeated business interactions with a number of different customers allowing them to build reputational capital. As a result, we would expect the impact of personal connections to be lower for larger firms. Similarly, large suppliers are more likely to have built a reputation reducing the uncertainty facing their customers. A reputable supplier is also likely to have survived in the marketplace for a number of years. We use the number of years since the firm began trading on CRSP (Age) to proxy for the length of time the supplier firm has been operating in the product market. Finally, prior research suggests that analyst following is associated with reduced information asymmetry (e.g. Healy and Palepu 2001). Therefore, we conjecture that analyst following could attenuate the importance of CEO personal relationship. Analyst following is calculated as the natural logarithm of one plus the number of analysts following each firm. We interact each of these variables with the Network variable to test whether the sensitivity to personal network is lower for suppliers with better information environment. In particular, we run the following regression:

$$\begin{aligned} \ln(1 + PCT\ Sales)_{i,c,t} = \alpha + \beta_1\ Network_{i,c,t} + \beta_2\ Network_{i,c,t} \times \\ InformationEnvironment_{i,c,t} + \Gamma Controls_{i,t} + FE + \epsilon_{i,t} \end{aligned} \tag{3}$$

The results are reported in Table 9. The interaction terms in each model suggest that personal connections are less important when customers have more external information about the suppliers. For example, in column 1 of Table 9, the coefficient of the interaction term (β_2) is negative and significant, suggesting that the impact of connected CEO on sales to customer is less pronounced when customer relationship length is longer. Interaction of network dummy with total sales in column 2, the interaction firm age in column 3 and finally the interaction with analyst coverage in column 4 are all negative and significant. Overall, these results suggest that the benefits that arise from personal connections are lower when alternative information about the reliability of the supplier can be obtained from repeated business with the supplier firm as well as long public history of the supplier firm's operations.

4.4 CEO personal connections and firm value

In previous analysis, we have shown that personal connections lead to higher sales of the suppliers and greater integration. These results suggest that connected CEOs can produce higher sales and generate greater synergies than the firm would otherwise achieve without the CEO's personal influence. Do higher sales and greater integration result in an increase in firm value? Although personal connections lead to greater economic benefits for the supplier firm, greater concentration in sales and greater reliance on the supplier CEO can have negative consequences for the supplier. For instance, the supplier CEO may concentrate the sales of the firm to the customer with whom they have a personal relationship in order to entrench themselves. An entrenched CEO is well-known to have the ability to extract higher wages and greater perquisites from shareholders (Shleifer and Vishny, 1989).[8]

Personal relationship with a major customer creates a dependency on the supplier CEO. This occurs because if the supplier's board terminates their personally-connected CEO, the termination can harm the business relationship developed through personal contact. Moreover, as we have shown personal connections lead to greater integration and may lead a networked CEO to make higher levels of customer-specific investments. These investments can lead a supplier firm's operations to be tightly connected with the operations of their major customer. A break in these operations for any reason would lead to costly realignment to serve alternative customers. This commitment of resources poses an additional risk for the supplier firm, and can lead to further entrenchment of the connected CEO.

We empirically test to see how personal connections to a major customer affect valuations of the supplier by examining the stock price reaction to CEOs turnovers that disrupt personal relationships. Specifically, we examine supplier stock price reactions to the announcement that the supplier firm is replacing its connected CEO. If CEO departures disrupt the a value enhancing customer–supplier relationships, then supplier shareholders should react negatively to the announcement that the supplier firm is losing its connected CEO. Alternatively, market should react positively to value destroying

[8]Shleifer and Vishny (1989) model managers' incentives to make investments that are complementary to their existing skills and knowledge. They predict that such investments make the manager more valuable to the shareholders of the firm and enable the manager to extract higher compensation"

entrenched CEO departures. Using our data on whether the supply chain relationship has a personal connection as a key separating variable, we collect supplier CEO turnover announcement dates from press reports using EDGAR. We then calculate supplier cumulative abnormal returns (CARs) over the event window (-1,+1) surrounding the CEO departure, where day 0 is the announcement date. We use the CRSP value-weighted market returns as the benchmark for this analysis.

To estimate whether the change in stock price surrounding CEO departure is related to personal connections, we use the following specification:

$$CAR_{i,t} = \beta\ Networki, t-1 + \Gamma Controls_{i,t-1} + FE + \epsilon_{i,t}, \tag{4}$$

where the key variable of interest is the coefficient on the network dummy variable $Network$, which is set to one if the supplier firm CEO is personally connected to their customer. Control variables in this regression include the same set of supplier level controls we used in the regression specified in (1) above.

