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Are overconfident CEOs better leaders? Evidence from stakeholder commitments

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Abstract

We find evidence that the leadership of overconfident chief executive officers (CEOs) induces stakeholders to take actions that contribute to the leader's vision. By being intentionally overexposed to the idiosyncratic risk of their firms, overconfident CEOs exhibit a strong belief in their firms' prospects. This belief attracts suppliers beyond the firm's observable expansionary corporate activities. Overconfident CEOs induce more supplier commitments including greater relationship-specific investment and longer relationship duration. Overconfident CEOs also induce stronger labor commitments as employees exhibit lower turnover rates and greater ownership of company stock in benefit plans.

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Keywords: CEO overconfidence, Leadership, Customer-supplier, Employee ownerhsip

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"I told people you weren't betting on a device. You were betting on Steve Jobs."

~ Randall Stephenson (AT&T CEO)

1. Introduction

Managerial overconfidence can significantly affect corporate activities and outcomes. Studies show that overconfident CEOs affect investment decisions, merger and acquisition choices, and accounting practices.[1] Yet, some of the most successful leaders, such as Jack Welch of General Electric and Steve Jobs of Apple Inc., displayed managerial overconfidence during their tenure as CEO. Recent studies have uncovered important benefits to employing overconfident CEOs such as higher research & development (R&D) productivity and innovation output (e.g., Galasso and Simcoe, 2011; Hirshleifer, Low, and Teoh, 2012). We add to this growing literature by asking: Are overconfident CEOs better leaders?

Our definition of leadership follows Hermalin (1998), where a leader's actions motivate key stakeholders, such as employees and suppliers, to exert greater effort. Leadership is distinct from formal authority because stakeholders' actions are voluntary. In this context, suppliers choose to invest in relationship-specific assets and to sell their products to customers. Employees select their employment and level of effort on the job. To motivate stakeholder actions, a leader must have strong self-belief and belief in the firm's prospects under her leadership. Recent psychology studies show that overconfident people are more respected, more influential, and viewed as more competent by their peers (e.g., Anderson, Brion, Moore, and Kennedy, 2012; Kennedy, Anderson, and Moore, 2013). These psychological underpinnings motivate our hypothesis that the leadership of overconfident CEOs may attract greater stakeholder commitments.

Short of conducting interviews or running experiments, leadership and influence are typically unobservable and difficult to quantify and measure. Instead, we test our *leadership hypothesis* by focusing on the observable actions of two key stakeholders of the

[1] For example, see Malmendier and Tate (2005, 2008), Billet and Qian (2008), Kolasinski and Li (2013), Schrand and Zechman (2012), Ahmed and Duellman (2013), Banerjee, Humphery-Jenner, Nanda, and Tham (2017).

firm, suppliers and employees. This is an ideal test setting because voluntary participation represents a significant leadership outcome, particularly when stakeholder effort and commitment are critical to a firm's success. From the stakeholder's view, commitment and effort require costly investments that may be firm-specific and have low redeployability value outside of the relationship.[2] Therefore, stakeholders will only make such investments if they strongly believe in the leadership of the firm's CEO.

The success of the original iPhone is an example of the importance of stakeholder commitment. AT&T (then Cingular) helped Apple Inc. to secretly develop the iPhone and made heavy concessions to become the exclusive iPhone carrier in the U.S. market, effectively tying their fate to the iPhone's future prospects.[3] This example shows the close interdependency between a firm's success and the commitments made by a firm's stakeholders towards product design and quality. More notably, the decision of Randall Stephenson, the CEO of AT&T, to commit relationship-specific investment to Apple Inc. was not motivated by the prospect of the iPhone per se, but by his belief in the leadership of Steve Jobs, the CEO of Apple Inc. at the time.

Following extant literature, we measure CEO overconfidence using vested-in-the-money stock options of CEOs in the ExecuComp database.[4] While holding vested-in-the-money stock options may underdiversify the CEO's wealth (Hall and Murphy, 2002), it may also display leadership for at least three reasons. First, having "skin in the game" conveys the CEO's strong belief in the firm's prospects because the CEO's human capital is already tied to the firm. Second, it demonstrates a willingness to lead by example. Hermalin (1998) argues that leading by example may be a credible form of leadership and cites historical examples including Dr. Martin Luther King, Jr. marching at the head of civil rights marches. Third, holding vested-in-the-money options may reflect a commitment by the manager to exert greater effort (Gervais, Heaton, and Odean, 2011). The manager believes the firm has valuable growth opportunities and therefore works

[2] A classic example is the steel dies used to form the body of a car model which have low outside practical value (Klein, Crawford, and Alchian, 1978).

[3] "Life after the iPhone: How AT&T's bet on Apple mobilized the company" Forbes, January 21, 2013.

[4] For example, see: Campbell et al. (2011), Malmendier, Tate, and Yan (2011), Hirshleifer, Low, and Teoh (2012), Banerjee, Humphery-Jenner, and Nanda (2015).

harder. Stakeholders understand that this type of leadership and dedication to hard work translates into higher firm value, which makes the bilateral relationship more valuable.

Our first finding indicates that overconfident CEOs are more likely to initiate and to expand dependent supplier networks.[5] Controlling for firm characteristics, CEO overconfidence increases the probability of adding a dependent supplier by +0.9%. This effect is economically large given that on average, only 7.2% of firm-year observations in our sample experience an increase in dependent suppliers. These findings suggest that CEO overconfidence facilitates the development of important bilateral relationships with suppliers.

A concern with this interpretation is the possibility of an omitted variable that drives the CEO to hold vested-in-the-money options and induces growth in the firm's supplier network. We partially address this issue by estimating conditional logit regressions that include firm strata, which capture unobserved firm heterogeneity, and industry-year strata, which capture industry growth cycles. We also employ an overconfidence measure by Kolasinski and Li (2013) that requires active managerial choice rather than inaction or inertia. While these robustness tests do not entirely eliminate endogeneity concerns, they indicate that our results are unlikely driven by industry growth cycles, unobserved firm heterogeneity, and insider information.

Our second set of tests focuses on stakeholder commitments. Employees are arguably the most important stakeholders and their commitments can impact firm performance. First, we measure employee commitment using turnover because committed employees are likely to stay on with their employer. Using options cancellation data as a proxy of employee turnover (e.g., Carter and Lynch, 2004; Babenko and Sen, 2014), we find that firms led by overconfident CEOs are associated with a 2.4% decrease in employee turnover. Second, we measure employee commitment based on the amount of employer stock held in employee retirement benefit plans. We expect that committed employees are more likely to own more company stock. Using data from filings of Internal Revenue

[5] We follow Statement of Financial Accounting Standards (SFAS) 14 in classifying dependent suppliers as firms that generate at least 10% of revenues from a customer firm. Sample firms that are not reported as customers in this data set are assumed to have no dependent suppliers.

Service (IRS) Form 5500, we find that the allocation of benefit plan assets to company stock is 2.7% higher in firms led by overconfident CEOs. Overall, our evidence indicates that overconfident CEOs are able to induce greater employee commitment.

We also expect that the leadership of an overconfident CEO is important when supplier commitments are particularly valuable. For example, specialized inputs, such as the components of an iPhone, require customized supplier investment. These relationship-specific investments create value by improving productivity (Dyer and Nobeoka, 2000), enhancing core competency (Parmigiani, 2007), and stimulating inter-project spillovers (Kang et al., 2009). But unless suppliers have strong conviction in the leadership of their customer firm's CEO, they may be reluctant to develop customized inputs for customer firms due to costly initial investment and low ex post redeployability of the inputs if the relationship terminates prematurely (Titman, 1984).

We test this prediction by examining firms in durable manufacturing industries because these industries produce unique products that require greater relationship-specific inputs from suppliers (Titman and Wessels, 1988; Banerjee, Dasgupta, and Kim, 2008). Consistent with this hypothesis, our results are stronger in the durable manufacturing industries. The effects are also more pronounced for firms in high 'contract intensity' industries where contract intensity represents the depth of relationship-specific investment between supplier and customer industries (Nunn, 2007).

We further find direct evidence of relationship-specific investment in two additional tests. First, CEO overconfidence is associated with greater suppliers' R&D intensity, which is a proxy for relationship-specific investments (e.g., Kale and Shahrur, 2007; Raman and Shahrur, 2008). This effect is more pronounced for smaller suppliers who typically have less bargaining power. The leadership of overconfident CEOs potentially mitigates suppliers' concerns regarding hold-up problems that arise from weaker bargaining power. Second, we measure the depth of supply chain commitment using the duration of a customer-supplier relationship (Fee, Hadlock, and Thomas, 2006). Estimates from the hazard model suggest that the customer-supplier relationship is less likely to

terminate when the customer CEO is overconfident. Together, this set of findings suggests that overconfident CEOs induce greater supplier commitments.

We also design an additional test based on extant evidence that overconfident CEOs have higher investment-cash flow sensitivities (Malmendier and Tate, 2005). This implies that when cash flow is low, overconfident CEOs tend to refrain from investment expenditures. If suppliers are solely focused on signals related to expansionary activities, they are less likely to supply to firms led by overconfident CEOs with low cash flow. However, after separating firms based on cash flow, we find that overconfident CEOs of low cash-flow firms also attract suppliers. This implies that the anticipation of future expansionary corporate activities is unlikely to explain our findings.

While our set of findings provides support for the leadership hypothesis, our evidence is potentially consistent with a 'dark-side' view of overconfidence under which CEOs overpay to acquire these commitments. In this scenario, the leadership outcomes that we document may lower profitability and hurt the company's bottom line. However, additional tests uncover no such evidence. Instead, firms led by overconfident CEOs have higher future gross profitability, enjoy lower input costs, and generate higher risk-adjusted returns relative to their competitors. This lends credence to the leadership hypothesis and is consistent with a bright-side view that overconfident CEOs enhance firm value.

An alternative imperfectly rational interpretation of our findings is that stakeholder commitments are not due to the leadership channels of CEO overconfidence discussed earlier, but rather some combination of CEO and stakeholder irrationality. Perhaps stakeholders naively accept the CEO's overconfidence, which lacks actual leadership actions that improve the value of the bilateral relationship. However, it seems unlikely that suppliers would make costly relationship-specific investments unless they are convinced that the CEO will exert efforts to ensure a long-term sustainable relationship. Similarly, employees are unlikely to make costly commitments in their firm without a strong belief that their CEO will work hard to deliver value.

Lastly, we address the reporting-bias issue of the customer-supplier data set that firms may selectively disclose customer identities (Ellis, Fee, and Thomas, 2012).[6] Suppose suppliers that commit greater relationship-specific investments are more likely to report the identities of their customers and also take stronger cues from the overconfidence of their customer firms' CEOs. This example would work in favor of us finding empirical support for our leadership hypothesis. However, the authors find the opposite inclination that suppliers with greater proprietary costs are less inclined to reveal customers' identities. This evidence works against us finding our results.

A key contribution of our study is to provide empirical evidence supporting theories on leadership by examining stakeholder actions. Hermalin (1998) and Komai, Stegeman, and Hermalin (2007) show that by setting an example, managers may signal private information, and motivate subordinates to work harder. Almazan, Chen, and Titman (2017) show that "top-down" capital allocation may optimally create higher levels of investment expenditure to motivate effort from employees. We find that stakeholders provide greater commitment to the firm when the CEO is overconfident. In particular, the finding on supplier commitment emphasizes that CEO leadership reaches beyond the boundaries of the firm to include external stakeholders.

A large literature shows that overconfident CEOs have a significant impact on firm outcomes. An open question is why boards appoint overconfident CEOs (e.g., Goel and Thakor, 2008; Gervais, Heaton, and Odean, 2011) when evidence suggests that CEO overconfidence causes investment distortions, costly mergers and acquisitions (M&A), and loose accounting practices.[7] Recent studies find a 'bright side' of CEO overconfidence. Overconfident CEOs produce higher R&D productivity, generate better innovative output, and convert growth opportunities into firm value (e.g., Galasso and Simcoe, 2011; Hirshleifer, Low, and Teoh, 2012). Our evidence is also consistent with a 'bright side' of

[6] SFAS 131 which was issued in June 1997 requires firms to disclose sales to each material customer, but not the identity of the customer.

[7] See, Malmendier and Tate (2005, 2008), Billet and Qian (2008), Kolasinski and Li (2013), Schrand and Zechman (2012), Ahmed and Duellman (2013), Banerjee, Humphery-Jenner, Nanda, and Tham (2017).

CEO overconfidence. We find evidence that overconfident CEOs deliver important leadership outcomes in the form of valuable commitments from key stakeholders.

2. Sample selection and data

We start with firms in the ExecuComp database with available CEO stock option data. Following the standard literature, we remove utilities (Standard Industry Classification (SIC): 4000-4999) and financial firms (SIC: 6000-6999). Next, we identify customer and supplier pairs from the business segment files of Compustat. In accordance with SFAS 14, public firms are required to disclose sales to their principal customers, defined as customers that contribute to at least 10% of the total revenue of the firm or if sales to a customer are material to the business of the firm. Principal customer names are manually matched to Compustat GVKEYs following the approach in Fee, Hadlock, and Thomas (2006).[8]

We identify ExecuComp firms that are reported as customers by firms in the customer-supplier data set. *Suppliers increase* (*decrease*) is an indicator equal to one if the year-on-year change in the number of dependent suppliers is positive (negative), and zero otherwise. *Start of supplier network* equals one if a firm has at least one dependent supplier in year t, and none in year $t-1$, and equals zero otherwise.

Financial variables and stock return data are obtained from Compustat and Center for Research in Security Prices (CRSP). We collect insider trades from Thomson Insider and acquisition data from Securities Data Company (SDC) Platinum. Our sample period starts from 1993 and ends in 2011, which is the last year that we have information on customer-supplier pairs. Using these databases, we construct the following controls: firm size, leverage, return on assets (ROA), ROA volatility, sales growth, market-to-book ratio, investment, R&D, cash holdings, past stock return, CEO ownership, CEO tenure,

[8] For customer names that are abbreviated, we hand-match and use industry affiliations to determine whether the customer is in Compustat. For the remaining unmatched customers, we check their corporate websites in the Directory of Corporate Affiliation (DCA) database to determine if the customer is a subsidiary of a listed firm. If so, we assign the customer to its parent's GVKEY. To ensure accuracy, we discard any customer name that cannot be unambiguously matched to a GVKEY.

acquisitions, and financing activities.[9] We have 1,921 unique firms from 1993 to 2011, for a panel totaling 14,745 firm-year observations.

2.1. Measures of CEO overconfidence

Our primary measure of CEO overconfidence is a stock option-based measure, motivated by Malmendier and Tate (2005). Using CEO stock options data from ExecuComp, we compute the average moneyness of the CEO's option holdings annually following the approach in Campbell et al. (2011), Malmendier, Tate, and Yan (2011), Hirshleifer, Low, and Teoh (2012), and Banerjee, Humphery-Jenner, and Nanda (2015). Specifically, we obtain the number and value of the CEO's vested stock options to construct *CEO overconfidence* as the ratio of average value per option to average strike price, where the average value per option is the total value of the CEO's option holdings (ExecuComp: opt unex exer val) scaled by the number of such options (ExecuComp: opt_unex_exer_num). The average strike price is the firm's stock price at the end of the fiscal year (Compustat: prcc_f) less the average value per option. We define *Confident CEO (options)* as an indicator equal to one if the *CEO overconfidence* measure is at least 67% in-the-money on at least two occasions in the past five years (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013).[10]

We also create two indicator variables to capture when overconfidence is revealed so we can precisely connect to the timing of stakeholder actions. *CEO overconfidence up* is an indicator equal to one when *CEO overconfidence* moves into the top quartile from year $t-1$ to year t, and zero otherwise. *CEO overconfidence down* is an indicator equal to one when *CEO overconfidence* falls out of the top quartile in year t from year $t-1$.

Since unexercised options represent a non-action, it may reflect inattention or inertia rather than overconfidence. We estimate a measure of overconfidence that tracks the CEO's unprofitable insider purchases of firm stock and thus captures trading actions rather than inaction or inattention (Kolasinski and Li, 2013). *Overconfidence trade* is an

[9] The Appendix provides full variable construction details.

