

# Are Overconfident CEOs Good Leaders? Evidence from Stakeholder Commitments\*

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## Abstract

We find systematic evidence that overconfident CEOs are able to convince stakeholders (i.e. suppliers and employees) to take actions that contribute to their firm's success. By being intentionally over-exposed to the idiosyncratic risk of their firms, overconfident CEOs signal private information along the supply chain. Overconfident CEOs are more likely to attract suppliers and induce greater relationship-specific investment. They also gain stronger commitments from their own employees. Our evidence suggests that overconfident CEOs achieve these commitments through their leadership actions rather than their words.

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# **Are Overconfident CEOs Good Leaders? Evidence from Stakeholder Commitments\***

## **Abstract**

We find systematic evidence that overconfident CEOs are able to convince stakeholders (i.e. suppliers and employees) to take actions that contribute to their firm's success. By being intentionally over-exposed to the idiosyncratic risk of their firms, overconfident CEOs signal private information along the supply chain. Overconfident CEOs are more likely to attract suppliers and induce greater relationship-specific investment. They also gain stronger commitments from their own employees. Our evidence suggests that overconfident CEOs achieve these commitments through their leadership actions rather than their words.

## 1. Introduction

A growing literature examines the effects of managerial overconfidence on firm decision and outcomes. Evidence suggests that overconfident CEOs destroy firm value by over-investing, making costly merger and acquisition decisions, and employing loose accounting practices (Malmendier and Tate, 2005, 2008; Schrand and Zechman 2012; Ahmed and Duellman, 2013). This raises questions of why corporate boards employ such leaders (Goel and Thakor, 2008) and what can mitigate their actions (Banerjee, Humphrey-Jenner, and Nanda, 2015). However, recent findings suggest a potential bright-side as overconfident CEOs tend to be better innovators (Hirshleifer, Low, and Teoh, 2012). We add to this growing debate by asking: Are overconfident CEOs good leaders?

Our definition of leadership follows Hermalin (1998), where a leader's actions motivate employees and key affiliated parties (i.e. stakeholders) to work harder. The leader's action may act as a coordinating signal to stakeholders, who follow and commit to the leader's vision. We test the hypothesis that overconfident CEOs are good leaders by studying the behavior of a firm's major stakeholders – suppliers and employees. Stakeholder actions are an ideal test setting because firm success is closely tied to the relationship-specific investment (RSI) committed by stakeholders.

For example, consider the importance of stakeholder commitment in the success of the original iPhone. AT&T (then Cingular) helped 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.<sup>1</sup> This example shows the close inter-dependency between a firm's success and the commitments made by a firm's stakeholders towards product design and quality.

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<sup>1</sup> “*Life After the iPhone: How AT&T's Bet on Apple Mobilized the Company*” Forbes Jan 21, 2013.

By intentionally holding vested in-the-money stock options, overconfident CEOs may attract stakeholder investment, particularly when it is valuable to the firm’s success. Since relationship-specific investment is associated with high switching costs due to unique customization and low re-deployability, stakeholders engage in relationship-specific investment only when they are confident of the continuity and growth of a bilateral economic relationship. Signaling through personal investment is unlikely to reflect “cheap talk,” since the CEO not only loses her reputation but also her personal investment if the signal is revealed to be untrue. Thus, unless the CEO has precise and positive information on the firm’s investment projects, the costs are too prohibitively large to concentrate her personal wealth in the firm.

We develop a simple model to highlight the importance of signaling to attract commitment and relationship-specific investment from stakeholders. This model helps to guide our empirical tests. Canonical finance theories propose that dividends and debt are classic signaling mechanism to *shareholders*. However, such actions raise bankruptcy risk and therefore raise the probability that *stakeholders* will fail to recoup their investment, adversely affecting their commitment and choices. Because signaling with the CEO’s personal wealth does not raise bankruptcy risk, it may be an ideal signal to convince stakeholders to take actions that will improve the probability of firm success.

Our study focuses on 2391 unique firms in the Execucomp database with available CEO stock options data over the sample period from 1992 to 2012. Results from a conditional logit model show that increases in CEO’s vested option holdings attract additional major suppliers. Controlling for firm fixed effects, we find that a positive signal from the CEO’s personal investment has a marginal effect of 3.60% on the likelihood of increasing the number of dependent suppliers onboard the firm. This is economically large given that only 6.2% of firm-year observations in our sample

experience this event. Our results continue to hold using an OLS model, propensity score matching, and with the inclusion of firm strata (i.e. fixed effects). Collectively, this suggests that unobserved firm heterogeneity is not behind our results. We also find similar effects when CEO's exercise their vested options – major suppliers terminate their relation with these customers.

Our simple model also predicts that CEO's vested options holdings relate to increases in suppliers' relationship-specific investment (RSI). Following Dass, Kale, and Nanda (2014) we use trade credit as a proxy for RSI and find that suppliers extend additional trade credit when CEO's vested options holdings increase. Together, this suggests that suppliers take cues from their customer CEO's option activity, and choose their commitment and investment accordingly.

Next, we show that CEO's option exercise behavior predicts higher employee commitment as measured by the moneyness of non-executive employees' options. A positive/negative signal from the CEO's option exercise behavior has a marginal effect of 11%/-9.74% on the likelihood of a substantial increase/decrease in non-executive employees' option moneyness. This suggests that employees also take cues from CEO's option behavior.

Finally, we explore whether stakeholders are motivated by CEO's actions or by their words. For example, overconfident CEOs may be particularly charismatic, “charming” stakeholders into long-term investments with their firm. Using a media based measure of CEO overconfidence (Banerjee, Humphrey-Jenner, and Nanda, 2015), we find that suppliers only respond to the vested CEO options and not to the media-based level of CEO overconfidence. Therefore, we conclude that stakeholders follow the CEO's actions rather than ‘cheap-talk.’

Our study contributes to the literature on leadership in two ways. First, we show that CEO leadership may reach beyond the boundaries of the firm to include key stakeholders such as major suppliers. This extends existing studies on how managerial leadership motivates firm employees. Almazan, Chen, and Titman (2013) show that “top-down” capital allocation may optimally create higher levels of investment expenditure to motivate effort from employees. Hermalin (1998) and Komai, Stegeman, and Hermalin (2007) show that greater effort by managers may signal private information, motivating subordinates to work harder. Second, we introduce a new signaling mechanism – CEO’s own personal wealth – which suggests that CEO confidence may be an important aspect of providing leadership.

We also contribute to the growing literature on the dark and bright side of CEO overconfidence. Our findings suggest that CEO overconfidence produces good outcomes by inducing relationship-specific investment from stakeholders and commitment by employees. This is consistent with the finding that overconfident CEOs are better innovators (Hirshleifer, Low, and Teoh, 2012).

Our paper is structured as follows. In Section 2, we formulate our hypotheses using a simple model. Section 3 discusses our data, variable construction, and empirical design. We present our empirical results and additional tests in Section 4 and 5, respectively. Section 6 concludes.

## **2. Model**

We use a simple model to illustrate that a CEO whose firm has good prospects is able to signal to stakeholders by holding a fraction of firm equity. The main friction in the model is that the CEO has private information on firm type (high/low), which

stakeholders cannot observe. If the CEO can credibly signal, then stakeholders will increase their investment toward the CEO's firm, improving the total firm's output.

Consider a firm with random output  $\tilde{X}_t(I)$  which is increasing in stakeholder's investment,  $I$ . The productivity of the random output  $\tilde{X}_t(I)$  is either low or high, i.e.  $t = L, H$ . The probability  $p$  that  $t = H$  and  $1 - p$  that  $t = L$  are common knowledge to both CEO and stakeholders. The mean of  $\tilde{X}_t(I)$  is  $X_t^I$  with investment and  $X_t^0$  without investment. Before the CEO observes the firm type and chooses  $\alpha$ , the value of the firm is  $V_0 = pX_H + (1 - p)X_L$ . For simplicity, we assume that stakeholder prefers to invest in the firm only if the firm is the high-type, and prefers to invest nothing if the firm is low-type. If the firm is high-type, the firm may receive stakeholder investment and produce output  $X_H^I$  or no-investment output  $X_H^0$  where  $X_H^I > X_H^0$ . If the firm is low-type,  $X_L$ , the firm may receive stakeholder investment and produce output  $X_L^I$  or no-investment output  $X_L^0$  where  $X_L^I > X_L^0$ .

The CEO's wealth is described in the following equation:

$$W_t = s - \alpha s + \frac{\alpha s}{V_0} \tilde{X}_t(I)$$

where  $s$  is her total salary,  $\alpha$  is the fraction of salary invested in firm equity,  $V_0$  is firm value at time 0, and  $\frac{\alpha s}{V_0} \tilde{X}_t(I)$  represents the dollar value of equity holding in the company. We assume the CEO is risk-averse with expected utility function:

$$U(W_t) = EW_t - \frac{b}{2} Var(W_t) \quad \text{where } t = L, H$$

where  $b$  is the CEO's risk aversion. Therefore, the expected utility of a type  $t$  entrepreneur can be written as:

$$EU_t(\alpha, V) = s - \alpha s + \frac{\alpha s}{V_0} \tilde{X}_t(I) - \frac{b}{2} \frac{\alpha^2 s^2}{V_0^2} \sigma^2$$

The timeline of events is as follows:

<u>t=1</u>	<u>t=2</u>	<u>t=3</u>
CEO observes firm type $\tilde{X}_t$ and chooses $\alpha$	Stakeholder observes $\alpha$ , choose $I$	$X$ output is realized

Let us examine the  $\alpha$  values that allow the high-type to signal. Consider a low-type firm first. In the separating equilibrium, the low-type CEO does not hold firm equity and  $EU_L(0, X_L^0) = s$ . If the low-type CEO successfully mimics, then  $EU_L(\alpha, X_L^I) = s - \alpha s + \frac{\alpha s}{V_0} X_L^I - \frac{b}{2} \frac{\alpha^2 s^2}{V_0^2} \sigma^2$  where  $\sigma^2$  is the firm variance. The separating equilibrium occurs when the low-type is better off not mimicking,  $EU_L(0, X_L^0) \geq EU_L(\alpha, X_L^I)$  which yields  $\alpha \geq \hat{\alpha}_L^*$ . Therefore, the high-type CEO will need to invest at least  $\hat{\alpha}_L^*$  to deter the low-type CEO from mimicking, where:

$$\hat{\alpha}_L^* = \frac{2V_0(X_L^I - V_0)}{sb\sigma^2}$$

For the high-type CEO,  $EU_H(\alpha, X_H^I) = \alpha X_H^I + s - \alpha V_0 - \frac{b}{2} \alpha^2 \sigma^2$  if she is able to successfully signal by holding  $\alpha$ .  $EU_H(0, X_H^0) = s$  if she does not signal. The separating equilibrium occurs when  $EU_H(\alpha, X_H^I) \geq EU_H(0, X_H^0)$ . Therefore the high-type CEO will invest at most  $\alpha \leq \hat{\alpha}_H^*$ , where:

$$\hat{\alpha}_H^* = \frac{2V_0(X_H^I - V_0)}{sb\sigma^2}$$

Since  $X_H^I > X_L^I$ , then  $\hat{\alpha}_H^* > \hat{\alpha}_L^*$  implying a range of  $\alpha$  such that the high-type firm can separate from the low-type firm.