In column 1 of Table 10, we report the regression results estimated using equation (3). The network coefficient is negative and statistically significant. Over the 3-day window around the CEO departure announcement date, connected suppliers experience -1.8% lower CARs compared to firms where the departing CEO is not personally connected. Overall, these results suggest that personal connections in the supply chain are net value-enhancing.

We also examine the impact of connected CEO departures on the value of customer firms. We run the same regression specified in equation (3) replacing supplier firm CARs with those of their customers. We calculate customer cumulative abnormal returns (CARs) for the customer firms over the event window (-1,+1) around the supplier CEO departure, where day 0 is the announcement date. As with supplier firms, we use the CRSP value-weighted market returns as the benchmark for this analysis. The results are reported in column (2) of Table 10. The coefficient on the network dummy is not significant. As noted earlier, while customers account for significant portion of sales for a supplier, the supplier firm accounts for a much smaller share of cost of good sold for a customer. These results are consistent with supplier firms capturing most of the value-added that arises from

personal connections.

5 Conclusion

We examine the economic consequences of personal relationships between supplier CEOs and their major customers. We argue that personal connections allow for greater levels of trust and communication between business partners. In this way, supply chains that have a personal connection can enhance the business relationship, primarily in the reduction of information asymmetry costs between the two firms. In particular, networked supplier-customer pairs have significantly higher sales than all other supplier-customer relationships. When we compare sales made to customers with whom the supplier CEO has a personal relationship to sales made to the supplier's other major customers, we find a similar result. Our results are also robust to examining disruptions in the relationship. We find on average a 2% decrease in sales when a personal connection comes to an end.

Information sharing and greater trust that result from personal relationships lead to greater cooperation in research and development activities. We show that frequency of cross-citations of supplier patents by customer firms are higher when there is a personal connection. Using a measure of vertical relatedness, we also show personal connections lead to greater vertical integration along the supply chain. The flip-side of these enhancements is also apparent, when the personal connection is severed through attrition or death, the supplier firm, no longer in possession of a special relationship with the major customer, suffers a significant sales and stock value decline.

We document that personal connections that complement business-to-business ties along the supply chain have positive valuation effects. In particular, we find that departure of personally connected managers lead to negative market reactions, verifying our conjecture that the benefits that accrue to the supplier firm through reduction in information asymmetry, increased collaboration on innovative activities and stronger vertical integration between the firms outweigh the adverse effects of too much reliance on the personally connected supplier-CEO.

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Table 1: Descriptive Statistics

Panel A – Supplier-Customer Level Analysis

This table reports summary statistics for variables used in the main analyses. The sample includes supplier-customer pairs covered by *Customer Segment files* of *Compustat* between 2000 and 2016.

	N	Mean	St.Dev	p25	Median	p75
Dependent Variables						
ln_pct_SALES	19,298	0.091	0.116	0.000	0.056	0.143
ln _related_cites	11,485	0.042	0.250	0.000	0.000	0.000
Vertscore	19,298	0.188	0.471	0.000	0.000	0.075
Variable of Interest						
Network	19,298	0.091	0.287	0.000	0.000	0.000
Listedorg	19,298	0.048	0.214	0.000	0.000	0.000
Other	19,298	0.023	0.151	0.000	0.000	0.000
Unlistedorg	19,298	0.019	0.138	0.000	0.000	0.000
Education	19,298	0.011	0.106	0.000	0.000	0.000
Nfp	19,298	0.002	0.039	0.000	0.000	0.000
Control Variables						
REL_LENGTH	19,298	4.351	3.284	2.000	3.000	6.000
ROA	19,298	0.072	0.162	0.041	0.105	0.156
SALES_GROWTH	19,298	0.144	0.424	-0.037	0.072	0.222
LnSales	19,298	6.062	1.892	4.820	6.083	7.390
Vol_exret	19,298	0.030	0.016	0.019	0.026	0.037
AGE	19,298	17.271	13.923	7.000	13.000	24.000
SGA	19,298	0.251	0.214	0.092	0.211	0.346
RD	19,298	0.069	0.105	0.000	0.022	0.097
CAPEX	19,298	0.050	0.062	0.015	0.028	0.055
LEVERAGE	19,298	0.193	0.184	0.005	0.158	0.318
DIVIDEND_PAYER	19,298	0.275	0.446	0.000	0.000	1.000
BLOCKHOLDER	19,298	0.740	0.439	0.000	1.000	1.000
CUST_lnSales	19,298	10.177	1.677	9.181	10.353	11.353
CUST_ROA	19,298	0.137	0.074	0.090	0.137	0.174
CUST_RD	19,298	0.027	0.044	0.000	0.002	0.042
CUST_LEVERAGE	19,298	0.244	0.164	0.126	0.228	0.318
CUST_Chg_ASSETS	19,298	1.074	0.195	0.987	1.050	1.125
CUST_STOCK_RET	19,298	0.068	0.489	-0.245	-0.008	0.286
lnAnalysts	19,298	1.719	0.935	1.099	1.792	2.398

Panel B – CEO Turnover Analysis

This table reports summary statistics for variables used in the CEO turnover analyses. The sample includes suppliers CEO turnovers covered by *Customer Segment files* of *Compustat* and *Execucomp* between 2000 and 2016.