[10] Since variation in moneyness is a direct function of stock prices, we control for past stock returns in our tests following Malmendier, Tate, and Yan (2011), Hirshleifer, Low, and Teoh (2012), and Malmendier and Tate (2015).

indicator equal to one if the CEO purchases shares over the next two years that experience negative buy-and-hold returns benchmarked against the Fama-French size-decile portfolio. To capture the timing of overconfidence, we construct an indicator variable, *Overconfidence trade up*, equal to one if *Overconfidence trade* is unity in year t but not in year $t-1$, and zero otherwise.

We also use a media-based measure of overconfidence following Banerjee, Humphery-Jenner, and Nanda (2015). The measure is based on keyword search for references to confidence and non-confidence in media releases.[11] *CEO media positivity* is equal to one in the year if the number of 'confident' articles exceeds the number of 'non-confident' articles, and zero otherwise. Missing *CEO media positivity* values are set to zero.

2.2. Measures of supplier commitment

We measure supplier commitment using relationship-specific investment (RSI) and relationship duration. Following Kale and Shahrur (2007) and Raman and Shahrur (2008), we proxy for RSI using suppliers' R&D expenditure. Specifically, we define *Supplier R&D intensity* as the product of the supplier's R&D expenditure and the fraction of sales to the customer, divided by total assets of the supplier. The normalization allows for comparability across suppliers of different sizes. We measure relationship duration using the duration of customer-supplier relationships (Fee, Hadlock, and Thomas, 2006). In Section 3.3.3, we conduct survival analysis using the Andersen-Gill extension of the Cox model on the termination of the relationship at a given point in time (Andersen and Gill, 1982).

2.3. Measures of employee commitment

We measure employee commitment using: 1) *Employee turnover* and 2) *Employee ownership* of the company stock in their benefits plans. We proxy for *Employee turnover* using the rate of stock option cancellations, forfeitures, and expirations (e.g., Carter and Lynch, 2004; Babenko and Sen, 2014) because firm-level employee turnover is not publicly

[11] References to confidence are *overconfident*, *overconfidence*, *optimistic*, and *optimism*. References to non-confidence are *reliable*, *cautious*, *conservative*, *practical*, *frugal*, and *steady*. The search is done through Factiva database for articles referring to the CEOs in *The New York Times*, *Business Week*, *Financial Times*, *The Economist*, *Forbes Magazine*, *Fortune Magazine*, and *The Wall Street Journal*.

available.[12] Cancellations, forfeitures, and expiration of stock options may be reasonable proxies for labor turnover because these typically occur upon employee separation from the firm. Carter and Lynch (2004) find that the option-based measure of employee turnover is positively correlated (ρ=0.66, p-value<0.01) with actual industry-level employee turnover data from the Saratoga Institute. To address concerns that employee retirement induces noise in this measure, our tests include firm age to proxy for workforce age because Ouimet and Zarutskie (2014) find that young firms disproportionately employ younger workers in firm-level U.S. Census data.

We gather stock option and option cancellation data from Compustat, available from the year 2004 onwards, and construct *Employee turnover* as the ratio of stock option cancellations (Compustat: optca)[13] to the number of non-executive employee stock options outstanding at the beginning of the year defined as the total number of stock options outstanding (Compustat: optosey) minus the sum of the number of exercisable and non-exercisable executive stock options outstanding (ExecuComp: opt_unex_exer_num, opt_unex_unexer_num). To capture the turnover of rank-and-file employees, we further classify employee stock option plans as broad-based if the volume of option grants to non-executive employees exceeds 0.5% of the number of shares outstanding (e.g., Oyer and Schaefer, 2005; Hochberg and Lindsey, 2010; Chang et al., 2015).

Our second measure captures the view that committed employees are more likely to overweight company stock in their retirement benefit accounts when they believe in the company's future prospects under the CEO's leadership. From the 2004–2011 Form 5500 Schedule H filings of employee retirement plans (i.e., defined benefit and contribution plans), we collect the dollar value of company stock held in employee retirement plans and create two measures—*Employee stock holdings (%)* and *Per-employee stock holdings ($)*. *Employee stock holdings (%)* is the aggregate dollar-value of holdings of employer stock divided by the total benefit plan assets (item 1f of Form 5500 Schedule H). *Per-*

[12] *Fortune Magazine* publishes the employee turnover rates of companies in the Fortune 100 list, but this limited sample includes many private companies and is therefore not in our sample.

[13] Compustat item *OPTCA* is an aggregation of cancelled, forfeited, expired, terminated, and lapsed stock options. This aggregation is consistent with the finding of Carter and Lynch (2004) that many firms do not provide a breakdown of cancelled, forfeited, and expired options.

employee stock holdings ($) is the average employee dollar value of employer stock holdings calculated as the dollar value of employer stock held divided by the number of active plan participants (item 6a2 of Form 5500 Annual Return/Report). We match approximately 82% of our sample to the Form 5500 filings. Our tests also include controls for employee and plan-specific characteristics (i.e., cash/stock match, employee wealth) that may affect the employee's choice of stock ownership in benefit plans.

2.4. Summary statistics

Panel A of Table 1 shows that 53.3% of our customer-years are led by overconfident CEOs. Changes in CEO overconfidence (*CEO overconfidence up*) are only found in 6.8% of sample observations. 57% of customer-supplier relationships have overconfident customer CEOs. Rows 6 and 7 show that the arrival of dependent suppliers (mean=7.2%) is about as frequent as the departure of dependent suppliers (mean=7.5%). The start of supplier networks (Row 8) are rarer, occurring in 3.3% of the sample observations.

[Insert Table 1]

Panel B of Table 1 partitions the sample firms into firms with dependent suppliers (i.e., customer firms) and firms without dependent suppliers (i.e., standalone firms). There is no difference in likelihood of an overconfident CEO among these two groups, however CEOs of customer firms have a higher confidence level (i.e., greater vested-in-the-money option holdings). Relative to the average standalone firm, the average customer firm is about six times larger based on total assets, has higher valuation based on the market-to-book ratio (3.82 vs 3.05), has higher ROA (6.6% vs 5.0%), has lower ROA volatility (4.6% vs 5.5%), and has higher sales growth (13.2% vs 12.1%). The average customer firm also makes more investment (7.1% vs 6.5%) and has higher R&D intensity (4.8% vs 4.2%), but has higher leverage (24.6% vs 21.9%) and lower cash levels (9.8% vs 12.7%). Stock performance between the two types of firms is not statistically different.

3. Overconfident CEOs and leadership outcomes

This section tests the hypothesis that overconfident CEOs induce leadership outcomes. In our setting, leadership outcomes are voluntary stakeholder actions rather than mandates from formal authority. In Section 3.1, we test whether overconfident CEOs are

able to attract key suppliers. Sections 3.2 and 3.3 analyze employee and supplier commitments.

3.1. Do overconfident CEOs attract suppliers?

Suppliers provide necessary inputs and are vital to firm success. They also represent a key leadership outcome because they are independent entities that cooperate voluntarily. We examine whether CEO overconfidence attracts suppliers by estimating a logistic regression model using Eq. (1):

$$Suppliers\ Increase_{i,t} = a + \beta_1 CEO\ overconfidence\ Measure_{i,t-1} + \beta_2 \varphi_{i,t-1} + \varepsilon_{i,t.} \quad (1)$$

Suppliers increase is an indicator equal to one if the firm experiences an increase in the number of suppliers from year $t-1$ to t, and zero otherwise. The results are also similar using an ordinary least squares (OLS) model with the number of suppliers as the dependent variable. We estimate logit and conditional logit models using various *CEO overconfidence* measures described in Section 2 and the Appendix. φ represents a vector of control variables that are commonly used in the customer-supplier literature (see, e.g., Banerjee, Dasgupta, and Kim, 2008; Raman and Shahrur, 2008). In all tests, we control for past stock returns because it is related to the moneyness of the CEO's vested stock options. The baseline regression specification includes year indicators to control for macroeconomic trends and industry indicators to capture differences across industries, following the approach in Malmendier, Tate, and Yan (2011). We cluster standard errors at the firm level.

[Insert Table 2]

The evidence in Table 2 suggests that suppliers respond strongly to the presence of an overconfident CEO. The univariate logit results in Column 1 of Panel A show a positive and significant effect of the *Confident CEO (options)* measure on *Suppliers increase*. Column 2 shows that the finding remains robust with the inclusion of firm characteristics as controls. We are careful to include past stock returns, investment (capital expenditure), an acquisition indicator, and SEO proceeds as controls because *Confident CEO (options)* may be related to recent stock performance and suppliers may be attracted to

expansionary corporate activities. Evaluated at the means of the other independent variables, CEO overconfidence has a marginal effect of +0.9% on the likelihood of the firm experiencing an expansion of its supplier network. This represents a 12.5% increase over the average frequency of *Suppliers increase* (7.2%) in our sample.

We conduct a sharper test of the leadership hypothesis by examining the timing of CEO overconfidence. This test is important for two reasons. First, a corollary of the leadership hypothesis is that supplier actions should occur during periods when the CEO provides leadership. To measure the timing of leadership, we use the *CEO overconfidence up* indicator variable. Second, this test may help address plausible alternative explanations such as underlying industry shocks that may simultaneously increase demand and motivate overconfident CEOs to provide leadership. To capture time-varying industry-wide changes, we adopt a conditional logit model that stratifies observations along the industry-year dimension based on two-digit SIC. While it cannot completely rule out endogeneity concerns, the conditional logit model sidesteps the incidental parameters problem. However, it inevitably causes fluctuations in sample size across specifications.[14] Standard errors are clustered at the industry level.

The conditional logit estimates with industry-year strata suggest that suppliers react during times of leadership action. In Column 3, the positive and significant coefficient estimate on *CEO overconfidence up* suggests that the timing of leadership is important as suppliers are more likely to form relationships during times when the customer CEO provides leadership. The inclusion of industry-year strata mitigates the possibility that time-varying industry shocks drive our findings. Another concern is unobserved underlying firm heterogeneity. To capture unobserved firm heterogeneity, we exploit the timing of the *CEO overconfidence up* measure by estimating a conditional logit model with firm strata. Column 4 shows that the coefficient estimate on *CEO overconfidence up* remains positive and significant with the inclusion of firm strata.

[14] For example, when the stratification is industry fixed effects, the conditional logit model constrains the coefficient estimates to be equivalent across regressions in all industries. If a certain stratum experiences no variation in the dependent variable, all observations in that stratum are eliminated. This condition may cause variation in sample sizes across different specifications.

Overall, our evidence is consistent with the view that overconfidence attracts suppliers. While we cannot rule out all possible endogeneity explanations, the conditional logit estimates suggest that unobserved firm heterogeneity is not behind our findings.

3.1.1. Alternative measures of CEO overconfidence

It is possible that our findings are sensitive to the construction of CEO overconfidence measures. Also, prior studies find that the degree of CEO overconfidence may be important (see, e.g., Campbell et al., 2011; Hirshleifer, Low, and Teoh, 2012). Therefore, we re-estimate the conditional logit model using the continuous measure of *CEO overconfidence* (Banerjee, Humphery-Jenner, and Nanda, 2015).

Panel B shows that our findings are not sensitive to the measurement of CEO overconfidence. Column 1 shows that the coefficient estimate on the continuous measure *CEO overconfidence* is positive and significant with the inclusion of firm strata. This result indicates that the degree of CEO option holdings affects the probability of gaining a dependent supplier. Next, we use a measure of overconfidence based on CEO insider transactions (*Overconfidence trade up*) following the approach in Kolasinski and Li (2013).[15] Column 2 reports a positive and significant coefficient estimate on *Overconfidence trade up*, suggesting that the results are similar using the insider transaction measure. Together, these results suggest our findings are not sensitive to the measurement of CEO overconfidence.

3.1.2. Do suppliers respond to the withdrawal of leadership?

Our tests until this point focus on positive leadership outcomes as measured by an expansion in the dependent supplier network. A direct corollary of the leadership hypothesis is that suppliers should also react when the CEO withdraws leadership. Examining the withdrawal of leadership may provide a more powerful test if there are lingering concerns regarding construction of the overconfidence measures. We measure withdrawal of leadership using the *CEO overconfidence down* measure, which is the analog of the *CEO overconfidence up* measure, and replace the dependent variable with *Supplier*

[15] See Section 2 and the Appendix for full details of the construction of this measure.

decrease, which is an indicator equal to one if the firm experiences a decrease in the number of suppliers from year $t-1$ to t, and zero otherwise.

The evidence in Columns 3 and 4 of Panel B suggests that suppliers respond strongly to the withdrawal of leadership by customer CEOs. Controlling for industry-year fixed effects in Column 3, the coefficient estimate on *CEO overconfidence down* is positive and statistically significant. This implies that a firm is more likely to lose dependent suppliers when an overconfident CEO withdraws leadership. The results are similar in Column 4 with the inclusion of firm strata.

3.1.3. Initiations of supplier networks

To help address a potential econometric issue that supplier relationships tend to be persistent, we examine the boundary scenario where firms attract their first dependent supplier. For example, Fee, Hadlock, and Thomas (2006) estimate a 76% probability that a customer-supplier relationship continues in the subsequent year.[16] We find a similar pattern in our sample in which 75% of customer-supplier relationships continue into the next year.

To examine the initiations of supplier networks, we estimate our earlier logit regression specifications using *Start of supplier network* as the dependent variable. *Start of supplier network* is an indicator equal to one if a firm adds at least one dependent supplier in year t, but had no dependent supplier in year $t-1$.

[Insert Table 3]

The evidence in Table 3 shows a positive association between CEO overconfidence and the start of a supplier network. The coefficient estimate on *Confident CEO (options)* in Column 1 is positive and statistically significant, implying that firms led by overconfident CEOs are more likely to experience supplier network initiations. Column 2 reports similar results with the inclusion of firm characteristics as controls. Evaluated at the means of the other independent variables, *Confident CEO (options)* has a marginal

[16] Holding control variables at their sample means in a logistic regression, Fee, Hadlock, and Thomas (2006) estimate that the probability of a relationship termination is about 24%.

effect of +0.6% on the likelihood of supplier network initiations. This represents an 18% increase over the average sample frequency of supplier initiation (3.3%).

Similar to Table 2, large, high sales growth, high R&D expenditure firms are more likely to initiate supplier networks. The estimated coefficients have weaker statistical significance potentially because *Start of supplier network* represents a boundary scenario and occurs less frequently than *Suppliers increase* in the sample. Nevertheless, the economic effect of *Confident CEO (options)* on supplier network initiation remains economically large.

The results are also similar using conditional logit models. Using the *CEO overconfidence up* measure, Column 3 shows that customers attract their first set of suppliers when the CEO provides strong leadership. Column 4 shows that the coefficient estimate on *CEO overconfidence up* remains significantly positive with the inclusion of firm strata. This suggests that our findings are not driven by the persistence of customer-supplier relationships.

The overall findings in Section 3.1 support the leadership hypothesis. The results indicate that CEO overconfidence has strong effects on the expansions and initiations of firms' supplier networks. Specifically, we find that the timing of leadership is important as supplier actions occur during times when the overconfident CEO provides leadership. Our results are also robust to various measures of CEO overconfidence and the use of industry-year and firm stratification in conditional logit models.

3.2. Do overconfident CEOs influence employee commitments?

Employees are arguably the most important stakeholders and their commitments can impact firm performance. We focus on employee commitment using 1) *employee turnover* and 2) *employee ownership* in company stock within benefit plans.