Using the foundations of the model, we formulate testable empirical predictions. We focus primarily on a group of important stakeholders, namely the corporate suppliers and customers, as recent research suggests that strong economic ties between customer and supplier firms are prevalent in the U.S. economy.<sup>2</sup> In our idealized setting, the high-

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<sup>2</sup> For example, Fee, Hadlock, and Thomas (2006) document that approximately 16 percent of Compustat firms sell to major customers<sup>2</sup> during the period 1981 to 2001. Our model likewise applies to employees, but measuring employee investment and effort is empirically challenging.

type firm credibly signals, attracting stakeholder investment. This leads to our first predictions.

**Prediction 1:** *The CEO's personal investment in the firm increases the likelihood of having a dependent supplier network.*

Although our model considers a single stakeholder choosing to invest, the intuition is similar if the investment is continuous. If the high-type can separate, then it will receive greater stakeholder investment. This leads to our second related prediction.

**Prediction 2:** *The CEO's personal investment in the firm increases relationship-specific investment by suppliers and employees.*

Our next set of predictions relate to scenarios where the CEO's personal investment in the firm is particularly informative of firm-type. The lower bound  $\hat{\alpha}_L^*$  is lower when firm volatility is high, making it easier for the high-type to separate. This makes  $\alpha$  a more informative signal when firm volatility is high.

**Prediction 3:** *The CEO's personal investment in the firm is more informative when firm volatility is high.*

Likewise the lower bound  $\hat{\alpha}_L^*$  is also lower when ex-ante firm value is high, making  $\alpha$  also more informative in this scenario.

**Prediction 4:** *The CEO's personal investment in the firm is more informative when ex-ante firm value is high.*

### 3. Data

This section describes the data and variable construction. We start with firms in the Execucomp database with available stock option data on CEOs. The Execucomp database covers more than 3000 firms and provides compensation data for top

executives of firms from the year 1992 onwards. Following standard literature, we remove utilities (SIC: 4000 – 4999) and financial firms (SIC: 6000 – 6999).

Next, we identify customer and supplier pairs from the business segment files of Compustat. Financial variables and stock return data are obtained from Compustat and CRSP respectively. Our sample period starts from 1993 and ends in 2011, which is the last year that we have information on customer-supplier pairs.

### 3.1 Personal Investment Measure

When the CEO holds vested in-the-money options for an extended period she concentrates her personal investment in the firm and her decision to not diversify serves as a powerful signal of her expectations of the future business prospects of the firm. This idea motivates our focus on option-based measures as our primary proxies of the CEO's personal investment in her own firm.

From Execucomp, we obtain data on the number and value of the CEO's vested stock options. First, we construct the *CEO Confidence* measure as the ratio of average value per option to average strike price, following Banerjee, Humphrey-Jenner, and Nanda (2015), 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 (CRSP: prcc f) less the average value per option. Next, we construct 3 measures based on the *CEO Confidence* measure. *CEO Confidence 75* is an indicator which equates to unity if *CEO Confidence* is in the top quartile of the year, and equates to 0 otherwise. *CEO Confidence Up* is an indicator which equates to unity if *CEO Confidence 75* in the current year and the previous year is unity and 0 respectively, and equates to 0 otherwise. *CEO Confidence Down* is an indicator which equates to unity if *CEO Confidence 75* in the current year and the previous year is 0

and unity respectively, and equates to 0 otherwise. In addition to option-based measures, we also use a stock ownership measure. *CEO Share Ownership* equates to unity if the fraction of stock awards in the CEO's total compensation is in the top quartile of the year, and equates to 0 otherwise.

### 3.2 Customer Links

We identify major customer-supplier relationships from the business segment files of Compustat. In accordance with SFAS 14, public firms are required to disclose names of their principal customers, which are defined as customers that contribute to at least 10 percent of the total revenue of the firm, or if sales to a customer is material to the business of the firm. The amount of sales to each principal customer must also be disclosed. The names of the principal customers are manually matched to its GVKEY in Compustat by closely following the approach in Fee, Hadlock and Thomas (2006). For customer names that are abbreviated, visual inspection and industry affiliation are used to determine whether the customer is listed in Compustat. For the remaining unmatched customers, their corporate websites of the Directory of Corporate Affiliation (DCA) database is checked to determine if the customer is a subsidiary of a listed firm. If so, the customer is assigned to its parent's GVKEY. To ensure accuracy, any customer name that cannot be unambiguously matched to a GVKEY is discarded. By inverting this dataset, we have a list of firms reporting the identities of their dependent suppliers.

Next, we identify whether our sample of Execucomp firms are reported as major customers by dependent supplier firms using the customer-supplier dataset. As each firm can have multiple suppliers, we create a *Supplier Network* indicator which equates to unity if the sample firm has at least one dependent supplier, and equates to 0 if it is not reported as a customer in the customer-supplier dataset. Following this, *Initiation of*

*Supplier Network* equates to unity if *Supplier Network* in the current year and previous year is unity and 0 respectively, and equates to 0 otherwise. *Termination of Supplier Network* is defined symmetrically. Where *Initiation of Supplier Network* and *Termination of Supplier Network* both equate to 0, there is a status quo in the existence of a supplier network. We also compute *Number of Suppliers* which is the number of dependent suppliers in the firm's network. Relatedly, *Increase (Decrease) in Number of Suppliers* equates to unity if the year-on-year change in *Number of Suppliers* is positive (negative), and equates to 0 otherwise.

### **3.3 Trade Credit**

We measure the firm's *Trade Credit* from suppliers as its dollar accounts payable scaled by the dollar cost of goods sold. A larger *Trade Credit* therefore indicates that more generous trade credit terms were extended to the firm in aggregate by its suppliers. To capture non-trivial improvement in trade credit, we create the *Trade Credit Improvement* indicator which equates to unity if the year-on-year change in *Trade Credit* is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. As trade credit is a form of financing and the firm's needs for financing is a function of its cash holdings, we also include *Cash*, cash holdings scaled by total assets, as a control.

### **3.4 Additional Variables**

We control for firm size using the logarithm of total assets (*Total Assets*) since larger firms are less likely to suffer from volatility and more likely to have a supply chain network. Prior studies (Titman, 1984; Maksimovic and Titman, 1991; Kale and Shahrur, 2007; Banerjee et al, 2008) have documented that a firm's capital structure affects its stakeholders' commitment towards long-term contracting since a more levered

firm can pass on higher financial distress risks to its stakeholders. Thus, we control for the firm's *Leverage* computed as the sum of short-term and long-term debt scaled by total assets. Financial distress risk and stability of operating income are controlled by *Altman Z-Score* and *ROA Volatility* respectively. We control for the *Market-to-Book Ratio* of the firm computed as the market value of equity divided by the book value of equity.

Additionally, we include the firm's capital expenditures scaled by total assets (*Capital Expenditure*) and its R&D expenses scaled by total assets (*Research & Development*) since firms that are aggressively taking on investment projects and/or innovating may require greater relationship-specific investments from their suppliers as well. We set missing *Research & Development* values to be zero. To ensure that our results are not driven by management changes in the firm, we control for *Occurrence of CEO Turnover* which equates to unity if a CEO steps down, and equates to 0 otherwise. In robustness tests, we also control for corporate governance for the firms by using *G-Index* (Gompers, Ishii and Metrick, 2003). We exclude *G-Index* in our main analyses because its inclusion in the regression specifications reduces sample size substantially. Crucially, we include the logarithm of buy-hold returns of firm stock over the past 24 months as a control because equity performance may be mechanically correlated with our personal investment measure.

All financial variables are winsorized at the 5th and 95th percentiles of their distributions to minimize the influence of outliers. We control for fixed effects across various dimensions in both our OLS and conditional logit regressions.

### **3.5 Summary Statistics**

We have 2391 unique firms from 1992 to 2012, giving a panel of 24385 firm-year observations. Among these firms, departures of dependent suppliers (15.7%) are more

common than arrivals of dependent suppliers (6.2%). Unsurprisingly, terminations and initiations of supplier networks are rarer events, occurring in 3.3% and 3.9% of the sample observations respectively.

[Insert Table 1]

Our sample firms, on average, have total assets of 1076 million. The average sample firm has total debt of 22.4% relative to total assets, ROA of 5.6% and a market-to-book ratio of 3.1. In terms of the Altman's Z-score, the average sample firm is financially healthy with a value of 5.31, and has volatility in ROA of 5.4%.

## 4. Results

This section presents our main results. We start by testing our main predictions that CEO's holdings of in-the-money options relate to stakeholder investment in supplier networks.

### 4.1 Supplier Networks

To test our first prediction, we estimate a conditional logistic regression using the following two specifications:

$$Pr(\text{Increase in \# of Suppliers}_{i,t}) = a + b_1 \text{CEO Confidence Up}_{i,t} + b_3 \theta_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$Pr(\text{Decrease in \# of Suppliers}_{i,t}) = a + b_2 \text{CEO Confidence Down}_{i,t} + b_3 \theta_{i,t} + \varepsilon_{i,t} \quad (2)$$

In equation (1), the dependent variable, *Increase in Number of Suppliers*, is equal to 1 if the firm experiences an increase in the total number of suppliers, and zero otherwise. For equation (2), the dependent variable, *Decrease in Number of Suppliers*, is equal to 1 if the firm experiences a decrease in the total number of suppliers in that year. *CEO Confidence Up* is equal to 1 if the continuous *CEO Confidence* measure is in

the top quartile of the sample and if it was not in the top quartile of the sample in the previous year. *CEO Confidence Down* is equal to 1 if the continuous *CEO Confidence* measure is not in the top quartile of the sample and if it was in the top quartile of the sample in the previous year.  $\theta$  represents control variables as described in Section 3.4 and are defined in the Appendix.

