Redact to Protect?

The Effects of Customer-Supplier Relations on Suppliers' Information Strategies

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Abstract

Protecting various innovation related information along the supply chain is becoming increasingly important as we move towards a knowledge-based economy and partners along the supply chain are closely intertwined. Prior theoretical studies hypothesize that firms can rely on either information withholding or disclosure to protect the value of innovations. Using redacted mandatory disclosures to capture known information withholding, we find that suppliers are more likely to redact when they have a higher dependence on sales from their major customers, and when they have greater relationship proximity and information sharing with their customers. Using customers' trade secret and nondisclosure agreements as identified protection mechanisms, we continue to find that suppliers are more likely to redact when customers exhibit known preferences for using information withholding to appropriate value from innovations. These findings are robust to using mergers and acquisitions (M&A) in the industries of major customers to instrument for customer dependency or using the adoption of the Inevitable Disclosure Doctrine (IDD) as a shock to customers' trade secret. Overall, our findings highlight that customers' incentive to protect information can have a significant influence on suppliers' information strategies.

Key words: Trade secrecy, Supply Chain, Customer, Supplier, Disclosure, Redaction,

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1. Introduction

We examine whether customers' incentives to protect value relevant information (i.e. innovations) influence their dependent suppliers' information strategies.[1] Over the last few decades, the United States has transitioned into a knowledge-based economy where innovation has become a primary driver of value creation for firms (Shapiro and Varian 1998).[2] Around the same time, effective firm management has also shifted from managing within the firm towards managing the supply chain as a single entity. Information sharing along the supply chain is beneficial to facilitate supply chain management (e.g., Chen 2003; Lee, So, and Tang 2000; Cen, Chen, Hou and Richardson 2018). However, shared information can benefit rivals if it is leaked or revealed to the public (Anand and Goyal 2009; Li, Ragu-Nathan, Ragu-Nathan and Rao 2006; Kwon and Suh 2004; Zhang 2002). This concern is more problematic for major customers where information across the supply chain can be more easily inferred or linked from their dependent suppliers. In this study, we investigate the effects of major customer and dependent supplier relations, and how customer's incentive to protect the value of their intellectual property may affect suppliers' information strategies.

Two opposing views emerge from the large theoretical studies on how firms can protect the appropriate value of their innovations. On the one hand, studies argue that firms can provide greater disclosure to strategically protect the value of their innovations because disclosures can serve as signaling mechanisms and establish "prior art". In terms of signaling, disclosing innovation related information can signal future firm prospects and help to obtain better terms for

[1] Following the Oslo Manual from the OECD (The Organization for Economic Co-operation and Development), we define innovation broadly as any valuable information that could encompass various aspects of a firm: product innovation, process innovation, organizational innovation, and marketing innovation. Similar to others, in this paper, we also use innovations and intellectual property interchangeably.

[2] It is estimated that intangible assets contribute to 17 percent of S&P 500 companies' total value in 1975. By 2015, the percentage increased to 85 percent (Keller 2015). According to the World Intellectual Property Report in 2017, on average, one third of the price paid for a product is paying for values from intellectual property.

external financing. It can also signal firms' commitment and ability to compete, and thus, deter rivals (Bhattacharya and Ritter 1983, Gill 2008, Baker and Mezzetti 2005, Anton and Yao 2004). In terms of prior art, firms can disclose innovation related information to create hurtles for other firms to apply for patent protection. Innovation claims in patent applications are evaluated against existing public knowledge (i.e. prior art). Only inventions that have sufficient novelty will be granted patents (Hall, Helmers, Rogers and Sena 2014, Baker and Mezzetti 2005, Henkel and Pangerl 2008). Thus, disclosures can reduce the likelihood of competitors obtaining formal intellectual rights protection on similar innovations without having to incur the costs of applying for formal intellectual rights protection.[3]

On the other hand, some studies have the opposite prediction that firms will withhold information to protect the value of their innovations. The general argument is that firms have a better information advantage when the information is kept private. For instance, trade secrets rely heavily on nondisclosure to keep valuable information proprietary. Lead time relies on nondisclosure to give the firm a head start to appropriate value from their innovations. Even for patents, some studies argue that firms may need to rely on withholding proprietary information to protect research in progress prior to obtaining a patent (e.g. Bhattacharya and Ritter 1983, Hall, Helmers, Rogers and Sena 2014, Gill 2008, Zaby 2010)

Existing studies focus on examining whether firms' desire to protect their intellectual property affects their own corporate behaviors (Klasa, Ortiz-Molina, Serfling, and Srinivasan 2017, Erkens 2011, Glaeser 2017, Li, Lin and Zhang 2017). In this study, we explore whether firms'

[3] Patent protection is a very costly method. There are generally two main costs: patent application and litigation. Here, litigation is costly because a patent does not really prevent other firms from producing similar products. It merely gives the patenting firm the rights to sue other firms that infringe on the patent rights. Thus, some firms may prefer to use disclosure to establish their own rights to use the innovation while preventing other firms from patenting on the technology. Well known examples include IBM's Technical Disclosure Bullettin, Xerox's technical journal and websites, such as IP.com and researchdisclosure.com, are used to widely publish their innovation related information (Henkel and Pangerl 2008, Baker and Mezzetti 2005).

incentives to protect their innovations also affect the corporate behavior of supply chain partners. A firm's strategies to protect its value relevant information are likely to have a spillover effect on the information strategies of dependent suppliers. If disclosure is the preferred mechanism through which a firm protects its innovation-related information, its dependent suppliers are likely to adopt the same strategy and enjoy the benefits of transparency. However, if the major customers prefer nondisclosure, the information strategy for a dependent supplier becomes tricky as the supplier must balance the benefits of pleasing their major customers with the costs of higher information asymmetry. Information asymmetry can be especially costly for dependent suppliers as evidence from existing literature show that having a concentrated set of major customers is a risk factor that can lead to higher cost of equity, higher cost of debt and more restrictive covenant terms for dependent suppliers (Dhaliwal, Judd, and Serfling, and Shaikh 2016; Campello and Gao 2017).

To examine the influence that customer-supplier relations may have on a supplier's information and disclosure strategies, we use redacted material contracts to capture suppliers' decision to withhold valuable information. A key advantage of this setting is that redactions capture known information withholding. This is important because in a voluntary setting it is hard to distinguish whether nondisclosure is caused by no information to disclose or by the information strategies of a firm (Tian and Yu 2018, Hribar 2004, Guo, Lev, and Zhou 2004). Another advantage of the setting is that registrants are required to file material contracts with the Securities and Exchange Commission (SEC). Major customers are often big firms.[4] Naturally, it is harder for an individual contract to pass the materiality threshold for large firms, which gives major customers opportunities to avoid filing some contracts. Dependent suppliers, however, are often much smaller compare to their major customers. As a result, each of their contracts is more likely to be

[4] The average size of a major customer in our sample has $24 billion in total assets, which is about 83 times larger than the average size of a supplier at $290 million.

material. These filed contracts from dependent suppliers may reveal valuable information to their major customers' competitors (see Appendix 1 for examples of redacted contracts).

In our baseline tests, it is our maintained assumption that all major customers have value relevant information that they would like to protect either through disclosure or nondisclosure. Under this assumption, we posit that major customers' protection mechanism preferences will have greater influence on the suppliers' information strategies when the suppliers are more dependent on their major customers to generate sales revenue. Using multiple proxies for dependency on major customers, we find that dependent suppliers are more likely to redact material contracts in their filings.