Employee turnover represents a leadership outcome because it reflects the ability of a company to retain productive labor and to induce employees' commitment to the vision of the CEO. The employee's decision to invest retirement funds in the company stock reflects a costly monetary commitment because it underdiversifies the employees'

retirement wealth[17] (e.g., Meulbroek, 2005; Benartzi et al., 2007). We test the relation between CEO overconfidence and employee commitment by estimating Eq. (2) in fixed-effect panel Tobit models.

$$\textit{Employee Commitment}_{i,t} = a + \beta_1 \textit{Confident CEO (options)}_{i,t-1} + \beta_2 \varphi_{i,t-1} + \varepsilon_{i,t.} \quad (2)$$

Employee commitment is measured using *Employee turnover* or *Employee stock holdings* and φ represents a vector of control variables. We include industry-year fixed effects to control for unobserved heterogeneity across industries within the year. Since *Employee turnover* is bounded by zero, we estimate one-sided panel Tobit regressions and switch to two-sided panel Tobit regressions for *Employee stock holdings (%)*.

[Insert Table 4]

The results in Table 4 show that employees are less likely to turn over when the CEO is overconfident. The significantly negative association between *Confident CEO (options)* and *Employee turnover* in Column 1 suggests that *Employee turnover* is lower under the leadership of an overconfident CEO. Since some firms only issue options to executives, we also perform the analysis using only firms with broad-based plans that include rank-and-file employees (e.g., Oyer and Schaefer, 2005; Hochberg and Lindsey, 2010; Chang et al., 2015). Column 2 shows that the results are similar using the sample of firms with broad-based plans. We also find that *Employee turnover* is lower at larger, more productive (higher ROA), growth firms (higher market-to-book) with longer-serving CEOs. This is consistent with the view that employees are likely to stay longer with firms that have stable management and good growth potential. As in Aldatmaz, Ouimet, and Van Wesep (2018), past stock performance is associated with higher *Employee turnover*. A potential explanation is that better stock performance partially reflects industry growth and better outside labor opportunities, inducing employees to switch employers (e.g., Oyer, 2004).

Retaining talent is particularly important in industries where human capital is valuable. Therefore, we examine whether the effects of CEO overconfidence are stronger

[17] Meulbroek (2005) estimates that an employee who has 25% of her wealth allocated to company stock over a decade sacrifices 42% of the stock's market value on average.

in such industries. Following Coff (2002), we measure the human-capital intensity of an industry as its proportion of knowledge workers each year based on the distribution of occupation-types from the annual American Community Survey (ACS) census microdata (Ruggles et al., 2015).[18] In Columns 3 and 4, we split the sample based on the sample median of the human-capital intensity measure. The effect of CEO overconfidence on employee turnover is stronger among firms in industries that are more reliant on human capital. The Welch-Satterthwaite *t*-test indicates a significantly larger coefficient estimate at the 10% level on *Confident CEO (options)* for high human-capital intensity firms than for low human-capital intensity firms in Column 4.

Next, we examine the employees' decision to hold employer stock in their benefit plan.[19] We estimate Eq. (2) using *Employer stock holdings* and include controls for financial variables following Rauh (2006) and all control variables used in Table 4. Additionally, we add employee and plan-specific characteristics (i.e., cash/stock match, employee wealth) that may affect the employee's choice of company stock in retirement benefit plans. We also include firm age to proxy for workforce age because Ouimet and Zarutskie (2014) find that young firms disproportionately employ younger workers in firm-level U.S. Census data.

[Insert Table 5]

The results in Table 5 show that overconfident CEOs attract higher *Employee stock holdings*. Results from a two-sided panel Tobit regression in Column 1 show a positive and significant association between *Confident CEO (options)* and *Employee stock holdings (%)*. The coefficient estimate suggests that an overconfident CEO increases *Employee stock holdings (%)* by 2.7%. For reference, the employee benefit plans in our sample have

[18] We obtain the 2004–2012 American Community Survey (ACS) census microdata from IPUMS-USA. The person-weighted database classifies occupations into seven broad categories, 1) management, professional, and related occupations, 2) service occupations, 3) sales and office occupations, 4) farming, fishing, and forestry occupations, 5) construction, extraction, and maintenance occupations, 6) production, transportation, and material moving occupations, and 7) military-specific occupations. Following the definition of professional workers in Coff (2002), we define knowledge occupations as the ones in Category (1) of the ACS database.

[19] We collect data on benefit plans from filings of Form 5500 between year 2001 and year 2011 (see Section 2.3 for full details).

a mean (median) size of about $419 million ($102 million). We repeat this analysis on a subsample of benefit plans that have positive holdings of company stock in the preceding year to ensure that the results are not driven by plan-years with zero holdings of company stock. Column 2 shows that our results are robust in this subsample analysis. Columns 3 and 4 show that the results are similar using a per-employee dollar measure of stock ownership, *Employee stock holdings ($)*. The coefficient estimates from Column 4 imply that CEO overconfidence increases the per-employee value of stock ownership in benefit plans by about $1,570 annually. Economically, this represents a 21.3% increase relative to the sample mean of $7,355.

Overall, the findings in this section are consistent with the view that overconfident CEOs attract greater employee commitment. They are better able to retain employees, particularly when talent is valuable. Their employees are also more likely to 'buy-in' by holding more company stock in their benefit plans.

3.3. Do overconfident CEOs attract greater supplier commitments?

In this section, we focus on supplier commitment along three dimensions. First, we examine the effect of CEO overconfidence in settings where relationship-specific investment (RSI) is valuable. Second, the supplier's commitment to produce relationship-specific inputs should be revealed in higher supplier R&D investment. Therefore, we test whether the overconfidence of customer firm CEOs is associated with higher supplier R&D intensities. Third, terminations of customer-supplier relationships often stem from hold-up problems or contractual frictions (Fee, Hadlock, and Thomas, 2006). We test the leadership hypothesis by examining whether customer CEO overconfidence predicts lower risks of relationship terminations.

3.3.1. Importance of overconfident CEOs in industries requiring intensive relationship-specific investment

Businesses in certain industries are particularly reliant upon suppliers to create customized inputs for their final products. Supplier relationships in these industries are on average more valuable because these inputs are costlier to develop and more difficult to redeploy if the relationship terminates. Moreover, cultivating supplier relationships in

industries requiring intensive RSI may reflect a leadership outcome due to potential hold-up problems (e.g., Alchian, 1984; Tirole, 1988). For example, firms in durable goods manufacturing industries (henceforth, durable industries) produce more unique products that can only be sold to few customers (e.g., Titman, 1984; Titman and Wessels, 1988). To the extent that firms in durable industries require greater customized inputs from suppliers, CEO overconfidence may be particularly important in order to attract valuable suppliers onboard the firm and to induce greater supplier RSI.

We test this hypothesis by narrowing our focus to only firms in manufacturing industries and separately analyze durable and non-durable industries. We employ the same empirical tests used in Tables 2 and 3 for both expansion and initiation of a supplier network.

[Insert Table 6]

Panel A of Table 6 reports the results from logit regressions using the *Confident CEO (options)* measure of CEO overconfidence. As before, we include industry dummies and year dummies following Malmendier, Tate, and Yan (2011) and cluster standard errors by firm. The regressions include the full set of control variables as in Tables 2 and 3 but are suppressed to conserve space. Column 1 presents results from the durable industries, while Column 2 presents results from the non-durable industries.

The evidence suggests that the leadership of overconfident CEOs is more valuable for the expansion of a supplier network in durable manufacturing relative to non-durable manufacturing industries. The coefficient estimate on *Confident CEO (options)* is positive and statistically significant at the 10% level in durable industries, while it is negative and insignificant among the non-durable industries as shown in Column 2. We also find similar patterns for the initiation of a supplier network. Column 3 shows that, among the durable industries, the coefficient estimate on *Confident CEO (options)* is positive and significant at the 10% level indicating that overconfident CEOs are more likely to initiate a supplier network. Column 4 shows that there is no such relation in the non-durable industries. This evidence is consistent with the view that leadership by overconfident CEOs is particularly important when suppliers are particularly valuable.

The above analysis has weaker statistical power due to smaller subsamples and the broad classification of durable/non-durable manufacturing industries. To estimate a sharper test, we examine the timing of supplier actions using the *CEO overconfidence up* measure. In Panel B, we use the conditional logit model with firm stratification and find stronger links between CEO overconfidence and supplier network outcomes in the durable manufacturing industry. Column 1 shows that the loading on *CEO overconfidence up* is positive and significant among the durable industries, but is insignificant among the non-durable industries as shown in Column 2. Also, Column 3 shows a strong association between CEO overconfidence and the initiation of a supplier network among the durable industries, but not in the non-durable subsample in Column 4. We present firm strata specifications to capture unobserved firm heterogeneity although the patterns are similar when we employ industry-year strata to control for industry shocks.

The evidence is consistent with the view that the leadership of overconfident CEOs is more important when relationship-specific investment is particularly valuable to firm success. To more precisely evaluate the importance of RSI, we classify firms based on a measure of "contract intensity" within each industry. Contract intensity refers to the proportion of inputs in an industry that are not traded on an exchange nor reference-priced (Nunn, 2007). Therefore, industries with higher contract intensity have more customized goods. To keep the analysis comparable to the durable/non-durable analysis above, we split manufacturing firms into two groups based on the median industry-level contract intensity. We present results using both the *Confident CEO (options)* and *CEO overconfidence up* measures of CEO overconfidence.

The evidence suggests that the leadership of overconfident CEOs is particularly valuable in industries with high contract intensities. Panel C presents the results using *Confident CEO (options)*. Column 1 indicates that in industries with high contract intensities, the estimated coefficient on *Confident CEO (options)* is positive and statistically significant at the 10% level. This suggests that CEO overconfidence is associated with supplier network expansions in high contract-intensity industries. This association is not found among firms in low contract-intensity industries. The results are statistically stronger when examining supplier network initiation. Column 3 shows that in

high contract-intensity industries, overconfident CEOs are more likely to initiate supplier networks, while no such relation exists in low contract-intensity industries (Column 4).

The results are also similar when we use the *CEO overconfidence up* measure of CEO overconfidence. Panel D shows the coefficient estimates are positive and significant on *CEO overconfidence up* in high contract-intensity industries (Columns 1 and 3), but not in low contract-intensity industries (Columns 2 and 4).

Collectively, the evidence indicates that in manufacturing industries which require relationship-specific inputs, CEO overconfidence is particularly important in initiating and growing supplier networks. In these industries, the cost of supplier commitment tends to be higher and contracting imperfections are likely to be more salient, making leadership particularly important. Our evidence in this section supports this view.

3.3.2. Supplier commitments: R&D intensity

The previous section examines supplier commitments by exploiting variation in the degree of relationship-specific investment (RSI) across industries. In this section, we search for more direct evidence of RSI at the individual customer-supplier level.

We use two proxies for relationship-specific investment motivated from the existing literature: 1) *Supplier R&D intensity,* which captures the amount of research and development at the supplier firm (Kale and Shahrur, 2007; Raman and Shahrur, 2008), and 2) *Relationship duration,* which captures the likelihood of relationship termination at a given point in time (Fee, Hadlock, and Thomas, 2006).

Our first test uses *Supplier R&D intensity*, which we construct as follows. First, we scale the supplier's R&D activity by its relationship sales with the customer.[20] To allow for comparability across suppliers of different size, we normalize by total assets and apply the natural logarithm transformation to minimize the influence of outliers.[21] Using this measure, we estimate OLS regressions following Eq. (3).

[20] For example, if a firm has \$100 in R&D activity and 40% of its sales are to a single customer, then we attribute \$100*0.4=\$40 to this particular relationship.

[21] The results are both qualitatively and quantitatively similar using the raw values.

$$\textit{Supplier R\&D Intensity}_{i,t} = \alpha + \beta_1 \textit{Confident CEO (options)}_{i,t-1} + \beta_2 \varphi_{i,t-1} + \beta_3 \gamma_{i,t-1} + \varepsilon_{i,t.} \quad (3)$$

φ represents a vector of supplier control variables while γ represents a vector of customer control variables. All regression specifications include industry fixed effects to capture differences in R&D activity across industries and time fixed effects to capture macroeconomic trends. We cluster standard errors by customer-year because each customer may have multiple suppliers in a given year. The regressions include customer characteristics and supplier characteristics that are potentially associated with R&D activity.

[Insert Table 7]

The results in Table 7 suggest that suppliers of customer firms with overconfident CEOs produce greater *Supplier R&D intensity*. Column 1 shows a positive and significant coefficient estimate on *Confident CEO (options)* with the inclusion of customer firm characteristics. The results are similar after controlling for supplier firm characteristics in Column 2, alleviating concerns that supplier heterogeneity is driving our findings. The estimates from Column 2 suggest that *Confident CEO (options)* is associated with a 7.2% increase in supplier R&D investment. As a comparison benchmark, we log-transform the estimated coefficient on customer firm size (0.054) and find that a 100% increment in customer firm size increases supplier R&D investment by 5.4%. This suggests that the effect of *Confident CEO (options)* on *Supplier R&D intensity* is on the same order of magnitude as the effect of doubling firm size.

Consistent with Raman and Shahrur (2008) and Kale, Kedia, and Williams (2015), we find that suppliers tend to commit more R&D investments if the customer firm has more cash holdings and lower leverage. The negative association with investments of customer firms suggests a substitution between in-house production of inputs (i.e., vertical integration) and procurement from external suppliers (Banerjee, Dasgupta, and Kim, 2008).

Suppliers tend to have less bargaining power when they are smaller than their major customers. While locking in a larger customer may secure revenues, smaller suppliers run

the risk of ex post hold-up problems due to their relatively weaker bargaining positions. Therefore, smaller suppliers may require additional assurances, in particular when relationship-specific investments are required. CEO overconfidence can be a solution, albeit imperfect, to the hold-up problem. By holding in-the-money options, customer CEOs may be less likely to hold up the smaller suppliers because delays along the supply-chain may affect the CEO's personal wealth substantially.

To test this hypothesis, we split our sample by the total assets of suppliers relative to that of their customers. A supplier is classified as small (big) if the *Supplier-customer size ratio* is lower (higher) than the SIC two-digit industry median value. The evidence presented in Column 3 suggests that overconfident CEOs strongly affect supplier R&D intensity among smaller suppliers, but have little impact among larger suppliers as shown in Column 4. Our evidence supports the view that the leadership of overconfident CEOs convinces smaller suppliers to make relationship-specific investments when hold-up problems are more likely to exist.

3.3.3. Supplier commitments: relationship duration

Another dimension of supplier commitment is the duration of the customer-supplier relationship which relates to contractual frictions that may arise from RSI-related issues or hold-up problems (Fee, Hadlock, and Thomas, 2006). If the leadership of overconfident CEOs helps to alleviate such frictions, we expect that these relationships are less likely to terminate, ceteris paribus.

To model the duration of customer-supplier relationships, we use survival analysis to estimate a hazard function. Specifically, we estimate the probability that a customer-supplier relationship terminates within a time interval, conditional on the survival of the relationship up till the beginning of that interval. Since a customer-supplier relationship may terminate and then restart in the future, we employ the Andersen-Gill extension of the standard Cox model.

We define *Overconfident CEO relationship* equal to one if a *Confident CEO (options)* customer CEO is present between the start and termination of the relationship, and zero

otherwise. *Overconfident CEO relationship* is re-computed for relationships with subsequent restarts and terminations. All other independent variables are based on relationship and firm characteristics in the first year of the customer-supplier relationship. Our definition of customer-supplier relationship duration follows Fee, Hadlock, and Thomas (2006) closely. The start of a relationship is defined to be the first year in which both customer and supplier are linked in the Compustat business segment file. We follow the relationship till the year in which the link is broken (termination year). If both firms are present in Compustat in the termination year, we determine that the customer-supplier relationship is terminated. If at least one of the firms disappears from Compustat in the termination year, the relationship is right-censored because we cannot determine if a relationship is terminated mutually. Since our sample period ends in 2011, we also classify all surviving relationships in 2011 as being right-censored. As it may take at least two years for a customer CEO to be classified as a *Confident CEO (options)* CEO, we only include relationships that begin on or after 1995. We report hazard ratios, which represents the ratio of hazard rates corresponding to two levels of the variable.[22] For example, a hazard ratio above one (below one) implies that the variable increases (decreases) the chance of relationship termination at that point in time.