From Prediction 1, we expect  $b_1 > 0$  in equation (1) and  $b_2 > 0$  in equation (2) if the CEO's personal investment serves as a credible signal of the CEO's private information of the future value of the firm.

The conditional logit model (also known as the fixed-effect logit model) stratifies observations along the dimension of the intended fixed effect. Therefore, there must be variation within each stratum.<sup>3</sup> This condition allows the conditional logit model to sidestep the incidental parameters problem by avoiding the estimation of the fixed effect parameters. Inevitably, this causes fluctuations in sample sizes across different model specifications. We perform various stratifications and clustering to ensure that our results are robust.

[Insert Table 2]

The results in Panel A of Table 2 show that suppliers respond to the CEO's personal investment signal across all six specifications. Column (1) shows that the firm significantly increases its dependent suppliers during the year that CEO confidence moves into the top quartile. The results are similar using firm strata in Column (2). Columns (3) and (4) show evidence that a firm tends to lose dependent suppliers when the CEO emits negative signals from her personal investment. The results are also economically large. The *CEO Confidence Up* has a marginal effect of +3.60% on the

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<sup>3</sup> If a certain stratum experiences no variation in the dependent variable, all observations in that stratum is eliminated.

likelihood of the firm experiencing an expansion of its supplier network, where the unconditional mean is on 6.20%. Notably, increases (decreases) in the supplier network size are only significantly driven by positive (negative) personal investment signals.

While the number of observations varies due to the conditional logit estimation procedure, our conclusions remain unchanged. Our results are also not affected by CEO ownership, consistent with the idea that ownership is a weak signal since CEOs may be required to hold equity as part of their compensation contract. We also observe results consistent with extant literature. Firms with lower financial distress risks (i.e. larger firm, lower leverage and higher Altman’s Z-score) are more likely to induce supplier networks.

Next we show that our results are robust in a standard OLS setting. We estimate a panel regression using the following equation:

$$\# \text{ of Suppliers}_{i,t}^{Adjusted} = a + b_1 \text{CEO Confidence}_{i,t} + b_2 \theta_{i,t} + \varepsilon_{i,t} \quad (3)$$

The dependent variable,  $\# \text{ of Suppliers}_{i,t}^{Adjusted}$ , is the number of total dependent suppliers. We adjust the variable by subtracting its industry-year median to ensure the variable is not left censored at 0. *CEO Confidence* is the continuous measure of the CEO’s vested in-the-money options.

Panel B of Table 2 shows that the OLS regressions produce similar results. The coefficient estimate,  $b_1$ , remain positive and statistically significant with the inclusion of industry, firm, and year fixed effects. Our findings are robust to alternative methods of adjusting standard errors.

While these results show a strong link between CEO’s vested in-the-money options and changes in supplier links, a sharper test of our hypothesis is to consider the

boundary scenario where firms either attract their first large major supplier or when they lose their last dependent supplier.

Table 3 presents the results of conditional logit regressions following a similar specification as Equation (1) and (2), but replacing the dependent variable with either *Initiation of Supplier Network*, a dummy equal 1 if the firm starts with zero suppliers and gains a supplier during the year, or *Termination of Supplier Network*, a dummy equal 1 if the firm loses all its suppliers during the year.

[Insert Table 3]

While *CEO Confidence Up* is only weakly related to initiations, the coefficient on *CEO Confidence Down* is negative and statistically significant in Columns (3) and (4). In Column (3), *CEO Confidence Down* has a marginal effect of +0.59% on the likelihood of the firm experiencing a termination of its supplier network relative to the unconditional probability of 3.90%.

In sum, we find evidence that CEO holdings of vested options positively relate to changes in supplier relationships. These findings are robust across various econometric specifications and also exist when we focus only on initial supplier links and termination of supplier links. These findings suggest that suppliers are carefully watching the CEO's actions and following his or her leadership.

## 4.2 Relationship Specific Investment

While supplier links reflect one aspect of commitment, the strength of the supplier relationship may also exist along other dimensions. In this section, we investigate whether the CEOs' personal investment decisions induce relationship-specific investment (RSI) by suppliers using two approaches. First we use trade credit and then we partition our sample based on durable and non-durable industries.

Dass, Kale and Nanda (2014) propose that extension of trade credit reflects greater commitment levels of supplier RSI as it helps to resolve contracting issues that arise in the customer-supplier relationships. One example of such issues is that the quality of relationship-specific goods may not be easily specified ex-ante or verified ex-post. Therefore, vertical supplier-customer relationships are susceptible to potential underinvestment and moral hazard problems. To resolve this problem, customers may extend trade credit as an implicit guarantee, suggesting that greater trade credit reflects greater commitment levels of RSI in the relationships.

We expect suppliers to extend more trade credit when CEOs signal their confidence in the future prospects of the firms. We test this using conditional logit regressions by creating *Trade Credit Improvement* which equates to 1 if the year-on-year increase in *Trade Credit* exceeds the industry-year 75<sup>th</sup> percentile value. This ensures that captured enhancements in trade credit are non-trivial.

Our regression tests follow the specification:

$$Pr(\text{Trade Credit Improvement}_{i,t}) = a + b_1 \text{CEO Confidence Up}_{i,t} + b_2 \theta_{i,t} + \varepsilon_{i,t} \quad (5)$$

Table 4 (Panel A) reports that across all specifications, *CEO Confidence Up* is a statistically significant and positive predictor of increases in trade credit. Column (1) employs year strata while Columns (2) and (3) use industry-year strata. Standard errors are robust and clustered along various dimensions. The coefficient estimate  $b_1$  translates to a +4.26% probability of a substantial improvement in trade credit. Our findings continue to hold after including firm strata in Column (4), suggesting that our results are unlikely driven by unobserved firm heterogeneity. In unreported tables, our results remain qualitatively similar if we restrict the sample to firms with at least 1 dependent supplier in each of the current and previous years.

Next, we consider whether the CEO's personal investment has differential effects on RSI across industries. Firms in manufacture durable goods industries are more likely to produce unique products that can only be sold to few customers (Titman and Wessels, 1988). This suggests that suppliers of firms in industries which manufacture durable goods are more likely to be less diversified and dependent on their customers (Banerjee et al., 2008) argues that. Therefore, we hypothesize that the abovementioned CEOs are also more likely to signal their firm prospects via their personal investments to encourage their suppliers to commit RSI.

To test the hypothesis that the CEOs' personal investment signals have stronger effects on supplier outcomes in durable goods industries, we follow Titman and Wessels (1988) and allocate firms whose primary SIC codes ranges from 3400 (inclusive) to 4000 (exclusive) to the *Durable* subsample. Firms with primary SIC codes in the range of 2000 (inclusive) to 3400 (exclusive) are allocated to the *Non-Durable* subsample.

Table 4 (Panel B). presents the results of analyses on subsamples split on *Durable* and *Non-Durable* industries. Columns (1) and (2) show that *CEO Confidence Up* is a statistically significant and positive predictor of *Increase in Number of Suppliers* in the *Durable* subsample, and but insignificant in the *Non-Durable* subsample. Symmetrically, in Columns (3) and (4), we find that the effect of *CEO Confidence Down* on *Decrease in Number of Suppliers* is limited to firms in the *Durable* subsample, but not the *Non-Durable* subsample. Consistent with our conjecture, these results suggest that the CEOs' personal investment signals play different roles within bilateral customer-supplier relationships in *Durable* and *Non-Durable* industries. Columns (5) and (6) to show that the effects of the CEOs' personal investment signals on *Trade Credit Improvement* are observed only in the *Durable* subsample, and not in the *Non-Durable* subsample.

In sum, Table 4 (Panel A) provides evidence that CEOs’ personal investment signals have implications on supplier commitment while Table 4 (Panel B) suggests that the effect is likely to manifest via the signaling channel.

### 4.3 Employee Commitment

In this section, we explore how employees respond to changes in CEO confidence. Employees are key stakeholders in the firm and, as does the CEO, have human capital closely tied to firm performance. If the CEO’s option holdings are a valuable signal of future prospects, we would also expect employees to increase their commitment and investment in the firm.

However, measuring employee commitment is difficult task. One possibility is to use survey data (i.e. 100 best places to work for), but that approach significantly reduces the available sample and has limited time-series. We use employee option moneyness as a measure of commitment. We argue that employees who keep larger amounts of their options in the firm are more committed to the firm. Employee options are good measure for our purposes because it signals both that the employee has a long-term commitment and is willing to invest their own personal wealth.

To test employee commitment, we estimate a conditional logit using the following equations:

$$Pr(NEE\ Money\ Up_{i,t}) = a + b_1 CEO\ Confidence\ Up_{i,t} + b_3 \theta_{i,t} + \varepsilon_{i,t} \quad (4)$$

*NEE Money Up* equates to unity if the year-on-year increase in non-executive employees’ option moneyness is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. *High NEE Money* equates to unity if the moneyness of non-executive employees’ option exceeds the industry-year 75<sup>th</sup> percentile value. Imposing

these distribution cutoffs ensures that we are capturing non-trivial evolutions of non-executive employees' option moneyness.

[Insert Table 5]

Table 5 presents the results of our employee commitment tests. The first three columns show that *CEO Confidence Up* is positive and significantly associated with increases in employee option moneyness. The coefficient estimates on *CEO Confidence Down* are negative and statistically significant suggesting that employees also take cues when CEOs exercise their vested options. Controlling for firm fixed effects, we find that the marginal effects of *CEO Confidence Up* and *CEO Confidence Down* on substantial increases in non-executive employees' option moneyness are +10.98% and -9.74% respectively. Our findings are robust across specifications using industry-year and firm strata. The latter suggests that unobserved firm heterogeneity is not behind our results.