	N	Mean	St.Dev	p25	Median	p75
Dependent Variables						
CAR_3days	601	-0.002	0.076	-0.024	-0.001	0.020
Variable of Interest						
CUST_Network_sales_ratio	601	0.025	0.068	0.000	0.000	0.000
Control Variables						
ROA	601	0.103	0.113	0.060	0.114	0.169
SALES_GROWTH	601	0.068	0.211	-0.035	0.056	0.157
LnSales	601	6.988	1.614	5.862	6.868	8.181
Vol_exret	601	0.025	0.013	0.017	0.022	0.030
AGE	601	22.621	15.227	11.000	18.000	32.000
SGA	601	0.252	0.186	0.114	0.222	0.336
RD	601	0.061	0.077	0.000	0.028	0.103
CAPEX	601	0.042	0.047	0.016	0.027	0.049
LEVERAGE	601	0.189	0.169	0.010	0.172	0.305
DIVIDEND_PAYER	601	0.379	0.486	0.000	0.000	1.000
BLOCKHOLDER	601	0.767	0.423	1.000	1.000	1.000
CUST_REL_LENGTH_avg	601	0.025	0.027	0.000	0.019	0.036
CUST_ln_Sale_avg	601	1.041	1.412	0.000	0.540	1.450
CUST_ROA_avg	601	1.917	1.954	0.000	1.540	2.774
CUST_RD_avg	601	0.004	0.011	0.000	0.000	0.002
CUST_LEVERAGE_avg	601	0.039	0.043	0.000	0.031	0.060
CUST_Chg_ASSETS_avg	601	0.194	0.203	0.000	0.152	0.270
CUST_STOCK_RET_avg	601	0.110	0.694	-0.278	-0.023	0.364

Table 2: CEO Personal Connections and Sales to Customers

The sampling period for this table is from 2000 to 2016. The dependent variable *ln(1+PCT SALES)* is the natural logarithmic of the sales to the major customer as percentage of total sales in year t. Network equals one if the CEO of the supplier has a connection with the customer in year t and zero otherwise. Controls is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***.

	(1)	(2)	(3)	(4)
VARIABLES	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*
Network	0.028***	0.037***	0.039***	0.038***
	(0.008)	(0.006)	(0.006)	(0.006)
REL_LENGTH		0.001**	0.003***	0.003***
		(0.000)	(0.001)	(0.001)
ROA		0.022*	0.012	0.026**
		(0.013)	(0.013)	(0.013)
SALES_GROWTH		0.007**	0.007**	0.001
		(0.003)	(0.003)	(0.003)
LnSales		-0.011***	-0.012***	-0.011***
		(0.001)	(0.001)	(0.001)
Vol_exret		0.271***	0.133	0.182
		(0.092)	(0.114)	(0.116)
AGE		-0.000*	-0.000	-0.000**
		(0.000)	(0.000)	(0.000)
SGA		-0.043***	-0.041***	-0.030***
		(0.010)	(0.010)	(0.011)
RD		0.109***	0.108***	0.069***
		(0.023)	(0.023)	(0.025)
CAPEX		-0.023	-0.008	0.021
		(0.024)	(0.024)	(0.029)
LEVERAGE		-0.011	-0.007	-0.021**
		(0.009)	(0.009)	(0.010)
DIVIDEND_PAYER		0.018***	0.018***	0.016***
		(0.004)	(0.004)	(0.004)
BLOCKHOLDER		-0.004	-0.003	-0.003
		(0.004)	(0.003)	(0.004)
CUST_lnSales		0.010***	0.009***	0.008***
		(0.001)	(0.001)	(0.001)
CUST_ROA		-0.002	-0.003	0.014
		(0.022)	(0.022)	(0.021)
CUST_RD		-0.105***	-0.123***	-0.049
		(0.040)	(0.040)	(0.042)
CUST_LEVERAGE		-0.018*	-0.012	-0.002
		(0.010)	(0.010)	(0.010)
CUST_Chg_ASSETS		0.037***	0.033***	0.029***
		(0.005)	(0.005)	(0.005)
CUST_STOCK_RET		-0.002	-0.001	-0.002
		(0.002)	(0.002)	(0.002)
Observations	19,298	19,298	19,298	19,298
Industry FE	NO	NO	NO	YES
YEAR FE	NO	NO	YES	YES
Adjusted R-squared	0.005	0.066	0.078	0.107