In addition to customer dependency, protecting value relevant information along the supply chain may become more important when customers and suppliers have greater relationship proximity and share more information. As expected, we find that suppliers are more likely to redact when their major customers make greater investments in relationship specific assets, when patent cross citation between customers and suppliers is higher, when suppliers have longer business relationship, and when suppliers share a common set of investors with their major customers. Overall, these baseline results indicate that customers' higher capability to influence their dependent suppliers through greater relationship proximity and information sharing will lead to a higher likelihood of redaction from suppliers, suggesting that customers may prefer to use nondisclosure to appropriate the value from their innovation.

Next, to establish a better link between customers' preferences for nondisclosure to protect innovation and suppliers' information strategies, we employ specific settings where customers are known to have preferences for nondisclosure as a protection mechanism. First, a trade secret has arguably the most reliance on secrecy to protect its value among all protection strategies. Thus, we

use it as a specific setting to examine whether major customers' incentives to protect trade secrets influences suppliers' information withholding. Our results show a positive association between major customer having trade secrets and suppliers' likelihood of redactions. Furthermore, we use customers subject to the Inevitable Disclosure Doctrine (IDD) as an exogenous shock to trade secrecy at the customer level, and examine its relation to the redactions made by a dependent supplier. Our results show that suppliers whose major customers are headquartered in states that enact IDD (or prior to the subsequent rejection of this rule) are more likely to redact their disclosures.

In our next setting we use nondisclosure agreement to identify major customers that likely prefer to use information hiding as a mechanism to protect the value of their innovation-related information. A nondisclosure agreement is a legal contract between at least two parties where the parties agree not to disclose information covered by the agreement. A major customer that uses nondisclosure agreements is likely to prefer its dependent supplier to redact information to help protect its innovations. Our findings are consistent with this prediction.

Lastly, we also perform robustness checks and additional analyses to further support our main findings. First, following Campello and Gao (2017), we use mergers and acquisitions (M&A) in the industries of major customers to instrument for major customer dependency. This alternative specification provides results consistent with our main findings. Second, we show that having trade secrets at the customer level will lead to higher likelihood of adopting a nondisclosure policy for their suppliers. Finally, we document some effects of supplier redaction through increases in idiosyncratic volatility and sales growth.

Our study contributes to the literature on customer-supplier relationships. Prior studies find that relationships with customers can impact a supplier's capital structure (Kale and Shahrur 2007;

Banerjee, Dasgupta, and Kim 2008), costs of external financing (Dhaliwal, Judd, Serfling, and Shaikh 2016), cash holdings (Itzkowitz 2015), and operating performance (Patatoukas 2012; Irvine, Park, and Yildizhan 2016; Kalwani and Narayandas 1995). Our work adds to this literature by examining how customers' incentive to protect their innovation-related information can influence a supplier's information strategies.

Furthermore, our findings also have policy implications. The SEC is currently considering a proposal to allow companies to redact filing without the need to formally submit a request (Brehaeny et al. 2017; Alsop et al. 2017). Existing studies find that firms use redactions to help protect proprietary information (Verrecchia and Weber 2006, Tian and Yu 2018). Our findings suggest that redactions made by a firm may be influenced by supply chain partners that have incentives to protect value relevant information. Such a policy may encourage more redactions as supply chain partners leverage their influence to use nondisclosure as a protection mechanism, which may limit disclosures to investors, should the proposal pass.

The remainder of the paper is organized as follows. Section 2 discusses prior literature and develops our hypothesis. Section 3 describes our data and sample. Section 4 presents our baseline empirical tests and results. Section 5 provides supplemental analyses. Section 6 concludes.

2. Hypothesis Development

As we move into a knowledge-based economy, protecting the value of innovations becomes increasingly important and yet difficult due to technological advances in how information-based assets can be acquired and disseminated. At the same time, effective supply chain management requires accurate information sharing with supply chain partners. For instance, to mitigate production and distribution problems, such as the bullwhip effect, a greater demand for transparency and information sharing between the suppliers and customers is required. This

sharing of information has been shown to lead to more efficient operations (Ha and Tong 2008; Lee, So and Tang 2000). However, increased information sharing also raises the risk of information leakage. According to the ASIS survey, for medium to large firms, suppliers and vendors are ranked as one of the top risk factors associated with loss of their proprietary information.[5] Thus, to effectively protect the value of their innovations, customers have incentives to manage or influence their suppliers' information strategies. This is particularly true for dependent suppliers that rely on a small set of customers where proprietary information across the supply chain can be more easily inferred.

Several mechanisms exist to protect the value of innovations. These methods include: disclosure, trade secrets, formal intellectual property rights (e.g. patents, trademarks, or copyrights), and lead time. The latter three methods rely on a certain degree of information withholding. This contrasts with the first method that relies on disclosing innovation related information to protect its value. Specifically, withholding information can help protect research in progress until it reaches a patentable stage or until formal intellectual property rights are granted. If a firm relies on lead time to appropriate value from its innovations, withholding information can reduce the likelihood of rival firms catching up and protect the lead status of the firm. Trade secrets consist of proprietary information that can generate economic value and can be of many forms. For instance, a secret formula, process, codes, or customer list are all examples of trade secrets. Among all three methods that relies on information withholding, trade secrecy is perhaps the one that relies the most on nondisclosure to protect its value because the details of the innovation must be kept proprietary in order to receive legal protection as a trade secret.

[5] "Trends in Proprietary Information Loss," ASIS International, September 2002.

In contrast, existing studies predict that firms can also disclose innovation or innovation related information to protect its value. These theoretical predictions can be summarized into two categories. The first set of studies model disclosure as a signaling mechanism to either the financial market or a firm's competitors. Bhattacharya and Ritter (1983) models a set of firms that are competing on the innovation dimension. In their model, innovation is costly. Thus, firms have incentives to disclose invention related information in order to obtain better financing terms to support their research and development activities. In other signaling studies, disclosure serves as a deterrent signal to competitors. Firms have incentives to disclose because disclosure helps them signal their capability and commitment to engage in aggressive competition with rivals (Hall et al. 2014, Gill 2008, Baker and Mezzetti 2005, Anton and Yao 2004).

The second category of theoretical studies argues that disclosures can help establish prior art. Three purposes to establish prior art are often discussed in these studies. First, withholding information to protect innovations runs the risk of competing firms obtaining patents on similar innovations, and consequently being excluded from using those innovations. Claimed inventions for patent applications are evaluated against prior public knowledge (i.e. prior art). Only inventions that demonstrate significant novelty compared to prior art will be granted patents. Thus, disclosure can raise the bar for competing firms to apply for patents (Hall, Helmers, Rogers and Sena 2014, Ponce 2011, Lichtman, Baker and Kraus 2000, Johnson 2014). Second, establishing prior art may help extend the patent race and lead to a higher chance of winning for firms that are behind in the innovation race (Baker and Mezzetti 2005). Third, establishing prior art will give the disclosing firm the rights to use the innovation without worrying about applying and incurring the costs for formal intellectual rights protection (Henkel and Pangerl 2008).

Prior literature documents that greater transparency can reduce a firm's cost of capital and improve its stock liquidity by reducing information asymmetries (Beyer et al. 2010; Easley and O'Hara 2004; Leuz and Verrecchia 2000; Bertomeu et al. 2011). Given these benefits for being transparent, if major customers rely on disclosures to appropriate value from their innovations, then we expect that their dependent suppliers will also have higher likelihood of being transparent with their disclosures. By committing to the same disclosure strategy as their major customers, transparency, dependent suppliers will enjoy the benefits of transparent disclosures while pleasing their customers.

