CEO Option Compensation Can Be a Bad Option:

Evidence from Product Market Relationships

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Abstract

The executive compensation literature has inconclusive findings for the impact of CEO option-based compensation on firm value. We hypothesize that having major customers raises the costs associated with option compensation, leading to a lower optimal level for CEO option-based compensation. Using import tariff cuts as exogenous shocks to existing customer relationships, we find strong empirical support for this hypothesis. Firms with large customers dramatically reduce CEO option-based compensation following tariff reductions. When CEO option compensation is not reduced, firm value declines as major customer relationships weaken. Our study provides new insights into how important stakeholders shape executive compensation decisions.

1. Introduction

Option compensation is an important component of executive pay in the United States. By providing convex payoffs, option-based compensation is viewed as a standard mechanism to reduce manager risk-aversion and encourage value-enhancing risk-taking. The extant literature generally concludes that giving stock option grants to senior executives leads to greater firm risk taking.[1] However, the evidence is quite mixed as to whether CEO option grants improve firm performance and value.[2] This study identifies one channel in which CEO stock options can significantly undercut firm value and thus, helps to explain why the overall empirical relation between CEO option compensation and firm value yields generally weak and inconsistent findings.

While stock options can better align CEO and shareholder interests, options are also associated with less desirable effects. By increasing executive risk-taking incentives, CEO stock option compensation can raise a firm's risk of financial distress and intensify conflicts of interests between shareholders and debtholders or other key stakeholders with debt-like claims (for example, see John and John, 1993; Opler and Titman, 1994; Berger, Ofek, and Yermack, 1997; Kuang and Qin, 2013). We examine whether executive option compensation can undermine these valuable stakeholder relationships, and thereby weaken future firm performance and value. As a nexus of contracting relationships, a firm's bargaining position relative to its stakeholders determines the economic rents it captures from these relationships over time and is a major component of firm value (Jensen and Meckling, 1976). Therefore, in

[1] For example, see Defusco, Johnson, and Zorn (1990), Mehran (1992), Tufano (1996), Guay (1999), Cohen, Hall, and Viceira (2000), Knopf et al. (2002), Coles, Daniel, and Naveen (2006), Low (2009), Dong, Wang, and Xie (2010), Gormley, Matsa, and Milbourn (2013), and Shue and Townsend (2014).

[2] For instance, Low (2009) and Rajgopal, and Shevlin (2002), and Hanlon, Rajgopal, and Shevlin (2003) find that stock option grants create firm value. Armstrong, Larcker, Ormazabal, and Taylor (2013), Efendi, Srivastava, and Sanson (2007), Lie (2005), Aboody and Kasznik (2000) and Yermack (1997) show that option-based compensation lead to increased agency costs and thus could destroy value. Dong, Wang, and Xie (2010) show that option-based compensation can lead to suboptimal capital structure levels. Shue and Townsend (2014) find mixed evidence relating CEO option compensation and firm performance.

selecting a CEO compensation structure to maximize shareholder value, boards should take into account the impact its risk-taking incentives has on its stakeholder relationships.

Preserving major customer relationships is generally crucial to a firm's overall sales and profitability. In the United States, nearly half of public firms depend on at least one large customer for a substantial portion of their sales, i.e. representing at least 10% of sales (Ellis, Fee, and Thomas, 2012). Prior literature suggests that suppliers commonly make relationship-specific investments in their major customer relationships.[3] Once these relationship-specific investments are made, a supplier faces substantial losses if its major customer terminates the trading relationship. Given the significance of these large customer relationships for firm revenues and their typically long-term nature, the health of these valuable trading relationships can significantly affect firm value. Accordingly, the board of directors should make decisions that protect the long-term integrity of these major relationships.[4]

We hypothesize that having a major customer relationship raises the costs associated with option compensation, leading to a lower optimal level for CEO option-based compensation. The existing literature finds that CEO stock option compensation leads to increased leverage (Mehran, 1992; Cohen, Hall, and Viceira, 2000; Dong, Wang, and Xie, 2010; Shue and Townsend, 2014), and thus, also increases the likelihood of financial distress and credit ratings downgrades (Kuang and Qin, 2013). An important indirect cost of financial distress is the expected loss of customers as the probability of financial distress increases (Titman, 1984; Hortaçsu et al., 2013). This loss of major customers reflects stronger supplier incentives to undertake ex post opportunism and customers facing heightened uncertainty about a supplier's reliability in terms of product quality and timeliness of product deliveries

[3] Classical works in this area include Titman (1984), Joskow (1988) and Titman and Wessels (1988).

[4] Of course, CEOs could also seek to extract private benefits from these stakeholders. Which incentive dominates is difficult to assess since endogeneity issues make testing the board's broad goals concerning stakeholders challenging. We exploit exogenous competitive shocks that raise the risk of losing major trading relationships to test this proposition. We discuss this with more details in a later section.

and servicing (Klein, Crawford, and Alchian, 1978; Williamson, 1979; Titman, 1984; Opler and Titman, 1994; Hortaçsu et al., 2013; Wowak, Mannor, and Wowak, 2015). As a result, CEO option compensation that raises the probability of financial distress reduces customer demand for a firm's products and services. Moreover, losing major customers is particularly costly for firms, since they experience a loss in the value of their relationship-specific investments. This leads to a lower optimal level of CEO stock option compensation for firms with major customers since financial distress is costlier for these firms.

Consistent with the above perspective, we expect firms experiencing an exogenous shock, which weakens their bargaining power relative to large customers, are likely to reduce CEO stock option compensation. Williamson (1979) argues that firms optimally adjust governance structures so as to reduce contracting costs with key stakeholders by attenuating incentives towards ex post opportunism. Specifically, these adjustments act as a pre-commitment mechanism against ex post opportunism. Thus, the strength of these adjustments should reflect the importance or value of these relationships and the relative bargaining power of their customers (Hui, Klasa, and Yeung, 2012). This reduction in stock option compensation strengthens the firm's pre-commitment mechanism to avoid ex post opportunism, thus making the firm more attractive, which reduces the likelihood of relationship termination and a loss from relationship-specific investments.

Further, we hypothesize that firms which experience a shock that weaken their bargaining power relative to their large customers, and that do not respond by reducing CEO stock option compensation, are likely to experience a decline in market value. This fall in value should reflect an expected decline in operating performance due to anticipated deterioration of their major customer relationships. Specifically, a decline in its on-going major trading relationships weakens the expected growth rate of sales to these large customers, leading to a decline in a supplier's expected operating performance. The health of

a major customer trading relationship should be directly related to a supplier's reliability, on which CEO compensation choice can have a large impact. Thus, the extent of CEO option compensation should be negatively related to the fragility of these major trading relationships.

Our empirical findings are consistent with our main hypotheses. We find novel evidence that a negative shock (discussed below) to the bargaining power of suppliers relative to large customers has a first-order negative effect on the fraction of CEO compensation that is option based. We also show that following such competitive economic shocks, firms that fail to adjust CEO option compensation are more likely to find their major trading relationships weakening, leading to reduced firm value. To provide causal evidence that large customer relationships lead to a negative CEO option-firm value link, we exploit periodic U.S. import tariffs reductions experienced by different industries as quasi-natural experiments. Import tariff reductions unexpectedly intensify competitive pressures for firms in the affected industries, which significantly reduce a customer's switching costs and raises the probability of a firm's losing a major customers to a foreign rival. Thus, tariff reductions represent exogenous shocks to the bargaining power of existing customer-supplier relationships.

Using a series of industry level tariff reductions as exogenous shocks to the strength of existing customer-supplier relationships, we find compelling evidence that in response to a weakening of existing large customer relationships, boards reduce CEO option-based compensation.[5] On average, the existence of a large customer reduces the fraction of annual compensation received in the form of stock options by 25.6% following tariff cuts. In an alternative test, we follow Atanasov and Black (2015) and use propensity score matching to correct for endogenous selection across observable factors. We repeat the above analysis for these tariff shocks and conclude that our findings remain robust to this matching approach.

[5] We do not find evidence that this effect is driven by a change in stock volatility for firms with large customers. There is no significant change in the stock volatility of firms with large customers around the tariff reductions. In untabulated evidence we find no evidence that the result is driven by changes in CEOs around these tariff cuts.

Taken together, these empirical results provide strong evidence that large customers have an economically large causal impact on a firm's executive compensation structure.

We also show that the negative relation between a shock to the strength of large customer relationships and CEO option compensation exhibits significant cross-sectional differences based on customer and supplier characteristics. Specifically, we find these exogenous shocks strongly impact CEO option compensation policies of suppliers with economically important customer relationships. We find stronger results with large corporate (rather than government) customers that are likely to be more sensitive to a supplier's financial condition. We also find stronger results when suppliers have higher asset specificity, greater product differentiation, higher fractions of domestic sales, higher fractions of sales within their primary industries, higher leverage, and are closer to financial distress.

Our empirical results provide causal evidence that lower CEO option compensation significantly improves the value of firms with large customers. Economically we find that conditional on the existence of large customers, a 1% increase in the fraction of CEO option-based compensation is predicted to reduce a supplier's Tobin's Q by about 2%-3%.[6] This result is robust to using matching procedures mentioned above. Overall, the empirical results strongly support our hypothesis that conditional on large customer relationships, CEO option compensation and firm value exhibit a significant negative causal link.

Finally, we find strong evidence that CEO stock option compensation undercuts firm performance and value by weakening a firm's pre-existing trading relationships with its large customers. Following tariff reductions, firms that continue to reward their CEOs with large stock option compensation experience significant declines in sales growth rates to their largest customers and an increased probability of relationship terminations.

[6] In untabulated results, we find similar effects of the firms operations, such as sales growth or operating performance measures.

Our study is most closely related to a recent paper by Kale, Kedia, and Williams (2015) who analyze managerial risk-taking and customer investment. Our empirical analysis confirms their finding that management risk-taking incentives influence product market relationships by reducing future sales to major customers. Nevertheless, given our focus is on supplier CEO compensation and firm performance and value as outlined above, our study differs from theirs in several key ways. First, we show that firms with large customers lower their CEOs' risk-taking incentives, while firms that do not experience lower valuations. Finally, we employ a pseudo-natural experiment utilizing exogenous shocks to product market competition caused by tariff reductions across industries. Given these differences, we believe our results complement the earlier findings in Kale, Kedia, and Williams (2015).

This study contributes to the existing literature in several ways. First, while substantial research in executive compensation attempts to establish the empirical relation between option-based compensation and risk-taking behavior, the empirical evidence on the linkage between stock option compensation and firm performance and value remains unclear. For example, Shue and Townsend (2014) document mixed evidence on the relation between option compensation and firm performance. Results from our study identify one channel where option grants undercut firm performance and value. That is, given the existence of large customers, boards that provide CEOs with substantial risk-taking incentives through option grants can actually hurt firm performance. In addition, our results partially support the efficient contracting theory of executive compensation.[7] When a firm has important product market relationships, the board of directors appears to optimize senior manager compensation structures by reducing risk-taking incentives to enhance firm performance and value.

Second, this study provides the first evidence that when a firm has major customers as important nonfinancial stakeholders, implementing stakeholder-friendly compensation

[7] Several excellent surveys on this subject include Edmans and Gabaix (2009), Frydman and Jenter (2010), and Murphy (2012).

policies raises shareholder value. This finding contributes to a growing literature documenting that important stakeholders have real effects on corporate decisions.[8] Despite this prior evidence, there is little existing theoretical or empirical work that examines the impact of large customers on the choice of a supplier's CEO compensation contracts. This study helps fill this important gap.[9] We advance our understanding of these issues by showing that the relationship between firms and key stakeholders, particularly large customers, significantly influences CEO compensation structure and shareholder value.