Table 3: Analysis of Different Connections Types

The sampling period for this table is from 2000 to 2016. The dependent variable *ln(1+PCT SALES)* is the natural logarithmic of the sales to the major customer as percentage of total sales in year t. Every network variable equals one if the CEO of the supplier has a respective connection with the customer in year t and zero otherwise. Controls is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*
Listedorg	0.052***					0.046***
	(0.009)					(0.008)
Other		0.016**				0.010
		(0.008)				(0.008)
Unlistedorg			0.059***			0.045***
			(0.017)			(0.015)
Education				0.019		0.016
				(0.013)		(0.013)
Nfp					0.017	0.013
					(0.020)	(0.021)
REL_LENGTH	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ROA	0.026**	0.024*	0.024*	0.024*	0.024*	0.026**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
SALES_GROWTH	0.002	0.002	0.002	0.002	0.002	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
LnSales	-0.011***	-0.011***	-0.011***	-0.011***	-0.010***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Vol_exret	0.194*	0.191*	0.210*	0.196*	0.197*	0.197*
	(0.115)	(0.116)	(0.115)	(0.116)	(0.116)	(0.115)
AGE	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SGA	-0.031***	-0.032***	-0.031***	-0.033***	-0.032***	-0.030***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
RD	0.069***	0.070***	0.072***	0.071***	0.070***	0.070***

	(0.025)	(0.026)	(0.025)	(0.026)	(0.026)	(0.025)
CAPEX	0.025	0.018	0.022	0.020	0.020	0.025
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
LEVERAGE	-0.022**	-0.021**	-0.023**	-0.022**	-0.022**	-0.022**
	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)
DIVIDEND_PAYER	0.016***	0.017***	0.017***	0.017***	0.017***	0.016***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
BLOCKHOLDER	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
CUST_lnSales	0.008***	0.007***	0.008***	0.007***	0.007***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CUST_ROA	0.013	0.015	0.015	0.015	0.015	0.013
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
CUST_RD	-0.041	-0.027	-0.029	-0.027	-0.024	-0.047
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.042)
CUST_LEVERAGE	-0.002	-0.001	-0.001	-0.001	-0.001	-0.002
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
CUST_Chg_ASSETS	0.029***	0.031***	0.031***	0.031***	0.031***	0.029***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
CUST_STOCK_RET	-0.002	-0.002	-0.003	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	19,298	19,298	19,298	19,298	19,298	19,298
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.108	0.099	0.104	0.099	0.099	0.111

Table 4: CEO Personal Connections and Sales to Customers Alternative Specifications

The sampling period for this table is from 2000 to 2016. The dependent variable *ln(1+PCT SALES)* is the natural logarithmic of the sales to the major customer as percentage of total sales in year *t*. *Network* equals one if the CEO of the supplier has a connection with the customer in year *t* and zero otherwise. *Controls* is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and

	(1)	(2)	(3)	(4)
VARIABLES	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*
Network	0.032***	0.035***	0.019***	0.012***
	(0.004)	(0.004)	(0.005)	(0.004)
REL_LENGTH	0.001**	-0.019***	0.003***	-0.003
	(0.001)	(0.007)	(0.001)	(0.007)
ROA	0.046***	0.046***		
	(0.014)	(0.014)		
SALES_GROWTH	-0.003	-0.002		
	(0.003)	(0.003)		
LnSales	-0.012***	-0.017***		
	(0.004)	(0.005)		
Vol_exret	0.012	0.015		
	(0.103)	(0.098)		
AGE	-0.004**	-0.005**		
	(0.002)	(0.002)		
SGA	-0.061***	-0.052***		
	(0.015)	(0.015)		
RD	0.093**	0.039		
	(0.042)	(0.038)		
CAPEX	0.044	0.052*		
	(0.028)	(0.026)		
LEVERAGE	-0.031***	-0.023**		
	(0.011)	(0.011)		
DIVIDEND_PAYER	0.002	0.003		
	(0.004)	(0.004)		
BLOCKHOLDER	-0.000	-0.001		
	(0.003)	(0.003)		
CUST_lnSales	0.008***	0.032***	0.008***	0.018***
	(0.001)	(0.005)	(0.001)	(0.005)
CUST_ROA	0.015	-0.026	0.020	0.004
	(0.018)	(0.022)	(0.024)	(0.024)
CUST_RD	-0.031	-0.193**	-0.007	-0.285***
	(0.039)	(0.096)	(0.048)	(0.100)
CUST_LEVERAGE	-0.013*	-0.027**	-0.020**	-0.009
	(0.008)	(0.013)	(0.010)	(0.014)
CUST_Chg_ASSETS	0.017***	0.003	0.021***	0.003
	(0.004)	(0.004)	(0.006)	(0.005)
CUST_STOCK_RET	-0.001	-0.001	-0.002	-0.003
	(0.002)	(0.002)	(0.003)	(0.002)
Observations	19,195	18,908	13,060	12,648
Firm FE	YES	NO	NO	NO
Supplier_customer FE	NO	YES	NO	YES
Supplier_year FE	NO	NO	YES	YES
Year FE	YES	YES	NO	NO
Adjusted R-squared	0.456	0.614	0.377	0.733