On the other hand, if major customers depend on information withholding to appropriate value from their innovations, leakage of the proprietary information from these innovations can have adverse effects on both the customers and their dependent suppliers. After all, disruptions from major customers can lead to a significant loss in sales for dependent suppliers (Intintoli et al. 2017; Cen, Dasgupta, and Sen 2016). To reduce the likelihood of such losses, suppliers may have incentives to protect proprietary information that others might use to infer information about their major customers. Furthermore, prior research indicates that major customers can leverage their bargaining power to demand more favorable contract terms such as lower prices, more generous trade credit, and flexible product delivery schedules (Bloom and Perry 2001; Fee and Thomas 2004; Murfin and Njoroge 2015; Gosman et al. 2004; Campello and Gao 2017). If withholding information is important for major customers to protect their innovations, then we posit that they are also likely to demand their dependent suppliers to also engage in information withholding to help protect valuable information. However, dependent suppliers may not comply with such demands because withholding information can increase information asymmetry and potentially lead to higher costs for external financing (Armstrong, Core, Taylor, and Verrecchia 2011). Given

the above discussion, we make no directional prediction on whether or not major customers' incentive to protect innovation related information can influence suppliers' information strategies.

3. Sample Selection and Descriptive Statistics

3.1. Sample selection and data

Following prior research (e.g., Pandit, Wasley, and Zach 2011; Patatoukas 2012), we use the Compustat segment files to identify a supplier's major customers as reported in their 10-K filings. We link major customers with Compustat (gvkey) following the procedures in Patatoukas (2012). SEC Regulation S-K Item 101 mandates that suppliers must disclose customers who represent at least 10% of total sales. Suppliers, though, often voluntarily disclose customers below this threshold. Following Campello and Gao (2017) and Patatoukas (2012), we exclude these customers in our analyses.

Panel A of Table 1 describes our sample selection procedure. We begin with 231,531 firm year observations corresponding to 27,440 firms across Compustat from 1996-2015. We exclude 67,270 firm-year observations where the firm had nonpositive assets, sales or equity. We further exclude 44,404 observations from financial firms (SIC 6000-6999), utilities (SIC 4900-4999), and public administration companies (SIC 9000-9999). Observations with insufficient data for computing the control variables are also excluded from the sample. Finally, firms that do not have available data in the Compustat Segment database or identifiable major customers are further excluded. Our final sample consists of 12,165 firm-year observations from 2,807 suppliers.

Panels B and C of Table 1 provides descriptive statistics on the industry and year distribution of the observations in our sample. As shown in Panel B of Table 1, the majority of the suppliers are in manufacturing with 68.29% of the firm-year observations coming from that

industry. Services is the next largest industry comprising of 15.18% the sample. Panel C of Table 1 provides the distribution of observations by year. As the panel shows, the observations are spread relatively evenly throughout all years of the sample.

< INSERT TABLE 1 >

3.2. Descriptive statistics

Table 2 provides descriptive statistics about the sample. Panel A of Table 2 provides the number of observations, means, standard deviations, and quartile values of the variables used in our main analyses. *Redaction*, is set to one if a firm has at least one redacted material contracts, and zero otherwise. We identify redacted disclosures from material contracts by searching all 10-K and 10-Q filings for the following keywords: "confidential treatment" or "confidential request".

The mean value of *Redaction* is 0.322 indicating that firms redacted one or more agreements in their filings across 32.2% of our firm-year observations. We use four measures to capture suppliers' dependency on their major customers. Our primary proxy *CustomerSales* has a mean (median) of 0.316 (0.243) suggesting that the average (median) firm in our sample derives 31.6% (24.3%) of its sales from major customers. Our second proxy for dependency on major customers, *CustomerSize*, has a mean (median) of 3.156 (2.401). *CustomerHHI* has a mean (median) value of 0.109 (0.045). These results are in line with findings from existing literature (e.g. Campello and Gao 2017, Patatoukas 2012). *Size* has a mean of 5.669, indicating that the average firm in our sample has $290 million in total assets. In contrast, the major customers that they serve have an average of $24 billion in total assets, suggesting that major customers are substantially larger than their suppliers. Panel B of Table 2 provides the correlation table between all of the variables in our sample. The univariate correlations between *Redaction* and our four proxies for major customer dependency (*CustomerSales*, *CustomerSize*, *CustomerHHI*, and

Rank_CustomerHHI) are positive, which provide some preliminary evidence that suppliers' reliance on their major customers can affect their information strategies.

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4. Empirical Design and Findings

4.1 Suppliers' dependency on their major customers

Customers' incentives are likely to have higher influence over suppliers' corporate strategies when suppliers have higher reliance on their customers. Thus, to investigate whether the relation between suppliers and their major customers affects suppliers' information strategies, we first test whether suppliers' dependency on their major customers affects the likelihood of redaction by using the following multivariate probit model:

$$Redaction = \alpha_0 + \alpha_1 Customer\ Dependency + \sum \alpha_i Controls + \varepsilon \quad (1)$$

Our main variable of interest is suppliers' dependency on their major customers (*Customer Dependency*). We use four proxies to capture dependency on major customers based on the measures from Campello and Gao (2017) and Patatoukas (2012). Our first and primary proxy is the fraction of total sales made to major customers (*CustomerSales*). A major customer is defined as a customer that accounts for at least 10% of a supplier's total sales. Higher values of *CustomerSales* indicate that the firm has greater dependence on major customers to generate sales revenue. The second proxy for dependency on major customers is customer's firm size weighted by the proportion of sales generated from that customer (*CustomerSize*). In addition to revenue reliance, this measure gives more weight to larger customers, which is intended to capture the notion that larger customers may have greater influence over their dependent suppliers. Therefore, higher values of *CustomerSize* indicate that the firm depends more heavily on a fewer number of larger customers. The third measure is the Herfindahl index of sales across all major customers

(*CustomerHHI*). Higher *CustomerHHI* indicates a greater concentration and dependence on major customers. The fourth measure is the decile rank of *CustomerHHI (Rank_CustomerHHI)* scaled to values between 0 and 1. If customers prefer to employ nondisclosure to protect the value of their innovations then their nondisclosure preference may also lead to higher likelihood of redaction at the supplier level, particularly, for those suppliers that have higher reliance on their customers (i.e. $\alpha_1 > 0$).

Controls refer to a set of control variables following prior literature on the determinants of redaction. Consistent with prior literature (e.g., Verrecchia and Weber 2006; Tian and Yu 2017; Ettredge et al. 2016), we control for firm size (*Size*). We include *Market-to-book* to control for the impact that firm growth and expansion can have on redactions (Ettredge et al. 2016). In addition, we control for firm performance through *ROA* and firm competition through *Total_Similarity* since these factors may influence the decision to redact a disclosure (Verrecchia and Weber 2006, Hoberg and Phillips 2016). Furthermore, prior work highlights the role that external financing activities can play in a firm's propensity to redact disclosures (e.g., Verrecchia and Weber 2006). Thus, we control for the amount of debt held by the firm (*Leverage*) as well as the propensity of the firm to issue bonds (*Debt issue*) and equity (*Equity issue*). We also include the number of exhibits (*Num_exhibits*) to control for the association between redaction and the number of exhibits as the likelihood of redaction may naturally rises when firms have more contracts. Appendix B contains details on how variables are measured.