Finally, we find that a firm can optimize its governance practices so as to bond their trading relationships, consistent with Williamson (1979). This subsequently improves firm operating performance. Along with Hui et al. (2012), Johnson et al. (2015), Cen et al. (2015), and Cremers et al. (2016), we find a new channel through which firms use governance policies as bonding devices. In this context, we consider how listed firms can adjust their governance practices by altering their executive compensation policies. Compared to other governance related bonding mechanisms, adjusting compensation policy to protect relationship-specific investments is a potentially less costly approach to reassuring customers.[10] As a consequence, shareholders should be more open to such policies, given they can actually enhance shareholder wealth.

2. Hypothesis Development

Managerial risk-aversion is a fundamental component of the agency problem associated with separating ownership and control (Jensen and Meckling, 1976; Fama, 1980).

[8] Large customers affect a firm's takeover probability (Harford, Schonlau, and Stanfield, 2015), the level of takeover protections (Johnson, Karpoff, and Yi, 2015; Cen, Dasgupta, and Sen, 2015), financial leverage (Kale and Shahrur, 2007; Banerjee, Dasgupta, and Kim, 2008), and equity investments in economically-linked firms (Fee, Hadlock, and Thomas, 2006). Financial distress (Hertzel, Li, Officer, and Rodgers, 2008) and gains from merger activity (Fee and Thomas, 2004) can also spillover from customers to suppliers.

[9] For example, Huang, Jiang, Lie, and Que (2015) find labor unions' bargaining power influences CEO pay and Edmans and Liu (2011) demonstrate the importance of debt-equity conflicts in CEO risk taking.

[10] Johnson et al. (2015), Cen et al. (2015), and Cremers et al. (2016) find that anti-takeover provisions can serve as a bonding device of important business relationships. Yet, institutional investors generally have strong resistance to anti-takeover proposals.

In order to mitigate manager's risk-aversion, it is a common practice to give key executives convex payoffs through option-based compensation. Existing studies generally conclude that granting stock options to executives encourages greater risk-taking activity. For instance, it leads to increased leverage (Mehran, 1992; Cohen, Hall, and Viceira, 2000; Dong, Wang, and Xie, 2010; Shue and Townsend, 2014), riskier investment policy (Coles, Daniel, and Naveen, 2006; Low, 2009), voluntary liquidations (Mehran, Nogler, and Schwartz, 1998), discourages hedging (Tufano, 1996; Knopf, Nam, and Thornton, 2002; Rajgopal and Shevlin, 2002), and raises both stock volatility (Defusco, Johnson, and Zorn, 1990; Guay, 1999) and the likelihood of ratings downgrades (Kuang and Qin, 2013). Overall, the past literature suggests that greater risk-taking incentives for senior managers through option grants are associated with more corporate risk-taking, which in turn raises the probability of financial distress.

CEO stock option compensation can impose both benefits and costs on a firm's customer relationships. It can be beneficial as it provide a manager with incentives to exert more efforts in preserving those relationships. However, a firm's customers can be adversely impacted by the increased probability of a supplier's financial distress since it encourages post-contractual opportunism, which is further amplified by CEO stock option grants. Supply interruptions and the deterioration of product quality are first-order concerns for a customer. For instance, Maksimovic and Titman (1991) argue that a supplier's willingness to produce high-quality products falls significantly with financial distress, making its customers bear greater uncertainties about both the quantity and quality of products purchased from the supplier. Additionally, Opler and Titman (1994), among others, suggest that the loss of valuable customer relationships to be an important component of the costs of bankruptcy. Similarly, Shleifer and Summers (1988) point out that a firm's implicit contracts can be better enforced through the manager's personal commitments.

A customer also faces more risk of supplier change of control or liquidation when suppliers are financially distressed. If creditors take control of a major supplier, a new manager can be reluctant to honor a former manager's personal commitments with a firm's major customers. In the event of supplier liquidation, customers face switching costs, and those costs are higher if they purchase customized goods from the supplier. Consistent with the above analysis, Hortaçsu et al. (2013) find that a rise in the probability of financial distress of a supplier significantly reduces major consumer demand for its core products.

Thus, increased supplier CEO option-based compensation can be costly to and may cause the firm to lose its major customers due to their concerns about a supplier's financial condition and post-contractual opportunism. Thus, a supplier's major customer relationships, as part of its fundamental operations, are a critical determinant of firm value. Prior studies document that corporate decisions made by major customers have large economic impacts on their suppliers. Suppliers can also suffer significant losses from a major customer's horizontal acquisitions or financial distress (Fee and Thomas, 2004; Hertzel et al, 2008).

A firm with major customers is likely to respond to major customer concerns about supplier financial distress when making corporate decisions (Williamson, 1979). Relationship-specific investments (RSIs) exist for economically large and longer-term trading relationships, and are usually made by both customers and suppliers to support these relationships. Compared to firms with diversified customer base, firms with concentrated customers are more likely to make RSIs when producing customized products for these large customers (Titman, 1984; Joskow, 1988; Titman and Wessels, 1988). Once RSIs are made, a supplier's relationship-specific assets lose value if the large customer terminates the trading relationship. The loss in value of its customer-specific assets can be substantial, since major customers account for a large portion of the supplier's sales and thus have economically large impacts on supplier profitability. To avoid a loss in value of its RSI, firms with major

customers should ceteris paribus reduce risk-taking more than firms with a diversified customer base. Consistent with this conjecture, Kale and Shahrur (2006) and Banerjee, Dasgupta, and Kim (2008) find that both customers and suppliers in bilateral relationships maintain lower leverage to reduce the loss of RSI should the counterparty fail.

From the above analysis, we predict that following a decline in switching costs for customers and an increase in customer bargaining power relative to that of its supplier, firms with major customer relationships will award their CEOs lower stock option compensation than firms without large customers. As explained in the introduction, these adjustments act as a pre-commitment mechanism against ex post opportunism, while the strength of these adjustments is related to the relationship's importance/value and the relative bargaining power of its customers (Hui, Klasa, and Yeung, 2012). Lower supplier CEO option compensation also reduces the firm's probability of financial distress and helps strengthen important trading relationships so as to prevent significant reductions in the value of RSIs that are tied to these major customers.

Hypothesis 1. *Supplier CEOs receive lower stock option compensation in response to an increase in the bargaining power of a large customer.*

As mentioned above, customers are particularly wary of supply continuity, product quality, and potential serviceability and warranty claims that are conditional on a supplier's health. Thus, a customer should rationally assess a potential supplier's cash flow variability as well as its risk-taking policies (reflected in risk-taking incentive payments to executives) prior to entering into an important customer-supplier relationship. When a supplier uses less CEO option compensation and provides lower risk-taking incentives to its CEO, its major customer should be willing to pay a higher price for its products (Titman, 1984), purchase more goods from the supplier, and maintain pre-existing trading relationships for a longer duration. In equilibrium, the level of option compensation is determined by the relative

importance of the customer relationship and the relative bargaining power of the supplier/CEO and the customer (Hui, Klasa, and Yeung, 2012).

Lower CEO option compensation can also bond the major customer to the trading relationship by encouraging RSI by a customer, which significantly increases the switching costs the customer faces. However, a customer's RSI loses value if its major supplier goes bankrupt. Thus, greater risk-taking encouraged by CEO option compensation, is likely to discourage its customers from making substantial RSI *ex ante.* Consistent with this prediction, Kale, Kedia and Williams (2015) find that increases in risk-taking incentive payments to executives are associated with declines in subsequent RSI by its trading partners. Thus, a firm's major customers are likely to raise RSIs when supplier CEOs receive less stock option compensation. This in turn strengthens its major trading relationships since higher customer RSI raises its switching costs, which leads to a lower likelihood of relationship termination.

Therefore, lower supplier CEO stock option compensation is predicted to strengthen the supplier's relationships with major customers, and leads to increases in major customer sales and longer-lasting relationships. Due to strengthened pre-exiting major customer relationships, lower usage of CEO stock option compensation is also expected to prevent a supplier's losses in RSI and lead to rising sales to major customers, and thus positively affect a supplier's overall operating performance. However, if suppliers do not reduce option compensation to provide a stronger pre-commitment mechanism in the face of reduced switching costs by major customers, then suppliers can expect to experience a reduction in performance and value and subsequent deterioration of their customer relationships.

The above discussions lead directly to the following hypothesis:

Hypothesis 2. *Suppliers with higher CEO stock option compensation and risk-taking incentives can expect to experience a decline in value following an increase in the bargaining power of a large customer.*

3. Data and Empirical Methodology

3.1. Data

3.1.1. Compensation Data

We extract executive compensation data from the Execucomp database from 1992-2005. Stock volatility is calculated from daily stock returns taken from CRSP and calculated over the prior fiscal year, and the annual dividend yield is taken from Compustat and averaged over past three years. We use this information to calculate the Black-Scholes value of options accounting for annual dividends. To be consistent with the treatment in Execucomp, we winsorize return volatilities and dividend yields at 5th and 95th percentiles.

We use *Pct Option* as the primary measure the use of CEO stock option compensation, which is calculated as the *ex ante* value of stock options as a fraction of annual total compensation. To capture the level of risk-taking incentives provided by stock option compensation, we also compute *Vega*. Following the existing literature (Guay, 1999; Core and Guay, 2002; Coles, Daniel, and Naveen, 2006), Vega is computed as the dollar change in the executive's total option portfolio, associated with a 0.01 change in the annualized standard deviation of daily stock returns. The dollar value of Vega is stated in 2012 dollars. We include cash compensation and delta from CEO's stock and option portfolio (pay-performance sensitivity) as control variables for Vega. Vega is likely to be positively correlated with cash compensation and delta since boards are likely to mitigate CEO risk aversion from debt-like payments and undiversified equity risk from stock grants. CEO compensation delta and vega are winsorized at 99th percentile, since these variables are truncated at zero at the 1st percentile.

In a series of robustness checks, we use the following alternative measures of CEO option compensation: (1) Vega scaled by total assets; (2) Flow Vega, where the calculation is

same as Vega, but only accounting for a CEO's current option grants; (3) the value of option-based compensation divided by stock compensation; and (4) the number of options granted in current year divided by the number of shares granted.

3.1.2. Firm-level Customer Relationships Data

We extract the firm-level customer information from the Compustat Segment files from 1992-2005. Our primary variable of interest is *Large Customer*, an indicator variable equal to 1 if firm *i* has one or more large customers that usually account for more than 10% of its sales in year *t* and 0 otherwise. We also include two alternative measures of significant trade partners that identify whether the large customer is a government agency or a corporate (both public and private) firm as indicated in the Compustat Segment files. *Corporate Customer* and *Government Customer* are indicator variables that respectively equal 1 if the firm has one or more large corporate customers or large government customers respectively that account for more than 10% of its total sales and equals 0 otherwise.

Since 1998, firms are no longer required to report identities of their important customers under SFAS No.14, but the existence of a major customer must be reported. Reporting the actual sales level is also voluntary under this requirement. Due to this reporting practice, measures computed with customer identities and sales levels are understated and subject to downward biases. Therefore, *Large Customer* is the most complete measure of the existence of large trading relationships. However, for completeness, we also utilize several additional measures of significant trading partners and report the results for the main test in the appendix. These alternative measures include: the sum of total percentage sales to large customers (*Sum Sale*), long-term customer (*Large Customer 2yr*), and number of large customers (*Number Customers*).