[Insert Table 8]

The results in Table 8 suggests that the supplier relationships of overconfident CEOs have statistically lower termination risk on average. Column 1 shows that the hazard of a relationship termination is about 10.8% lower in an *Overconfident CEO relationship* relative to a *Non-overconfident CEO relationship*. Column 2 shows that the effects are stronger with the inclusion of supplier and customer control variables which are unreported to conserve space. The hazard of a relationship termination is about 17.5% lower in an *Overconfident CEO Relationship* relative to a *Non-Overconfident CEO Relationship*. The results are similar after including *Supplier-customer size ratio*, *Supplier R&D intensity,* and *Sales dependency* as controls in Column 3. Consistent with Fee,

[22] Likewise, the hazard ratio of a continuous variable represents the ratio of hazard rates corresponding to a unit change in the said variable.

Hadlock, and Thomas (2006), we find that customer-supplier relationships face lower termination risks when *Sales dependency* is higher.

Next, we verify that hazard proportionality holds in the model. Under hazard proportionality, the magnitude of treatment effects does not vary across time so interaction terms should not predict the termination risks of customer-supplier relationships.[23] Column 4 confirms that hazard proportionality is not violated in our model after adding interaction terms of all independent variables with time. *Overconfident CEO relationship* continues to predict a lower hazard of relationship termination (-29.2%), but the effect of its interaction with time is not statistically distinguishable from zero. This result corroborates our earlier findings and also implies that the effect of customer CEO leadership is stable throughout the relationship duration.

Finally, we restrict our sample to customer-supplier relationships without any restarts (i.e., only one termination). Column 5 shows that our conclusions remain unchanged. In sum, our findings suggest that leadership of overconfident CEOs helps to ease contractual frictions between customers and suppliers, resulting in more durable relationships.

4. Additional test and discussions

In this section, we provide additional evidence in support of the leadership hypothesis and discuss alternative explanations for our findings.

4.1. Do supplier commitments represent a dark side of CEO overconfidence?

The results in previous sections support a bright-side view that overconfident CEOs create valuable stakeholder relationships along various dimensions. However, if overconfident CEOs are over-optimistic and overpay for supplier commitments, these 'achievements' may ultimately hurt the company's bottom line and sacrifice firm value. This would represent a dark-side view of CEO overconfidence.

[23] The standard Cox framework assumption of hazard proportionality implies that hazard ratios are constant through time. The Andersen-Gill extension relaxes this assumption, making it possible to include interaction terms between independent variables and time.

We create two tests to examine the possibility that overconfident CEOs overpay for their supplier commitments. First, we examine *Input costs* and *Markup percentage* which capture gross profitability and buying power (Fee and Thomas, 2004). Overpaying suppliers would result in higher input costs and lower markup percentages. Second, we examine stock returns to directly measure valuation effects. The dark-side view would imply that these supplier commitments come at a significant cost, destroying firm value and producing poor stock performance.

4.1.1. Input costs and gross profitability

We test whether overconfident CEOs overpay for their supplier commitments by estimating OLS regressions following Eq. (4).

$$Margin_{,t} = a + \beta_1 Confident\ CEO\ (options)_{i,t-1} + \beta_2 \varphi_{i,t-1} + \varepsilon_{i,t.} \quad (4)$$

Margin represents either *Input costs* or *Markup percentage*. Following Fee and Thomas (2004), we measure buying power using *Input Costs* defined as the cost of goods sold (COGS) scaled by total sales. *Markup percentage* is defined as total sales less cost of goods sold (COGS), normalized by COGS. φ represents a vector of control variables. In all specifications, we include industry-year fixed effects to capture unobserved heterogeneity in *Input costs* or *Markup percentage* across industries within each year. Since we are interested in examining the possibility of overpaying suppliers, we only consider observations with at least one dependent supplier in each of both year t and year $t-1$. After applying this constraint, our subsample comprises 422 unique firms (2,244 firm-years) across 29 industries (two-digit SIC) from the years 1994 to 2011.

[Insert Table 9]

The results in Table 9 are inconsistent with the dark-side view. The estimates from Column 1 show that a firm led by an overconfident CEO has 2.3% lower *Input costs* relative to the sample mean ($-0.014/0.606 = -2.3\%$). While it may be difficult to benchmark overpayment of asset-specific inputs, overconfident CEO do not appear to pay more for input costs. Column 2 shows that controlling for input costs, firms led by overconfident CEOs command higher prices for their products. Economically, *Confident*

CEO (options) is associated with 15.0% higher *Markup percentage* relative to the sample mean (0.164/1.093=15%).[24]

Overall, the evidence is inconsistent with the view that supplier commitments acquired by overconfident CEOs destroy firm value. While we cannot definitively rule out overpayment for supplier commitments, the evidence generally points in the opposite direction. Firms led by overconfident CEOs tend to have greater buying power and gross profitability, as measured by *Input costs* and *Markup percentage*. These findings support the bright-side view that CEO overconfidence generates valuable leadership outcomes.

4.1.2. Stock performance of firms with dependent suppliers

In our second test, we use stock returns to examine the valuation effects of CEO overconfidence in firms with dependent suppliers. If overconfident CEOs secured supplier commitments at excessively high costs, this will likely generate poor future stock performance. We test the overpayment hypothesis by forming stock portfolios and tracking their performance using the following procedure. First, we restrict our sample to observations with at least one disclosed supplier at the fiscal year end. We allocate firms into either the *Confident* (*Non-confident*) portfolio if the CEO is (is not) overconfident at the fiscal year end. The firm stays in the portfolio for the next 12 months. We calculate the average returns of the stocks in the two portfolios each month and average alphas using the Fama-French five factors and the momentum factor.

[Insert Figure 1]

Fig. 1 presents the results. The evidence strongly rejects the overpayment hypothesis. Panel A presents the average monthly alphas of the *Confident* portfolio, *Non-Confident* portfolio, and the difference in returns between the two portfolios. The *Confident* portfolio yields a statistically significant and positive monthly alpha of 0.38%, while the alpha of the *Non-confident* portfolio is not statistically distinguishable from zero. The long-short portfolio yields a statistically significant and positive monthly alpha of 0.27%. Our results

[24] The sample means referred to in Columns 1 and 2 are computed only among firms with at least one supplier in the current year and at least one supplier in the previous year. Due to this constraint, the sample size in Table 9 is smaller than that in Table 2.

are also similar using characteristics-adjusted returns (Daniel, Grinblatt, Titman, and Wermers, 1997), and are available upon request. The evidence suggests that overconfident CEOs are unlikely to overpay suppliers.

We also present the factor loadings of the *Confident*, *Non-confident*, and the long-short portfolio in Panel B. Notably, both overconfident CEO and non-overconfident CEO firms have similar loadings on small-minus-big (SMB), suggesting that they have similar factor exposures to the size premium. However, the factor loadings on high-minus-low (HML) are statistically insignificant for firms led by overconfident CEOs but positive for their counterparts. This suggests that stocks in the *Non-confident* portfolio tend to be value firms. Firms in the *Non-confident* portfolio also tend to be more conservative in their corporate investment activities as they have a significantly positive loading on conservative-minus-aggressive (CMA). Firms in the *Confident* portfolio are not necessarily aggressive in their investment activities as the factor loading on CMA is close to zero (0.029).

Panels C and D examine manufacturing firms in the durable/non-durable industries and high-RSI/low-RSI industries, respectively. Firms in the *Confident* portfolios do not underperform in these subsamples. In the durable industries (Panel C) and high-RSI industries (Panel D), the *Confident* portfolio has a statistically significant and positive alpha. Overall, these patterns are inconsistent with the view that overconfident CEOs overpay for supplier inputs.

4.2. Do suppliers anticipate expansionary corporate activities?

Our evidence so far suggests that observable expansionary corporate activities do not explain our findings as we have included controls for investments, M&A activities, equity issuance, and R&D expenditures. However, we recognize that the inclusion of these controls does not rule out the possibility that suppliers anticipate future expansionary activities.

To address this, we employ a test that distinguishes the effect of overconfidence from corporate activity.[25] Malmendier and Tate (2005) find that overconfident CEOs have higher investment-cash flow sensitivity which implies that overconfident CEOs tend to restrain investment when cash flows are low. Therefore, if suppliers ignore overconfidence and focus solely on expansionary investment signals, the relation between overconfidence and supplier commitments is likely to be weaker in the low cash-flow subsample. We implement this test by re-estimating our main supplier test based on Eq. (1), splitting the sample based on high and low cash flow in year $t-1$.[26] We also include the Kaplan-Zingales index as a control for financial constraints (Kaplan and Zingales, 1997).

[Insert Table 10]

The evidence in Table 10 supports our leadership hypothesis as CEO overconfidence continues to attract supplier relationships in both low and high cash-flow firms. Columns 1 and 2 show a positive and significant relation between *Confident CEO (options)* and *Suppliers increase* in both the low and high cash-flow subsamples, respectively. The Welch-Satterthwaite *t*-test reveals that the coefficients on *Confident CEO (options)* in Columns 1 and 2 are not statistically different (p-value=0.663). These results suggest that supplier actions are not solely motivated by anticipated expansionary corporate activities. As Malmendier and Tate (2015) find a weaker relation between CEO overconfidence and investment-cash flow sensitivity during the Great Recession years (2008–2009), we show that our results are robust to the exclusion of those years in Columns 3 and 4.

Overall, the evidence suggests that the overconfidence of customer CEOs is important and directly influences suppliers beyond observable and anticipated expansionary corporate activities.

4.3. Does the manner of overconfidence matter?

The option holdings behavior of overconfident CEOs provides leadership through three potential channels: 1) communicating a strong belief in the firm's prospects, 2)

[25] We thank the referee for suggesting this test.

[26] We measure cash flows following Chang, Dasgupta, Wong, and Yao (2014) and provide details in the Appendix.

leading by example, and 3) displaying commitment. Throughout the paper, we measure overconfidence using an options-based measure but overconfidence can also be demonstrated through positive public statements to the news media. Following Banerjee, Humphery-Jenner, and Nanda (2015), we use a news-based measure of overconfidence, *CEO media positivity*, to capture verbal communication of overconfidence. When the interests of both parties are perfectly aligned, such verbal communication may be sufficient to induce commitments from stakeholders since stakeholders deduce that the CEO has no incentives to lie (e.g., Farrell and Rabin, 1996).

To test whether the manner of leadership is important, we include *CEO media positivity* as a key independent variable and re-estimate our previous tests.

[Insert Table 11]

The results in Table 11 suggest that stakeholders do not respond to the verbal leadership measure of CEO overconfidence. Column 1 shows a positive but statistically insignificant association between *CEO media positivity* and *Suppliers increase*. The results are similar after including *Confident CEO (options)* in Column 2. Our tests on employee commitments paint a similar picture. Columns 3 and 4 show that the association between verbal leadership and employee turnover is negative but statistically insignificant. Using employee holdings of company stock, we find a positive effect of verbal leadership in Column 5 but this effect is statistically indistinguishable from zero. With the inclusion of the *Confident CEO (options)* measure in Column 6, the coefficient estimate on *CEO media positivity* remains statistically insignificant.

Our findings suggest that stakeholders appear to be influenced only by CEO leadership displayed through options-based overconfidence. A possible explanation is that stakeholders rely predominantly on verifiable behavior because the interests of the parties are not perfectly aligned.

4.4. Do supplier actions drive CEO overconfidence?

Under the leadership hypothesis, suppliers are more inclined to make costly commitments after they observe managerial overconfidence in customer firms. Motivated

by concerns of reverse causality, one may propose an alternative mechanism where supplier actions drive the overconfidence of the customer firm CEO.

The alternative mechanism is improbable for three reasons. First, the nature of the SFAS No. 131 reporting requirement is such that customer firms are generally significantly larger than their identified suppliers (Fee and Thomas, 2004). This size difference makes it unlikely that actions initiated by suppliers evoke managerial overconfidence in customer firms. Second, it is more economically intuitive that the customer firm CEO originates a project vision and subsequently finds suppliers to support it. Third, the alternative mechanism is not consistent with findings in Chu, Tian, and Wang (2017). In their study of corporate innovation along the supply chain, they find causal evidence that feedback flows from customers to suppliers. While we cannot categorically rule out the effect of supplier actions on customer firm CEO overconfidence, these reasons suggest reverse causality is unlikely to be a severe concern.

5. Conclusion

CEOs are hired for their vision and leadership talent. Yet, leadership has many dimensions and definitions, which makes the systematic analysis of this ability difficult. We hypothesize that corporate boards hire overconfident CEOs because they are better leaders. Our study provides a tractable empirical setting where stakeholder commitments represent valuable leadership outcomes. Leadership is distinct from formal authority because stakeholders' actions are voluntary.

Our evidence suggests that overconfident CEOs generate tangible leadership outcomes in the form of stakeholder commitments. Overconfident CEOs attract supplier relationships, particularly in durable goods manufacturing industries and high relationship-specificity industries, where such relationships are valuable. Suppliers are also more likely to provide relationship-specific products to the customer firm when the customer CEO is overconfident. The supplier relationships of overconfident CEOs have lower termination risk.

The leadership effects of CEO overconfidence also extend to employees. Overconfident CEOs are better able to retain talent, particularly in industries where human capital is more valuable. Their employees are also more likely to 'buy-in' as they hold more company stock in their benefit plan accounts. Together, these findings are consistent with the view that CEO overconfidence leads to greater employee commitments.

Overall, our results reveal a bright side of CEO overconfidence that is consistent with recent findings by Galasso and Simcoe (2011) and Hirshleifer, Low, and Teoh (2012). Our findings may also help to explain boards' appointments of overconfident CEOs. Gervais, Heaton, and Odean (2011) show that boards are more likely to appoint overconfident CEOs at riskier, growth firms creating potential benefits for both the firm and manager. Boards may be more likely to appoint overconfident CEOs at firms where developing good stakeholder relationships and attracting key commitments are especially important. Our evidence suggests that overconfident CEOs are better able to deliver these leadership outcomes. Future research may explore this and other additional positive dimensions of CEO overconfidence.