Table 3 reports the results. Column (1) provides the results for our first proxy of major customer dependence, *CustomerSales*. As shown in the column, *CustomerSales* has a positive and statistically significant association with *Redaction* (coefficient = 0.672, p-value = 0.000). The marginal effects analysis indicates that a one standard deviation increase in *CustomerSales* from

its mean value increase the probability of a redaction by 5%. Among the control variables, firm size is positively associated with redaction as evidenced by the positive coefficient of *Size* and is statistically significant. *ROA* has a negative and statistically significant coefficient suggesting that poorer performing firms are more likely to redact their disclosures. Firms that issue equity (*Equity issue*) and those that are more highly levered (*Leverage*) are less likely to redact their disclosures. This result is consistent with the notion that firms may be more transparent in order to lower the cost of capital and attract external financing from public sources (e.g., Lang and Lundholm 2000). Consistent with ex-ante expectations, firms with greater research activity (as proxied by *R&D*) are more likely to redact their filings. *Age* has a statistically significant, negative coefficient indicating that younger firms have a greater propensity to redact disclosures. Furthermore, firms facing higher competitive threat (as proxied by *Total_similarity*) are more likely to redact their filings. Overall, the effects of controls generally conform to ex-ante expectations and existing literature (Boone et al. 2016, Verrecchia and Weber 2006, Glaeser 2017).

Columns (2) through (4) present results using alternative measures of major customer dependency (*CustomerSize*, *CustomerHHI*, and *Rank_CustomerHHI*). As shown in the table, the coefficients are positive and statistically significant across all of these alternative measures for major customer dependency with positive coefficients and p-values of less than 1%. Overall, this table provides evidence indicating that greater dependency on major customers to generate sales leads to higher likelihood of redaction for dependent suppliers. If major customers can influence their dependent suppliers' information strategies to help with protecting value relevant information, then these findings suggest that major customers generally prefer to use nondisclosure to protect value relevant information.

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4.2 Customer-supplier relationship proximity and information sharing

Our first set of baseline results provide preliminary evidence suggesting that customers may in general prefer using nondisclosure to protect value relevant information and that their preferences are reflected in suppliers' information strategies. If this inference is true, then a supplier's likelihood of redaction will be higher when the customers and supplier share more information and/or have a closer relationship. First, we posit that information sharing might be greater when major customers make more relationship specific investments, or when customers and suppliers cross cite each other's patents. Furthermore, we use relationship length and common ownership to approximate relationship proximity between suppliers and their major customers. Longer business relationship or having common ownership can indicate that suppliers and customers are more closely linked. Information sharing is likely to be greater in such a closely linked relation. To test these predictions, we specify the following model:

$$Redaction = \alpha_0 + \alpha_1 Relationship\ Proximity + \sum \alpha_i Controls + \varepsilon \quad (2)$$

Relationship Proximity represents a set of variables intended to capture how closely a supplier is linked to their major customers. The closer the link, the greater chance that customers and their suppliers are sharing more information. First, we posit that major customers will have greater incentive and ability to sway their dependent suppliers to help protect value relevant information when they are more linked technologically. Specifically, customers may put more emphasis on information protection when they make greater investments in relationship-specific assets. Relationship-specific assets can have little to no residual value outside of the relationship with a supplier. Thus, major customers may have greater incentive to influence a dependent supplier's disclosures to prevent the erosion of the value of these assets from competitive harm. We use *CustomerR&D* to capture major customers' investment in relationship specific investment (e.g.,

Dhaliwal et al. 2016; Kale and Shahrur 2007; Raman and Shahrur 2008). *CustomerR&D* is defined as the sales-weighted research and development intensity across all major customers.
Similar to the construction of *CustomerSize*, higher values of *CustomerR&D* indicate greater dependency on fewer major customers who make greater relationship-specific investments.

Next, we also use patent cross citations to capture whether a dependent supplier is closely linked to their customers technologically. Higher patent citation intensity between a supplier and its customers may indicate higher information exchange and sharing between them. This may generate additional incentives for suppliers to protect their major customers' value relevant information. *Crosscite* is intended to capture this construct. Findings from Chu, Tian and Wang (2014) suggest that customers can have influence on suppliers' innovation and this influence in stronger when they are more closely linked through shared research and technology. Similarly, we argue that higher patent cross citations from customers and suppliers will likely increase (decrease) suppliers incentive to redact if customers prefer to use nondisclosure (disclosure) to protect the value of innovations.

Our next testing variable, *Duration*, measures relationship length between a supplier and its major customers. It is the sales-weighted number of years that the supplier and its major customers have had in a business relationship. We argue that information sharing likely increases as the length of the business relationship increases. Lastly, *Common Owner* is intended to capture whether a supplier and its customers have the same owner. Existing literature often argues that common ownership can increase collaboration because common owners naturally would like to maximize joint profits. Thus, we predict that major customers may have higher influence over their dependent suppliers if they share common owners. *Controls* refer to the same set of control variables as specified in equation (1).

Table 4 presents the analyses of the model specified in equation (2). As shown in column (2), *CustomerR&D* has a positive coefficient with a statistical significance of less than 1% (coefficient = 0.076, p-value = 0.000). Column (4) also shows that *Crosscite* is positively associated with *Redaction* (coefficient = 0.712, p-value = 0.000). The marginal effects analyses indicate that a one standard deviation increase in *CustomerR&D* and *Crosscite* increases the probability of redaction by 4.6% and 3%, respectively. Columns (1) and (3) present the results for the major customer ability variables - *Duration* and *Common Owner*. We predict that dependent suppliers are more likely to redact their disclosures when they have a longer relation with their major customers. Similarly, we argue that major customers are more likely to influence dependent suppliers through a shared group of investors. As shown in column (1), the coefficient of *Duration* is 0.244 with a p-value of 0.000 suggesting that firms are more likely to redact their disclosures when they have a longer relation with their major customers. Similarly, the coefficient of *Common Owner* is 0.712 with a p-value of 0.000, suggesting that supplier disclosures may be influenced when the supplier shares a common set of investors with its major customers. Overall, this table provides support for our main hypothesis and suggests that greater information sharing makes information protection along the supply chain more important.

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5. Supplemental Analyses and Robustness Tests

5.1 Customers' incentive to protect trade secrets and likelihood of redaction

We provide results for various supplemental tests in this section. These tests provide further support for our main findings. In our baseline analyses, our findings suggest that higher reliance on major customers and greater relationship proximity and information sharing between dependent

supplier and major customers will lead to an increase in the likelihood of redaction. If customers' incentive to protect innovation is the driving factor behind these results then one would infer that customers prefer to use nondisclosure to protect the value of their innovations. To provide further evidence for this inference, we identify two settings where customers are more likely to prefer nondisclosure as the mechanism to protect innovation.

In our first setting, we posit that customers that use trade secrecy to protect innovations are more likely to favor nondisclosure strategies. Thus, a dependent supplier may be more likely to redact their disclosures if their major customers protect proprietary information through trade secrets. The United States Patent and Trademark Office (USPTO) defines a trade secret as proprietary information that can include a "formula, pattern, compilation, program, device, method, technique or process…… used in business" and gives "an economic advantage over competitors who do not know or use it." Simply stated, a trade secret contains information that have two basic characteristics: proprietary and commercially valuable.[6] As our society continues to shift to an information-based economy, firms are relying more on secrecy to protect their "know-how" and intangible assets (Almeling 2012).[7] In fact, surveys suggest that secrecy is almost always ranked as the top mechanism to protect returns to innovation (Cohen, Nelson, Walsh 2000, Marsh and Liberty International Underwriters 2011).[8]

Compare with other forms of legal property rights protection, trade secrecy has lower enforceability and thus less protection. However, it also has many advantages. For instance, applying for patents requires detail disclosures of the invention in the application. On the other

[6] Some experts believe that every reasonable sized firms have trade secrets given this broad definition (Rowe and Sandeen 2012)

[7] It is estimated that intangible assets contribute to 17 percent of S&P 500 companies' total value in 1975. By 2015, the percentage increased to 85 percent (Keller 2015).