Table 5: CEO Personal Connections and Sales to Customers First-Difference Specifications

The sampling period for this table is from 2000 to 2016. The dependent variable *Chg_ln_pct_SALES* is the change of natural logarithmic of the sales to the major customer as percentage of total sales in year t. *Chg_Network* equals one if the CEO of the supplier has a change of connection with the customer in year t and zero otherwise. *Gain_Network* equals one if the CEO of the supplier establishes a connection with the customer in year t and zero otherwise. *Loss_Network* equals one if the CEO of the supplier losses a connection with the customer in year t and zero otherwise. Controls is a vector of first differences of control variables used in prior tables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***

	(1)	(2)	(3)
VARIABLES	*Chg_ln_pct_SALES*	*Chg_ln_pct_SALES*	*Chg_ln_pct_SALES*
Chg_Network	0.025***		
	(0.007)		
Gain_Network		0.020*	
		(0.011)	
Loss_Network			-0.034***
			(0.010)
Chg_ROA	0.044	0.043	0.042
	(0.062)	(0.063)	(0.062)
Chg_SALES_GROWTH	0.006	0.006	0.005
	(0.010)	(0.010)	(0.010)
Chg_LnSales	-0.001	0.002	-0.001
	(0.013)	(0.013)	(0.013)
Chg_Vol_exret	0.386	0.403	0.390
	(0.269)	(0.270)	(0.270)
Chg_SGA	0.011	0.007	0.008
	(0.059)	(0.059)	(0.059)
Chg_RD	0.016	0.028	0.022
	(0.146)	(0.146)	(0.148)
Chg_CAPEX	0.104	0.096	0.101
	(0.105)	(0.105)	(0.106)
Chg_LEVERAGE	-0.058*	-0.059*	-0.054*
	(0.033)	(0.033)	(0.033)
Chg_DIVIDEND_PAYER	0.013	0.013	0.014
	(0.010)	(0.010)	(0.010)
Chg_BLOCKHOLDER	0.016	0.017	0.017
	(0.013)	(0.013)	(0.013)
Chg_CUST_ROA	-0.011	-0.004	-0.011
	(0.049)	(0.050)	(0.049)
Chg_CUST_RD	0.375	0.387	0.376
	(0.322)	(0.318)	(0.324)
Chg_CUST_LEVERAGE	0.022	0.025	0.019
	(0.039)	(0.039)	(0.039)
Chg_CUST_Chg_ASSETS	-0.027*	-0.024	-0.027*
	(0.015)	(0.016)	(0.015)
Chg_CUST_STOCK_RET	0.005	0.005	0.005
	(0.007)	(0.007)	(0.007)
Observations	677	677	677
Adjusted R-squared	0.024	0.013	0.022

Table 6: CEO Personal Connections and Sales to Customers Instrumental Variable Specifications

The sampling period for this table is from 2000 to 2016. The dependent variable *Loss_Network* of first stage equals one if the CEO of the supplier turnovers over and the supplier losses a connection with the customer in year *t* and zero otherwise. The dependent variable *CEO_v_turnover* is the industry average of CEOs turnover in year *t*. *Controls* is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***.

	First Stage IV Regression	Second Stage
VARIABLES	*Loss_Network*	*Chg_ln_pct_SALES*
CEO_v_turnover	0.549**	
	(0.215)	
Loss_Network_predicted		-0.243*
		(0.142)
Chg_ROA	0.046	0.051
	(0.141)	(0.052)
Chg_SALES_GROWTH	-0.012	0.003
	(0.030)	(0.011)
Chg_LnSales	-0.108***	-0.022
	(0.035)	(0.020)
Chg_Vol_exret	-0.820	0.259
	(0.788)	(0.299)
Chg_SGA	0.123	0.034
	(0.171)	(0.065)
Chg_RD	-0.430	-0.063
	(0.377)	(0.149)
Chg_CAPEX	0.266	0.155
	(0.361)	(0.136)
Chg_LEVERAGE	0.062	-0.037
	(0.102)	(0.039)
Chg_DIVIDEND_PAYER	0.022	0.019
	(0.032)	(0.012)
Chg_BLOCKHOLDER	-0.025	0.012
	(0.036)	(0.013)
Chg_CUST_ROA	-0.216	-0.063
	(0.200)	(0.081)
Chg_CUST_RD	-0.530	0.286
	(1.027)	(0.379)
Chg_CUST_LEVERAGE	-0.181	-0.014
	(0.142)	(0.056)
Chg_CUST_Chg_ASSETS	-0.099**	-0.047**
	(0.047)	(0.022)
Chg_CUST_STOCK_RET	-0.001	0.006
	(0.022)	(0.008)
Observations	677	677