The prior literature analyzes the existence of key suppliers as another type of important trading partner on various firm policies (Kale and Shahrur, 2007; Banerjee et al.,

2008; Hui et al., 2012; Johnson et al., 2015). However, we focus on the role of large customers for several reasons. First, large customers are the main sources of a firm's revenues and several studies suggest that large customers have stronger wealth effects on a firm than its suppliers (Hertzel, Li, Officer and Rodgers, 2008; Pandit, Wasley, and Zach, 2011). Second, and partially due to reasoning above, SFAS only requires public firms to report significant customers, but not key suppliers. Thus, it is only possible to identify whether a firm is an important customer to a public supplier from the Compustat Segment files, but not whether the supplier is important to their business. Third, it is easier to identify the implications of large customers on firm value (for example, subsequent sales growth) than that of suppliers. Nevertheless, we also examine the impact of the existence of important suppliers (measured as *Large Supplier*) on CEO compensation policy for robustness checks in an untabulated test.

3.1.3 Import Tariff Data

We use the import tariff data compiled by Fresard (2010) covering the period 1974-2005.[11] The tariff data only exists for manufacturing industries (2000-3999 SIC range). Following Fresard (2010), we identify a tariff cut as a large negative tariff change in a specific 4-digit SIC industry that is 2.5 times larger than the industry's median change. Tariff $Cut_{j,t}$ is an indicator variable equals 1 if the supplier firm is in industry *j* which experiences a tariff cut at time t and 0 otherwise. To ensure that the tariff changes only reflect non-transitory shocks and thus relatively permanent changes in the competitive environment, we exclude tariff cuts followed by equivalently large increases over next two years. As a result, we identify 257 tariff cuts in 86 unique 4-digit SIC industries in the 1992 to 2005 period. Figure 1 displays the levels for the 257 industry-level tariff reductions by year for our sample.

[11] Available on Laurent Fresard's webpage: http://terpconnect.umd.edu/~lfresard/

3.2. Sample Formation

We merge the Execucomp compensation data with the Compustat Segment and company financial data, and require the firm-years to be in the manufacturing industries described above. These requirements yield a sample of manufacturing firms for the period 1992-2005. Since we use reductions of import tariff in manufacturing industries to capture the exogenous rise in competitive pressure and the increase in a large customer's importance to the manufacturing supplier, it is important to ensure that customers are also not subject to a tariff reduction itself. Thus, we drop 45 firm-years where firms have only reported one large customer and this large customer is also subject to a concurrent tariff cut. This leads to a maximum of 6,356 firm-years as a result of above requirements containing 836 unique firms, after requiring the availability of lagged values of controlled variables in our final sample.

The mean, standard deviation, and quartile statistics for key variables and other compensation, CEO, and firm characteristics are presented in Table 1a. As it is shown in Table 1a, 48% of all the firm-year observations in our final sample have one or more major customers. Although the compensation data requirement restricts our sample to well-established firms (S&P 1500 firms), the existence of large customers is commonly observed and accounts for nearly half of all the firm-years. The mean and the median of our key stock option compensation measure, *Pct Option*, is 0.36 for all firms and 0.37 in the subsample of firms that report at least one major customer. By comparison, firms with large customers differ significantly from firms without large customers in almost all the compensation, CEO and firm characteristics reported in the table. In particular, the mean total sales of firms that do not have large customers is more than 3 times larger than is the case for firms with large customers. As a result of this large disparity in firm size between these two samples of firms, multivariate analysis of stock option compensation is needed. We also use propensity score matching to help mitigate tangible disparities in firm characteristics as discussed in Section

3.4. below. Additionally, while the average option compensation for firms with and without a customer may seem to run counter to hypothesis 1, these univariate summary statistics represent an equilibrium outcome also demonstrating the importance of utilizing exogenous shocks to the bargaining power of large customers to determine the causal relation between large customers, option compensation, and firm value.

3.3. Import Tariff Reductions as Quasi-Natural Experiments

To address concerns about reverse causality in the relation between having a large customer and CEO stock option compensation, we use a quasi-natural experiment to examine how firms change their CEO compensation policies in response to exogenous changes in competitive pressure. Following Fresard (2010) and Valta (2012), we use reductions in import tariffs on select industries within U.S. manufacturing firms as unexpected intensifications of competitive pressures faced by suppliers. Following these tariff reductions, customers face lower switching cost that lead to a higher likelihood of a supplier losing an existing major customer, thus improving the bargaining position of customers relative to suppliers. To prevent customers switching to foreign rivals, firms that have major customer relationships and in industries that are subject to import tariff deductions will award their CEOs significantly lower stock option compensation.

As pointed out by Fresard (2010), the tariff deductions have to satisfy three requirements under parallel trends assumption to be a valid experiment for establishing causality: 1) There are substantial changes in competition after the tariff cuts; 2) The industry-levels tariff cuts need to be exogenous to factors that drive CEO's risk-taking incentive award; 3) The tariff reductions are unexpected.

Tariff reductions make it significantly less costly for foreign firms to directly compete with domestic firms, this will lead to significant increases in competitive pressures on domestic firms. Past studies including Bertrand (2004) and Irvine and Pontiff (2009) find that

the market share of foreign competitors significantly increases following tariff cuts. Also, tariff cuts effectively intensify competition in domestic markets (Bernard et al., 2006; Lee and Swagel, 1997; Trefler, 1993). In addition, Fresard (2010) documents significant increases in import penetration following industry import tariff reductions. Thus, tariff cuts are associated with intensified competitive pressures. In untabulated results, we also perform univariate tests of the effects of tariff cuts on total industry sales and industry concentration, and find evidence consistent with Fresard (2010). Both the total industry sales and the industry concentration by domestic firms dramatically decrease. These findings indicate a significant increase in industry competition (this finding is likely to understate the increase in competition, since we only have data on domestic firms) and an increase the probability of domestic firms losing large customers.

The industry-level tariff cuts need to be exogenous to the factors that drive CEO compensation structures. The tariff reductions are events that repeat themselves on multiple occasions for various groups of firms. An advantage of using repeated experiments is that one can show that the treatment effects are similar across time, and that they are not driven by a particular group of firms over a few adjacent years. However, there may be a concern that policy makers consider industrial performance and financial conditions when granting trade protections. Another potential concern is that larger firms are more capable of lobbying politicians for trade protections. To address concerns with the randomness of this experiment, we also include controls for firm performance (ROA, sale growth), financial strength (leverage, cash holdings) and firm size in an alternative specification. These control variables use lagged values from before every tariff cut so that they do not reflect the subsequent impacts of tariff reductions on performance, financial condition, or firm size.

Finally, to be a valid experiment the tariff cuts should not be anticipated, so that firms do not make adjustments in CEO's risk-taking incentives ex ante. To ensure this assumption

holds, we perform a falsification test on the pre-treatment trends. We construct a pre-trend indicator variable that equals 1 if the firm is 1 or 2 years before the industry-level tariff cut, and then regress the portion of option compensation (*Pct Option*) on it. The results (shown in the Table 9) indicate that there is no significant change in the use of option-based compensation before tariff cuts.

3.4. Propensity Score Matching

We use propensity score matching to form an alternative matched sample, to mitigate the possibility that observed differences in compensation structures between large-customer firms and non-large-customer firms following tariff reductions are potentially due to differences in observable firm characteristics between the two samples. Following the recommendations of Atanasov and Black (2015), we estimate propensity scores and form the matched sample based on scores in the entire period before tariff reductions to ensure the tariff reductions produce covariate balance between the two groups of firms. Propensity scores are estimated using a probit model that is based on the following matching criteria: Vega, Delta, sales, return volatility, the natural log of firm age, sales growth, ROA, MTB, leverage, ExCash, capital expenditure, R&D intensities, and number of business segments. As next step, we match each large customer firm-year observation to the corresponding nearest *two* neighbor firm-year observations. We also restrict the matched pseudo-firm-year observations to be in the same year as the large customer firm-year observations, and have not experienced tariff reductions in the past two years. There are 2,722 large customer (real) firm-year observations and 5,444 pseudo-firm-year observations in the final matched sample.

Table 1b reports the means for CEO compensation, firm, and CEO characteristics of large-customer firm-years and the non-large customer in the matched sample. As a result of matching, the sample of firms with large customers and the sample of firms without large customers have similar firm characteristics. We find that firm size, risk, performance,

investment expenditures, financial policies, sales concentration, and corporate governance are not significantly different between these two samples of firms. The only large differences between the two samples are the option Vega of the CEO and CEO age. In particular, we observe that firms with large customers give lower risk-taking incentives to their CEOs, when other firm characteristics of these firms are equivalent to those of firms without a large customer. This result is in line with Hypothesis 1. To address the concern that the CEO in firms with large customers are significantly younger than firms that do not have large customers, we control for CEO age as robustness checks in our main specifications. This does not lead to changes in our conclusions. Therefore, we expect that our matched sample has balanced covariates. Large-customer firms and firms without a large customer are likely to have similar time trends in their compensation structures in our matched sample before the occurrence of an exogenous shock.

In Figure 2, we also check the overlap of the covariates in our matched sample by plotting the distribution of all the key covariates, including firm size, firm risk, ROA, book leverage, and cash holdings. As can be seen in the figure, the distributions of the covariates of the treated and control observations are very similar for all the key covariates. Together with the prior analysis, this provides collaborating evidence that our matching procedure allows us to draw valid inferences on the effects of tariff changes on executive compensation and firm value.

4. Empirical Results

4.1. Summary Statistics of Import Tariff Cuts and CEO Stock Option Compensation

Table 2 summarizes the mean, median, and quartile values of the magnitudes of tariff and tariff changes among the firm-years with tariff reductions. It also reports the differences inthe means of CEO stock option compensation for large-customer and non-large customer

firms before and after the tariff reductions. As shown in Panel A of Table 2, the 257 industry-level tariff reductions contain 972 firm-years, which account for nearly 20% of all the firm-years in our sample (972 out of 6,356 firm-years) in the 1992-2005 period. Imports tariffs in the manufacturing industries are generally very low following tariff reductions in our sample period, with a mean tariff rate of 1.83% and a median of 1.37%. Among the firm-years that are subject to tariff reductions, the mean magnitude of the cuts in our sample is also large. The mean tariff rate change is -0.59% and the median tariff rate change is -0.43%, which represents roughly a mean reduction of tariff by 33%. The economic significance of these tariff cuts likely to lead to significant changes of the competitive pressures. Further validity checks on the economic significance of tariff reductions are shown in the Panel A of Table 9.

In column 1 and 2 of panel B in Table 2, we show that the mean CEO option compensation significantly decreases from 36% to 33% following tariff reductions. The mean value of *Vega* also decreases significantly by $42,000 after the tariff cuts. These differences are both significantly significant at 1%. Columns 3 and 4 report the mean changes in stock option compensation in the subsample of firms that have at least one major customer. Following the tariff cuts, firms with large customers experience a larger reduction in *Pct Option* and *Vega* compared to firms without large customers (as shown in column 5 and 6). Firms with large customers reduce the percentage of their CEO's option compensation by 5%, while firms without large customers reduce it by 2%. This also results in larger reductions in Vega by firms with large customers, where CEO risk-taking incentives are reduced by 40% of their pre-tariff cut values, compared to a decrease in Vega of 28% for CEOs of firms without large customers. The above results are also consistent in the matched sample as reported in panel C. Overall, our univariate results provide strong evidence that the changes in the CEO's stock option compensation are more responsive to tariff reductions in firms with large customers. In other words, firms that are more dependent on major customers tend to

reduce more CEO stock option compensation after exogenous shocks to their large customer relationships.