[8] In 2016, the Defend Trade Secrets Act was signed into federal law by President Obama, mark yet another acknowledgement that protecting trade secrets is an important and pressing issue faced by corporate America.

hand, trade secret protection requires no disclosures. Thus, even though the existence of trade secrets is generally public knowledge the details of the invention is kept secret. In theory, trade secrecy protection can last forever while patents generally last up to 20 years (Cohen et al. 2000, Glaeser 2017, Schwartz 2013).

To receive legal protection for trade secrets, the details of innovation needs to be kept proprietary. There are at least two reasons for which customers' effort to protect trade secrecy may lead to higher information withholding from their dependent suppliers. First, although misappropriation of trade secret is unlawful, third parties can legally develop the subject matter of a trade secret. It is also legal if a third party uses reverse engineering to discover the trade secret through examining and analyzing publicly available information (Yeh 2016). Thus, it is in the firms' best interest to withhold information that can be used by third parties to engage in such behavior. Glaeser (2017) finds that firms are likely redact their own material contracts when they have trade secrets. In other words, customers that have trade secrets to protect are also more likely to redact. In this study, we further examine whether big customers' incentive to protect trade secrets also affects their dependent suppliers' likelihood to redact. According to the World Intellectual Property Organization (WIPO), making supply chain partners aware of trade secret protection expectation is one of eight important mechanisms to protecting a trade secret.[9] We posit that this is especially true for dependent suppliers that rely on a smaller set of customers where proprietary information across the supply chain can be more easily inferred. To test this prediction, we specify the following regression model:

$$\begin{aligned} \textit{Redaction} = \quad & \alpha_0 + \alpha_1 \textit{Customer Trade Secret} + \alpha_2 \textit{Supplier Trade Secret} \\ & + \sum \alpha_i \textit{Controls} + \varepsilon \end{aligned} \tag{3}$$

[9] http://www.wipo.int/wipo_magazine/en/2016/01/article_0006.html

Customer Trade Secret is a sales-weighted count of whether trade secrets are discussed in the major customers' filings. *Supplier Trade Secret* is an indicator variable set to one if a supplier's 10-K filings discuss about trade secrets and zero otherwise. Following Glaeser (2017) we identify trade secret discussion by searching for the keywords "trade secret" or "trade secrecy" across all 10-K filings. *Controls* refer to the same set of control variables as used in equation (1). If customers' incentive to protect trade secrets increase suppliers likelihood to withhold material information then we expect $\alpha_1 > 0$.

Table 5 provides the results. Column (1) of Table 5 provides preliminary results for *Customer Trade Secret* excluding controls for supplier trade secrets. As shown in the column, the coefficient of *Customer Trade Secret* is positive and statistically significant at the 1% level (coefficient = 0.620, p-value = 0.000). A one standard deviation increase in *Customer Trade Secret* increases the probability of redaction by 4.6%. Column (2) of the same table further controls for supplier trade secrets through the indicator *Supplier Trade secret*. As expected, the coefficient of *Supplier Trade Secret* is positive and statistically significant. More importantly, the coefficient of *Customer Trade Secret* remains positive and statistically significant, suggesting that major customer trades secrets are an increment factor above and beyond the influence of supplier trade secrets on a firm's decision to redact its disclosures. Overall, this table provides support for the notion that major customers' incentive to protect their trade secrets can lead to higher likelihood of redaction for their dependent suppliers. When a firm's major customers have trade secrets to protect, they have greater incentive to influence their dependent suppliers from providing disclosures that can potentially divulge those secrets.

< INSERT TABLE 5 >

In the test above, we used financial reports to identify major customers with trade secrets that needs protection. The benefit of this approach is that it helps us identify a relatively large sample of firms with trade secrets. However, one might argue that this identification suffers from endogeneity. Thus, we examine how the staggered adoption, and subsequent rejection in some cases, of the inevitable disclosure doctrine (IDD) by U.S. state courts influences major customers' incentives to influence supplier information strategies. The IDD is a legal doctrine through which a firm can prevent a former employee from working for a rival firm if the new job would lead the former employee to reveal the trade secrets of the firm to the rival. It is applicable even if there is no evidence of potential or actual misappropriation and applies to every employee, whether or not they sign a non-compete or non-disclosure agreement, and every type of trade secret that the company may own. The adoption of IDD eliminates a primary mechanism through which product market rivals can obtain proprietary information about a company. Thus, it increases the incremental value of using nondisclosure to protect proprietary information (Li et al. 2018). In our setting, this indicates that the value of using nondisclosure increases for those customers who are subject to IDD. As a results, suppliers may be more likely to redact when their major customers are subject to the IDD shocks.[10] Thus, we predict that the adoption of IDD in states where major customers are headquartered can influence the propensity for a supplier to redact its disclosures. To test this prediction, we specify the following regression model:

$$\begin{aligned} \textit{Redaction} = \; & \alpha 0 + \alpha_1 \textit{IDD\_Treated\_Post} + \alpha_2 \textit{IDD\_Treated} + \sum \alpha i \text{Controls} + \text{Year} \\ & \text{indicators} + \text{Industry indicators} + \varepsilon \end{aligned} \tag{4}$$

IDD_Treated_Post is a sales-weighted sum of indicators across all major customers that is equal to one if the major customer's incorporated state is an IDD state and the year is during the two

[10] See Li et al. (2018) and Klasa et al. (2018) for more details about the Inevitable Disclosure Doctrine (IDD).

years after the adoption year or the year is two years before the rejection year (for states that enacted IDD and subsequently rejected it).[11] Otherwise it is equal to zero. *IDD_Treated* is a sales-weighted sum of indicators across all major customers that is equal to one if the major customer's incorporated state is an IDD state. *Controls* refer to the same set of control variables as in equation (1). Our prediction is that $\alpha_1 > 0$.

Table 6 provides the results. As argued in Li et al. (2018), the proprietary costs of disclosure can increase through IDD by increasing the marginal value of disclosure to industry competitors. With less ability to procure trade secrets through former employees, rival companies must depend more on a firm's public disclosures in discovering its proprietary information. We argue that major customers subject to IDD may exert influence on its dependent suppliers to curtail the information that rivals can obtain through their supplier's disclosures. The model used for generating the results in Table 6 come from equation (4). The main variable of interest is *IDD_Treated_Post* which represents the incremental effect of IDD on a supplier's major customers subsequent to enactment of IDD (or just prior to rejection of IDD) in the states where these major customers are headquartered. As shown in column (1), *IDD_Treated_Post* has a positive coefficient and is statistically significant at the 1% level (coefficient = 1.334, p-value = 0.005). The overall effect of major customers being subject to IDD on a supplier's redaction is also positive (coefficient = 2.006 = 1.334+0.672, p-value = 0.000). This table provides further support for our main findings. Namely, the results of this table suggest that shocks in the proprietary cost of disclosure for major customers can influence a supplier's propensity to redact its disclosures.