Table 7: CEO Personal Connections and R&D Efficiency

The sampling period for this table is from 2000 to 2010. The dependent variable *ln_related_cites* is the natural logarithmic of the related patent citations of the supplier customer pair in year t. Network equals one if the CEO of the supplier has a connection with the customer in year t and zero otherwise. Controls is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***.

	(1)	(2)	(3)
VARIABLES	*ln_related_cites*	*ln_related_cites*	*ln_related_cites*
Network	0.044**	0.045**	0.053**
	(0.019)	(0.018)	(0.023)
REL_LENGTH	-0.001	-0.001	0.089
	(0.001)	(0.002)	(0.054)
ROA	-0.023	-0.077*	-0.086**
	(0.023)	(0.040)	(0.037)
SALES_GROWTH	-0.006	-0.005	0.001
	(0.006)	(0.008)	(0.008)
LnSales	0.029***	0.024**	0.017
	(0.005)	(0.011)	(0.012)
Vol_exret	0.859***	0.838***	0.840***
	(0.236)	(0.279)	(0.283)
AGE	-0.001*	0.012	-0.008
	(0.000)	(0.021)	(0.015)
SGA	-0.018	-0.048**	-0.058**
	(0.012)	(0.025)	(0.024)
RD	0.247***	-0.034	-0.010
	(0.048)	(0.061)	(0.056)
CAPEX	0.137*	0.093	0.083
	(0.070)	(0.066)	(0.063)
LEVERAGE	-0.074***	0.025	0.034
	(0.025)	(0.042)	(0.042)
DIVIDEND_PAYER	0.007	0.034*	0.026
	(0.011)	(0.018)	(0.016)
BLOCKHOLDER	-0.028***	-0.003	0.006
	(0.010)	(0.014)	(0.013)
CUST_lnSales	0.012***	0.014***	0.049**
	(0.002)	(0.002)	(0.024)
CUST_ROA	-0.019	-0.094**	-0.263**
	(0.052)	(0.047)	(0.104)
CUST_RD	0.490***	0.055	-0.349
	(0.104)	(0.146)	(0.389)
CUST_LEVERAGE	-0.009	-0.054**	-0.083
	(0.026)	(0.028)	(0.073)
CUST_Chg_ASSETS	0.021	0.009	0.005
	(0.014)	(0.013)	(0.014)
CUST_STOCK_RET	-0.007	-0.005	-0.006
	(0.006)	(0.006)	(0.007)
Observations	11,484	11,404	11,143
Industry FE	YES	NO	NO
Firm FE	NO	YES	NO
Supplier_customer FE	NO	NO	YES
Year FE	YES	YES	YES
Adjusted R-squared	0.139	0.390	0.445

Table 8: CEO Personal Connections and Vertical Integration

The sampling period for this table is from 2000 to 2010. The dependent variable *Vertscore* is the relatedness scores as defined by Fresard et al. (2020) of the supplier customer pair in year t. Network equals one if the CEO of the supplier has a connection with the customer in year t and zero otherwise. Controls is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***.