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Appendix A. Variable definitions

2-Year stock returns	Buy-and-hold returns of firm stock from beginning of year $t-1$ to end of year t. Source: CRSP
Acquisitions	Indicator variable that equals one if the firm performs at least one acquisition within the ($t-1$, t) window, and equals zero otherwise. Source: SDC Platinum
Annual employer cash match	Indicator variable that equals one if the firm offers matching cash contributions to its employees in the previous year, and equals zero otherwise. Source: Item (2a1a) from Schedule H of Form 5500
Annual employer stock match	Indicator variable that equals one if the firm offers matching non-cash contributions to its employees in the previous year, and equals zero otherwise. Source: Item (2a2) from Schedule H of Form 5500
Broad-based plan	An employee stock option plan is broad-based if the number of options granted to non-executive employees exceeds 0.5% of the number of shares outstanding. Source: Oyer and Schaefer (2005), Hochberg and Lindsey (2010), Chang et al. (2015), ExecuComp, Compustat
Cash	Cash holdings of firm, scaled by total assets. Source: Compustat
CEO media positivity	Indicator variable that equals one if the number of articles containing references to confidence is more than the number of articles containing references to non-confidence during the year, and equals zero otherwise (Banerjee, Humphery-Jenner, and Nanda, 2015). Source: Banerjee, Humphery-Jenner, and Nanda (2015)
CEO overconfidence	Average value of the CEO's options scaled by the average strike price. The numerator is the value of the CEO's vested and unexercised options (ExecuComp: opt_unex_exer_val) scaled by the number of such options (ExecuComp: opt_unex_exer_num). The denominator is the difference between the firm's stock price at the end of the fiscal year (Compustat: prcc_f) and the numerator. Source: Campbell et al. (2011), Malmendier, Tate, and Yan (2011), Hirshleifer et al. (2012), ExecuComp, CRSP
CEO overconfidence up	Indicator variable that equals one if CEO overconfidence in year t is in the top quartile of the sample and if CEO overconfidence in year $t-1$ is not in the top quartile of the sample, and equals zero otherwise. Source: ExecuComp, CRSP
CEO stock ownership	CEO's percentage share ownership. Source: ExecuComp
CEO tenure	If the date of appointment as CEO is available in ExecuComp, variable equates to the number of years elapsed since the appointment date. Otherwise, variable equates to the number of years elapsed since the earliest date where the CEO first appears in the database. Source: ExecuComp
Confident CEO (options)	Indicator variable that equals one if a CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. Variable switches from zero to one from the first such instance. Source: ExecuComp, CRSP
Dividends-to-price ratio	Ratio of common equity dividends (dvc) to market value of equity (csho*prcc_f). Compustat data items are contained in parentheses. Source: Compustat
Durable firm	Industries whose SIC codes are between 3400 and 3999. Source: Titman and Wessels (1988)
Employee benefit plan assets	Total assets of the employee benefit plan. Source: Item (1f) from Schedule H of IRS Form 5500.
Employee stock holdings	We extract the dollar value of employer securities held in employee benefit plans from item (1d1) of the firm's Form 5500 Schedule H. As a simplification, we assume that employer securities in employee benefit plans only comprise the common stock of the firm. Employee stock holdings is the dollar value of employer stock held in the benefit plan scaled by the number of active plan participants (item 6a2 of Form 5500 Annual Return/Report) in the year. We also construct a variant that is scaled by the total assets of the benefit plan (item 1f of Schedule H) in the year. Source: Form 5500 Annual Return/Report, Schedule H of Form 5500

Appendix A. (Continued)

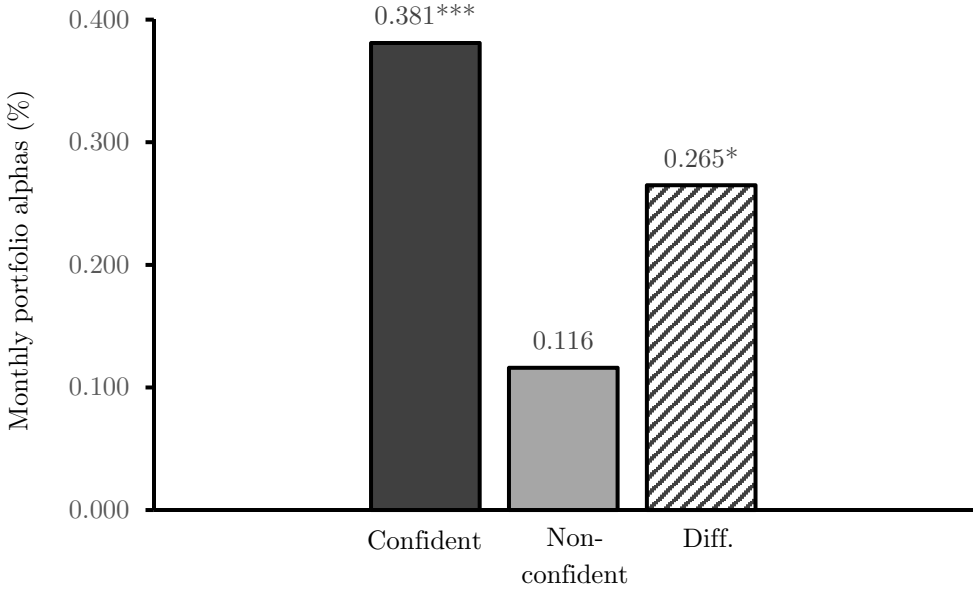
Employee turnover	The ratio of the number of non-executive options that are cancelled, terminated, forfeited, expired, or lapsed in the year to the number of non-executive options outstanding at the beginning of the year. We construct the number of non-executive options outstanding by subtracting the number of exercisable and non-exercisable executive options outstanding (ExecuComp: opt_unex_exer_num, opt_unex_unexer_num) from the total number of options outstanding (Compustat: optosey). The construction of Employee turnover begins in 2004 when Compustat begins coverage of option data. Compustat does not provide a breakdown of the quantities of options that are cancelled, terminated, forfeited, expired, and lapsed. Instead, it aggregates these quantities into a single variable – OPTCA. We apply a logarithmic transformation to Employee turnover. Source: Carter and Lynch (2004), ExecuComp, Compustat
Financial constraints	Kaplan-Zingales index. Definitions are from Kaplan and Zingales (1997). -1.001909 (CF/Capital) + 0.2826389 (Q) + 3.139193 (Leverage) – 39.3678 (Dividend/Capital) – 1.314759 (Cash / Capital). Source: Kaplan and Zingales (1997)
Firm age	The number of years elapsed since the founding year of the firm. Data on the founding years of firms are publicly available on Jay Ritter's website and are used in Loughran and Ritter (2004). If the founding year of the firm is not available, Firm age is the number of years elapsed since the earliest year where the firm is covered in Compustat and has a non-missing stock price. Source: Loughran and Ritter (2004), Compustat
Industry relationship-specificity	Proportion of inputs used in industry that are neither traded on organized exchanges nor reference-priced. Source: Nunn (2007)
Input costs	Ratio of cost of goods sold to total sales. Source: Compustat
Investment	Capital expenditure of firm, scaled by total assets. Source: Compustat
Leverage	Sum of long-term debt and short-term debt, scaled by total assets. Source: Compustat
High cash flow	Cash flow is the sum of income before extraordinary items (ibc), extraordinary items and discontinued operations (xidoc), depreciation and amortization (dpc), deferred taxes (txdc), equity in net loss (esubc), gains in sale of property, plant & equipment (PP&E) and investment (sppiv), other funds from operation (fopo), the exchange rate effect (exre), and less changes in working capital (wcapc), scaled by total assets (at). Compustat data items are contained in parentheses. A firm is marked as High cash flow if its Cash flow is higher than the year median. Source: Chang et al. (2014), Compustat
High human capital intensity	The ratio of knowledge workers to the total number of workers in each industry-year. The distribution of worker-types (or occupations) is obtained from the annual American Community Survey (ACS) census microdata. Data in the ACS census microdata are person-weighted. Knowledge workers are individuals whose occupations belong to the Management, Professional, and Related Occupations class. An industry is marked as High human capital if its Human capital ratio is higher than the sample median. Source: Integrated Public Use Microdata Series: Version 6.0
High RSI	An industry is marked as High RSI if its industry relationship-specificity values are higher than the sample median. Source: Nunn (2007)
Market-to-book ratio	Ratio of market value of equity to book value of equity. Source: Compustat
Markup percentage	Ratio of the difference between total sales and cost of goods sold to cost of goods sold. Source: Compustat
Missing R&D	Indicator variable that equals one if R&D expenses are missing in the Compustat database, and equals zero otherwise. Source: Compustat
Non-durable firm	Industries whose SIC codes are between 2000 and 3399. Source: Titman and Wessels (1988)
Overconfidence (OC) trade	Indicator variable that equals one in year t if the CEO's stock purchases over the next two years have negative 180-day buy-and-hold abnormal returns (BHARs) on average, and equals zero otherwise. Source: Kolasinski and Li (2013)

Appendix A. (Continued)

Overconfidence trade up	Indicator variable that equals one if OC trade (see above) is zero in year t–1 and is unity in year t, and equals zero otherwise. Source: Kolasinski and Li (2013), Thomson Reuters Insiders
Overconfident CEO relationship	For a given customer-supplier relationship, indicator variable that equals one if a Confident CEO (options) customer CEO is incumbent in any year between the start (inclusive) and end (exclusive) of the relationship, and equals zero otherwise. Source: ExecuComp, CRSP, Compustat
Per-employee non-stock wealth	Total assets of benefit plan less Employee stock holdings, scaled by the number of active plan participants in the year. Source: Form 5500 Annual Return/Report, Schedule H of Form 5500
Price-to-earnings ratio	Ratio of market value of equity (csho*prcc_f) to net income (ibc). Compustat data items are contained in parentheses. Source: Compustat
R&D intensity	R&D expenses of customer firm, scaled by total assets. Missing R&D expenses are set to zero. Source: Compustat
Return on assets	Ratio of net income to assets. Source: Compustat
ROA volatility	3-year standard deviation of ROA from year t–2 to year t. Source: Compustat
Sales growth	Difference between sales in year t and year t–1, scaled by sales in year t–1. Source: Compustat
SEO proceeds	Total dollar value of seasoned equity offering (SEO) proceeds in the year, scaled by lagged total assets of the firm. Source: SDC Platinum, Compustat.
Start of supplier network	Indicator variable that equals one if firm has at least one dependent supplier in year t and has no dependent supplier in year t–1, and equals zero otherwise. Source: Compustat
Supplier R&D intensity	For each supplier-customer pair in a year, we first compute the supplier's R&D activity that is attributable to the customer by multiplying supplier's R&D expenses by Supplier sales dependency (see above for definition). Thereafter, we normalize the resulting value by the total assets of the supplier. To facilitate presentation, values are inflated by a factor of 1,000. Source: Compustat
Supplier sales dependency	The ratio of supplier-customer sales to total supplier sales for each supplier-customer pair in a year. Source: Compustat
Supplier-customer size ratio	For each customer-supplier pair in a year, Supplier-customer size ratio is computed as the ratio of total assets of the supplier to that of the customer. Supplier-customer size ratio is defined to be small (big) if it is lower (higher) than the SIC two-digit industry median value. Source: Compustat
Suppliers decrease	Indicator variable that equals one if the number of dependent suppliers in year t is lower than the number of dependent suppliers in year t–1, and equals zero otherwise. Source: Compustat
Suppliers increase	Indicator variable that equals one if the number of dependent suppliers in year t is higher than the number of dependent suppliers in year t–1, and equals zero otherwise. Source: Compustat
Total assets	Total assets of firm. Source: Compustat
Working capital	Difference between total current assets (act) and total current liabilities (lct), scaled by total assets (at). Compustat data items are contained in parentheses. Source: Compustat

Fig. 1. Monthly portfolio alphas**.** The figure reports monthly alphas of portfolios of firms led by overconfident/ non-overconfident CEOs. Our sample includes firms that are covered in the ExecuComp database and business segment files of Compustat. We remove utilities (Standard Industry Classification (SIC): 4000 – 4999) and financial firms (SIC: 6000 – 6999). Our sample spans the years 1993–2011 and is restricted to observations with at least one supplier in each of both year t and year $t-1$. We allocate each firm to the *Confident* (*Non-confident*) portfolio if the CEO is (is not) identified as *Confident CEO (options)* at the end of its fiscal year. The firm remains in the portfolio over the next 12 months. We calculate average returns of the stocks in each portfolio and benchmark them against the Fama-French five factors and the momentum factor. *Confident CEO (options)* is a dummy variable which equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. Detailed variable definitions are contained in Appendix A. Panel A presents the monthly alphas of the *Confident* portfolio, the *Non-confident* portfolio, and the long-short portfolio (*Diff*). Panel B presents the loadings and standard errors of each portfolio on the six risk factors. Panel C repeats the monthly alpha analysis separately for firms in the *durable*/*non-durable* industries. Following Titman and Wessels (1988), *durable* industries have SIC codes 3400 – 3999 and *non-durable* industries have SIC codes 2000 – 3399. Panel D separates firms in *high-RSI*/*low-RSI* industries. We determine industry-level relationship specificity according to the year 1997 contract intensity variable from Nunn (2007). An industry is classified as *high* (*low*)-*RSI* if its industry contract intensity is above (below) the sample median. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

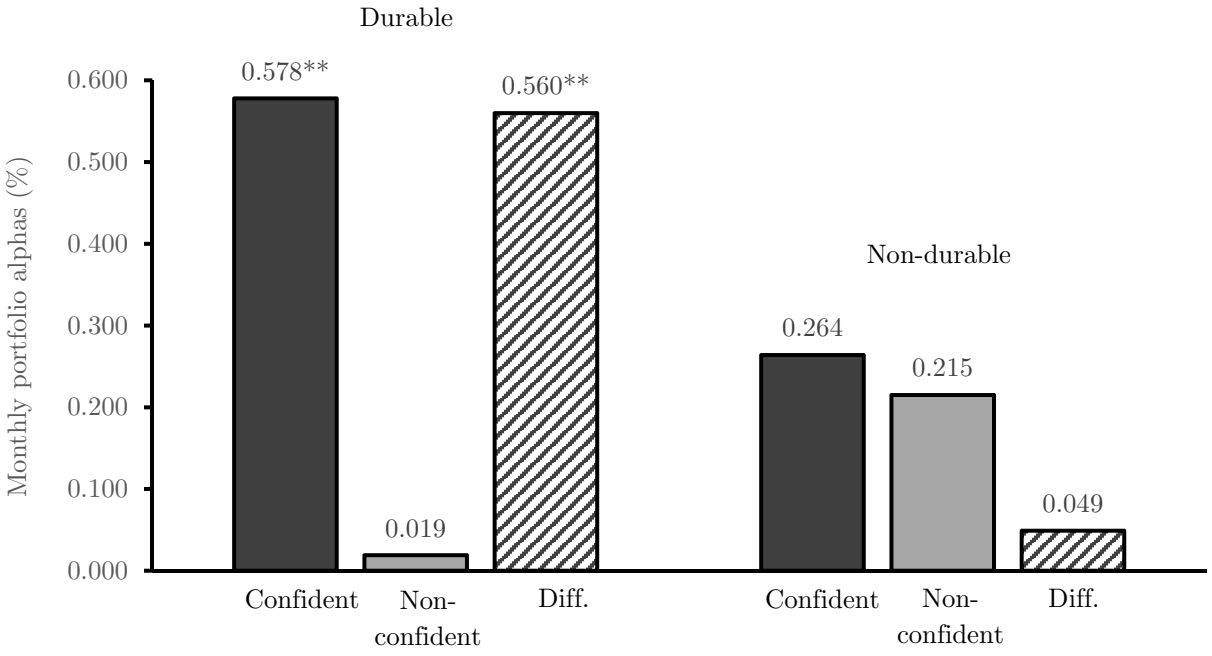
Panel A. Portfolio monthly alphas of firms led by overconfident/non-overconfident CEOs and with at least one supplier



Panel B. Portfolio loadings on Fama-French five factors + momentum factor

	(1)	(2)	(3)
Portfolio	Confident	Non-confident	Difference
a	0.381***	0.116	0.265*
	(0.127)	(0.120)	(0.146)
MKT – RF	1.091***	1.076***	0.015
	(0.032)	(0.031)	(0.037)
SMB	0.469***	0.468***	0.000
	(0.046)	(0.043)	(0.053)
HML	-0.107	0.125**	-0.232***
	(0.065)	(0.062)	(0.075)
RMW	0.155**	0.236***	-0.082
	(0.063)	(0.060)	(0.073)
CMA	0.029	0.157**	-0.128
	(0.076)	(0.072)	(0.087)
MOM	-0.232***	-0.260***	0.028
	(0.024)	(0.023)	(0.028)
Months	234	234	234
R-squared	0.909	0.906	0.294

Panel C. Portfolio monthly alphas of firms led by overconfident/non-overconfident CEOs in durable/non-durable industries and with at least one supplier



Panel D. Portfolio monthly alphas of firms led by overconfident/non-overconfident CEOs in high/low-RSI industries and with at least one supplier

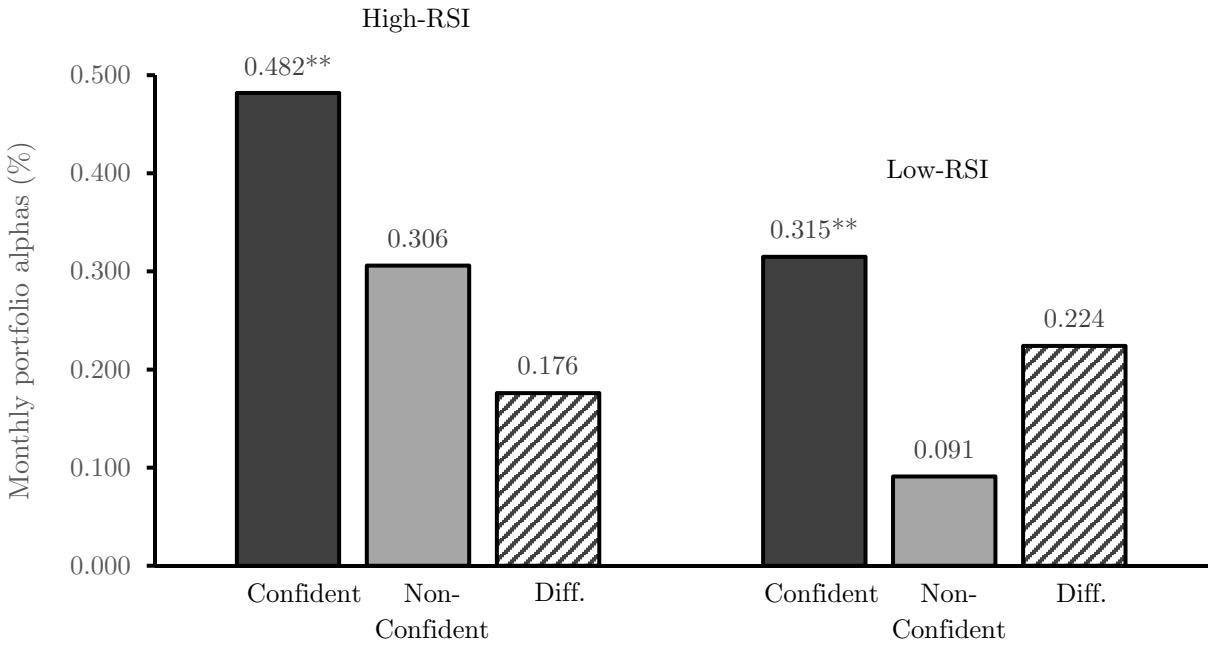


Table 1

Descriptive statistics

Panel A presents means, standard deviations, percentiles, and the number of observations for variables used in our baseline regression in Column 2 of Table 2 Panel A. Panel B compares the variable means of firm-year observations of customer firms and non-customer firms. Our sample spans the years 1993–2011 and includes firms that are covered in the ExecuComp database and business segment files of Compustat. We remove utilities (SIC: 4000 – 4999) and financial firms (SIC: 6000 – 6999). Detailed variable definitions are contained in Appendix A. Financial variables are winsorized at the 1st and 99th percentiles to reduce the influence of outliers. ***, **, * represent statistical significance of differences in means at the 1%, 5%, and 10% levels, respectively.