< INSERT TABLE 6>

5.2 Customers' Nondisclosure Agreements and Suppliers' Information Strategies

[11] The decision to use two years is because the median relationship length for customer and supplier is two years.

A non-disclosure agreement is also frequently referred to as a confidentiality agreement. It is a legal contract that a firm signs with their employee or business partners which generally requires the involved parties to keep certain information proprietary. Firms frequently use this type of agreement when they have valuable information that they do not want to reveal or disclose. We predict that major customer confidentiality agreements can also influence the information strategies of dependent suppliers. Suppliers may be more likely to redact their disclosures if major customers utilize confidentiality agreements to protect their intellectual property. To test this prediction, we specify the following regression model:

$$\begin{aligned} \textit{Redaction} = \; & \alpha 0 + \alpha_1 \textit{Customer Nondisclosure} + \alpha_2 \textit{Supplier Nondisclosure} \\ & + \sum \alpha i \text{Controls} + \varepsilon \end{aligned} \tag{5}$$

Customer Nondisclosure is defined as the sales-weighted count of whether nondisclosure agreements are discussed in the major customer's filings. *Supplier Nondisclosure* is set to one if the supplier discusses about nondisclosure agreements in its filings, and zero otherwise. *Controls* refer to the same set of control variables as in equation (1). We expect customers' use of nondisclosure agreement will lead to higher likelihood of redaction from suppliers ($\alpha_1 > 0$).

Table 7 provides the results for equation (4). The presence of nondisclosure agreements made by major customers can influence a supplier to curtail its disclosures. Column (1) of Table 7 provides the results for *Customer Nondisclosure* excluding controls for firm confidentiality agreements. As shown in the column, the coefficient of *Customer Nondisclosure* is positive and statistically significant at the 1% level (coefficient = 0.489, p-value = 0.000). Column (2) of the same table further controls for *Supplier Nondisclosure* While the magnitude of the coefficient of *Customer Nondisclosure* slightly decreases with the inclusion of *Supplier Nondisclosure*, the coefficient remains positive and statistically significant. Overall, this table provides supportive

evidence that a supplier is more likely to redact its disclosures when a firm's major customers protect their proprietary information through nondisclosure agreements.

< INSERT TABLE 7>

5.3 Instrumental Variable Approach

Table 8 provides the results examining the main hypothesis using an alternative instrumental variables (IV) approach. We follow Campello and Gao (2017) in using customer merger and acquisitions (M&A) in the customers' industries (*CustomerM&A*) as an instrument for dependency on major customers (*CustomerSale*). Higher M&A activity within a customer's industry implies greater concentration and fewer customers that a firm can potentially do business with (greater dependency). However, there is no clear relation between customer M&A and the redactions made by a firm suggesting that customer M&A should only influence the information strategies of suppliers through the business link between the firm and its customers (otherwise, known as the exclusion restriction). The definition of *CustomerM&A* follows Campello and Gao (2017) and is equal to the sum of the sales weighted, average acquisition activity across each of the major customers' industries over the past five years. For this analysis, we use the same set of controls as defined in equation (1).

Column (1) of Table 8 provides the first stage results. As the column shows, *CustomerM&A* is positively correlated with *CustomerSale*, conditional on controlling for other covariates, and is statistically significant at the 1% level (coefficient = 4.22, p-value = 0.000). This result suggests that suppliers may face greater constraints in the availability of potential customers for conducting business with and may be forced to rely more on their existing major customers. Regarding tests for whether *CustomerM&A* is a weak instrument, the F-test from the first-stage regression rejects the null hypothesis at the 1% level (F-statistic = 223.42). Furthermore, the

Kleinberg-Paap statistics rejects the null hypothesis of under-identification (LM-statistic = 319.44). The results of this column are consistent with Campello and Gao (2017).

Column (2) of Table 8 provides the second stage IV results. As the column shows, the coefficient of *CustomerSale* is positive and statistically significant (coefficient = 0.219, p-value = 0.002). The signs and statistical significance of the control variables are similar to the results of Table 3. Overall, this table provides results consistent with our main findings – that dependency on major customers can lead to a firm to curtail its disclosures through greater likelihood of redactions.[12] The use of an IV approach reduces concerns regarding endogeneity in a supplier's potential choice of major customer dependency in influencing its propensity to redact its disclosures.

< INSERT TABLE 8 >

5.4 Idiosyncratic volatility and sales growth

We next explore the effects that redactions can have on suppliers. Specifically, we examine two characteristics - idiosyncratic volatility and sales growth. To test whether idiosyncratic volatility and sales growth performance changes in the following year for redacting firms, we construct a matched sample using propensity score matching. We require sample firms that have at least $10 million annual revenues and potential controls do not have information redaction in current year and one year before. Propensity score matching can help us select non-redacting peers which have the closest probability to redact comparing to redacting firms based on observable firm characteristics. We estimate the probability to redact (i.e. the "propensity score") by running a probit regression of redaction on *CustomerSale* as well as a full set of control variables in our

[12] The findings for alternative measures of major customer dependency and customer supplier relationship proximity are all robust to using the IV approach (untabulated).

baseline regression. At each year, we match redacting firms by choosing non-redacting peers from potential controls with no replacement and having the nearest propensity score to redacting firms.

Panel A of Table 9 first presents the results for idiosyncratic volatility. Idiosyncratic volatility is measured as a natural logarithm of standard deviation of daily stork return residuals over each fiscal year. Stok return residuals are estimated from a regression of regression daily stock returns on Fama-French three factors and Cahart momentum factor. We require stock price at the beginning of fiscal year greater than five dollars. Column (1) shows that supplier redactions are positively associated with idiosyncratic volatility across the entire sample, suggesting that redaction increases private information search and acquisition by investors for these firms. Columns (2) and (3) provide results dividing the overall sample by our main proxy for major customer dependency (*CustomerSale*). We define high (low) *CustomerSale* as firm-years where *CustomerSale* is above (equal to or below) the overall sample mean (See Table 2). As shown in these columns, the coefficient of Redaction remains positive and statistically significant in both subsamples when we divide the sample by *CustomerSale*. This suggest that, regardless of the level of suppliers' dependency on their major customers, suppliers' redaction may lead to higher idiosyncratic return volatility.

Lastly, we also explore whether sales growth increases for redacting firms. The results are reported in Panel B of Table 9. Overall, supplier redaction is positively associated with sales growth as evidenced by the results in column (1) of this panel (coefficient = 0.030, p-value = 0.024). The results remain statistically only in subsample where suppliers have high reliance on their major customers. If higher sales dependency captures higher influences from major customers, these findings suggest that suppliers' redaction will lead to higher sales growth only when their information strategies are likely catering to their customers' preferences.

< INSERT TABLE 9 >

5.5 Customer trade secrets and suppliers' nondisclosure agreements

If a firm wants to protect their intellectual property by using secrecy, then one recommended strategy is to require business partners to adopt nondisclosure agreements. To explore this issue, we test whether having trade secrets at the customer level will lead to higher utilization of nondisclosure agreements at the supplier level. Table 10 provides the results. When major customers have trade secrets that they wish to protect, a supplier may be more likely to enter into confidentiality agreements in order to protect major customer trade secrets. Column (1) presents the results excluding controls for the presence of supplier trade secrets. As the column shows, *Customer Trade Secret* has a positive and statistically significant association with *Supplier Nondisclosure* (coefficient = 0.350, p-value = 0.001). Column (2) presents results including a control for supplier trade secrets (*Supplier Trade Secret*). Column (2) shows that the coefficient of *Customer Trade Secret* is positive and statistically significant (coefficient = 0.309, p-value = 0.004), suggesting that major customer trade secrets increases the likelihood that a supplier will sign a nondisclosure agreement, incremental to supplier trade secrets. Overall, this table provides supporting evidence suggesting that major customer trade secrets are linked with nondisclosure agreements entered into by suppliers.