	(1)	(2)	(3)
VARIABLES	*Vertscore*	*Vertscore*	*Vertscore*
Network	0.037*	0.039**	0.024*
	(0.019)	(0.018)	(0.014)
REL_LENGTH	0.002	0.004*	0.047*
	(0.002)	(0.002)	(0.028)
ROA	-0.019	-0.038	-0.026
	(0.037)	(0.027)	(0.026)
SALES_GROWTH	0.005	-0.001	0.001
	(0.006)	(0.004)	(0.004)
LnSales	0.001	0.011	0.005
	(0.005)	(0.009)	(0.009)
Vol_exret	-0.214	-0.060	-0.123
	(0.404)	(0.266)	(0.223)
AGE	0.000	0.013	0.002
	(0.001)	(0.008)	(0.007)
SGA	-0.086***	-0.017	-0.028
	(0.023)	(0.025)	(0.021)
RD	-0.033	0.090**	0.050
	(0.049)	(0.042)	(0.040)
CAPEX	-0.071	0.039	0.023
	(0.109)	(0.074)	(0.070)
LEVERAGE	0.069*	-0.053	-0.053
	(0.037)	(0.036)	(0.035)
DIVIDEND_PAYER	0.042**	-0.025	-0.026
	(0.019)	(0.019)	(0.019)
BLOCKHOLDER	-0.003	-0.013	-0.017**
	(0.010)	(0.009)	(0.008)
CUST_lnSales	0.001	0.002	0.077***
	(0.004)	(0.004)	(0.015)
CUST_ROA	-0.373***	-0.143**	-0.143**
	(0.073)	(0.057)	(0.065)
CUST_RD	0.219	-0.105	-0.203
	(0.140)	(0.133)	(0.209)
CUST_LEVERAGE	0.214***	0.078**	0.017
	(0.047)	(0.040)	(0.059)
CUST_Chg_ASSETS	-0.019	-0.016	-0.035***
	(0.014)	(0.011)	(0.011)
CUST_STOCK_RET	0.017**	-0.008	-0.011**
	(0.008)	(0.006)	(0.006)
Observations	19,298	19,195	18,908
Industry FE	YES	NO	NO
Adjusted R-squared	0.328	0.662	0.810
Firm FE	NO	YES	NO
Supplier_customer FE	NO	NO	YES
Year FE	YES	YES	YES

Table 9: Cross-sectional Analysis of CEO Personal Connections

The sampling period for this table is from 2000 to 2016. The dependent variable *ln(1+PCT SALES)* is the natural logarithmic of the sales to the major customer as percentage of total sales in year t. Network equals one if the CEO of the supplier has a connection with the customer in year t and zero otherwise. Controls is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by supplier-customer pair (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***.

	(1)	(2)	(3)	(4)
VARIABLES	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*	*ln(1+PCT SALES)*
Network	0.047***	0.078***	0.053***	0.074***
	(0.008)	(0.021)	(0.011)	(0.014)
*Network * REL_LENGTH*	-0.002*			
	(0.001)			
*Network * lnSales*		-0.006**		
		(0.003)		
*Network * Age*			-0.001**	
			(0.000)	
*Network * lnAnalysts*				-0.018***
				(0.006)
REL_LENGTH	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
ROA	0.026**	0.025*	0.026**	0.024*
	(0.013)	(0.013)	(0.013)	(0.013)
SALES_GROWTH	0.001	0.001	0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
LnSales	-0.011***	-0.011***	-0.011***	-0.010***
	(0.001)	(0.001)	(0.001)	(0.002)
Vol_exret	0.184	0.182	0.183	0.151
	(0.116)	(0.116)	(0.116)	(0.115)
AGE	-0.000**	-0.000**	-0.000*	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
SGA	-0.030***	-0.030***	-0.030***	-0.032***
	(0.011)	(0.011)	(0.011)	(0.011)
RD	0.069***	0.069***	0.071***	0.076***
	(0.025)	(0.025)	(0.025)	(0.026)
CAPEX	0.022	0.023	0.021	0.025
	(0.029)	(0.029)	(0.029)	(0.029)
LEVERAGE	-0.021**	-0.021**	-0.021**	-0.023**
	(0.009)	(0.009)	(0.010)	(0.010)
DIVIDEND_PAYER	0.016***	0.016***	0.016***	0.016***
	(0.004)	(0.004)	(0.004)	(0.004)
BLOCKHOLDER	-0.003	-0.003	-0.003	-0.002
	(0.004)	(0.004)	(0.004)	(0.003)
CUST_lnSales	0.008***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)
CUST_ROA	0.014	0.013	0.014	0.013
	(0.021)	(0.021)	(0.021)	(0.021)
CUST_RD	-0.050	-0.051	-0.052	-0.049
	(0.042)	(0.042)	(0.042)	(0.042)
CUST_LEVERAGE	-0.002	-0.002	-0.002	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)
CUST_Chg_ASSETS	0.029***	0.029***	0.029***	0.029***
	(0.005)	(0.005)	(0.005)	(0.005)
CUST_STOCK_RET	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
lnAnalysts				-0.002
				(0.002)
Observations	19,298	19,298	19,298	19,298
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Adjusted R-squared	0.108	0.108	0.108	0.109

Table 10: CEO Personal Connections and Firm Value

The sampling period for this table is from 2000 to 2016. The dependent variable CAR is defined as 3-day cumulative abnormal return around CEO departure. *CUST_Network_sales_ratio* equals the percent of sales that the firm generates from the major customers that the CEO has a connection with in the year before CEO departs. Controls is a vector of control variables. All Variable definitions are provided in Appendix A. All continuous variables are winsorized at 1% and 99%. Two-tailed probability values are computed using standard errors clustered by firm (presented in parentheses). Statistical significance at 10%, 5% and 1% levels are indicated by *, **, and ***