4.2. Multivariate Analysis of CEO Stock Option Compensation and Large Customer Relationships

Estimates of diff-in-diff OLS regressions are shown in Table 3. We are primarily interested in the changes of supplier CEO's annual compensation structures after the tariff reductions to test hypothesis 1. The dependent variable is the fraction of CEO annual compensation in stock options (Pct Option). We use OLS regressions with firm and year fixed effects in all our specifications and standard errors are clustered by firm.

Results in column (1) indicate that after the tariff deductions, firms with large customers provide significantly lower CEO stock option compared to those without large customers. This result is statistically significant at 5%. Economically, the difference between these two groups of firms following the tariff cuts is predicted to be 25.6%. Since firms with Vega equal to zero already have the lowest possible Vega and will not be able to reduce the risk-taking incentives provided to their CEOs further, we exclude firms with 0 Vega in the year before the tariff cuts in column (2), Consequently, we obtain stronger results of the option reductions following the tariff cuts, where in this subsample of firms does have the ability to reduce their CEO option compensation, as reported in column (2). Regression results in our matched sample are reported in column (3) and (4) and they also remain robust. The magnitude of the effect of tariff cuts on large customers following the tariff cuts is smaller, though still economically significant, in the matched sample. This demonstrates the importance of having balanced observable covariates as a result of matching.

Overall, the empirical evidence in Table 3 strongly supports hypothesis 1. We find compelling evidence that having large customers leads to firms to provide CEOs with significantly lower stock option compensation, following import tariff reductions as

exogenous shocks to existing large customer relationships. However this negative option-customer relation is weaker when the large customer is a government organization.

4.3. Multivariate Analysis of CEO Stock Option Compensation and Firm Value

To test hypothesis 2, we examine whether the changes in a supplier CEO's compensation structure lead to changes in firm value when the firm has a large customer. Table 4 presents difference-in-difference regression results. In this test we split our sample into firm-years with and without large customers, and compare their differences in firm value caused by CEO's option compensation following tariff reductions. Results in Column (1) indicate that following the tariff reductions firms that have large customers experience significantly reduced firm value if their CEOs have lower stock option compensation. This result is statistically significant at 10%. Economically, after the tariff reductions, firms with large customers experience 2.2% fall in Tobin's Q after a 1% increase in CEO stock options. However the CEO stock option compensation of firms without large customers does not significantly impact on firm value, as shown in Column (2). Similar to results in Table 3, we observe a stronger option-value link in firms for the subsample of firms where the Vega of the CEOs' compensation in the year prior to the tariff cut is greater than zero, as shown in Columns (3) and (4). When firms have positive risk-taking incentives prior to the tariff cuts, a 1% decrease in *Pct Option* leads to 3% improvement in the firm's Tobin's Q if the firm has large customers.

We conduct a similar test using our matched sample and obtain similar results in Panel B of Table 4. Taken together we find strong evidence consistent with our hypothesis that following an increase in customer bargaining power, higher CEO stock option compensation reduces firm value. Using import tariff reductions as exogenous shocks to large customer-supplier relationships, we also provide creditable causal evidence of the above relation. In untabulated tests, we repeat this analysis using ROA and Sales Growth as

measures of firm performance measures and find both quantitatively and qualitatively similar results.

4.4. Supplier CEO Stock Option Compensation and the Strengths of Large Customer Relationships

In this section, we test the channel through which CEO option compensation reduces firm value. Specifically, we examine if stock option compensation weakens large customer-supplier relationships following import tariff reductions.

We take sales data for major customer-supplier pairs from the Compustat Segment files. Under SFAS accounting rules, firms are required to report the existence of customers who account for more than 10% of their sales. Due to this reporting practice, Compustat Segment files only contain trading relationships for firms that have large customers. However, the reporting of sales percentages and customer identities is voluntary since 1998. We use the supplier GVKEY and the customer id from the segment files to identify supplier-customer pairs and to validate and match listed customer names to existing firms by hand where possible. We then merge this relationship data with the CEO compensation and tariff data.

We limit the trade relationship data to suppliers that report both the amount of sales and the identities of its large customers to identify each unique supplier-major customer pair. We then calculate the annual change in sales for a particular customer-supplier relationship (Change in Reported Sales). For every unique customer-supplier relationship, we calculate the total length of the relationship in years. There are 284 unique suppliers with CEO compensation data available, 772 unique trading relationships and 1,812 relationship-year observations left after requiring information on key control variables and dependent variables. In addition, the calculation of the growth in sales to a particular customer requires past sales data, therefore this step requires all the trade relationships last for at least two years.

Panel A of Table 5 reports the summary statistics of the characteristics of major customer-supplier relationships. On average, the mean relationship length is 4.6 years and the median is 4 years, indicating that long-term trading relationships commonly exist in our sample. Average sales to a large customer is $458 million, and represents 20% of total sales for firms with large customers (sale dependence). Median sales to a large customer is smaller at $153 million, representing 15% of total sales. Overall, the statistics in Table 5 indicate that the major customer-supplier relationships in our sample are generally large and stable relationships.

Panel B of Table 5 compares the length and sales growth of these large trade relationships before and after the tariff reductions. Overall, there is not a significant difference in the strength of these relationships following tariff cuts. One exception, though, is that the relationship lengths are significantly shortened, in the sample where the supplier's CEO stock option compensation is greater than the median value as shown in Column 3 & 4.

Table 6 reports diff-in-diff results from a multivariate analysis of supplier CEO stock option compensation and the strengths of the major customer-supplier relationships. We use OLS regressions with supplier-customer pair and year fixed effects in column (1) and (2) and standard errors are clustered by relationship. The dependent variable in Column 1 & 2 is change in reported sales, which is the percentage sales growth to a particular large customer as reported by the supplier. Results in column (1) indicate that tariff reductions and stock option compensation do not significantly affect the subsequent sales growth to large customers. However, as shown in column (2), a higher fraction of option-based compensation leads to significantly lower sales growth to a customer when there are tariff reductions in the firm's industry. This result is statistically significant at 10%. Economically, a 1% increase in the annual option usage as a form of compensation is predicted to be associated with 4.9% decrease in subsequent sales growth to the same large customer.

The dependent variable in column 3 & 4 is termination, an indicator variable equals to one if the trade relationship discontinues next year and 0 otherwise. We use logit regressions with year fixed effects, with standard errors clustered by supplier-customer pairs in in column 3 & 4. Results in column (3) indicate that tariff reductions do not significantly increase the likelihood of relationship termination. However, a higher fraction of option-based compensation significantly increases the likelihood of relationship termination. This result is significant at 1% and the economic magnitude is also large. In column (4), we also observe a higher fraction of option-based compensation significantly increases the likelihood of relationship termination when there are tariff reductions in the firm's industry. This result is statistically significant at 10%.

Overall, we do not find evidence that the tariff reductions themselves significantly weaken the existing major customer-supplier relationships, which is in line with Bertrand, Jensen and Scott (2006) and Fresard (2010). However, we do find some trade relationships are weakened and others are strengthened, which leads to an overall neutral effect of tariff reductions. In particular, we find that CEO stock option compensation affects the reallocation of major customer sales following reductions in import tariffs. Firms with lower stock option compensation to CEOs are predicted to strengthen major customer relationships, and experience higher large customer sales growth, and lower probability of relationship interruptions following tariff reductions.

4.5. Firm Heterogeneity and Large Customer Characteristics in Compensation Structures After Tariff Cuts

To demonstrate the robustness of our results, in this section, we examine cross sectional differences in firms with large customers changing their CEO stock option compensation in response to tariff reductions. In particular, we expect that firms that have higher leverage, higher asset specificity, more differentiated products, more domestic sales

and more sales in the industry that is experiencing tariff cuts. We find results consistent with this expectation and report results in Table 7.

In columns 1 and 2 of Panel A in Table 7, we split firm-years by whether they have leverage above or below the median of our sample. We find that firms with higher leverage, and thus higher cost financial distress to important customers will cut significantly more CEO option compensation following tariff cuts at the presence of large customers. This is consistent with our expectation that higher leverage as encouraged by CEO option compensation reduces customer's demands. As existing large customer relationships become more important following tariff reductions in the supplier firm's industry, firms with higher leverage needs to reduce CEO option-based compensation more to protect their valuable customer relationships. We find consistent evidence in columns 3 and 4, where we split our sample into firms with higher and lower probability of financial distress (following Fong, Hong, Kacperczyk, and Kubik (2012)) using the sample median as the cutoff.

The increased costs of contracting due to ex post opportunism are greatest for firms with higher asset specificity or more differentiated products (for example, see Gibbons (2005)). Accordingly, a supplier with higher asset specificity or differentiated products suffers from a greater loss in RSI if the customer terminates the trade relationship because of the supplier's customized production for its customer (Banerjee et al., 2008). Similarly, major customers are also more concerned about the financial distress by suppliers that produce differentiated products, due to the higher switching costs. Therefore, we expect suppliers with greater asset specificity or product uniqueness are more likely to reduce CEO option compensation following increased threats of foreign rivals as a result of tariff cuts.

In columns 1 and 2 of Panel B in Table 7, we split firm-years by whether they have asset specificity above or below the median in our sample, where asset specificity is defined as the gross value of machinery and equipment scaled by lagged assets (James and Kizilaslan,

2014). Alternatively, in columns 3 and 4, we split firm-years by median product uniqueness. Following Titman and Wessels (1998) and Masulis, Wang and Xie (2007), we define product uniqueness using the ratio of selling expense to total assets. Consistent with the discussion above, we find that firm-years with above median asset specificity (in column 1) and above median product uniqueness (in column 3) significantly reduce CEO option-based compensation. These results are statistically significant at 5% and 1% in the subsample of firm-years with above median asset specificity and product uniqueness (respectively), but are not significant in the subsample of firm-years with below median asset specificity or product uniqueness. Moreover, differences in above- versus below-median estimates are statistically significant for both characteristics. Overall, we find convincing evidence that customer RSI creates strong incentives for a supplier to reduce CEO stock option compensation.

In Panel C of Table 7, we split all the firm-years by supplier-firm industry characteristics. In columns 1 & 2, we find that when firms have large customers and in industries with higher than the median concentration, and therefore face greater potential losses to foreign competitors as the result of tariff changes,, they reduce more CEO option-based compensation following tariff cuts. Similarly, in columns 3 & 4 we find that firms with more percentage sales in industries that are subject to tariff cuts reduce more option-based compensations when they have large customers. These results are consistent with our expectations that firms need to reduce more CEO option compensation if they have valuable customer relationships if they are more affected by tariff reductions in their industries.

We further explore the heterogeneity of the characteristics of firm's customers and report results in Table 8. We split all the firm-years by the median fraction of domestic sales out of total sales in our sample in columns 1 & 2 of Panel A. We expect firms with a larger proportion of domestic sales to be impacted by tariff cuts to a greater degree. We find that when firms have large customers and higher than median percentage domestic sales, they

reduce more CEO option-based compensation following tariff cuts, as shown in column 5. This result is statistically significant at 10%. However this result is not significant in the subsample where firms are less dependent on domestic sales as shown in column 2.