< INSERT TABLE 10 >

6. Conclusion

Overall, this study sheds light on the role that major customers can play in the information strategies of suppliers. We argue that a firm has incentives to curtail the information and disclosures provided by a dependent supplier because customers' competitors may be able to infer

information through these disclosures. Consistent with this argument, we find that dependent suppliers are more likely to redact their disclosures. The results are robust to the use of alternative proxies for supplier dependency on major customers. Furthermore, we show that customer and supplier relationship proximity and greater information sharing can influence the propensity for a firm to redact its disclosures. Major customers who invest more heavily in relationship-specific investments, have higher cross citation of patents, have a longer relation, and share a common set of investors are more likely to have dependent firms redact their disclosures. We also show that the presence of trade secrets and confidentiality agreements in the disclosures of major customers are positively associated with supplier disclosure redactions. We further find that an exogenous increase in customer propriety costs (in the form of the Inevitable Disclosure Doctrine) are associated with a supplier's redactions. To further alleviate concerns regarding endogeneity in major customer dependency, we also use an instrumental variables approach and provide results consistent with our main findings.

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Appendix A

Examples of Redacted Disclosures in Material contracts

Examples of redacted disclosure from contracts between customers and suppliers

1. Supplier: United Natural Foods (UNFI); Customer: Whole Foods Markets (WFM)
Exhibit 10.9, 10-K filed by WFM on 12/8/2006
(filed and redacted by both WFM and UNFI)
https://www.sec.gov/Archives/edgar/data/865436/000119312506249376/dex109.htm

UNFI agrees to (i) use commercially reasonable efforts to increase its distribution capacity in [*CONFIDENTIAL*] and (ii) establish a new distribution center in [*CONFIDENTIAL*]. If UNFI fails to provide fully functional UNFI DCs capable of servicing the applicable WFM Locations in the [*CONFIDENTIAL*] and [*CONFIDENTIAL*] (in each case, the "Online Date"), UNFI will be charged a penalty fee. The penalty fee begins on the applicable UNFI DCs Online Date and continues until the applicable UNFI DC is fully functional and is equal to [*CONFIDENTIAL*]. If there is an event of Force Majeure that prevents UNFI from meeting the applicable Online Date, the parties agree to negotiate a new Online Date…….

Exhibit B
[*CONFIDENTIAL*]

[*CONFIDENTIAL*]	[*CONFIDENTIAL*]	[*CONFIDENTIAL*]
		-
[*CONFIDENTIAL*]	[*CONFIDENTIAL*]	[*CONFIDENTIAL*]
[*CONFIDENTIAL*]	[*CONFIDENTIAL*]	[*CONFIDENTIAL*]
[*CONFIDENTIAL*]	[*CONFIDENTIAL*]	[*CONFIDENTIAL*]
[*CONFIDENTIAL*]	[*CONFIDENTIAL*]	[*CONFIDENTIAL*]
[*CONFIDENTIAL*]	[*CONFIDENTIAL*]	[*CONFIDENTIAL*]

2. Supplier: Orchard Enterprises Inc.; Customer: Apple Inc.;
Exhibit 10.24, 10-K filed by Orchard Enterprises Inc on 3/30/2007
(filed and redacted by the supplier)
https://www.sec.gov/Archives/edgar/data/1339729/000119312507070508/dex1024.htm

Schedule of Wholesale Prices – Audio
Sales in the United States shall be in United States dollars (US$). Sales in Canada shall be in Canadian dollars (CDN$).

Multi-Track Albums

Album Tiers	Wholesale Price
[***]**	US$[***]* CDN$[***]*
[***]**	US$[***]* CDN$[***]*
[***]**	US$[***]* CDN$[***]*
[***]**	US$[***]* CDN$[***]*
[***]**	US$[***]* CDN$[***]*
[***]**	US$[***]* CDN$[***]*
Multi-CD Sets**	(Selected Album Tier Wholesale Price) x (# of CDs)*

* Notwithstanding anything to the contrary herein (including any album tier designation pursuant hereto)[***].

** COMPANY may select the [***] tier only for [***] tiers may be used solely for [***]. In addition, the [***] tier may be used solely where the [***]

3. Supplier: Republic Airways Holdings, Inc.; Customer: United Air Lines, Inc. Exhibit 10.3, 10-Q filed by Republic Airways Holdings, Inc. on 7/26/2004 (filed and redacted by the supplier) https://www.sec.gov/Archives/edgar/data/1159154/000110465904020861/a04-8199_1ex10d3.htm

When executed by both parties, this letter agreement (this "Agreement") shall amend and supersede the letter agreement dated February 13, 2004 (the "Prior Agreement") between Republic Airways Holdings, Inc. ("RJET") and United Air Lines, Inc. ("United") pursuant to which RJET agreed to provide United a [*] for United Express flights operated by RJET's subsidiary, Chautauqua Airlines, Inc. ("Chautauqua"). Upon the execution of this Agreement, the Prior Agreement shall be null and void and of no force or effect.

In consideration of United entering into the United Express Agreements dated as of February 9, 2004 with Republic Airline, Inc. ("Republic") and dated as of February 13, 2004 with Chautauqua, in each case as amended (collectively, the "United Express Agreements"), and in consideration of United agreeing to amend and supersede the Prior Agreement and to forego [*] to which it is or

would have be entitled thereunder, RJET shall provide United with [*] as provided herein. The [*] shall be [*] for each aircraft [*] aircraft that is operated during an [*] in revenue service (i.e. excluding spares) by Chautauqua or Republic under a [*] under the United Express Agreements. The [*] no later than the 10th day of [*]. By way of example, if during a [*], Chautauqua and Republic operated a total of [*] aircraft, including [*] spare aircraft, under the United Express Agreements, RJET would be required to [*] by the 10th day of [*].

Examples of redacted disclosures from contracts that suppliers sign with a third party

4. Supplier: Adaptimmune Therapeutics; Major customer(s): GlaxoSmithKline plc
Third Party: Life Technologies Corporation
Exhibit 10.1, 8-K filed by Adaptimmune Therapeutics on 6/21/2016
(filed and redacted by the supplier)
https://www.sec.gov/Archives/edgar/data/1621227/000110465916128496/a16-13526_1ex10d1.htm

This Supply Agreement is made and entered into with effect from June 1 2016 ("**Effective Date**") by and between:
Life Technologies Corporation of 5791 Van Allen Way, Carlsbad, California, 92008, U.S.A. ("**Life**"); and
Adaptimmune Limited of 101 Park Drive, Milton Park, Abingdon, Oxon, OX14 4RX, England ("**Customer**"),

Development Phase Purchasing Obligation: The minimum purchasing obligation applicable during the Development Phase shall be as follows: (a) Adaptimmune shall purchase and receive *** ; and, assuming that the Commercial Phase has not commenced prior to 31 December 2019, (b) Adaptimmune shall purchase and receive *** . If the Transitional Phase commences prior to or during 2019 then the Development Phase Purchasing Obligation shall continue to apply unless the Commercial Phase commences prior to 31 December 2019. In the event that the Commercial Phase has commenced prior to 31 December 2019, the Minimum Purchasing Obligation shall apply for 2019 and each subsequent calendar year. Life also acknowledges the purchase and receipt of *** under the Letter Agreement.