	(1)	(2)
VARIABLES	*CAR*	*CAR*
CUST_Network_sales_ratio	-0.075***	-0.089***
	(0.025)	(0.028)
ROA		-0.041
		(0.031)
SALES_GROWTH		-0.015
		(0.022)
LnSales		0.002
		(0.002)
Vol_exret		0.261
		(0.495)
AGE		0.000
		(0.000)
SGA		0.046**
		(0.019)
RD		0.028
		(0.055)
CAPEX		-0.074
		(0.064)
LEVERAGE		0.002
		(0.019)
DIVIDEND_PAYER		0.006
		(0.010)
BLOCKHOLDER		-0.010
		(0.007)
CUST_ROA_average		-0.177
		(0.144)
REL_LENGTH_ratio_average		0.006*
		(0.003)
CUST_lnSales_ratioaverage		-0.017**
		(0.007)
CUST_RD_average		0.405*
		(0.234)
CUST_LEVERAGE_average		0.061
		(0.105)
CUST_Chg_ASSETS_average		0.131*
		(0.070)
CUST_STOCK_RET_average		-0.004
		(0.005)
Observations	601	594
Industry FE	NO	YES
YEAR FE	NO	YES
Adjusted R-squared	0.003	-0.003

Appendix A: Variable Definition

Dependent Variables	
ln(1+PCT SALES)	The natural logarithm of sales to a customer divided by the supplier's total sales (source: Compustat).
ln_related_cites	The natural logarithm of one plus total related patent citations (source: Noah Stoffman website).
Vertscore	Vertical relatedness scores as defined by Fresard et al. (2020) (source: Fresard-Hoberg-Phillips Vertical Relatedness Data Library).
CAR	3-day cumulative abnormal return around CEO departure (source: CRSP)
Variable of Interest	
Network	An indicative variable which equals one if the CEO of a supplier firm has a personal connection with the board members / executives of its major customer (source: Boardex).
Listedorg	An indicative variable which equals one if the CEO of a supplier firm has a personal connection through listed organization with the board members / executives of its major customer (source: Boardex) .
Other	An indicative variable which equals one if the CEO of a supplier firm has a personal connection through social organizations such as golf clubs, churches, synagogues, mosques, other religious and spiritual centers (source: Boardex).
Unlistedorg	An indicative variable which equals one if the CEO of a supplier firm has a personal connection through private organization with the board members / executives of its major customer (source: Boardex).
Education	An indicative variable which equals one if the CEO of a supplier firm went to the same university with the board members / executives of its major customer (source: Boardex).
Nfp	An indicative variable which equals one if the CEO of a supplier firm has a personal connection through not-for-profit organization with the board members / executives of its major customer (source: Boardex).
Control Variables	
REL_LENGTH	The number of years since a supplier first reported positive sales to a particular customer (source: Compustat).
ROA	Operating income before depreciation divided by book value of assets (source: Compustat).
SALES_GROWTH	The percentage change in sales over the prior year (source: Compustat).
lnSales	The natural logarithm of total sales of the year (source: Compustat).
Vol_exret	Standard deviation of daily stock returns during the fiscal year (source: CRSP).
AGE	The number of years since the firm began trading on CRSP (source: CRSP).
SGA	Selling, general, and administrative expenses scaled by book value of total assets (source: Compustat).
RD	Research and development expenditures scaled by book value of total assets (source: Compustat).

CAPEX	Capital expenditures scaled by book value of total assets (source: Compustat).
LEVERAGE	The book value of long-term debt plus debt in current liabilities scaled by book values of total asset (source: Compustat).
DIVIDEND_PAYER	An indicative variable which variable equals 1 if a firm pays a common dividend during the year (source: Compustat).
BLOCKHOLDER	An indicative variable which variable equals 1 if a firm has one or more block holders in the year (source: Thomson Reuters).
CUST_lnSales	A customer's natural logarithm of total sales of the year (source: Compustat).
CUST_ROA	A customer's ROA of the year (source: Compustat).
CUST_RD	A customer's RD of the year (source: Compustat).
CUST_LEVERAGE	A customer's Leverage of the year (source: Compustat).
CUST_Chg_ASSETS	The percentage change in book value of a customer's assets over the prior year (source: Compustat).
CUST_STOCK_RET	A customer's 3-year buy-and-hold return of the customer in excess of the 3-year buy-and-hold return of the value-weighted market portfolio (source: CRSP).
lnAnalysts	The natural logarithm of number of analysts covering the firm (source: IBES).
Forced	Forced CEO turnover (source: Peters and Wagne 2014)