A possible issue with this analysis is that both the CEO and employees share similar views on the future prospects of the firm. This opens the possibility of an omitted variable driving both parties to hold onto their vested options. However, we argue that this is unlikely for two reasons. First, non-executive employees are unlikely to have the same information set as the CEO. Second, if the result is indeed driven by both parties sharing the same views, we should not observe the marginal effects of *CEO Confidence Up* to be similar in magnitude to that on *CEO Confidence Down* (as discussed above). Non-executive employees ought to react asymmetrically to the CEO's option exercise behavior because negative signals from her personal investment decisions may be noisier than positive ones. The decision to exercise vested options could be motivated by personal circumstances instead of a signaling intent. For example, Liu and Yermack (2012) document that S&P500 CEOs purchase personal real estate using options and

equity. Instead, we observe evidence that is consistent with the CEO's personal investment signaling channel.

#### 4.4 Valuation and Volatility

If Predictions (3) and (4) of our theoretical model are correct, we should find evidence that signals from the CEOs' personal investment are more informative in firms which are of higher valuation and higher volatility.

A firm-year is designated a *High Valuation* status if its industry-year median *Market-to-Book Ratio* is above the median value of the distribution in the year, and is designated a *Low Valuation* status otherwise. We opted to use the industry-year median *Market-to-Book Ratio* as it is arguably a more exogenous measure of ex-ante firm valuation. In a similar vein, firm-year is designated a *High Volatility* status if its industry-year median *ROA Volatility* is above the median value of the distribution in the year, and is designated a *Low Volatility* status otherwise. In the designation of firm volatility statuses, we favored the use of *ROA Volatility* over that of volatility of stock returns because the latter is directly related to the CEOs' personal investment measures. We also create the indicator *HighValuation-HighVolatility* which equates to unity if the firm-year is designated both *High Valuation* and *High Volatility* statuses concurrently, and equates to 0 otherwise.

[Insert Table 6]

Columns (1) to (4) present evidence that firm valuation and volatility have a mediating effect on the relationship between *Adjusted Number of Suppliers* and our CEOs' personal investment measures. In these 4 columns, we find that the estimated coefficients on *CEO Confidence* and *CEO Confidence 75* are not statistically significant, albeit being correctly signed. Instead, we find that their respective interactions with *HighValuation-HighVolatility* are statistically significant and positive predictors of

*Adjusted Number of Suppliers.* We adopted an alternative method of investigating the effects of firm valuation and volatility in a conditional logit setting because the interpretation of interaction terms in non-linear models is tenuous. In Columns (5) and (6), we created 2 corner subsamples – one comprising firm-years with joint *High Valuation* and *High Volatility* statuses and the other one comprising firm-years with concurrent *Low Valuation* and *Low Volatility* statuses. Consistent with our theoretical predictions, we find that CEOs’ personal investment signals only affect *Trade Credit Improvement* in the *High Valuation – High Volatility* corner subsample.

On aggregate, the evidence in Table 6 suggests that CEOs’ personal investment serve as more credible signals to induce suppliers into contractual relationships and commitment of RSI when ex-ante firm valuation is higher. Alternatively, we can view higher firm valuation as an indication of greater information asymmetry since such firms typically possess more future growth options which are harder to value than in-situ assets. Our results also support the notion that the utility of CEOs’ personal investment signals to external stakeholders is higher in industries characterized by higher operating income uncertainty. In these environments of uncertainty, the CEOs’ signals are more useful to suppliers in separating firms with favorable prospects from those with less favorable ones.

## **5. Additional Tests**

This section presents our additional tests. First, we examine whether stakeholders are influenced by CEO actions or their words. Next, we present additional tests using propensity score matching to ensure that our results are robust.

## 5.1 Media Measure of Overconfidence

An alternative behavioral story for our results could be that our option-based measures are capturing overconfidence of CEOs. As an artefact of overconfidence, these CEOs may also be highly charismatic and hence more likely to charm suppliers into long-term contractual commitments. To support the claim that our results are driven by a rational personal investment signaling mechanism, we employ *CEO Media Positivity* as a news-based measure of CEO overconfidence. This measure is constructed based on the relative frequency of positive statements to negative states made by the CEO (Hirshleifer, Low and Teoh, 2012). Since this measure is independent of the CEOs' option exercise behavior, it does not constitute a personal investment signal. Instead, *CEO Media Positivity* is likely to measure the behavioral bias of CEOs.

[Insert Table 7]

We add *CEO Media Positivity* to equations (3), (5) and (6) and pit it against the CEO personal investment measures. In Columns (1), (2), (3) and (4), we perform tests pertaining to suppliers and non-executive employees. We unequivocally found that *CEO Media Positivity* has weak predictive power while the CEO personal investment measures retain their explanatory powers. In Columns (5) and (6) where *CEO Media Positivity* is a statistically significant predictor, we find that the previously documented effects of *CEO Confidence Up* and *CEO Confidence Down* survive. While this does not rule out the possibility that our CEO personal investment measures are encapsulating some form of overconfidence or managerial hubris, our evidence suggests that there may also be room for a rational signaling explanation.

## 5.2 Propensity Score Matching

Setting *CEO Confidence 75* to be the treatment, we match each treated observation to an untreated one based on their propensity scores. Sample observations are 1-to-1 matched on all observable characteristics without replacement.

[Insert Table 8]

Table 8 (Panel A) presents results of regressions performed on the matched sample. In tests pertaining to both suppliers and non-executive employees, we observe evidence which is consistent with our rational signaling mechanism. Various fixed effects and clustering specifications are employed. Though our results, especially those in Columns (3) and (4), display strong statistical significance, a potential caveat is that the standard errors in these results have not been adjusted for the fact that the propensity scores (from which the matched sample is constructed) are estimates in themselves.

Table 8 (Panel B) presents propensity score matching diagnostics. We observe that the firms in both the treated and control samples are well-matched on all observable characteristics.

## 6. Conclusion

This paper tests the hypothesis that overconfident CEOs are good leaders. We find systematic evidence that overconfident CEOs are able to convince stakeholders (i.e. suppliers and employees) to take actions that contribute to their firm's success. By being intentionally over-exposed to the idiosyncratic risks of their firms, overconfident CEOs signal private information along the supply chain. Overconfident CEOs are more likely to attract suppliers and induce greater relationship-specific investment. They also gain stronger commitments from their own employees. Our evidence suggests that overconfident CEOs achieve these commitments through their leadership actions rather than their words.

Our study suggests that CEO overconfidence adds value to the firm by inducing relationship-specific investment from stakeholders and commitment by employees. This is consistent with recent findings that overconfident CEOs are better innovators (Hirshleifer, Low, and Teoh, 2012). While overconfidence is often perceived as a negative trait, future research may explore the potential bright side of overconfidence.

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## Appendix Variable Definitions

Variable	Definition	Data Source
<i>CEO Confidence</i>	Average value of the CEO's options scaled by the average strike price (Malmendier et al., 2011). 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 (CRSP: prcc f) and the numerator.	Execucomp, CRSP
<i>CEO Confidence 75</i>	Variable equals unity if <i>CEO Confidence</i> in the year exceeds the 75 <sup>th</sup> percentile value of its distribution, and equals 0 otherwise.	Execucomp, CRSP
<i>CEO Confidence Up</i>	Variable equates to unity if <i>CEO Confidence</i> in the current year is in the top quartile of the sample and if <i>CEO Confidence</i> in the previous year is not in the top quartile of the sample, and equates to 0 otherwise.	Execucomp, CRSP
<i>CEO Confidence Down</i>	Variable equates to unity if <i>CEO Confidence</i> in the current year is not in the top quartile of the sample and if <i>CEO Confidence</i> in the previous year is in the top quartile of the sample, and equates to 0 otherwise.	Execucomp, CRSP
<i>CEO Media Positivity</i>	Variable equals the relative frequency of positive media statements to negative media statements made by the CEO (Hirshleifer, Low & Teoh, 2012).	
<i>CEO Share Ownership</i>	Variable equals unity if fraction of shares awarded to CEO in total compensation is in the top quartile of the year, and equals 0 otherwise.	Execucomp

## Appendix (Continued)

Variable	Definition	Data Source
<i>Total Assets</i>	Logarithm of total firm assets.	Compustat
<i>Leverage</i>	Sum of long-term debt and short-term debt, scaled by total assets.	Compustat
<i>Altman Z-Score</i>	Variable equals $1.2 * (\text{working capital} / \text{total assets}) + 1.4 * (\text{retained earnings} / \text{total assets}) + 3.3 * (\text{EBIT} / \text{total assets}) + 0.6 * (\text{market value of equity} / \text{total liabilities}) + 0.999 * (\text{sales} / \text{total assets})$ .	Compustat
<i>Market-to-Book Ratio</i>	Ratio of market value of equity to book value of equity.	Compustat, CRSP
<i>Return on Assets</i>	Ratio of operating income to beginning total assets.	Compustat
<i>Sales</i>	Total sales of firm scaled by <i>Total Assets</i>	Compustat
<i>Institutional Ownership</i>	Percentage of firm shares held by institutional owners.	Thomson Reuters
<i>Capital Expenditure</i>	Capital expenditure of firm.	Compustat
<i>Research &amp; Development</i>	Research & development expenses of firm.	Compustat
<i>Occurrence of CEO Turnover</i>	Variable equals unity if there was a CEO turnover event in the previous year, and equals 0 otherwise.	Execucomp
<i>Cash</i>	Cash holdings scaled by total assets of firm.	Compustat
<i>ROA Volatility</i>	Standard deviation of <i>Return on Assets</i> over the past 36 months.	Compustat

## Appendix (Continued)

Variable	Definition	Data Source
<i>Stock Return (2 Years)</i>	Buy-and-hold returns of firm stock over past 24 months.	CRSP
<i>Supplier Network</i>	Variable equals unity in a year if the firm has at least one dependent supplier defined under S.E.C Regulation S-K, and equals 0 otherwise.	Compustat
<i>Initiation of Supplier Network</i>	Variable equals unity in a year if <i>Supplier Network</i> is unity in the current year and <i>Supplier Network</i> is 0 in the previous year, and equals 0 otherwise.	Compustat
<i>Termination of Supplier Network</i>	Variable equals unity in a year if <i>Supplier Network</i> is zero in the current year and <i>Supplier Network</i> is unity in the previous year, and equals 0 otherwise.	Compustat
<i>Number of Suppliers</i>	Number of dependent suppliers defined under S.E.C. Regulation S-K.	Compustat
<i>Adjusted Number of Suppliers</i>	The difference between <i>Number of Suppliers</i> and the industry-year median <i>Number of Suppliers</i> .	Compustat
<i>Increase in Number of Suppliers</i>	Variable equals unity if <i>Number of Suppliers</i> in the current year is higher than <i>Number of Suppliers</i> in the previous year, and equals 0 otherwise.	Compustat
<i>Decrease in Number of Suppliers</i>	Variable equals unity if <i>Number of Suppliers</i> in the current year is lower than <i>Number of Suppliers</i> in the previous year, and equals 0 otherwise.	Compustat
<i>Trade Credit</i>	Accounts payable scaled by cost of goods sold.	Compustat
<i>Trade Credit Improvement</i>	Variable equals unity if the difference between <i>Trade Credit</i> in the current year and <i>Trade Credit</i> in the previous year is above the industry-year 75 <sup>th</sup> percentile value, and equates to 0 otherwise.	