Table 1 (continued)
Panel A: *Summary statistics for sample firms*

		N	Mean	S.D.	P10	P25	P50	P75	P90
1.	CEO overconfidence	14745	0.321	0.262	0.000	0.075	0.289	0.516	0.703
2.	Confident CEO (options)	14745	0.533	0.499	0	0	1	1	1
3.	Overconfident CEO relationship	4974	0.570	0.495	0	0	1	1	1
4.	CEO overconfidence up	14179	0.068	0.253	0	0	0	0	0
5.	CEO media positivity	7923	0.810	0.392	0	1	1	1	1
6.	Suppliers increase	14745	0.072	0.258	0	0	0	0	0
7.	Suppliers decrease	14745	0.075	0.264	0	0	0	0	0
8.	Start of supplier network	14745	0.033	0.180	0	0	0	0	0
9.	Total assets	14745	4088	8760	190	408	1066	3225	10219
10.	Market-to-book ratio	14745	3.204	2.904	1.075	1.580	2.365	3.703	5.947
11.	Return on assets	14745	0.053	0.108	-0.052	0.019	0.062	0.105	0.158
12.	ROA volatility	14745	0.054	0.069	0.007	0.014	0.030	0.064	0.125
13.	Sales growth	14745	0.124	0.269	-0.123	0.001	0.087	0.198	0.387
14.	Investment	14745	0.066	0.068	0.013	0.025	0.045	0.081	0.138
15.	R&D intensity[27]	14745	0.043	0.068	0	0	0.010	0.062	0.134
16.	Leverage	14745	0.224	0.201	0	0.050	0.202	0.335	0.464
17.	Cash	14745	0.121	0.144	0.009	0.024	0.070	0.164	0.298
18.	2-Year stock returns	14745	0.373	1.279	-0.474	-0.186	0.164	0.605	1.236
19.	CEO tenure	14745	1.751	0.855	0.693	1.099	1.792	2.398	2.833
20.	CEO stock ownership	14745	2.021	4.917	0	0	0.21	1.35	5.63
21.	Acquisitions indicator	14745	0.355	0.478	0	0	0	1	1
22.	SEO proceeds	14745	0.006	0.037	0	0	0	0	0
23.	Employee turnover	7742	0.094	0.097	0.010	0.027	0.063	0.126	0.220
24.	Employee benefit plan ($M)	7887	419.390	1224.709	13.994	34.966	102.420	302.880	879.596
25.	Total-employee stock held (%)	3577	0.139	0.127	0.011	0.043	0.108	0.196	0.306
26.	Per-employee stock held ($1000)	3577	7.355	7.704	0.271	1.318	4.481	10.966	19.909
27.	Durable indicator	14745	0.336	0.472	0	0	0	1	1
28.	Non-durable indicator	14745	0.270	0.444	0	0	0	1	1
29.	High-RSI indicator	8360	0.531	0.499	0	0	1	1	1
30.	Customer-supplier size ratio	12002	0.081	0.386	0.001	0.002	0.008	0.039	0.146
31.	Supplier R&D intensity	12002	23.213	48.114	0.654	2.083	7.652	21.417	52.577
32.	Input costs	2244	0.606	0.218	0.269	0.451	0.657	0.769	0.865
33.	Markup percentage	2244	1.093	1.481	0.155	0.300	0.522	1.219	2.723

[27] Missing values of *R&D* are assigned to be zero. Reported statistics exclude missing *R&D* values.

Table 1 (continued)
Panel B: *Comparison between customer firm and stand-alone firm observations*

	Customer firm		Standalone firm		
	N	Mean	N	Mean	Difference
Confident CEO (options)	2904	0.545	11841	0.531	0.014
CEO overconfidence	2904	0.343	11841	0.315	0.028***
CEO overconfidence up	2804	0.065	11375	0.069	-0.004
Total assets	2904	12394	11841	2051	10343***
Market-to-book ratio	2904	3.824	11841	3.052	0.771***
Return on assets	2904	0.066	11841	0.050	0.015***
ROA volatility	2904	0.046	11841	0.055	-0.009***
Sales growth	2904	0.132	11841	0.121	0.010**
Investment	2904	0.071	11841	0.065	0.006***
R&D intensity	2904	0.048	11841	0.042	0.006***
Leverage	2904	0.246	11841	0.219	0.026***
Cash	2904	0.098	11841	0.127	-0.029***
2-Year stock returns	2904	0.407	11841	0.365	0.042
CEO tenure	2904	0.930	11841	0.959	-0.028***
CEO stock ownership	2904	1.123	11841	2.241	-1.118***

Table 2

The effect of CEO overconfidence on the increase/decrease in suppliers

This table presents results from logit and conditional logit regressions. *Suppliers increase* is a dummy variable that equals to one if a firm has more dependent suppliers in year t than it has in $t-1$, and equals to zero otherwise. *Suppliers decrease* is defined symmetrically to *Suppliers increase*. Dependent suppliers are defined according to SFAS 14. Columns 1 and 2 present results from a logit model while Columns 3 and 4 present results from a conditional logit model. *Confident CEO (options)* is a dummy variable which equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. *CEO overconfidence up* is a dummy variable that equals one if the continuous *CEO overconfidence* measure in year t is in the top quartile of the sample but not in the top quartile of the sample in year $t-1$, and equals zero otherwise. *CEO overconfidence down* is defined symmetrically to *CEO overconfidence up*. CEO overconfidence is the per-option value of CEO's vested and unexercised options scaled by average strike price (Campbell et al., 2011; Malmendier, Tate, and Yan, 2011; Hirshleifer, Low, and Teoh, 2012). *Overconfidence trade up* is an indicator that switches on if *Overconfidence trade* is equal to zero in year $t-1$ and equal to one in year t. *Overconfidence trade* is a dummy variable that equals one in year t if the CEO's purchases over the next two years have negative 180-day BHARs on average, and equals zero otherwise (Kolasinski and Li, 2013). BHARs are benchmarked against returns of Fama-French size-decile portfolios. The sample in Column 2 of Panel B begins from year 1996 (inclusive) onwards because the *Overconfidence trade* measure starts in 1996. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 2 (continued)
Panel A: *Baseline specifications of supplier commitment*

	(1) LOGIT: Suppliers increase	(2) LOGIT: Suppliers increase	(3) C-LOGIT: Suppliers increase	(4) C-LOGIT: Suppliers increase
Confident CEO (options) $_{t-1}$	0.261***	0.165**		
	(0.085)	(0.080)		
CEO overconfidence up $_{t-1}$			0.516***	0.368***
			(0.114)	(0.122)
CEO stock ownership $_{t-1}$		-0.006	-0.008	0.004
		(0.010)	(0.011)	(0.013)
Log (Total assets $_{t-1}$)		0.798***	0.810***	-0.113*
		(0.034)	(0.042)	(0.067)
Leverage $_{t-1}$		-0.391*	-0.400*	0.045
		(0.210)	(0.230)	(0.305)
Market-to-book ratio $_{t-1}$		0.042***	0.040**	0.013
		(0.014)	(0.016)	(0.009)
Return on assets $_{t-1}$		0.234	0.415	0.648
		(0.439)	(0.380)	(0.607)
Sales growth $_{t-1}$		0.317**	0.411***	0.391**
		(0.148)	(0.139)	(0.187)
R&D intensity $_{t-1}$		5.049***	4.895***	4.035***
		(0.748)	(0.637)	(0.817)
Missing R&D $_{t-1}$		0.229	0.202	0.348
		(0.152)	(0.144)	(0.611)
Log (1 + CEO tenure $_{t-1}$)		-0.025	0.017	0.001
		(0.109)	(0.106)	(0.107)
Cash $_{t-1}$		0.282	0.311	-0.584
		(0.346)	(0.336)	(0.455)
ROA volatility $_{t-1}$		0.914	0.926*	0.392
		(0.676)	(0.500)	(0.620)
Log (2-Year stock returns $_{t-1}$)		-0.022	-0.009	0.036
		(0.075)	(0.103)	(0.100)
Investment $_{t-1}$		1.192*	1.048	1.922***
		(0.669)	(0.947)	(0.739)
Acquisitions $_{t-1}$		0.014	0.006	-0.057
		(0.077)	(0.083)	(0.089)
SEO proceeds $_{t-1}$		-0.449	-0.875	-1.715*
		(1.076)	(0.765)	(0.897)
Num. suppliers $_{t-1}$		-0.015**	-0.015**	-0.126***
		(0.006)	(0.007)	(0.031)
Industry dummies	Yes	Yes	No	No
Year dummies	Yes	Yes	No	No
Observations	14,745	14,745	11,040	5,285
Pseudo R-squared	0.071	0.206	0.188	0.034
Industry-year strata	No	No	Yes	No
Firm strata	No	No	No	Yes
Firm cluster	Yes	Yes	No	No
Industry cluster	No	No	Yes	Yes

Table 2 (continued)
Panel B: *Alternative specifications of supplier commitment*

	(1) C-LOGIT: Suppliers increase	(2) C-LOGIT: Suppliers increase	(3) C-LOGIT: Suppliers decrease	(4) C-LOGIT: Suppliers decrease
CEO overconfidence $_{t-1}$	0.904***			
	(0.198)			
Overconfidence trade up $_{t-1}$		0.199**		
		(0.099)		
CEO overconfidence up $_{t-1}$			0.153	0.092
			(0.129)	(0.127)
CEO overconfidence down $_{t-1}$			0.403**	0.301**
			(0.168)	(0.144)
CEO stock ownership $_{t-1}$	-0.002	0.007	-0.026***	-0.014
	(0.012)	(0.010)	(0.008)	(0.018)
Log (Total assets $_{t-1}$)	-0.114*	-0.154**	0.702***	0.269***
	(0.067)	(0.068)	(0.108)	(0.091)
Leverage $_{t-1}$	0.198	0.130	-0.228	0.418
	(0.251)	(0.289)	(0.211)	(0.395)
Market-to-book ratio $_{t-1}$	-0.007	0.017	0.025**	-0.001
	(0.010)	(0.011)	(0.011)	(0.021)
Return on assets $_{t-1}$	0.472	0.716*	-0.727*	-1.153**
	(0.461)	(0.420)	(0.390)	(0.482)
Sales growth $_{t-1}$	0.359**	0.435**	-0.672***	-0.409*
	(0.155)	(0.180)	(0.133)	(0.229)
R&D intensity $_{t-1}$	3.267***	2.661***	5.067***	0.658
	(0.753)	(0.777)	(0.651)	(1.622)
Missing R&D $_{t-1}$	0.184	0.344	0.148	-0.058
	(0.596)	(0.625)	(0.175)	(0.367)
Log (1 + CEO Tenure $_{t-1}$)	-0.063	0.003	0.149	0.081
	(0.087)	(0.086)	(0.125)	(0.158)
Cash $_{t-1}$	-0.429	-0.563	-0.019	-0.102
	(0.402)	(0.374)	(0.364)	(0.635)
ROA volatility $_{t-1}$	0.391	0.011	-0.359	-1.952***
	(0.591)	(0.501)	(0.779)	(0.451)
Log (2-Year stock returns $_{t-1}$)	-0.128	-0.062	-0.095	0.098
	(0.097)	(0.083)	(0.091)	(0.102)
Investment $_{t-1}$	1.171	1.247**	1.556*	0.259
	(0.736)	(0.635)	(0.855)	(1.041)
Acquisitions $_{t-1}$	-0.091	-0.074	0.053	-0.095
	(0.082)	(0.088)	(0.077)	(0.061)
SEO proceeds $_{t-1}$	-1.088	-0.092	-1.689	-1.447
	(0.779)	(0.882)	(1.102)	(1.453)
Num. suppliers $_{t-1}$	-0.131***	-0.127***	0.055	0.547***
	(0.031)	(0.030)	(0.068)	(0.173)
Observations	5,575	5,629	11,684	5,583
Pseudo R-squared	0.035	0.029	0.213	0.130
Firm strata	Yes	Yes	No	Yes
Industry-year strata	No	No	Yes	No
Industry cluster	Yes	Yes	Yes	Yes

Table 3.
The effect of CEO overconfidence on the start of supplier network

This table presents results from logit and conditional logit regressions. *Start of supplier network* is a dummy variable that equals one when the firm has at least one dependent supplier in year t and none in $t-1$, and equals zero otherwise. Dependent suppliers are defined according to SFAS 14. *Confident CEO (options)* is a dummy variable which equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. *CEO overconfidence up* is a dummy variable that equals one if the continuous *CEO overconfidence* in year t is in the top quartile of the sample but not in the top quartile of the sample in year $t-1$, and equals zero otherwise. Columns 1 and 2 present results from a logit model while Columns 3 and 4 present results from a conditional logit model. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 3 (continued)