Next we further differentiate the types of large customers into large corporate customers and large government customers. We predict that large corporate customers are more likely to switch to a foreign supplier when imports become cheaper after the tariff reductions, while large government customers strongly prefer to trade with domestic firms and thus are less sensitive to tariff cuts.[12] Consistent with this prediction, the results in columns (1) and (2) of Panel B show a reduction in CEO stock option compensation that is stronger in firms that have large corporate customers than for firms that have large government customers. The interaction coefficient in Column (1) is larger than that in column (1) of Table 3, indicating that the effect of large corporate customer on firm's compensation structure is larger than the average effect for all customers. In comparison, the coefficient of the interaction in Column (2) of Panel B is not statistically significant, which indicates that large government customers do not have a significant effect on firms' compensation structures.

4.6. The Implementation of FAS 123R as an Exogenous Shock to Option-based Compensation

Our primary analysis utilizes tariff cuts as a plausibly exogenous shock to the competition for large customers, which enhances customer bargaining power. As discussed in Section 3.3, this setting has several desirable empirical properties including multiple events shocking many different industries at different points in time. To strengthen the external

[12] Another alternative explanation is that government customers mainly purchase goods for consumption rather than production, where the suppliers' poor quality products lead to less severe reputational or monetary losses (Banerjee et al., 2008). Also, government buyers may not be driven by a profit motive, and can sometimes provide help to distressed firms and save their employees from losing jobs, therefore they can be less sensitive to the risk-taking of their suppliers. These predictions similarly point to a stronger empirical relation for corporate customers.

validity of our findings, we also use an alternative exogenous shock to option-based compensation (rather than the competition for customers) to confirm the negative option-value link in the presence of concentrated customer base.

Specifically, following Hayes, Lemmon, and Qiu (2012), we use the change in the accounting valuation of stock options under FAS 123R. Following FAS 123R, firms are no longer able to expense employee stock options at their intrinsic value, but instead they must expense these options at their fair values. The change in accounting treatment under FAS 123R significantly reduced the accounting benefits of expensing option-based compensation and we observe that CEO stock option compensation significantly declines post FAS 123R.[13] To perform this analysis, we define the post-123R period as fiscal years 2005 through 2013. After requiring necessary data from RiskMetrics Director Database, RiskMetrics Governance Database, and Compustat, our sample consists of 2,811 large-customer firm-years and 3,979 non-large-customer firm-years from 1996-2013.

We compare the impact of FAS 123R on firm value in the subsamples of large-customer and non-large-customer firm-years. We use Tobin's Q as the main dependent variable and study the impact of FAS 123R on firm value in the subsamples of large-customer and non-large-customer firm-years in OLS regressions. We include all the control variables used in our baseline regressions as well as board independence, E-index, CEO ownership, as added control variables along with CEO and firm fixed effects, with standard errors clustered by firm. In untabulated results, we find that the coefficient on the Post-123R indicator is positive and statistically significant at 5% in the large-customer firm-years subsample, but insignificant in the non-large-customer firm-year subsample. This result is

[13] It is important to note that while this alternative setting provides a plausibly exogenous shock to option compensation, utilizing FAS 123R introduces several econometric issues and potentially confounding effects not present in our tariff analysis. First, FAS 123R adoption represents a simultaneous shock to the option compensation to all industries, and reduces the power of econometric tests due to the shared shock among all firms. Second, due to the timing of the single shock (in the post-SOX period and near the start of the global financial crisis), it is difficult to separate the effects of the FAS 123R from other potentially confounding macroeconomic factors occurring around the same time.

consistent with findings of our baseline regression reported in Table 4. It indicates that the reduction of option-based compensation significantly increases firm value in the presence of important product market relationships.

We repeat our Table 6 analysis using Post-123R as the focal variable in additional untabulated results. We find strong evidence that the adoption of FAS 123R significantly reduces the probability of the termination of the existing large customer relationships, and find moderately significant evidence that the sales growth to the same customers rise following the adoption of FAS 123R. Overall, our results indicate that following a negative shock to CEO stock-option compensation, the value of firms with large customers significantly improves, reflecting strengthened trading relationships. These findings support the results in Table 4 & 6 and provide externally validity to our previous inferences using an alternative quasi-natural experiment.

4.7. Additional Robustness Tests

To ensure our results are robust to a variety of alternate explanations and definitions, we conduct several robustness tests. First, tariff cuts can impact the stock volatility of firms with large customers more than firms without large customers. Since our option compensation measure (*Pct Option*) is value-based, changes in stock volatility could be influencing our results. To ensure that this is not the case, we explicitly test whether stock volatility of firms with large customers increased following tariff cuts in an untabulated test. We do not observe a significant change in stock volatility around the tariff cuts for firms with or without large customers. Furthermore, we do not observe a significant difference between the two subsamples. This provides evidence that the reduction in option compensation that we observed is not due to a change in stock volatility.

In untabulated tests, we repeat our primary analysis using alternative measures of risk-taking incentives including: 1) vega; 2) vega scaled by total assets; 3) flow vega; 4) the

value of CEO option-based compensation divided by CEO stock compensation; and 5) the number of options granted in current year divided by number of shares granted. We obtain qualitatively similar results. These results are robust to alternative measures of major trading relationships, including: 1) the number of large customers (*Number Customer*); 2) the sum of percentage sales to all large customers *(Sum Sale*) 3) large longer-term customers (*Large Customer 2yr*); and 4) major suppliers (*Large Supplier*).

We also check whether suppliers experience CEO turnovers when they are subject to tariff reductions. In our sample, there are 52 CEO turnovers when the firm is also subject to tariff reductions. When these 52 firm-years are excluded from our analysis, we find that our main results remain robust.

Additionally, to ensure that our findings are not being driven by the general decline in option compensation that occurred in the 2000s due to the Sarbanes-Oxley Act in 2002 as well as FASB 123R (announced in 2004), we repeat our analysis for years 2001 and prior. In untabulated results, we continue to find significant and consistent evidence in support of our findings in the general sample.

We also repeat our primary analysis using the Coarsened Exact Matching (CEM) approach as an alternative matching method to propensity score matching. Some recent studies criticize the fragility and biases in PSM and find evidence that CEM dominates PSM in terms of providing more stable/credible evidence (Iacus, King & Porro, 2011). We find quantitatively and qualitatively similar results for our primary analysis using CEM matching in untabulated robustness tests.

Finally, in untabulated robustness tests, we perform our analysis on a comprehensive set of firms using a standardized OLS approach for period 1992-2009. While we lose the causal nature of the tariff cuts for these tests, this allows us to understand whether our results are externally valid in a broad sample of firms, and not just in manufacturing industries. We

continue to find strong results in support of hypothesis 1 and 2 that are consistent with our difference-in-differences estimates presented earlier. Taken together, these tests indicate that the results reported are robust to different variable definitions as well as externally valid in understanding the relation between CEO option compensation and risk-taking, as well as firm performance and value and the presence of a large customer.

5. Conclusion

In this study, we examine the influence that an important stakeholder (namely a large customer) can have on firms' CEO option compensation and value. Using import tariff reductions as exogenous shocks to existing customer relationships, we provide credible causal evidence that when a firm has a large customer, the CEO is given lower option-based compensation, leading to significantly increased firm value. Furthermore, this improved firm value is, at least partially, driven by strengthened relationships with large customers: lower CEO option-based compensation leads to higher sales growth to its large customers and lower probability of relationship terminations. This indicates that CEO option compensation is a fundamental component of firm value for firms with large customers. Moreover, our results are stronger if firms with large customers are more responsive to tariff reductions. Firms exhibiting greater sales sensitivity to tariff cuts (including firms with large corporate customers, higher asset specificity, higher product uniqueness, more domestic sales, and more concentrated sales in the industry subjective to the tariff cuts) reduce CEO stock option compensation more aggressively following these exogenous shocks to their customer relationships.

Bringing these findings together, this study sheds new light on the importance of customer-supplier relationships on firm value, performance, and optimal compensation policy. We find that CEO risk-taking incentives can weaken these relationships ex post and having a

large customer can lead to reduced CEO stock option compensation ex ante. Also, we find that raising CEO risk-taking incentives can undercut firm performance when a firm has a large customer. These results add support to the notion that firms modify governance mechanisms so as to bond their actions for important stakeholders. These results also suggest firms incorporate implicit or explicit constraints imposed by important stakeholders when making real decisions.

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Table 1a. Summary Statistics

This table summarizes the means and medians of our key compensation variables and various CEO and firm characteristics. Our sample consists of 6,356 firm-years and 836 unique ExecuComp firms in U.S. manufacturing industries for 1992 – 2005. *Large Customer* is an indicator variable equals 1 if the firm has reported at least one major customer which usually accounts for >10% total sales and 0 otherwise. ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

	All Firms			**Large Customer=0 (N=3326)**		**Large Customer=1 (N=3030)**		**Difference of Means**	**Difference of Medians**
	N	Mean	Median	Mean	Median	Mean	Median		
Compensation Characteristics									
Pct Option	6356	0.358	0.359	0.347	0.350	0.369	0.373	-0.019***	-0.024
Vega ($000s)	6356	134.614	53.599	166.800	70.977	99.283	41.253	69.290***	29.725***
Flow Vega ($000s)	6356	41.734	11.897	53.411	16.826	28.916	8.446	25.250***	8.380***
Delta ($000s)	6356	533.409	197.949	607.800	237.897	451.751	166.034	166.626***	71.863***
Total Compensation ($000s)	6356	3554.400	1957.490	4028.790	2250.680	3033.670	1683.340	1035.012***	567.340***
Firm and CEO Characteristics									
Sale ($ millions)	6356	4054.960	779.286	6101.910	1260.310	1808.050	458.073	4355.111***	802.237***
Total Assets	6356	4641.360	801.157	7116.660	1382.200	1924.250	504.914	5241.895***	877.286***
Firm Risk	6350	10.165	10.128	9.950	9.894	10.401	10.419	-0.447***	-0.525***
Sales Growth	6356	0.759	0.737	0.746	0.731	0.773	0.750	-0.026***	-0.019***
ROA	6356	0.135	0.158	0.139	0.159	0.130	0.154	0.014**	0.005**
MTB	6356	2.359	1.743	2.256	1.702	2.472	1.802	-0.200***	-0.100***
CAPEX	6356	0.066	0.049	0.060	0.048	0.072	0.051	-0.012***	-0.003**
R&D Intensity	6356	0.075	0.038	0.060	0.028	0.092	0.055	-0.032***	-0.027***
Leverage	6356	0.234	0.201	0.244	0.221	0.222	0.173	0.023***	0.048***
ExCash	6356	0.087	0.093	0.080	0.088	0.095	0.100	-0.009	-0.012***
Business Segments	6108	2.544	2.000	2.836	2.000	2.231	1.000	0.599***	1.000***
Sale HHI	6108	0.753	0.915	0.686	0.668	0.823	1.000	-0.138***	-0.332***
Board Independence	3128	0.644	0.667	0.652	0.667	0.634	0.667	0.015**	0.000***
Board Size	3128	9.188	9.000	9.778	10.000	8.466	8.000	1.298***	2.000***
BCF Index	4657	2.081	2.000	2.140	2	1.997	2	0.131***	0.000***
Institutional Block	6356	0.685	1.000	0.673	1	0.697	1	-0.020*	-
CEO Age	6124	55.521	56	56.082	57	54.901	55	1.189***	2.000***
CEO Tenure	6356	7.645	5	7.616	5	7.677	6	-0.098	-1.000***
CEO Own	5548	0.028	0.003	0.024	0.002	0.032	0.005	-0.008***	-0.003***