## Appendix (Continued)

Variable	Definition	Data Source
<i>NEE Money</i>	Average value of non-executive employees' options scaled by average strike price. The value of non-executive employees' options is computed by subtracting the value of the top-5 executives' options (EXECUCOMP) from the value of options granted to all employees (IRRC). The value of non-executive employees' options is then scaled by the number of non-executive employees to obtain the numerator of this variable. The denominator is the difference between the firm's stock price at the end of the fiscal year and the numerator.	Execucomp, IRRC
<i>High NEE Money</i>	Variable equals unity if <i>NEE Money</i> is above the industry-year 75 <sup>th</sup> percentile value, and equals 0 otherwise.	Execucomp, IRRC
<i>NEE Money Up</i>	Variable equals unity if year-on-year change in <i>NEE Money</i> is above the industry 75 <sup>th</sup> percentile, and equals 0 otherwise.	Execucomp, IRRC

**Table 1. Summary Statistics**

This table presents summary statistics of the main variables used in this study. Definitions and constructions are described in the Appendix.

<b>Variable</b>	<b>N. Obs.</b>	<b>Mean</b>	<b>S. D.</b>	<b>Min</b>	<b>P10</b>	<b>P25</b>	<b>P50</b>	<b>P75</b>	<b>P90</b>	<b>Max</b>
CEO Confidence Up	24385	0.05102	0.22003	0	0	0	0	0	0	1
CEO Confidence Down	24385	0.0618	0.2408	0	0	0	0	0	0	1
CEO Media Positivity	2757	3.05708	2.32596	0	0	1.1	2.8	4.8	6.3	9.9
CEO Share Ownership	22213	0.24954	0.43276	0	0	0	0	0	1	1
Increase in Number of Suppliers	24385	0.06188	0.24095	0	0	0	0	0	0	1
Decrease in Number of Suppliers	24385	0.15678	0.3636	0	0	0	0	0	1	1
Initiation of Supplier Network	22220	0.03258	0.17755	0	0	0	0	0	0	1
Termination of Supplier Network	22220	0.0387	0.19289	0	0	0	0	0	0	1
Trade Credit	24327	0.12986	0.08447	0.0328	0.04546	0.07267	0.1093	0.15662	0.24224	0.37582
Trade Credit Improvement	24385	0.25229	0.43433	0	0	0	0	1	1	1
NEE Money Up	24385	0.743	0.43699	0	0	0	1	1	1	1
High NEE Money	24385	0.69457	0.4606	0	0	0	1	1	1	1
Total Assets	24289	6.98104	1.43767	4.62757	5.07196	5.86774	6.8549	7.99024	9.12565	9.77019
Leverage	24190	0.22381	0.18964	0	0	0.04134	0.20189	0.34917	0.50434	0.64057
Altman Z-Score	23336	5.30738	4.05855	0.86384	1.56771	2.57869	4.05938	6.53147	11.2802	16.8815
Market-to-Book Ratio	23518	3.10654	2.20643	0.82623	1.06383	1.5727	2.39604	3.83617	6.44256	9.30523
Return on Assets	24278	0.05645	0.09024	-0.1618	-0.0637	0.01622	0.0607	0.10842	0.17055	0.22363
Sales	24278	6.98246	1.4738	4.39869	4.97459	5.90344	6.91711	8.01694	9.1223	9.78919
Institutional Ownership	24385	0.45106	0.39309	0	0	0	0.53966	0.82164	0.94835	1.01456
Capital Expenditure	24099	0.06459	0.05521	0.00907	0.01335	0.0247	0.0464	0.08455	0.1499	0.21814
Research & Development	24289	0.03862	0.05793	0	0	0	0.00655	0.05655	0.13816	0.19548
Occurrence of CEO Turnover	24385	0.05102	0.22003	0	0	0	0	0	0	1
Cash	24032	0.11945	0.12437	0.00457	0.00916	0.02462	0.07244	0.1719	0.31781	0.45016
ROA Volatility	23923	0.05366	0.05607	0.00469	0.00736	0.01475	0.03207	0.06983	0.14013	0.21428
Stock Return (2 Year)	20680	0.11704	0.52611	-0.9915	-0.644	-0.2029	0.15415	0.47144	0.80671	1.05674

**Table 2**  
**Signaling to Suppliers:**  
**CEO's Option Holdings and Number of Suppliers**

Table 2 (Panel A) presents results from a conditional logit model. The dependent variables in Table 2 (Panel A) are *Increase in Number of Suppliers* and *Decease in Number of Suppliers*. *Increase in Number of Suppliers* is a dummy variable which equates to unity if a firm has more dependent suppliers in the current year than it has in the previous year, and equates to zero otherwise. *Decease in Number of Suppliers* is a dummy variable which equates to unity if a firm has less dependent suppliers in the current year than it has in the previous year, and equates to zero otherwise. The key independent variables in Table 2 (Panel A) are *CEO Confidence Up* and *CEO Confidence Down*. *CEO Confidence Up* is a dummy variable which equates to unity if CEO CONFIDENCE in the current year is in the top quartile of the sample and *CEO Confidence* in the previous year is not in the top quartile of the sample, and equates to zero otherwise. *CEO Confidence Down* is a dummy variable which equates to unity if *CEO Confidence* in the current year is not in the top quartile and *CEO Confidence* in the previous year is in the top quartile of the sample, and equates to zero otherwise. Table 2 (Panel B) presents results from an ordinary least squares model. The dependent variable in Table 2 (Panel B) is *Adjusted Number of Suppliers*. *Adjusted Number of Suppliers* is the number of dependent suppliers of the firm, as defined under S.E.C Regulation S-K less the industry-year median number of such dependent suppliers. The key independent variable in Table 2 (Panel B) is *CEO CONFIDENCE*. *CEO CONFIDENCE* is per-option value of CEO's vested and unexercised options scaled by average strike price (see Appendix 1 for details). Definitions of other variables are described in Appendix 1. Robust standard errors are reported in parentheses. \*\*\*, \*\*, \* represent statistical significance at the 1%, 5% and 10% levels respectively.

**Table 2 (Continued)**  
**Panel A. Conditional Logit Regressions**

	(1)	(2)	(3)	(4)
	Increase in Num. Suppliers	Increase in Num. Suppliers	Decrease in Num. Suppliers	Decrease in Num. Suppliers
CEO Confidence Up	0.369*** (0.085)	0.250*** (0.092)	0.183 (0.122)	0.130 (0.120)
CEO Confidence Down	-0.110 (0.157)	0.004 (0.150)	0.315*** (0.111)	0.326*** (0.115)
CEO Share Ownership	0.129 (0.097)	0.149 (0.130)	0.023 (0.065)	0.147 (0.094)
Total Assets	0.581*** (0.133)	-0.026 (0.109)	0.560*** (0.103)	0.400*** (0.131)
Leverage	0.012 (0.278)	0.862*** (0.288)	-0.749** (0.294)	-0.368 (0.373)
Altman Z-Score	0.029** (0.015)	0.073*** (0.012)	-0.033** (0.016)	-0.030 (0.021)
Market-to-Book Ratio	0.045 (0.030)	-0.023 (0.015)	0.078*** (0.017)	0.037* (0.020)
Return on Assets	-0.679* (0.410)	0.031 (0.512)	-1.122** (0.566)	-0.928* (0.534)
Sales	0.295** (0.144)	0.131 (0.139)	0.331*** (0.117)	0.244* (0.127)
Institutional Ownership	0.530*** (0.185)	-0.307*** (0.114)	0.381** (0.192)	-0.584*** (0.161)
Capital Expenditure	1.273 (1.054)	2.142* (1.097)	1.451 (1.250)	2.104** (1.029)
Research & Development	6.270*** (0.852)	2.106 (1.341)	7.747*** (0.546)	4.754*** (1.607)
Occurrence of CEO Turnover	-0.118 (0.169)	0.085 (0.160)	0.103 (0.135)	0.082 (0.147)
Cash	0.710 (0.487)	-0.765* (0.461)	-0.234 (0.377)	-0.917* (0.469)
ROA Volatility	2.171*** (0.795)	0.391 (1.109)	0.639 (0.828)	-1.452* (0.847)
Stock Return (2 Years)	0.293*** (0.085)	0.291*** (0.072)	-0.274*** (0.079)	-0.154** (0.063)
Observations	13,836	6,522	14,664	6,998
INDUSTRY-YEAR strata	YES	-	YES	-
FIRM strata	-	YES	-	YES
YEAR strata	-	-	-	-
INDUSTRY-YEAR cluster	YES	-	YES	-
INDUSTRY cluster	YES	YES	YES	YES
FIRM cluster	-	YES	-	YES
YEAR cluster	-	-	-	-
Pseudo R-squared	0.189	0.0201	0.198	0.0227