	(1) LOGIT: Start Supp. Network	(2) LOGIT: Start Supp. Network	(3) C-LOGIT: Start Supp. Network	(4) C-LOGIT: Start Supp. Network
Confident CEO (options) $_{t-1}$	0.242**	0.179*		
	(0.097)	(0.106)		
CEO overconfidence up $_{t-1}$			0.434***	0.307**
			(0.129)	(0.149)
CEO Stock Ownership $_{t-1}$		-0.018	-0.017	0.005
		(0.013)	(0.013)	(0.015)
Log (Total Assets $_{t-1}$)		0.317***	0.327***	-0.243***
		(0.036)	(0.046)	(0.085)
Leverage $_{t-1}$		0.072	0.138	0.153
		(0.255)	(0.317)	(0.334)
Market-to-Book Ratio $_{t-1}$		0.024	0.015	0.027*
		(0.018)	(0.021)	(0.016)
Return on Assets $_{t-1}$		0.072	0.500	0.333
		(0.526)	(0.425)	(0.630)
Sales Growth $_{t-1}$		0.435**	0.502**	0.552**
		(0.173)	(0.202)	(0.253)
R&D intensity $_{t-1}$		3.221***	3.167***	2.443***
		(0.911)	(0.587)	(0.868)
Missing R&D $_{t-1}$		-0.035	-0.057	0.560
		(0.169)	(0.176)	(0.518)
Log (1 + CEO Tenure $_{t-1}$)		0.007	0.099	0.143
		(0.136)	(0.173)	(0.160)
Cash $_{t-1}$		-0.134	-0.206	-0.380
		(0.406)	(0.370)	(0.684)
ROA Volatility $_{t-1}$		0.376	0.562	-1.061
		(0.856)	(0.568)	(0.861)
Log (2-Year Stock Returns $_{t-1}$)		-0.010	-0.030	-0.017
		(0.091)	(0.113)	(0.084)
Investment $_{t-1}$		-0.302	-0.285	-0.676
		(0.809)	(1.659)	(1.283)
Acquisitions $_{t-1}$		-0.012	-0.005	-0.126
		(0.100)	(0.097)	(0.106)
SEO Proceeds $_{t-1}$		-1.145	-1.110	-1.936*
		(1.454)	(1.272)	(1.037)
Industry dummies	Yes	Yes	No	No
Year dummies	Yes	Yes	No	No
Observations	14,731	14,731	9,054	4,040
Pseudo R-squared	0.027	0.056	0.045	0.018
Industry-year strata	No	No	Yes	No
Firm strata	No	No	No	Yes
Firm cluster	Yes	Yes	No	No
Industry cluster	No	No	Yes	Yes

Table 4
The effect of CEO overconfidence on employee turnover

This table presents results from one-sided panel Tobit regressions. Following Carter and Lynch (2004), *Employee turnover* is the ratio of the number of options that are cancelled, terminated, forfeited, expired, or lapsed in the year to the number of options outstanding at the beginning of the year. The construction of *Employee turnover* begins in 2004 when Compustat begins coverage of option cancellation data (*optca*). *Confident CEO (options)* is a dummy variable that equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. The sample in Column 2 comprises only firm-years with broad-based plans. An employee stock option plan is classified as broad-based if the number of options granted to non-executive employee exceeds 0.5% of the number of shares outstanding (e.g., Oyer and Schaefer, 2005; Hochberg and Lindsey, 2010; Chang et al., 2015). We split the sample in Columns 3 and 4 by the sample median of human capital intensity from the American Community Survey (ACS) census microdata. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4 (continued)

	(1) P-TOBIT: Employee turnover	(2) P-TOBIT: Employee turnover	(3) P-TOBIT: Employee turnover	(4) P-TOBIT: Employee turnover
Sample	All firms	Broad-based plans	High human-capital intensity	Low human-capital intensity
Confident CEO (options) $_{t-1}$	-0.024***	-0.015***	-0.027***	-0.019***
	(0.003)	(0.003)	(0.004)	(0.005)
Log (Firm age $_{t-1}$)	0.003	-0.003	0.006*	0.003
	(0.002)	(0.002)	(0.004)	(0.003)
CEO stock ownership $_{t-1}$	0.001**	0.001	0.001**	0.001
	(0.000)	(0.000)	(0.001)	(0.000)
Log (Total assets $_{t-1}$)	-0.013***	-0.010***	-0.009***	-0.017***
	(0.001)	(0.001)	(0.002)	(0.002)
Leverage $_{t-1}$	0.030***	0.013*	0.020*	0.042***
	(0.009)	(0.007)	(0.011)	(0.013)
Market-to-book ratio $_{t-1}$	-0.005***	-0.003***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Return on assets $_{t-1}$	-0.173***	-0.169***	-0.219***	-0.124***
	(0.021)	(0.024)	(0.023)	(0.037)
Sales growth $_{t-1}$	-0.014	-0.015*	-0.014	-0.011
	(0.009)	(0.008)	(0.012)	(0.013)
R&D intensity $_{t-1}$	0.049	-0.015	0.084	-0.009
	(0.040)	(0.036)	(0.054)	(0.048)
Missing R&D $_{t-1}$	0.001	-0.003	0.003	0.000
	(0.004)	(0.005)	(0.005)	(0.007)
Log (1 + CEO tenure $_{t-1}$)	-0.024***	-0.026***	-0.027***	-0.022***
	(0.004)	(0.005)	(0.006)	(0.005)
Cash $_{t-1}$	0.025*	0.024**	0.044***	0.000
	(0.014)	(0.011)	(0.017)	(0.019)
ROA volatility $_{t-1}$	-0.038***	-0.037***	-0.032***	-0.047***
	(0.005)	(0.004)	(0.007)	(0.006)
Log (2-Year stock returns $_{t-1}$)	0.200***	0.155***	0.163***	0.253***
	(0.029)	(0.024)	(0.041)	(0.038)
Investment $_{t-1}$	-0.116***	-0.084**	-0.168***	-0.101**
	(0.034)	(0.034)	(0.044)	(0.048)
Acquisitions $_{t-1}$	-0.010***	-0.002	-0.008*	-0.013***
	(0.003)	(0.003)	(0.004)	(0.005)
SEO proceeds $_{t-1}$	-0.059	-0.058	-0.165***	0.064
	(0.050)	(0.049)	(0.063)	(0.089)
Observations	7,676	4,294	3,995	3,681
Chi-squared	1140.45	837.36	1272.06	452.65
Industry-year fixed effects	Yes	Yes	Yes	Yes

One-tailed Welch-Satterthwaite t-test on Confident CEO (options) coefficients:
Columns 3 and 4: p-value = 0.087, d.f. = 7,565

Table 5

The effect of CEO overconfidence on employee holdings of company stock

This table presents results from one-sided and two-sided panel Tobit regressions. *Employee stock holdings (%)* is the total dollar value of employer stock held in the benefit plan scaled by the total assets of the benefit plan in the year. *Employee stock holdings ($)* is the dollar value of employer stock held in the benefit plan per active plan participant in the year. The dollar value of employer securities held in employee benefit plans are from item (1d1) of the firm's Form 5500 Schedule H. In specifications of *Employee stock holdings (%)*, we perform two-sided panel Tobit regressions in Columns 1 and 2. In specifications of *Employee Stock Holdings ($)* in Columns 3 and 4, we perform one-sided panel Tobit regressions. *Confident CEO (options)* is a dummy variable that equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. *Annual employer cash match* is a dummy variable that equals one if the firm offers matching cash contributions to its employees in the plan, and equals zero otherwise. *Annual employer stock match* is a dummy variable that equals one if the firm offers matching non-cash contributions to its employees in the plan, and equals zero otherwise. The dollar values of matching non-cash contributions and cash contributions made by the firm are extracted from item (2a2) and item (2a1a) of the firm's IRS Form 5500 Schedule H. *Per-employee non-stock wealth* is the total assets of the benefit plan less the total dollar value of employer securities, scaled by the number of active plan participants. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5 (continued)

	(1) Employee stock holdings (%)	(2) Employee stock holdings (%)	(3) Employee stock holdings ($)	(4) Employee stock holdings ($)
Require positive employee stock holdings in previous year	No	Yes	No	Yes
Confident CEO (options) $_{t-1}$	0.027***	0.012**	2.123***	1.570***
	(0.007)	(0.006)	(0.425)	(0.386)
Annual employer cash match $_{t-1}$	0.072***	0.023**	3.610***	1.040
	(0.013)	(0.012)	(0.822)	(0.690)
Annual employer stock match $_{t-1}$	0.145***	0.048***	9.964***	3.755***
	(0.015)	(0.011)	(1.291)	(0.899)
Per-employee non-stock wealth $_{t-1}$	-0.002***	-0.002***	0.045***	0.062***
	(0.000)	(0.000)	(0.008)	(0.007)
Dividends-to-price ratio $_{t-1}$	0.192	0.615**	46.644***	73.470***
	(0.261)	(0.246)	(15.459)	(15.598)
Price-to-earnings ratio $_{t-1}$	-0.000	-0.000	-0.007*	-0.002
	(0.000)	(0.000)	(0.004)	(0.003)
Working capital $_{t-1}$	-0.187***	-0.111***	-12.486***	-7.077***
	(0.027)	(0.025)	(1.593)	(1.564)
Log (Firm age $_{t-1}$)	0.068***	0.028***	3.323***	1.138***
	(0.007)	(0.005)	(0.444)	(0.325)
CEO stock ownership $_{t-1}$	-0.002***	-0.002***	-0.192***	-0.227***
	(0.001)	(0.000)	(0.046)	(0.042)
Log (Total assets $_{t-1}$)	0.004	0.006**	0.011	0.168
	(0.003)	(0.002)	(0.182)	(0.149)
Leverage $_{t-1}$	0.013	-0.015	1.454	0.939
	(0.018)	(0.015)	(1.116)	(1.012)
Market-to-book ratio $_{t-1}$	0.007***	0.008***	0.400***	0.466***
	(0.002)	(0.002)	(0.113)	(0.099)
Return on assets $_{t-1}$	0.089*	0.119***	4.487	6.696**
	(0.048)	(0.042)	(3.498)	(3.027)
Sales growth $_{t-1}$	-0.021	-0.004	-1.052	-0.767
	(0.017)	(0.017)	(1.226)	(1.120)
R&D intensity $_{t-1}$	-0.203***	0.050	-15.035***	4.526
	(0.066)	(0.064)	(4.724)	(4.927)
Missing R&D $_{t-1}$	-0.047***	-0.048***	-2.975***	-2.620***
	(0.010)	(0.008)	(0.684)	(0.543)
Log (1 + CEO tenure $_{t-1}$)	0.003	0.006	0.646	0.818*
	(0.010)	(0.008)	(0.557)	(0.489)
Cash $_{t-1}$	0.065*	0.115***	3.802*	5.737***
	(0.035)	(0.030)	(2.031)	(1.719)
ROA volatility $_{t-1}$	-0.181***	-0.090	-10.680***	-5.523
	(0.061)	(0.060)	(4.041)	(3.946)
Log (2-Year stock returns $_{t-1}$)	0.016***	0.010**	1.033***	0.608**
	(0.006)	(0.005)	(0.352)	(0.301)
Investment $_{t-1}$	0.132	0.385***	-2.044	8.700**
	(0.084)	(0.089)	(4.623)	(4.355)

Table 5. (Continued)

	(1)	(2)	(3)	(4)
Acquisitions $_{t-1}$	-0.002	-0.006	-0.132	-0.478
	(0.007)	(0.006)	(0.431)	(0.369)
SEO proceeds $_{t-1}$	-0.074	0.028	-0.752	3.944
	(0.101)	(0.090)	(5.616)	(5.071)
Observations	7,887	3,577	7,887	3,577
Chi-squared	422.18	336.94	702.06	632.41
Industry-year fixed effects	Yes	Yes	Yes	Yes

Table 6

The effect of CEO overconfidence on suppliers in industries with high relationship-specific investment

This table presents results from conditional logit regressions. *Suppliers increase* is a dummy variable that equals one if a firm has more dependent suppliers in year t than it has in $t-1$, and equals zero otherwise. *Start of supplier network* is a dummy variable that equals one when the firm has at least one dependent supplier in year t and none in $t-1$, and equals zero otherwise. The key independent variable in Panel A and Panel C is *Confident CEO (options)*. *Confident CEO (options)* is a dummy variable that equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. The key independent variable in Panel B and Panel D is *CEO overconfidence up*. *CEO overconfidence up* indicator is a dummy variable that equals one if the continuous *CEO overconfidence* measure in year t is in the top quartile of the sample and not in the top quartile of the sample in year $t-1$, and equals zero otherwise. Panel A and Panel B include manufacturing firms split into subsamples of durable industries (SIC 3400 – 3999) and non-durable industries (SIC 2000 – 3399). Panel C and Panel D include manufacturing firms split into subsamples based on industry-level relationship-specificity according to the year 1997 contract intensity variable from Nunn (2007). An industry is classified as High (Low) RSI if its industry contract intensity is above (below) the sample median. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6 (continued)
Panel A: *Durable/Non-durable manufacturing industries subsample analysis*

	(1) LOGIT: Suppliers increase	(2) LOGIT: Suppliers increase	(3) LOGIT: Start supp. network	(4) LOGIT: Start supp. network
Industry type	Durable	Non-durable	Durable	Non-durable
Confident CEO (options) $_{t-1}$	0.225*	-0.011	0.308*	-0.055
	(0.136)	(0.171)	(0.187)	(0.224)
Control variables	Yes	Yes	Yes	Yes
Observations	4,946	4,037	4,946	4,037
Pseudo R-squared	0.219	0.241	0.069	0.073
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm cluster	Yes	Yes	Yes	Yes

Panel B: *Durable/Non-durable manufacturing industries subsample analysis*

	(1) C-LOGIT: Suppliers increase	(2) C-LOGIT: Suppliers increase	(3) C-LOGIT: Start supp. network	(4) C-LOGIT: Start supp. network
Industry type	Durable	Non-durable	Durable	Non-durable
CEO overconfidence up $_{t-1,\,t}$	0.559***	0.249	0.564***	-0.207
	(0.210)	(0.271)	(0.149)	(0.249)
Control variables	Yes	Yes	Yes	Yes
Observations	1,771	1,411	1,372	1,032
Pseudo R-squared	0.042	0.070	0.026	0.028
Firm strata	Yes	Yes	Yes	Yes
Industry cluster	Yes	Yes	Yes	Yes

Table 6 (continued)
Panel C: *High/Low RSI manufacturing industries subsample analysis*

	(1) LOGIT: Suppliers increase	(2) LOGIT: Suppliers increase	(3) LOGIT: Start supp. network	(4) LOGIT: Start supp. network
Relationship specificity	High	Low	High	Low
Confident CEO (options) $_{t-1}$	0.299*	0.060	0.458**	0.046
	(0.164)	(0.176)	(0.219)	(0.233)
Control variables	Yes	Yes	Yes	Yes
Observations	4,472	4,057	4,472	4,057
Pseudo R-squared	0.210	0.251	0.083	0.070
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Firm cluster	Yes	Yes	Yes	Yes

Panel D: *High/Low RSI manufacturing industries subsample analysis*

	(1) C-LOGIT: Suppliers increase	(2) C-LOGIT: Suppliers increase	(3) C-LOGIT: Start supp. network	(4) C-LOGIT: Start supp. network
Relationship specificity	High	Low	High	Low
CEO overconfidence up $_{t-1,\,t}$	0.340**	0.382	0.464***	0.040
	(0.140)	(0.358)	(0.096)	(0.334)
Control variables	Yes	Yes	Yes	Yes
Observations	1,583	1,221	1,231	939
Pseudo R-squared	0.045	0.073	0.027	0.028
Firm strata	Yes	Yes	Yes	Yes
Industry cluster	Yes	Yes	Yes	Yes

Table 7

The effect of CEO overconfidence on relationship-specific investment

This table presents results from OLS regressions. The unit of observation is a customer-supplier pair in a year. *Supplier R&D intensity* is calculated by first multiplying the R&D expenses of the supplier by the supplier-to-customer pair sales to total supplier sales ratio, before scaling by the total assets of the supplier. We then multiply the raw value by a factor of 1,000 and take its logarithmic transformation. *Confident CEO (options)* is a dummy variable that equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. In Columns 3 and 4, we split the sample on the two-digit SIC industry median value of *Supplier-customer size ratio*. For each customer-supplier pair in a year, *Supplier-customer size ratio* is computed as the ratio of the total assets of the supplier to the total assets of the customer. Where multiple fixed effects are deployed, singleton observations are eliminated from the sample. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7 (continued)