Table 1b. Summary Statistics of the Matched Sample

We estimate propensity scores and match each *large customer* firm-year observation to the corresponding 2 firm-year nearest neighbors. Propensity scores are estimated from the probit model that uses matching criteria includes: Vega, Delta, sale, return volatility, the natural log of firm age, sales growth, ROA, MTB, ExCash, leverage, capital expenditure, R&D intensities, and number of business segments. We also restrict the matched pseudo large customer firm-year observation to be in the same year as the real large customer firm-year observation, and do not experience tariff reductions for the past two years. ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

Variables	Large Customer=0			Large Customer=1			Difference of Means	Difference of Medians
	N	Mean	Median	N	Mean	Median		
Compensation Characteristics								
Pct Option	5444	0.37	0.36	2722	0.371	0.37	-0.006	-0.002
Vega ($000s)	5444	77.72	26.76	2722	71.133	26.35	6.582**	0.417
Flow Vega ($000s)	5444	21.38	5.34	2722	20.463	5.62	0.912	-0.283
Delta ($000s)	5444	425.06	157.21	2722	217.214	148.87	1.2	8.334
Total Compensation ($000s)	5444	2841.26	1506.26	2722	1671.5	1524.69	108.95	-18.430
Firm and CEO Characteristics								
Sales ($ millions)	5444	1780.45	419.52	2722	1671.5	390.54	0.026	28.980
Firm Risk	5444	10.42	10.49	2722	10.42	10.47	0.004	0.019
Sales Growth	5444	0.78	0.75	2722	0.772	0.75	0.007	0.001
ROA	5444	0.11	0.15	2722	0.108	0.15	0.003	0.000
MTB	5444	2.46	1.79	2722	2.48	1.79	-0.015	-0.004
CAPEX	5444	0.07	0.05	2722	0.073	0.05	-0.001	-0.001
R&D Intensity	5444	0.09	0.06	2722	0.095	0.06	-0.001	0.001
Leverage	5444	0.22	0.17	2722	0.221	0.17	0	0.004
ExCash	5444	0.08	0.10	2722	0.082	0.10	0.001	-0.001
Business Segments	5444	2.19	1.00	2722	2.21	1.00	-0.023	0.000
Sale HHI	5444	0.82	1.00	2722	0.829	1.00	-0.013	0.000
Board Independence	2298	0.64	0.67	1149	0.64	0.67	0.003	0.000
Board Size	2298	8.38	8.00	1149	8.319	8.00	0.058	0.000
BCF Index	3521	1.96	2.00	1675	1.973	2.00	-0.016	0.000
Institutional Block	5444	0.63	1.00	2722	0.622	1.00	0.009	0.000
CEO Age	2335	54.251	55	1203	53.249	53	1.002***	2.000***
CEO Tenure	5520	3.886	1	2760	3.674	1	0.212	0.000
CEO Own	3265	0.021	0.13%	1617	0.021	0.13%	0.000	0.000

Table 2. Summary Statistics of Import Tariff Cuts and CEO Stock Option Compensation.

Panel A of this table summarizes the characteristics of the 257 industry-level tariff reductions in our sample containing 836 firms and 6,356 firm-years for 1992-2005. Panel B shows the mean percentage. *Pct Option* is the dollar value of stock options as a fraction of total compensation. *Vega* is the dollar change in the executive's total option portfolio associated with a 0.01 change in the firm's return volatility, and its value is stated in thousand 2012 dollars. *Large Customer* is an indicator variable equals 1 if the firm has reported at least one major customer which usually accounts for >10% total sales and 0 otherwise. ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

Panel A: Characteristics of Imports Tariff Cuts

Variable	N	Mean	25th Pctl	Median	75th Pctl	Minimum	Maximum
% Tariff Change	257	-0.59	-0.70	-0.43	-0.21	-7.45	0.00
Total Tariff (in %)	257	1.83	0.38	1.37	2.56	0	19.97

Panel B: Option Compensation before and after Tariff Cuts in Non-matched Sample

	All Firms (N=6356)			Large Customer=1 (N=3030)			Large Customer=0 (N=3326)		
	Tariff cut=0	Tariff cut=1	Difference of Means	Tariff cut=0	Tariff cut=1	Difference of Means	Tariff cut=0	Tariff cut=1	Difference of Means
	(1)	(2)	(2) - (1)	(3)	(4)	(4) - (3)	(5)	(6)	(6) - (5)
Pct Option	0.36	0.33	-0.034***	0.378	0.327	-0.051***	0.351	0.332	-0.019*
Vega ($000s)	138.12	51.18	-41.075***	102.77	63.984	-38.786***	170.959	123.97	-46.989***
N	5391	1326		2596	596		2795	732	

Panel C: Option Compensation before and after Tariff Cuts in Matched Sample

	All Firms (N=8166)			Large Customer=1 (N=2722)			Large Customer=0 (N=5444)		
	Tariff cut=0	Tariff cut=1	Difference of Means	Tariff cut=0	Tariff cut=1	Difference of Means	Tariff cut=0	Tariff cut=1	Difference of Means
	(1)	(2)	(2) - (1)	(3)	(4)	(4) - (3)	(5)	(6)	(6) - (5)
Pct Option	0.383	0.324	-0.060***	0.386	0.318	-0.068***	0.382	0.328	-0.054***
Vega ($000s)	84.117	64.996	-19.121***	80.055	59.530	-20.525***	86.066	69.13	-16.935**
N	7121	1045		2272	450		4849	595	

Table 3. Difference-in-Difference Estimations: The Presence of Concentrated Customers and CEO Stock Option Compensation.

This table presents difference-in-difference regression on a sample of manufacturing firms for 1992-2005. The dependent variable is the natural logarithm of one plus *Pct Option* in all columns, and *Pct Option* is the value of stock options as a fraction of total compensation. We use firm and year fixed effects with firm clustered standard errors in all specifications. Columns (2) & (4) reports results only using the subsample where the Vega of the supplier firm CEOs' compensation is greater than zero in the year prior to the tariff cut. Columns (1) & (2) present regression results in the original sample without matching, and columns (3) & (4) present regression results in our matched sample, where each *large customer* firm-year observation to the corresponding 2 firm-year nearest neighbors. *Tariff Cut* $_t$ is an indicator variable equal to 1 when a reduction of import tariff which is 2.5 times larger than its industry's median change. *Large Customer* is an indicator variable equal to 1 if the firm has reported at least one major customer, which usually account for >10% total sales, and 0 otherwise. t-statistics are in parenthesis and ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

	Dependent Variable: Ln(1+Pct Option $_t$)			
	Non-matched sample		Matched Sample	
	(1)	(2)	(3)	(4)
Tariff Cut $_t$: a	0.148*	0.117	0.008	0.007
	(1.71)	(1.32)	(0.09)	(0.06)
Large Customer $_{t-1}$:b	0.052	0.075	0.008	0.009
	(0.76)	(1.07)	(0.36)	(0.38)
*a * b*	-0.256**	-0.265**	-0.096*	-0.102**
	(-2.13)	(-2.15)	(-1.85)	(-2.04)
Log(Sale) $_{t-1}$	0.140**	0.092	0.048	0.058
	(2.40)	(1.61)	(0.69)	(0.81)
ROA $_{t-1}$	0.179	0.130	0.329*	0.307*
	(1.26)	(0.90)	(1.90)	(1.76)
Sale Growth $_{t-1}$	-0.070	-0.025	-0.090	-0.098
	(-0.50)	(-0.18)	(-0.51)	(-0.56)
Leverage $_{t-1}$	-0.310**	-0.336***	-0.186	-0.178
	(-2.39)	(-2.59)	(-1.13)	(-1.02)
ExCash $_{t-1}$	-0.062	-0.123	-0.156	-0.193
	(-0.42)	(-0.81)	(-0.83)	(-1.09)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	6,319	6,025	8,128	7,619
Adjusted R Square	0.326	0.277	0.417	0.358

Table 4. Difference-in-Difference Estimations: CEO Stock Option Compensation, Large Customers, and Firm Value.

The table presents the following difference-in-difference regression on a sample of manufacturing firms for 1992-2005. The dependent variable in all columns is the natural logarithm of one plus *Tobin's Q*, and Tobin's Q equals to the market value of the firm's total assets divided by its beginning-year book value. Panel A presents regression results in the original sample without matching, and Panel B presents regression results in our matched sample, where each *large customer* firm-year observation to the corresponding 2 firm-year nearest neighbors. We use firm and year fixed effects with firm clustered standard errors in all specifications. Columns (2) & (4) in Panel A and B reports results only using the subsample where the Vega of the firm CEOs' compensation in the year prior to the tariff cut is greater than zero. *Pct Option* is the value of stock options as a fraction of total compensation. *Tariff Cut* $_{i,t}$ is an indicator variable equal to 1 when a reduction of import tariff which is 2.5 times larger than its industry's median change. *Large Customer* is an indicator variable equal to 1 if the firm has reported at least one major customer, which usually account for >10% total sales, and 0 otherwise, and it takes the value of the year just before the tariff cut. t-statistics are in parenthesis and ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

Panel A: Non-matched Sample

	Dependent Variable: Ln(1+Tobin's Q $_{t+1}$)			
	Large Customer=1		*Large Customer=0*	
	(1)	(2)	(3)	(4)
Tariff Cut $_t$: a	0.049	0.068	-0.045	-0.036
	(1.13)	(1.39)	(-1.34)	(-0.95)
Ln(1+Pct Option $_t$): b	-0.010*	-0.010	-0.001	-0.000
	(-1.70)	(-1.60)	(-0.22)	(-0.03)
a * b	-0.022*	-0.028**	0.001	-0.003
	(-1.71)	(-2.01)	(0.12)	(-0.26)
Log(Sale) $_{t-1}$	-0.141***	-0.141***	-0.178***	-0.180***
	(-4.67)	(-4.49)	(-5.77)	(-5.65)
ROA $_{t-1}$	-0.039	-0.015	-0.070	-0.073
	(-0.49)	(-0.18)	(-1.16)	(-1.17)
Sale Growth $_{t-1}$	0.089	0.093	-0.007	-0.029
	(1.19)	(1.19)	(-0.10)	(-0.37)
Leverage $_{t-1}$	-0.017	-0.018	-0.102*	-0.087
	(-0.25)	(-0.26)	(-1.88)	(-1.47)
ExCash $_{t-1}$	0.061	0.059	0.043	0.052
	(0.93)	(0.89)	(0.70)	(0.84)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	2837	2697	3143	3008
Adjusted R Square	0.663	0.659	0.715	0.715

Panel B: Matched Sample

	Dependent Variable: Ln(1+Tobin's Q $_{t+1}$)			
	Large Customer=1		*Large Customer=0*	
	(1)	(2)	(3)	(4)
Tariff Cut $_t$: a	0.041	0.070	-0.027	-0.018
	(0.97)	(1.41)	(-0.62)	(-0.34)
Ln(1+Pct Option $_t$): b	-0.012*	-0.012*	-0.018*	-0.018*
	(-1.96)	(-1.84)	(-1.78)	(-1.73)
a * b	-0.025*	-0.032**	-0.016	-0.022
	(-1.92)	(-2.23)	(-1.09)	(-1.40)
Log(Sale) $_{t-1}$	-0.125***	-0.119***	-0.129***	-0.128***
	(-4.17)	(-3.78)	(-4.58)	(-4.36)
ROA $_{t-1}$	0.012	0.014	-0.048	-0.069
	(0.14)	(0.16)	(-0.77)	(-1.06)
Sale Growth $_{t-1}$	0.095	0.099	0.008	0.008
	(1.08)	(1.09)	(0.13)	(0.12)
Leverage $_{t-1}$	-0.027	-0.064	-0.022	-0.027
	(-0.37)	(-0.89)	(-0.40)	(-0.50)
ExCash $_{t-1}$	0.006	0.016	0.030	0.030
	(0.09)	(0.24)	(0.44)	(0.44)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	2590	2417	5151	4823
Adjusted R Square	0.645	0.640	0.681	0.685

Table 5. Summary Statistics of Large Customer-Supplier Relationships.