**Table 2 (Continued)**  
**Panel B. Ordinary Least Squares Regressions**

	(1)	(2)	(3)	(4)
	Adj. Number of Suppliers	Adj. Number of Suppliers	Adj. Number of Suppliers	Adj. Number of Suppliers
CEO Confidence	0.345*** (0.117)	0.345*** (0.105)	0.238* (0.117)	0.238** (0.096)
CEO Share Ownership	-0.048 (0.040)	-0.048 (0.060)	-0.089** (0.037)	-0.089 (0.065)
Total Assets	0.360* (0.199)	0.360 (0.222)	0.536** (0.215)	0.536** (0.230)
Leverage	-0.203 (0.244)	-0.203 (0.278)	-0.502** (0.230)	-0.502* (0.271)
Altman Z-Score	0.007 (0.011)	0.007 (0.009)	-0.016 (0.010)	-0.016 (0.010)
Market-to-Book Ratio	-0.011 (0.028)	-0.011 (0.027)	0.004 (0.027)	0.004 (0.027)
Return on Assets	-0.432 (0.308)	-0.432 (0.306)	-0.356 (0.341)	-0.356 (0.300)
Sales	-0.059 (0.183)	-0.059 (0.205)	0.072 (0.190)	0.072 (0.199)
Institutional Ownership	-0.323*** (0.089)	-0.323*** (0.102)	0.262** (0.108)	0.262* (0.134)
Capital Expenditure	2.153** (0.871)	2.153** (0.896)	1.090 (0.741)	1.090 (0.776)
Research & Development	2.389** (1.012)	2.389** (1.014)	2.886** (1.118)	2.886*** (1.031)
Occurrence of CEO Turnover	0.026 (0.044)	0.026 (0.028)	-0.009 (0.048)	-0.009 (0.029)
Cash	-0.335* (0.193)	-0.335 (0.243)	0.066 (0.199)	0.066 (0.205)
ROA Volatility	0.401 (0.313)	0.401 (0.273)	0.576 (0.381)	0.576* (0.320)
Stock Return (2 Years)	-0.005 (0.023)	-0.005 (0.024)	0.015 (0.027)	0.015 (0.034)
Observations	15,980	15,980	15,980	15,980
R-squared	0.912	0.912	0.915	0.915
INDUSTRY fixed effects	-	YES	-	YES
FIRM fixed effects	YES	YES	YES	YES
YEAR fixed effects	-	-	YES	YES
INDUSTRY cluster	-	YES	-	YES
FIRM cluster	YES	YES	YES	YES
YEAR cluster	-	-	YES	-

**Table 3**  
**Signaling to Suppliers:**  
**Change in CEO's Option Holdings and Initiation/Termination of Supplier**  
**Network**

Table 3 presents results from a conditional logit model. The dependent variables are *Initiation of Supplier Network* and *Termination of Supplier Network*. *Initiation of Supplier Network* is a dummy variable which equates to unity when the firm has at least 1 dependent supplier in the current year and none in the previous year, and equates to zero otherwise. *Termination of Supplier Network* is a dummy variable which equates to unity when the firm has no dependent suppliers in the current year and at least 1 dependent supplier in the previous year, and equates to zero otherwise. The key independent variables are *CEO Confidence Up* and *CEO Confidence Down*. *CEO Confidence Up* is a dummy variable which equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample and *CEO Confidence* in the previous year is not in the top quartile of the sample, and equates to zero otherwise. *CEO Confidence Down* is a dummy variable which equates to unity if *CEO Confidence* in the current year is not in the top quartile and *CEO Confidence* in the previous year is in the top quartile of the sample, and equates to zero otherwise. Definitions of other variables are described in Appendix 1. Robust standard errors are reported in parentheses. \*\*\*, \*\*, \* represent statistical significance at the 1%, 5% and 10% levels respectively.

**Table 3 (Continued)**  
**Conditional Logit Regressions**

	(1)	(2)	(3)	(4)
	Initiation of Supplier Network	Initiation of Supplier Network	Termination of Supplier Network	Termination of Supplier Network
CEO Confidence Up	0.219* (0.126)	0.156 (0.137)	0.151 (0.166)	0.090 (0.166)
CEO Confidence Down	-0.302 (0.185)	-0.199 (0.171)	0.338** (0.155)	0.346** (0.144)
CEO Share Ownership	0.088 (0.078)	0.102 (0.139)	0.150* (0.082)	0.210* (0.118)
Total Assets	0.458*** (0.130)	-0.203 (0.150)	0.319*** (0.084)	0.307** (0.153)
Leverage	0.333 (0.357)	1.268*** (0.394)	-0.295 (0.368)	0.163 (0.365)
Altman Z-Score	0.024 (0.017)	0.092*** (0.015)	-0.046*** (0.018)	-0.070*** (0.027)
Market-to-Book Ratio	0.014 (0.032)	-0.029 (0.027)	0.057*** (0.020)	0.032 (0.035)
Return on Assets	-0.746 (0.729)	-0.667 (0.774)	-1.131** (0.547)	-0.708* (0.370)
Sales	-0.077 (0.143)	0.085 (0.170)	0.174* (0.106)	0.208 (0.161)
Institutional Ownership	0.872*** (0.232)	-0.074 (0.185)	0.370 (0.240)	-0.507*** (0.176)
Capital Expenditure	-0.733 (1.314)	0.691 (1.551)	1.264 (1.203)	3.024** (1.181)
Research & Development	3.535*** (0.678)	0.590 (2.277)	4.569*** (1.239)	3.669 (2.511)
Occurrence of CEO Turnover	0.159 (0.228)	0.428* (0.239)	-0.072 (0.158)	-0.084 (0.187)
Cash	0.047 (0.333)	-1.073* (0.584)	0.503 (0.550)	0.410 (0.664)
ROA Volatility	1.727** (0.868)	-0.635 (1.270)	0.633 (0.700)	-0.649 (1.171)
Stock Return (2 Years)	0.353*** (0.130)	0.266*** (0.100)	-0.198** (0.079)	-0.105 (0.070)
Observations	11,467	5,209	12,691	6,292
INDUSTRY-YEAR strata	YES	-	YES	-
FIRM strata	-	YES	-	YES
INDUSTRY-YEAR cluster	YES	-	YES	-
INDUSTRY cluster	YES	YES	YES	YES
FIRM cluster	-	YES	-	YES
Pseudo R-squared	0.0523	0.0199	0.0702	0.0202

**Table 4**  
**Inducing Relationship Specific Investment:**  
**Change in CEO's Option Holdings and Supplier Outcomes**

Table 4 (Panel A) presents results from a conditional logit model. The dependent variable is *Trade Credit Improvement*. *Trade Credit Improvement* equates to unity if the difference between COGS-scaled accounts payable in the current year and COGS-scaled accounts payable in the previous year is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. Table 4 (Panel B) presents results from analysis of subsamples split on industry type. The classification of firms follows Titman and Wessels (1988). Firms, whose primary SIC codes are between 3400 (inclusive) and 4000 (exclusive), are designated as *Durable* manufacturing firms. Firms, whose primary SIC codes are between 2000 (inclusive) and 3400 (exclusive), are designated as *Non-Durable* manufacturing firms. The dependent variables in Columns (1) to (4) of Table 4 (Panel B) are *Increase in Number of Suppliers* and *Decrease in Number of Suppliers*. *Increase in Number of Suppliers* is a dummy variable which equates to unity if a firm has more dependent suppliers in the current year than it has in the previous year, and equates to zero otherwise. *Decrease in Number of Suppliers* is a dummy variable which equates to unity if a firm has less dependent suppliers in the current year than it has in the previous year, and equates to zero otherwise. The dependent variable in Columns (5) and (6) is *Trade Credit Improvement* (see above). The key independent variables in Table 4 (Panel A) and Table 4 (Panel B) are *CEO Confidence Up* and *CEO Confidence Down*. *CEO Confidence Up* is a dummy variable which equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample and *CEO Confidence* in the previous year is not in the top quartile of the sample, and equates to zero otherwise. *CEO Confidence Down* is a dummy variable which equates to unity if *CEO Confidence* in the current year is not in the top quartile and *CEO Confidence* in the previous year is in the top quartile of the sample, and equates to zero otherwise. Definitions of other variables are described in Appendix 1. Robust standard errors are reported in parentheses. \*\*\*, \*\*, \* represent statistical significance at the 1%, 5% and 10% levels respectively.

**Table 4 (Continued)**  
**Panel A. Conditional Logit Regressions**

	(1)	(2)	(3)	(4)
	Trade Credit Improvement	Trade Credit Improvement	Trade Credit Improvement	Trade Credit Improvement
CEO Confidence Up	0.178*** (0.065)	0.179*** (0.068)	0.179*** (0.064)	0.125* (0.073)
CEO Confidence Down	-0.057 (0.082)	-0.073 (0.069)	-0.073 (0.084)	-0.022 (0.069)
CEO Share Ownership	0.005 (0.041)	-0.002 (0.040)	-0.002 (0.041)	0.042 (0.067)
Total Assets	0.088*** (0.031)	0.195** (0.082)	0.195*** (0.046)	-0.714*** (0.098)
Leverage	-0.373*** (0.143)	-0.577*** (0.114)	-0.577*** (0.137)	-0.606*** (0.188)
Altman Z-Score	-0.002 (0.007)	-0.006 (0.007)	-0.006 (0.007)	0.031** (0.013)
Market-to-Book Ratio	0.003 (0.009)	0.014 (0.012)	0.014 (0.011)	-0.040* (0.021)
Return on Assets	-0.318 (0.288)	-0.154 (0.509)	-0.154 (0.289)	-0.751*** (0.287)
Sales	-0.142*** (0.036)	-0.263*** (0.082)	-0.263*** (0.058)	0.541*** (0.085)
Institutional Ownership	-0.102 (0.062)	-0.110* (0.067)	-0.110* (0.061)	0.103 (0.070)
Capital Expenditure	-0.452* (0.259)	-1.433*** (0.503)	-1.433*** (0.374)	-3.594*** (0.614)
Research & Development	0.793* (0.446)	2.475*** (0.704)	2.475*** (0.552)	-3.738*** (1.226)
Occurrence of CEO Turnover	0.099* (0.060)	0.100 (0.065)	0.100 (0.064)	0.063 (0.070)
Cash	0.158 (0.181)	0.263 (0.216)	0.263 (0.189)	0.599*** (0.216)
ROA Volatility	1.417*** (0.388)	1.513*** (0.372)	1.513*** (0.421)	0.454 (0.295)
Stock Return (2 Years)	0.043 (0.051)	0.035 (0.055)	0.035 (0.060)	-0.011 (0.034)
Number of Suppliers	0.003 (0.003)	0.001 (0.003)	0.001 (0.004)	-0.002 (0.015)
Observations	18,234	18,016	18,016	16,640
INDUSTRY-YEAR strata	-	YES	YES	-
FIRM strata	-	-	-	YES
YEAR strata	YES	-	-	-
INDUSTRY-YEAR cluster	-	YES	YES	-
INDUSTRY cluster	-	YES	-	YES
FIRM cluster	-	-	-	YES
YEAR cluster	YES	-	YES	-
Pseudo R-squared	0.00846	0.0156	0.0156	0.0137