	(1) OLS: Supp. R&D intensity	(2) OLS: Supp. R&D intensity	(3) OLS: Supp. R&D intensity	(4) OLS: Supp. R&D intensity
Sample	All supp-cust pairs	All supp-cust pairs	Small supp-cust size ratio	Big supp-cust size ratio
Confident CEO (options) $_{t-1}$	0.116***	0.072*	0.149***	-0.006
	(0.042)	(0.038)	(0.046)	(0.048)
Customer control variables				
Stock ownership $_{t-1}$	0.023***	0.020***	0.034***	0.019**
	(0.007)	(0.007)	(0.011)	(0.008)
Log (Market cap $_{t-1}$)	0.010	0.054***	0.057**	-0.013
	(0.018)	(0.017)	(0.025)	(0.023)
Leverage $_{t-1}$	-0.545***	-0.421***	-0.501***	-0.547***
	(0.134)	(0.123)	(0.160)	(0.164)
Return on assets $_{t-1}$	0.231	0.207	0.556	0.247
	(0.352)	(0.330)	(0.423)	(0.408)
Sales growth $_{t-1}$	0.267**	0.259**	0.132	0.308**
	(0.116)	(0.106)	(0.139)	(0.122)
R&D intensity $_{t-1}$	4.991***	4.086***	3.552***	4.255***
	(0.591)	(0.524)	(0.759)	(0.631)
Missing R&D $_{t-1}$	-0.122	-0.098	-0.073	-0.121
	(0.097)	(0.089)	(0.117)	(0.105)
Log (1 + CEO tenure $_{t-1}$)	-0.071	-0.061	-0.039	-0.074
	(0.055)	(0.048)	(0.059)	(0.060)
Cash $_{t-1}$	0.862***	0.788***	0.542*	0.910***
	(0.250)	(0.242)	(0.321)	(0.292)
ROA volatility $_{t-1}$	-0.238	-0.262	-1.136	0.515
	(0.593)	(0.554)	(0.801)	(0.663)
Num. suppliers $_{t-1}$	0.005***	0.006***	0.004***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
Log (2-Year stock returns $_{t-1}$)	-0.047	-0.007	-0.052	0.031
	(0.041)	(0.039)	(0.044)	(0.053)
Investment $_{t-1}$	-1.420***	-1.238***	-1.470**	-0.110
	(0.518)	(0.479)	(0.645)	(0.585)
Acquisitions $_{t-1}$	0.082**	0.044	0.031	0.015
	(0.041)	(0.037)	(0.047)	(0.048)
SEO proceeds $_{t-1}$	-2.040	-1.957	1.612	-3.586
	(2.512)	(2.438)	(2.457)	(2.550)
Supplier control variables				
Leverage $_{t-1}$		-0.934***	-0.598***	-1.002***
		(0.065)	(0.086)	(0.094)
M/B ratio $_{t-1}$		0.026***	0.014***	0.030***
		(0.003)	(0.004)	(0.005)
Return on assets $_{t-1}$		-0.932***	-0.895***	-1.131***
		(0.065)	(0.071)	(0.128)

Table 7 (continued)

	(1)	(2)	(3)	(4)
Sales growth $_{t-1}$		0.067***	0.075**	0.025
		(0.024)	(0.030)	(0.041)
Investment $_{t-1}$		-0.001***	-0.009***	-0.001***
		(0.000)	(0.001)	(0.000)
Cash $_{t-1}$		0.001***	0.002***	0.000***
		(0.000)	(0.001)	(0.000)
ROA volatility $_{t-1}$		0.773***	0.706***	0.768***
		(0.080)	(0.089)	(0.155)
Log (Market cap $_{t-1}$)		-0.072***	0.003	0.004
		(0.009)	(0.017)	(0.018)
Observations	12,074	12,074	6,196	5,871
R-squared	0.277	0.364	0.338	0.402
Industry fixed effects	Yes	Yes	Yes	Yes
Customer-year cluster	Yes	Yes	Yes	Yes

Table 8

The effect of CEO overconfidence on duration of customer-supplier relationships

This table presents results from Andersen-Gill Cox regressions. The start of a customer-supplier relationship is either the first time the relationship is documented in the Compustat business segment file or the earliest year in which the previously terminated relationship is restarted. A customer-supplier pair with one previous termination and one restart is represented as two relationships (observations) in the data set. Following Fee, Hadlock, and Thomas (2006), if a relationship ends because the supplier/customer becomes inactive in Compustat or if the relationship lasts up till the final year of the sample period (2011), we treat the length of relationship as being right−censored. A relationship is classified as an *Overconfident CEO relationship* if a *Confident CEO (options)* customer CEO is incumbent between the start (inclusive) and end (exclusive) of the relationship. Since an *Overconfident CEO relationship* may take at least two years to be established, we only include relationships that begin on or after 1995. *Supplier R&D intensity*, *Sales dependency* and *Supplier-customer size ratio* are the values in the first year of the relationship, respectively. In Columns 2 to 5, we also include all supplier and customer control variables used in Table 7. These control variables are matched to the first year of the relationship. We include interactions of covariates with time in Columns 4 and 5. We allow customer-supplier relationships to end and restart in Columns 1 to 4. In Column 5, we restrict the sample to customer-supplier relationships with no restarts. Standard errors are reported in parentheses. Estimated coefficients of supplier and customer control variables are not presented in the table to facilitate presentation. These control variables are customer CEO stock ownership, customer CEO tenure, market capitalization, leverage, market-to-book ratio, ROA, sales growth, investment, R&D expenditure, cash, ROA volatility, number of suppliers, 2-year stock returns, and M&A activities. Estimated coefficients are presented as hazard ratios. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8 (continued)

	(1) Andersen-Gill Cox model	(2) Andersen-Gill Cox model	(3) Andersen-Gill Cox model	(4) Andersen-Gill Cox model	(5) Andersen-Gill Cox model
Supplier-customer relationship restarts allowed	Yes	Yes	Yes	Yes	No
Main covariates					
Overconfident CEO relationship	0.892***	0.825***	0.803***	0.708***	0.660***
	(0.036)	(0.042)	(0.044)	(0.089)	(0.098)
Supplier-customer size ratio			1.067	1.317	1.529**
			(0.084)	(0.239)	(0.325)
Supplier R&D intensity			1.019	1.031	1.042
			(0.022)	(0.049)	(0.060)
Sales dependency			0.781***	0.743***	0.675***
			(0.030)	(0.067)	(0.073)
Supplier and customer controls	No	Yes	Yes	Yes	Yes
Interactions with time					
Overconfident CEO relationship				1.010	1.012
				(0.013)	(0.015)
Supplier R&D intensity				0.999	0.998
				-0.005	(0.006)
Sales dependency				1.006	1.010
				(0.009)	(0.011)
Supplier-customer size ratio				0.982	0.967
				(0.018)	(0.021)
Supplier and customer controls				Yes	Yes
Observations	4,974	3,579	3,060	3,060	2,208
Unique customer-supplier pairs	4,427	3,181	2,736	2,736	2,208
Customer-supplier pair-years	14,502	10,604	8,958	8,958	6,185
Log likelihood	-19,341	-13,445	-11,167	-11,142	-7,029

Table 9

Do overconfident CEOs overpay suppliers?

This table presents results from OLS regressions. *Input costs* is the ratio of cost of goods sold (COGS) to total sales. *Markup percentage* is the ratio of the difference between total sales and COGS to COGS. *Confident CEO (options)* is a dummy variable which equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. We restrict the sample to include only firms with at least one supplier in the current year and at least one supplier in the preceding year. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9 (continued)

	(1) OLS: Input costs	(2) OLS: Markup percentage
Confident CEO (options) $_{t-1}$	-0.014*	0.164***
	(0.008)	(0.050)
CEO stock ownership $_{t-1}$	0.001	-0.004
	(0.001)	(0.004)
Log (Total assets $_{t-1}$)	0.003	0.008
	(0.003)	(0.023)
Leverage $_{t-1}$	-0.002	-0.112
	(0.024)	(0.152)
Market-to-book ratio $_{t-1}$	-0.008***	0.043***
	(0.001)	(0.011)
Return on assets $_{t-1}$	-0.506***	2.796***
	(0.056)	(0.506)
Sales growth $_{t-1}$	0.094***	-0.147
	(0.020)	(0.136)
R&D intensity $_{t-1}$	-1.526***	9.668***
	(0.096)	(1.187)
Missing R&D $_{t-1}$	-0.006	0.010
	(0.022)	(0.145)
Log (1 + CEO tenure $_{t-1}$)	-0.008	0.014
	(0.009)	(0.067)
Cash $_{t-1}$	0.149***	-0.997**
	(0.053)	(0.459)
ROA volatility $_{t-1}$	-0.169**	1.765***
	(0.075)	(0.642)
Num. suppliers $_{t-1}$	0.001***	-0.005***
	(0.000)	(0.002)
Log (2-Year stock returns $_{t-1}$)	0.030***	-0.219***
	(0.009)	(0.070)
Investment $_{t-1}$	-0.045	-0.310
	(0.104)	(0.760)
Acquisitions $_{t-1}$	-0.013*	0.096
	(0.008)	(0.075)
SEO proceeds $_{t-1}$	-0.151	0.600
	(0.233)	(1.659)
Observations	2,244	2,244
R-squared	0.654	0.535
Industry-year fixed effects	Yes	Yes
Industry-year cluster	Yes	Yes

Table 10

The effect of CEO overconfidence on suppliers: High/low cash flow subsamples

This table presents results from logit regressions. *Suppliers increase* is a dummy variable that equals one if a firm has more dependent suppliers in year t than it has in $t-1$, and equals zero otherwise. Dependent suppliers are defined according to SFAS 14. *Confident CEO (options)* is a dummy variable which equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. We split firms by their lagged levels of *Cash flow*. Following Chang et al. (2014), we define cash flow as the sum of income before extraordinary items (*ibc*), extraordinary items and discontinued operations (*xidoc*), depreciation and amortization (*dpc*), deferred taxes (*txdc*), equity in net loss (*esubc*), gains in sale of PP&E and investment (*sppiv*), other funds from operation (*fopo*), the exchange rate effect (*exre*), and less changes in working capital (*wcapc*). We scale cash flow by total assets (*at*) to compute *Cash flow*. We define a firm to have high (low) *Cash flow* if its *Cash flow* is higher (lower) than the median value in the year. In Columns 3 and 4, we exclude observations in the Great Recession years—2008 and 2009. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 10 (continued)

	(1) LOGIT: Suppliers increase	(2) LOGIT: Suppliers increase	(3) LOGIT: Suppliers increase	(4) LOGIT: Suppliers increase
Cash flow	Low	High	Low	High
Exclude great recession years	No	No	Yes	Yes
Confident CEO (options) $_{t-1}$	0.246**	0.176*	0.253**	0.201*
	(0.120)	(0.106)	(0.122)	(0.115)
Financial constraints $_{t-1}$	0.009	-0.019	0.021	-0.020
	(0.018)	(0.017)	(0.019)	(0.018)
CEO stock ownership $_{t-1}$	0.006	-0.016	0.005	-0.013
	(0.014)	(0.014)	(0.014)	(0.014)
Log (Total assets $_{t-1}$)	0.854***	0.876***	0.849***	0.869***
	(0.055)	(0.055)	(0.057)	(0.058)
Leverage $_{t-1}$	-0.546*	-0.646	-0.464	-0.742*
	(0.282)	(0.395)	(0.293)	(0.407)
Market-to-book ratio $_{t-1}$	0.086***	0.024	0.090***	0.028
	(0.023)	(0.019)	(0.025)	(0.020)
Return on assets $_{t-1}$	0.672	-1.083	0.591	-1.029
	(0.748)	(0.820)	(0.773)	(0.888)
Sales growth $_{t-1}$	0.433**	0.282	0.335*	0.335
	(0.184)	(0.261)	(0.182)	(0.275)
R&D intensity $_{t-1}$	3.340**	6.711***	3.055**	6.716***
	(1.323)	(0.983)	(1.386)	(1.072)
Missing R&D $_{t-1}$	0.230	0.226	0.242	0.217
	(0.214)	(0.199)	(0.215)	(0.222)
Log (1 + CEO tenure $_{t-1}$)	0.029	-0.120	0.053	-0.148
	(0.164)	(0.137)	(0.171)	(0.147)
Cash $_{t-1}$	0.787	-0.127	0.899*	-0.204
	(0.511)	(0.521)	(0.528)	(0.545)
ROA volatility $_{t-1}$	0.450	1.633*	0.752	1.388
	(1.200)	(0.881)	(1.239)	(0.915)
Log (2-Year stock returns $_{t-1}$)	-0.132	0.036	-0.126	0.011
	(0.117)	(0.115)	(0.121)	(0.117)
Investment $_{t-1}$	1.464	1.267	1.873	1.240
	(1.301)	(0.895)	(1.331)	(0.939)
Acquisitions $_{t-1}$	-0.068	0.057	-0.063	0.069
	(0.123)	(0.100)	(0.130)	(0.107)
SEO proceeds $_{t-1}$	-0.330	0.060	-0.956	0.312
	(1.603)	(1.599)	(1.608)	(1.613)
Num. suppliers $_{t-1}$	-0.033	-0.081***	-0.042**	-0.083***
	(0.021)	(0.020)	(0.020)	(0.021)
Observations	7,262	7,236	6,299	6,196
Pseudo R-squared	0.224	0.208	0.215	0.206
Industry and year dummies	Yes	Yes	Yes	Yes
Firm cluster	Yes	Yes	Yes	Yes
Two-tailed Welch-Satterthwaite t-test on Confident CEO (options) coefficients:				
Columns 1 and 2:	p-value = 0.663, d.f. = 14,285			
Columns 3 and 4:	p-value = 0.757, d.f. = 12,461			

Table 11
Does the manner of leadership matter?

This table presents results from logit and two-sided panel Tobit regressions. The dependent variables are *Suppliers increase* in Columns 1 and 2, *Employee turnover* in Columns 3 and 4, and *Employee stock holdings (%)* in Columns 5 and 6. *Suppliers increase* is a dummy variable that equals one if a firm has more dependent suppliers in year t than it has in $t-1$, and equals zero otherwise. Dependent suppliers are defined according to SFAS 14. Following Carter and Lynch (2004), *Employee turnover* is the ratio of the number of options that are cancelled, terminated, forfeited, expired, or lapsed in the year to the number of options outstanding at the beginning of the year. The construction of *Employee turnover* begins in 2004 when Compustat begins coverage of option cancellation data (*optca*). *Employee stock holdings (%)* is the total dollar value of employer stock held in the benefit plan scaled by the total assets of the benefit plan in the year. We require benefit plans to have positive employee stock holdings in the previous year. *CEO media positivity* is a dummy variable that equals one if the number of articles containing references to confidence is more than the number of articles containing references to non-confidence during the year, and equals zero otherwise (Banerjee, Humphery-Jenner, and Nanda, 2015). Missing values of *CEO media positivity* are set to zero. *Confident CEO (options)* is a dummy variable which equals one if the CEO's vested option holdings are at least 67% in-the-money on at least two instances (e.g., Campbell et al., 2011; Ahmed and Duellman, 2013), and equals zero otherwise. *Confident CEO (options)* switches from zero to one from the first such instance. Detailed variable definitions are in Appendix A. Table 1 contains a description of the sample. Robust standard errors are reported in parentheses. ***, **, * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 11 (continued)

	(1) LOGIT: Suppliers increase	(2) LOGIT: Suppliers increase	(3) P-TOBIT: Employee turnover	(4) P-TOBIT: Employee turnover	(5) P-TOBIT: Employee stock holdings (%)	(6) P-TOBIT: Employee stock holdings (%)
CEO media positivity $_{t-1}$	0.034	0.028	-0.002	-0.001	0.008	0.005
	(0.152)	(0.152)	(0.005)	(0.005)	(0.012)	(0.012)
Confident CEO (options) $_{t-1}$		0.227**		-0.017***		0.026***
		(0.109)		(0.003)		(0.008)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,923	7,923	5,231	5,231	3,121	3,121
Pseudo R-squared/Chi-squared	0.214	0.215	893.04	934.84	651.52	699.91
Industry and year dummies	Yes	Yes	No	No	No	No
Industry-year fixed effects	No	No	Yes	Yes	Yes	Yes
Firm cluster	Yes	Yes	No	No	No	No