This table reports summary statistics of the trading relationships between supplier firms and their large customers. Data is drawn from Compustat Segment files and we restrict it to trade relationships of US manufacturing suppliers for the period 1992-2005 after requires tariff reductions data. Due to the reporting practice required by SFAS, Compustat Segment files only contain firms that have significant customers (typically more than 10% of the firm's total sales). This sample contains 284 unique supplier firms, 772 unique large trading customer relationships and 1,812 relationship-years for the 1992-2005 period.

Panel A: All Relationships

Variable	N	Mean	Median	25th Pctl	75th Pctl	Std Dev
Reported Sales (in $ million)	1812	457.824	152.950	53.340	403.160	1135.180
Relationship Length (years)	1812	4.6	4.0	2.0	6.0	3.3
Sale Dependence (in %)	1812	19.6%	15.0%	10.8%	22.5%	21.2%
Vega ($000s)	1812	131.325	62.370	20.852	162.923	167.443
Pct Option	1812	0.386	0.406	0.082	0.627	0.289

Panel B: Characteristics of Relationships during Tariff Reductions

	All Firms (N=4025)			> Median Pct Option (N=2093)			< Median Pct Option (N=1932)		
	Tariff cut=0	Tariff cut=1	Difference of Means	Tariff cut=0	Tariff cut=1	Difference of Means	Tariff cut=0	Tariff cut=1	Difference of Means
	(1)	(2)	(1) - (2)	(3)	(4)	(4) - (3)	(5)	(6)	(6) - (5)
% Change in Reported Sales	4.68	4.71	-0.03	4.67	4.73	0.05	4.68	4.70	0.02
Relationship Length	4.1	4.05	0.05	3.8	3.4	-0.34*	4.5	4.8	0.35
Number of Observations	1285	2740		666	1427		619	1313	

Table 6. Difference-in-Difference Estimations: CEO Stock Option Compensation and Large Trading Relationships during Tariff Reductions.

The dependent variable in Column (1) & (2) is the natural logarithm of one plus *Change in Reported Sales* in percentage, and *Change in Reported Sales* is the sale growth to a particular large customer *j* as reported by the supplier firm. The dependent variable in Column (3) & (4) is *Termination,* an indicator variable equals to one if the trade relationship discontinues next year and 0 otherwise. This variable is set to missing if the one of the firms in the relationship disappears in the Compustat universe. *Pct Option* is the dollar value of stock options as a fraction of total compensation. OLS regressions in column (1) & (2) are estimated with relationship and year fixed effects and standard errors clustered by trade relationships. The logit models in column (3) & (4) are estimated with year fixed effects and standard errors are clustered by trade relationships. t-statistics are in parenthesis and ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

	Change in Reported Sales j,t		**Termination j,t**	
	OLS	OLS	Logit	Logit
	(1)	(2)	(3)	(4)
Tariff Cut t: a	0.081	0.197	0.110	-0.722
	(0.67)	(1.49)	(0.46)	(-1.33)
Ln(Pct Option t +1): b	0.008	0.011	0.109***	0.088**
	(0.65)	(0.85)	(2.59)	(2.05)
a * b		-0.049*		0.280*
		(-1.82)		(1.66)
Sale Dependence	0.016***	0.016***	-0.025***	-0.026***
	(7.11)	(7.11)	(-3.95)	(-3.92)
Relationship Length	0.604***	0.618***	-0.083***	-0.082***
	(4.39)	(4.17)	(-3.97)	(-3.92)
Log(Sale)	-0.107	-0.107	-0.126**	-0.129***
	(-1.25)	(-1.24)	(-2.52)	(-2.58)
ROA	-0.327	-0.310	-0.543	-0.513
	(-1.18)	(-1.12)	(-1.19)	(-1.13)
Sale Growth	0.024	0.022	0.029	0.030
	(0.15)	(0.13)	(0.06)	(0.06)
Firm Age	0.158*	0.154*	0.002	0.002
	(1.79)	(1.76)	(0.43)	(0.40)
R&D	0.778**	0.770**	-0.072	-0.080
	(2.09)	(2.07)	(-0.10)	(-0.11)
Leverage	-0.077	-0.075	-0.192	-0.184
	(-0.87)	(-0.84)	(-0.74)	(-0.70)
ExCash	-0.108	-0.109	-0.007	-0.005
	(-1.31)	(-1.31)	(-0.04)	(-0.03)
BCF			-0.039	-0.033
			(-0.77)	(-0.64)
Relationship FE	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes
Observations	1274	1274	1812	1812
Adjusted R-square	0.174	0.176	NA	NA

Table 7. Cross-Sectional Variations: Supplier Firm Characteristics and CEO Stock Option Compensation during Tariff Reductions

This table presents results from OLS regressions on a sample of manufacturing firms for 1992-2005. The dependent variable is the natural logarithm of one plus *Pct Option* in all columns. *Pct Option* is the dollar value of stock options as a fraction of the CEO's total compensation. *Tariff Cut* $_t$ is an indicator variable equal to 1 when a reduction of import tariff which is 2.5 times larger than its industry's median change. *Large Customer* is an indicator variable equal to 1 if the firm has one or more customers, which usually account for >10% total sales, and 0 otherwise. *Leverage* is the book value of total current debts plus long-term debts and scaled by total assets. *Distress* is the distance to default measure from Fong, Hong, Kacperczyk, and Kubik (2012). *Asset Specificity* is defined as the gross value of machinery and equipment scaled by lagged assets. *Product Uniqueness* is the ratio of selling expense to assets as a proxy for product uniqueness. *Industry Concentration* is the Herfindahl-Hirschman Index (HHI) of the supplier firm's 4-digit SIC industry. *% Sales in Affected Industry* is the percentage of the supplier's sales in industries that are experiencing tariff reductions. We split the full samples into high and low subsamples based on the sample's median. Controls (not reported for brevity) are similar to those used in Table 3. Standard errors are clustered by firm in all specifications. t-statistics are in parenthesis and ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

Panel A: Supplier Financial Distress and CEO Stock Option Compensation during Tariff Reductions

	High Leverage	*Low Leverage*	*High Distress*	*Low Distress*
	(1)	(2)	(3)	(4)
Tax Cut: a	0.135	0.130	0.130	0.098
	(1.32)	(0.87)	(1.23)	(0.65)
Large customer: b	0.055	-0.010	0.039	-0.008
	(0.49)	(-0.12)	(0.34)	(-0.09)
a * b	-0.298*	-0.224	-0.299*	-0.172
	(-1.77)	(-1.20)	(-1.79)	(-0.91)
Other Controls in Table 3	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year	Y	Y	Y	Y
Observations	3075	3084	3079	3080
Adjusted R-square	0.312	0.365	0.315	0.359

Panel B: Supplier Relationship-Specific Investments and CEO Stock Option Compensation during Tariff Reductions.

	High Asset Specificity	*Low Asset Specificity*	*High Product Uniqueness*	*Low Product Uniqueness*
	(1)	(2)	(3)	(4)
Tariff Cut: a	0.205*	0.061	0.432***	-0.017
	(1.74)	(0.45)	(3.49)	(-0.15)
Large Customer: b	-0.035	0.183*	0.052	0.053
	(-0.32)	(1.89)	(0.56)	(0.49)
a * b	-0.348**	-0.098	-0.592***	0.068
	(-2.11)	(-0.52)	(-3.42)	(0.40)
Additional Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	3125	3095	3080	3132
Adjusted R-square	0.314	0.355	0.308	0.369

Panel C: Tariff Impacts and Supplier CEO Stock Option Compensation during Tariff Reductions.

	High Industry Concentration	*Low Industry Concentration*	*High % Sales in Affected Industry*	*Low % Sales in Affected Industry*
	(1)	(2)	(3)	(4)
Tax Cut: a	0.305**	-0.073	0.273**	-0.095
	-2.46	(-0.59)	-2.4	(-0.64)
Large customer: b	0.036	0.027	0.057	0.055
	-0.32	-0.3	-0.47	-0.56
a * b	-0.420**	-0.002	-0.312**	-0.089
	(-2.42)	(-0.01)	(-2.11)	(-0.37)
Additional Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year	Y	Y	Y	Y
Observations	3085	3115	3171	3023
Adjusted R-squared	0.32	0.324	0.319	0.355

Table 8. Difference-in-Difference Estimations: Customer Firm Characteristics and Supplier CEO Stock Option Compensation during Tariff Reductions

This table presents results from OLS regressions on a sample of manufacturing firms for 1992-2005. The dependent variable is the natural logarithm of one plus *Pct Option* in all columns, which is the dollar value of stock options as a fraction of the CEO's total compensation. *Tariff Cut* $_t$ is an indicator variable equal to 1 when a reduction of import tariff which is 2.5 times larger than its industry's median change. *% Domestic Sales* is the percentage of the supplier's total sales to domestic customers. *Corporate (Government) Customer* is an indicator variable equal to 1 if the firm has one or more large corporate (government) customers, which usually account for >10% total sales, and 0 otherwise. Standard errors are clustered by firm in all specifications. t-statistics are in parenthesis and ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

Panel A: Proportion of Domestic Sales.

	High % Domestic Sales	*Low % Domestic Sales*
	(1)	(2)
Tax Cut: a	0.233**	-0.099
	(2.16)	(-0.60)
Large customer: b	-0.046	0.116
	(-0.39)	(1.13)
a * b	-0.292**	-0.076
	(-1.99)	(-0.29)
Additional Controls	Y	Y
Firm FE	Y	Y
Year	Y	Y
Observations	3127	3073
Adjusted R-squared	0.342	0.342

Panel B: The Presence of Significant Corporate vs. Government Customers.

	(1)	(2)
Tariff Cut: a	0.152*	0.035
	(1.79)	(0.50)
Corporate Customer: b	0.038	
	(0.56)	
*a * b*	-0.272**	
	(-2.25)	
Government Customer: c		0.467
		(1.52)
*a * c*		-0.189
		(-0.46)
Additional Controls	Y	Y
Firm FE	Y	Y
Year FE	Y	Y
Observations	6319	6319
Adjusted R-square	0.326	0.326

Table 9. Validity Checks for the Tariff Reduction Experiments.

The dependent variable in column (1) is the natural logarithm of one plus *Pct Option* in all columns, which is the dollar value of stock options as a fraction of the CEO's total compensation. The dependent variable in columns (2) and (3) is the natural logarithm of one plus *Tobin's Q*, and Tobin's Q equals to the market value of the firm's total assets divided by its beginning-year book value. *Pre Cut* is an indicator variable equals 1 if the firm is 1 or 2 years before the industry-level tariff cut, and 0 other wise. *Large Customer*$_t$ is an indicator variable equal to 1 if the firm has at least one large customers, which usually account for more than 10% sales, and 0 otherwise. t-statistics are in parenthesis and ***, **, and * indicates statistical significance of 1%, 5%, and 10% respectively.