**Table 4 (Continued)**  
**Panel B. Durable and Non-Durable Manufacturing Subsample Regressions**

	(1)	(2)	(3)	(4)	(5)	(6)
	Increase in Num. Suppliers	Increase in Num. Suppliers	Decrease in Num. Suppliers	Decrease in Num. Suppliers	Trade Credit Improvement	Trade Credit Improvement
Industry Type	DURABLE	NONDURABLE	DURABLE	NONDURABLE	DURABLE	NONDURABLE
CEO Confidence Up	0.370* (0.196)	0.393 (0.490)	0.305 (0.241)	0.236 (0.336)	0.212*** (0.059)	0.082 (0.172)
CEO Confidence Down	-0.275 (0.227)	0.177 (0.215)	0.529** (0.226)	0.191 (0.294)	-0.191 (0.126)	-0.085 (0.085)
Controls	YES	YES	YES	YES	YES	YES
Observations	5,091	3,381	5,452	3,659	5,458	4,598
INDUSTRY-YEAR strata	YES	YES	YES	YES	-	-
FIRM strata	-	-	-	-	YES	YES
INDUSTRY-YEAR cluster	YES	YES	YES	YES	-	-
INDUSTRY cluster	-	-	-	-	YES	YES
FIRM cluster	-	-	-	-	YES	YES
YEAR cluster	YES	YES	YES	YES	-	-
Pseudo R-squared	0.204	0.217	0.187	0.228	0.0259	0.00886

**Table 5**  
**Signaling to Employees:**  
**CEO's Option Holdings and Non-Executive Employees' Option Moneyness**

Table 5 presents results from a conditional logit model. The dependent variable in Table 5 specification (1), (2) & (3) is *NEE Money Up*. The value of non-executive employees' options is obtained by subtracting the value of options held by top-5 executives (Execucomp) from the value of options held by all employees (IRRC). *NEE Money* is computed by scaling the average option value held by non-executive employees by the firm year stock price. *NEE Money Up* equates to unity if the difference between *NEE Money* in the current year and *NEE Money* in the previous year is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. The key independent variables in Table 5 specification (1), (2) & (3) are *CEO Confidence Up* and *CEO Confidence Down*. *CEO Confidence Up* is a dummy variable which equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample and *CEO Confidence* in the previous year is not in the top quartile of the sample, and equates to zero otherwise. *CEO Confidence Down* is a dummy variable which equates to unity if *CEO Confidence* in the current year is not in the top quartile and *CEO Confidence* in the previous year is in the top quartile of the sample, and equates to zero otherwise. The dependent variable in Table 5 specification (4), (5) & (6) is *High NEE Money*. *High NEE Money* equates to unity if *NEE Money* is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. The key independent variable in Table 5 specification (4), (5) & (6) is *CEO Confidence 75*. *CEO Confidence 75* equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample, and equates to 0 otherwise. Definitions of other variables are described in Appendix 1. Robust standard errors are reported in parentheses. \*\*\*, \*\*, \* represent statistical significance at the 1%, 5% and 10% levels respectively.

**Table 5 (Continued)**  
**Conditional Logit Regressions**

	(1)	(2)	(3)	(4)	(5)	(6)
	NEE Money Up	NEE Money Up	NEE Money Up	High NEE Money	High NEE Money	High NEE Money
CEO Confidence Up	1.213*** (0.127)	1.213*** (0.134)	0.593*** (0.085)			
CEO Confidence Down	-0.786*** (0.147)	-0.786*** (0.123)	-0.436*** (0.105)			
CEO Confidence 75				0.745*** (0.079)	0.745*** (0.148)	0.381*** (0.086)
CEO Share Ownership	-0.026 (0.068)	-0.026 (0.062)	-0.041 (0.065)	0.035 (0.073)	0.035 (0.059)	-0.056 (0.068)
Total Assets	-0.324*** (0.083)	-0.324*** (0.054)	-0.862*** (0.230)	-0.212** (0.102)	-0.212** (0.093)	-0.570** (0.249)
Leverage	-0.132 (0.145)	-0.132 (0.125)	-1.664*** (0.269)	-0.222 (0.285)	-0.222* (0.122)	-1.757*** (0.399)
Altman Z-Score	-0.059*** (0.011)	-0.059*** (0.009)	-0.173*** (0.017)	-0.036** (0.014)	-0.036*** (0.011)	-0.147*** (0.025)
Market-to-Book Ratio	-0.111*** (0.020)	-0.111*** (0.025)	-0.242*** (0.037)	0.029* (0.016)	0.029** (0.013)	-0.104*** (0.036)
Return on Assets	-2.792*** (0.662)	-2.792*** (0.582)	0.825 (0.504)	-0.655 (0.677)	-0.655 (0.653)	1.279* (0.715)
Sales	0.089 (0.083)	0.089** (0.045)	1.156*** (0.184)	-0.028 (0.105)	-0.028 (0.050)	0.815*** (0.202)
Institutional Ownership	-0.428*** (0.119)	-0.428*** (0.104)	0.754*** (0.135)	-0.397*** (0.153)	-0.397*** (0.132)	1.548*** (0.178)
Capital Expenditure	-0.983 (0.801)	-0.983 (0.687)	0.031 (0.839)	0.112 (0.560)	0.112 (0.591)	-0.572 (1.108)
Research & Development	1.400*** (0.399)	1.400 (0.956)	5.556*** (1.166)	1.174 (0.987)	1.174* (0.700)	5.007*** (1.506)
Occurrence of CEO Turnover	0.111 (0.119)	0.111* (0.061)	-0.066 (0.099)	-0.035 (0.130)	-0.035 (0.086)	-0.202** (0.096)
Cash	0.098 (0.330)	0.098 (0.338)	0.848** (0.344)	0.332 (0.379)	0.332 (0.303)	1.635*** (0.303)
ROA Volatility	3.580*** (0.490)	3.580*** (0.434)	-0.665 (1.144)	3.086*** (0.984)	3.086*** (0.634)	-1.428 (1.272)
Stock Return (2 Years)	0.809*** (0.067)	0.809*** (0.102)	0.474*** (0.075)	1.489*** (0.065)	1.489*** (0.095)	0.684*** (0.088)
Observations	9,132	9,132	14,855	8,979	8,979	12,686
INDUSTRY-YEAR strata	YES	YES	-	YES	YES	-
FIRM strata	-	-	YES	-	-	YES
INDUSTRY-YEAR cluster	YES	YES	-	YES	YES	-
INDUSTRY cluster	YES	-	YES	YES	-	YES
FIRM cluster	-	-	YES	-	-	YES
YEAR cluster	-	YES	-	-	YES	-
Pseudo R-squared	0.117	0.117	0.113	0.128	0.128	0.110

**Table 6**  
**Valuation and Volatility:**  
**CEO's Option Holdings and Supplier Outcomes**

Table 6 presents results from our valuation and volatility analyses. Firm-years, whose industry-year *Market-to-Book Ratios* are above the median value of the distribution in the year, are designated the *High Valuation* status, and are designated the *Low Valuation* status otherwise. Firm-years, whose industry-year *ROA Volatilities* are above the median value of the distribution in the year, are designated the *High Volatility* status, and are designated the *Low Volatility* status otherwise. *HighValuation-HighVolatility* equates to unity if the firm-year is designated both *High Valuation* and *High Volatility* statuses concurrently, and equates to 0 otherwise. The dependent variable in Columns (1) to (4) of Table 6 is *Adjusted Number of Suppliers*. *Adjusted Number of Suppliers* is the number of dependent suppliers of the firm, as defined under S.E.C Regulation S-K less the industry-year median number of such dependent suppliers. The key independent variables in Columns (1) and (2) of Table 6 are *CEO Confidence*, *CEO Confidence x HighValuation-HighVolatility* and *HighValuation-HighVolatility*. *CEO Confidence* is per-option value of CEO's vested and unexercised options scaled by average strike price (see Appendix 1 for details). *CEO Confidence x HighValuation-HighVolatility* is the interaction between *CEO Confidence* and *HighValuation-HighVolatility*. The key independent variables in Columns (3) and (4) of Table 6 are *CEO Confidence 75*, *CEO Confidence 75 x HighValuation-HighVolatility* and *HighValuation-HighVolatility*. *CEO Confidence 75* equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample, and equates to 0 otherwise. *CEO Confidence 75 x HighValuation-HighVolatility* is the interaction between *CEO Confidence 75* and *HighValuation-HighVolatility*. The dependent variable in Columns (5) and (6) of Table 6 is *Trade Credit Improvement*. *Trade Credit Improvement* equates to unity if the difference between COGS-scaled accounts payable in the current year and COGS-scaled accounts payable in the previous year is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. The subsample in Column (5) of Table 6 comprises firm-years which have *Low Valuation* and *Low Volatility* statuses concurrently. The subsample in Column (6) of Table 6 comprises firm-years which have *High Valuation* and *High Volatility* statuses concurrently. The key independent variables in Columns (5) and (6) of Table 6 are *CEO Confidence Up* and *CEO Confidence Down*. *CEO Confidence Up* is a dummy variable which equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample and *CEO Confidence* in the previous year is not in the top quartile of the sample, and equates to zero otherwise. *CEO Confidence Down* is a dummy variable which equates to unity if *CEO Confidence* in the current year is not in the top quartile and *CEO Confidence* in the previous year is in the top quartile of the sample, and equates to zero otherwise. Definitions of other variables are described in Appendix 1. Robust standard errors are reported in parentheses. \*\*\*, \*\*, \* represent statistical significance at the 1%, 5% and 10% levels respectively.

**Table 6 (Continued)**  
**Ordinary Least Squares and Conditional Logit Regressions**

	(1)	(2)	(3)	(4)	(5)	(6)
	Adj. Num. of Suppliers	Adj. Num. of Suppliers	Adj. Num. of Suppliers	Adj. Num. of Suppliers	Trade Credit Improv'm't	Trade Credit Improv'm't
Valuation	-	-	-	-	LOW	HIGH
ROA Volatility					LOW	HIGH
CEO Confidence	0.090 (0.131)	0.090 (0.075)				
CEO Confidence x HighValue-HighVolatility	0.397** (0.176)	0.397*** (0.112)				
CEO Confidence 75			-0.042 (0.077)	-0.042 (0.043)		
CEO Confidence 75 x HighValue-HighVolatility			0.243** (0.113)	0.243*** (0.069)		
HighValue-HighVolatility	-0.095 (0.059)	-0.095** (0.041)	-0.033 (0.050)	-0.033 (0.032)		
CEO Confidence Up					0.206 (0.213)	0.104 (0.142)
CEO Confidence Down					0.118 (0.149)	-0.150** (0.068)
Controls	YES	YES	YES	YES	YES	YES
Observations	15,980	15,980	15,980	15,980	3,786	4,884
R-squared	0.915	0.915	0.915	0.915		
FIRM fixed effects	YES	YES	YES	YES	YES	YES
YEAR fixed effects	YES	YES	YES	YES	-	-
INDUSTRY-YEAR cluster	-	YES	-	YES	-	-
INDUSTRY cluster	YES	-	YES	-	YES	YES
FIRM cluster	-	-	-	-	-	-
YEAR cluster	YES	-	YES	-	-	-
Pseudo R-squared					0.0302	0.0210

**Table 7**  
**Distinguishing Cheap Talk from Signals:**  
**CEO Media Positivity, CEO's Option Holdings and Stakeholder Outcomes**

Table 7 columns (1) and (2) present results from an ordinary least squares model. The dependent variable is *Adjusted Number of Suppliers*. *Adjusted Number of Suppliers* is the number of dependent suppliers of the firm, as defined under S.E.C Regulation S-K less the industry-year median number of such dependent suppliers. The key independent variables in Table 7 columns (1) and (2) are *CEO Media Positivity* and *CEO Confidence*. *CEO Media Positivity* is the relative frequency of positive media statements to negative media statements made by the CEO (Hirshleifer, Low & Teoh, 2012). *CEO Confidence* is per-option value of CEO's vested and unexercised options scaled by average strike price (see Appendix 1 for details). Table 7 columns (3), (4), (5) and (6) present results from a conditional logit model. The dependent variable in Table 7 columns (3) and (4) is *Trade Credit Improvement*. *Trade Credit Improvement* equates to unity if the difference between COGS-scaled accounts payable in the current year and COGS-scaled accounts payable in the previous year is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. The dependent variable in Table 7 columns (5) and (6) is *NEE Money Up*. *NEE Money* is computed by scaling the average option value held by non-executive employees by the firm year stock price. *NEE Money Up* equates to unity if the difference between *NEE Money* in the current year and *NEE Money* in the previous year is above the industry-year 75<sup>th</sup> percentile value, and equates to 0 otherwise. The key independent variables in Table 7 columns (3), (4), (5) and (6) are *CEO Media Positivity* (see above), *CEO Confidence Up* and *CEO Confidence Down*. *CEO Confidence Up* is a dummy variable which equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample and *CEO Confidence* in the previous year is not in the top quartile of the sample, and equates to zero otherwise. *CEO Confidence Down* is a dummy variable which equates to unity if *CEO Confidence* in the current year is not in the top quartile and *CEO Confidence* in the previous year is in the top quartile of the sample, and equates to zero otherwise. Definitions of other variables are described in Appendix 1. Observations with missing CEO MEDIA POSITIVITY are eliminated from the sample. Robust standard errors are reported in parentheses. \*\*\*, \*\*, \* represent statistical significance at the 1%, 5% and 10% levels respectively.

**Table 7 (Continued)**  
**OLS and Conditional Logit Regressions**

	(1)	(2)	(3)	(4)	(5)	(6)
	Adj. Num. Suppliers	Adj. Num. Suppliers	Trade Credit Improve	Trade Credit Improve	NEE Money Up	NEE Money Up
CEO Media Positivity	0.009 (0.015)	0.007 (0.017)	0.045 (0.027)	0.050* (0.026)	-0.061* (0.031)	-0.056* (0.031)
CEO Confidence		0.629*** (0.197)				
CEO Confidence Up				0.691*** (0.225)		0.487 (0.306)
CEO Confidence Down				0.324 (0.279)		-1.008*** (0.379)
Observations	1,740	1,498	771	771	864	864
R-squared	0.973	0.973	-	-	-	-
CONTROLS	YES	YES	YES	YES	YES	YES
FIRM fixed effects	YES	YES	YES	YES	YES	YES
YEAR fixed effects	YES	YES	-	-	-	-
INDUSTRY cluster	-	-	YES	YES	YES	YES
FIRM cluster	-	-	YES	YES	YES	YES
YEAR cluster	YES	YES	-	-	-	-
Pseudo R-squared	-	-	0.0517	0.0625	0.222	0.240

**Table 8**  
**Propensity Score Matching:**  
**CEO's Option Holdings and Stakeholder Outcomes**

Table 8 (Panel A) columns (1) and (2) presents results from an ordinary least squares model. The dependent variable in Table 8 columns (1) and (2) is *Adjusted Number of Suppliers*. *Adjusted Number of Suppliers* is the number of dependent suppliers of the firm, as defined under S.E.C Regulation S-K less the industry-year median number of such dependent suppliers. The dependent variable in Table 8 columns (3) and (4) is *High NEE Money*. *High NEE Money* equates to unity if *NEE Money* is above the industry-year median, and equates to 0 otherwise. Treatment in all columns of Table 8 (Panel A) is defined as *CEO Confidence 75*. *CEO Confidence 75* equates to unity if *CEO Confidence* in the current year is in the top quartile of the sample, and equates to 0 otherwise. Table 8 (Panel B) presents balance diagnostics from the propensity score matching process. 1-to-1 matching method without replacement is employed and the maximum caliper distance is set to 0.01. Robust standard errors are reported in parentheses. \*\*\*, \*\*, \* represent statistical significance at the 1%, 5% and 10% levels respectively.

**Table 8 (Continued)**  
**Panel A. OLS and Conditional Logit Regressions**

	(1)	(2)	(3)	(4)
	Adj. Number of Suppliers	Adj. Number of Suppliers	High NEE Money	High NEE Money
Treatment = CEO Confidence 75	0.079*	0.079**	0.567***	0.567***
	(0.047)	(0.037)	(0.086)	(0.108)
CEO Share Ownership	-0.080	-0.080	0.175*	0.175**
	(0.066)	(0.072)	(0.097)	(0.074)
Total Assets	0.580***	0.580***	-0.123	-0.123
	(0.167)	(0.159)	(0.100)	(0.189)
Leverage	-0.398	-0.398	-0.415*	-0.415*
	(0.249)	(0.249)	(0.246)	(0.252)
Altman Z-Score	0.006	0.006	-0.026*	-0.026
	(0.012)	(0.014)	(0.013)	(0.017)
Market-to-Book Ratio	0.013	0.013	0.016	0.016
	(0.024)	(0.028)	(0.023)	(0.021)
Return on Assets	-0.236	-0.236	0.163	0.163
	(0.361)	(0.447)	(1.265)	(0.933)
Sales	-0.290*	-0.290*	-0.005	-0.005
	(0.157)	(0.147)	(0.114)	(0.139)
Institutional Ownership	-0.368***	-0.368**	-0.307	-0.307*
	(0.096)	(0.139)	(0.259)	(0.177)
Capital Expenditure	1.574***	1.574***	2.227***	2.227***
	(0.462)	(0.476)	(0.766)	(0.727)
Research & Development	1.291	1.291***	1.659**	1.659
	(0.799)	(0.422)	(0.762)	(1.159)
Occurrence of CEO Turnover	0.075	0.075	-0.377*	-0.377***
	(0.104)	(0.102)	(0.206)	(0.134)
Cash	-0.261	-0.261*	-0.198	-0.198
	(0.178)	(0.129)	(0.521)	(0.407)
ROA Volatility	0.453	0.453	1.601	1.601**
	(0.363)	(0.399)	(1.093)	(0.737)
Stock Return (2 Years)	0.040	0.040	1.991***	1.991***
	(0.031)	(0.031)	(0.108)	(0.192)
Observations	7,412	7,412	3,977	3,977
R-squared	0.926	0.926		
INDUSTRY-YEAR fixed effects	-	-	YES	YES
INDUSTRY fixed effects	-	YES	-	-
FIRM fixed effects	YES	YES	-	-
YEAR fixed effects	-	-	-	-
INDUSTRY-YEAR cluster	YES	-	YES	YES
INDUSTRY cluster	-	-	YES	-
FIRM cluster	-	-	-	-
YEAR cluster	-	YES	-	YES
Pseudo R-squared			0.152	0.152

**Table 8 (Continued)**

**Panel B. Propensity Score Matching Balance Diagnostics**

Variables	Mean		t-test	
	Treated	Control	t-value	p-value
Treatment = CEO Confidence 75				
CEO Share Ownership	0.32	0.32	0.22	0.83
Total Assets	6.94	6.97	-0.80	0.43
Leverage	0.20	0.20	-0.86	0.39
Altman Z-Score	6.76	6.69	0.67	0.50
Market-to-Book Ratio	3.89	3.94	-1.00	0.32
Return on Assets	0.09	0.09	-0.95	0.34
Sales	6.93	6.95	-0.70	0.48
Institutional Ownership	0.56	0.56	-0.58	0.56
Capital Expenditure	0.07	0.07	0.01	0.99
Research & Development	0.05	0.04	1.07	0.29
Occurrence of CEO Turnover	0.03	0.03	0.00	1.00
Cash	0.14	0.14	0.63	0.53
ROA Volatility	0.05	0.05	-0.83	0.41
Stock Return (2 Years)	0.24	0.23	0.49	0.62