Panel A: Impact of Tariff Reductions on Industry Sales and Concentration

	Tariff cut=0	Tariff cut=1	Difference of Means
	(1)	(2)	(2) - (1)
Mean Industry Sales ($ mil)	989,217	562,651	-426,565***
Mean Industry Concentration	0.344	0.301	-0.043***
N	1115	257	

Panel B: Falsification Test of Pre-treatment Trends

	Ln(1+Pct Option $_t$)	Ln(1+Tobin's Q $_{t+1}$)	
	All Firms	*Large Customer=1*	*Large Customer=0*
	(1)	(2)	(3)
Pre Cut: a	-0.037	0.099	0.020
	(-0.31)	(1.60)	(0.39)
Large Customer: b	-0.006		
	(-0.09)		
*a * b*	0.197		
	(1.42)		
Ln(1+Pct Option): c		-0.013**	-0.004
		(-2.13)	(-0.75)
*a * c*		-0.003	0.014
		(-0.24)	(1.09)
Log(Sale)	0.143**	-0.141***	-0.173***
	(2.51)	(-4.73)	(-5.70)
ROA	0.184	-0.041	-0.073
	(1.30)	(-0.52)	(-1.20)
Sale Growth	-0.079	0.087	-0.012
	(-0.56)	(1.18)	(-0.16)
Leverage	-0.313**	-0.016	-0.099*
	(-2.41)	(-0.24)	(-1.83)
ExCash	-0.069	0.061	0.048
	(-0.47)	(0.94)	(0.78)
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	6319	2837	3143
Adjusted R-squared	0.325	0.663	0.715

Figure 1: Industry Import Tariff Reductions by Year, 1992-2015

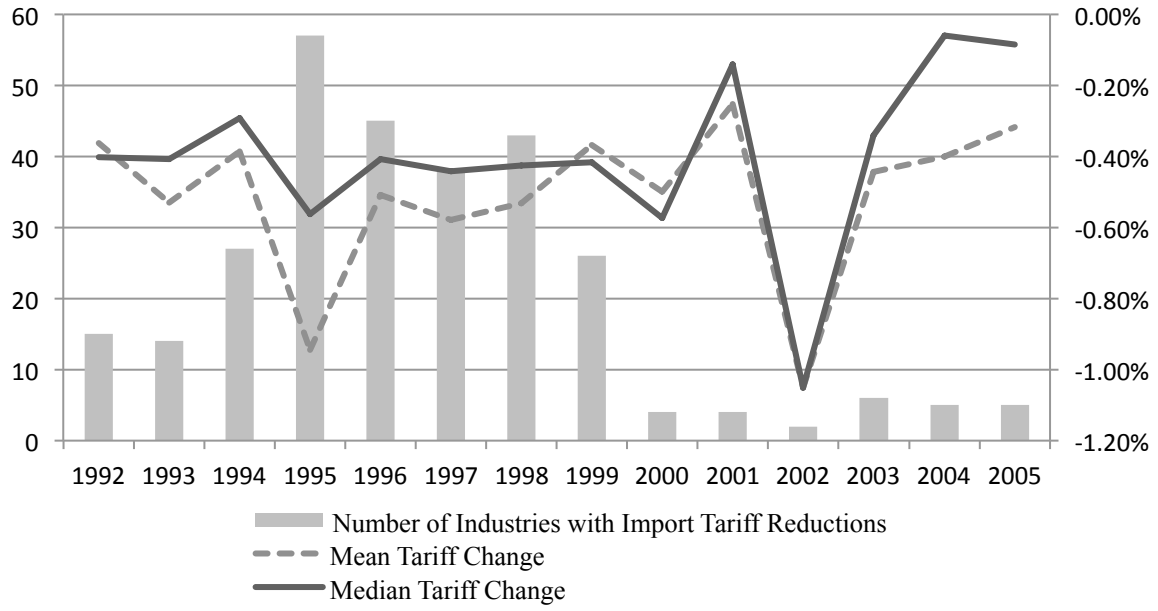
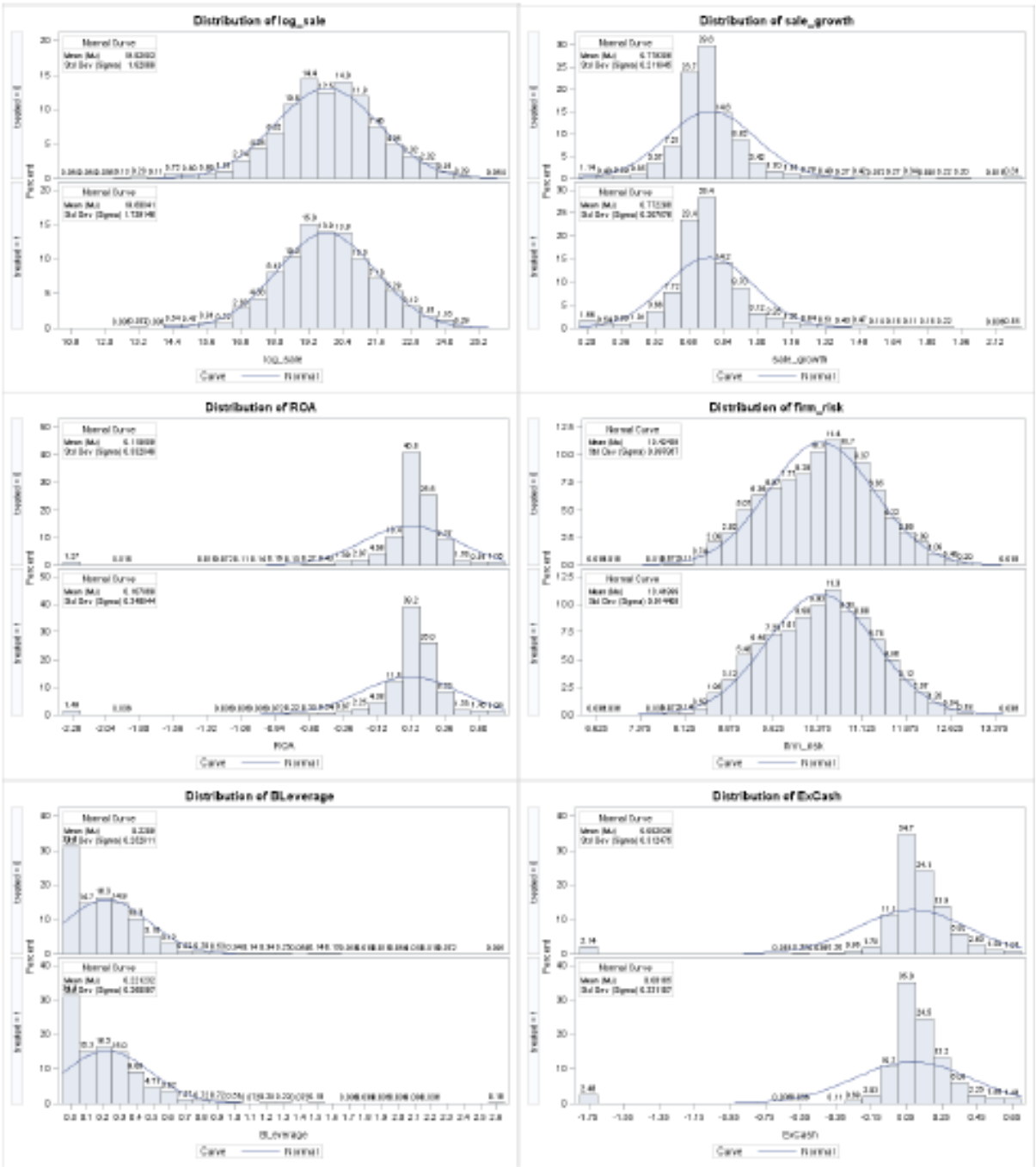


Figure 2: Distributions of Key Matched Sample Covariates

This figure presents histograms of the distributions of six key covariates of treated firm-years with their matched firm-years using the matched sample discussed in Table 1b. The vertical axis of each histogram is the proportion of firm-years with covariates in a given range. In each pair of histograms, the treated sample is below the matched sample. From the top left to the bottom right, the reported covariate distributions are of *Log(Sale)*, *Sales Growth*, *ROA*, *Firm Risk*, *Leverage*, and *ExCash*, and are as defined in the appendix.



Appendix: Table A.1. Variable Definitions

Label	Definition	Data Source
Stock Option Compensation Measures		
Pct Option	Dollar value of stock options as a fraction of total compensation.	Execucomp
Vega	Dollar change in the executive's total option portfolio associated with 0.01 increase in the firm's return volatility. We take the natural logarithm of (1+Vega) in regressions.	Execucomp
Flow Vega	Same as Vega but only calculated from the current year's stock option grants.	Execucomp
Quasi-Natural Experiment Variables		
Tariff Cut	Indicator variable equals 1 if the tariff cut in a specific industry which is 2.5 times larger than its median change.	Fresard (2010)
Key Explanatory Variable at Firm Level		
Large Customer	Indicator variable equals 1 if the firm has reported at least one major customer which usually accounts for >10% total sales and 0 otherwise.	Compustat Segment
Corporate Customer	Indicator variable equals 1 if firm has one or more large corporate customers accounts for more than 10% of the sales and 0 otherwise	Compustat Segment
Government Customer	Indicator variable equals 1 if firm has one or more large corporate customers accounts for more than 10% of the sales and 0 otherwise	Compustat Segment
Trading Relationship Measures		
Change in Reported Sales	Sales growth to a particular large customer as reported by the supplier.	Compustat Segment
Termination	Dummy variable equals 1 if the trading relationships terminate in the coming year, and it is set to missing if either supplier or customer disappears in the Compustat universe.	Compustat Segment
Length	Relationship length between the supplier and its large customer.	Compustat Segment
Sale Dependence	% of firm's sale to the customer	Compustat Segment
Control Variables		
CEO Own	CEO's share ownership excluding options as percentAge to total common shares	Execucomp
CEO Age	CEO Age	Execucomp

CEO Tenure	CEO Tenure	Execucomp
Delta	The sensitivity of wealth from CEO's stock and option portfolio to firm performance.	Execucomp
Cash Compensation	Sum of salary and bonus	Execucomp
Pct Cash	The fraction of (salary + bonus) of total compensation	Execucomp
Pct Stock	Dollar value of stock grants' dollar as a fraction of total compensation	Execucomp
Sale	Net Sales	Compustat
RD	R&D intensity. R&D expense/Lagged Book value of assets. Missing values are set to 0.	Compustat
CAPEX	(Capital Expenditures-Sale of Property)/ Lagged Book Value of Assets	Compustat
Leverage	(Total current debts+Long term debts)/ Lagged Book Value of Assets	Compustat
MTB	(Book Value of Assets-Book Value of Equity+Market Value of Equity) / Lagged Book Value of Assets	Compustat
ROA	Operating Income Before Depreciation/ Lagged Book Value of Assets	Compustat
ExCash	(Net Cash Flow from Operating Activities - Depretiation/Amortisation + R&D Expense)/ Lagged Book Value of Assets	Compustat
Sales Growth	log[Sale(t) / Sale(t-1)]	Compustat
Tobin's Q	(Total Assets - Book Value of Equity + Market Value of Equity) / Total Assets	
Firm Risk	log(variance of daily returns over firm fiscal year)	CRSP
Selling Expense	Selling expense scaled by total assets	Compustat
Sale HHI	(Sum of squared segment sales)/(squared firm sales).	Compustat Segment
Business Segments	Log of number of business segments	Compustat Segment
BCF	Entrenchment index	IRRC governance
Institutional Block	Indicator variable equals 1 if the firm has a >5% institutional investor	Thompson Reuters
Board Size	Log(1+number of directors)	IRRC director
Board Independence (BI)	The percentage of independent directors on board	IRRC director