Minimum Purchasing Obligation: The minimum purchasing obligation between the Effective Date and 31 December 2019 is defined by the Development Phase Purchasing Obligation. The minimum purchasing obligation applicable during the Commercial Phase shall be mutually agreed during the Transitional Phase with both Parties acting in good faith but shall be no less than *** in the Commercial Phase.

Minimum Order Volume: *** during Commercial Phase and *** during Development Phase and Transitional Phase.
Minimum Delivery Size: *** during Commercial Phase and *** during Development Phase and Transitional Phase.

5. Supplier: Synacor Inc.; Major customer(s): Alphabet Inc
Third Party: Maxit Technology Inc
Exhibit 10.2.1, 10-Q filed by Synacor Inc. on 5/14/2013
(filed and redacted by the supplier)
https://www.sec.gov/Archives/edgar/data/1408278/000140827813000022/sync-3312013xexx1021.htm

This JOINT VENTURE AGREEMENT (this "Agreement") is made as of March 11, 2013, by and among Synacor, Inc., a Delaware corporation ("Synacor"), Maxit Technology Incorporated, a company incorporated under the laws of the British Virgin Islands ("Maxit"), and Synacor China, Ltd., a company incorporated under the laws of the Cayman Islands (the "Company").

WHEREAS, the parties hereto intend that (i) the Company shall directly wholly own a company limited by shares incorporated under the law of the Hong Kong Special Administrative Region of the People's Republic of China (the "PRC"), which the parties intend, subject to applicable Law, to name XingMai Technology (HK) Limited (the "HK Sub"); and (ii) the HK Sub shall directly wholly own a limited liability company organized and existing under the law of the PRC, which the parties intend, subject to applicable Law, to name Beijing XingMai Technology, Ltd. (the "WFOE"), which WFOE shall operate all of the business of the Company in the PRC;

(vi) [*]. Synacor shall be satisfied that all rights to that certain [*] (the "[*] Agreement") have been legally and validly transferred to the WFOE on terms and
conditions satisfactory to Synacor and that all Governmental Approvals or other Third Party Approvals in connection therewith shall have been obtained.

3. HK Sub and WFOE.
3.1 Formation of HK Sub and WFOE. As soon as reasonably practicable following the First Closing, the Company shall take all necessary actions to form the HK Sub and the WFOE, including, without limitation, in relation to the formation of the WFOE, obtaining the approval of the Ministry of Commerce of the PRC or its relevant local branches and business licenses issued by the State Administration of Industry and Commerce of the PRC or its relevant local branches.

3.2 [*]

6. Supplier: Inphi Corporation; Major customer(s): Samsung Electronics Co Ltd, Micron Technology, Inc
Third Party: Cadence Design Systems, Inc
From Exhibit 10.14, 10-K filed on 3/7/2011
(filed and redacted by the supplier)
https://www.sec.gov/Archives/edgar/data/1160958/000119312511056594/dex1014.htm

This **Software License and Maintenance Agreement** ("*Agreement"*), entered into as of the date specified above, is by and between **Cadence Design Systems, Inc.**, a Delaware corporation having

a principal place of business at 2655 Seely Avenue, San Jose, California 95134-1937, USA ("*Cadence*"), and **Inphi Corporation**, having a place of business at 2393 Townsgate Road #101, Westlake Village, CA 91361 ("*Customer*"). Customer desires to obtain from Cadence, either directly or through an authorized Cadence reseller, rights to Use certain Licensed Materials on either a Subscription or 99-year License basis, as defined below. License Keys to the Licensed Materials may be purchased either from Cadence or an authorized Cadence reseller. Therefore, Cadence and Customer agree as follows:

……

Payment Schedule

Payment	Invoice Date	Due Date	Total Amount
1	***	***	$ ***
2	***	***	$ ***
3	***	***	$ ***
4	***	***	$ ***
5	***	***	$ ***
6	***	***	$ ***
7	***	***	$ ***
8	***	***	$ ***
9	***	***	$ ***
10	***	***	$ ***
11	***	***	$ ***
12	***	***	$ ***
13	***	***	$ ***
14	***	***	$ ***
15	***	***	$ ***
16	***	***	$ ***
Total [USD]			$ 7,000,000

Appendix B: Variable Definitions

Redaction	= an indicator variable. It equals one if the firm files at least one redacted agreement for a given year, and zero otherwise. Redacted agreement is based on the searching across all 10-K/10-Q filings using the keywords of "confidential treatment" or "confidential request"
CustomerSales	$=\frac{\sum_{j=1}^{n} Sale_{j,i}}{Sale_i}$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. Major customer is defined as a customer accounting for at least 10% of total sales as reported in Compustat.
CustomerSize	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times Size_j$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $Size_j$ is the natural logarithm of the book value of total assets for customer *j*. Major customer is defined as a customer accounting for at least 10% of total sales as reported in Compustat. Computation of *CustomerSize* follows Campello and Gao (2017).
CustomerHHI	$=\sum_{j=1}^{n} (\frac{Sale_{j,i}}{Sale_i})^2$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. Major customer is defined as a customer accounting for at least 10% of total sales. Computation of *CustomerHHI* follows Patatoukas (2012).
Rank_CustomerHHI	= values ranging from [0, 1]. We rank the firms by decile (the lowest rank is 0 and highest rank is 9) for each year and then divide the decile rank by 9 following Patatoukas (2012).
Duration	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times Customer\_Supplier\ Duration_{i,j}$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $Customer\_Supplier\ Duration_{i,j}$ is the natural logarithm of one plus the number of years that customer *j* has been the major customer for firm *i*. Major customer is defined as a customer accounting for at least 10% of total sales.
CustomerR&D	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times R\&D_j$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $R\&D_j$ is the natural logarithm of one plus R&D expenditures for customer *j*. Major customer is defined as a customer accounting for at least 10% of total sales.

Common Owner	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times Customer\_Supplier\ Common\ Owner_{i,j}$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $Customer\_Supplier\ Common\ Owner_{i,j}$ equals one if the same institutional investor held more than 5% of the shares outstanding for both firm *i* and customer *j* and zero otherwise. Major customer is defined as a customer accounting for at least 10% of total sales.
Crosscite	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times Customer\_Supplier\ Crosscite_{i,j}$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $Customer\_Supplier\ Crosscite_{i,j}$ equals one if customer *j* (firm *i*) has cited one or more of firm *i* (customer *j*)'s patents within the past three years and zero otherwise. Major customer is defined as a customer accounting for at least 10% of total sales.
Customer Trade Secret	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times Tradesecret_j$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $Tradesecret_j$ equals one if customer *j* states a trade secret in its 10-K filing and zero otherwise. 10-K filings containing the keywords of "trade secret" or "trade secrecy" are classified as containing one or more trade secrets following Glaeser (2017). Major customer is defined as a customer accounting for at least 10% of total sales.
Supplier Trade Secret	=dummy variable that equals one if the firm states a trade secret in its 10-K filing and zero otherwise. 10-K filings containing the keywords of "trade secret" or "trade secrecy" are classified as containing one or more trade secrets following Glaeser (2017).
Customer Nondisclosure	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times Nondisclosure_j$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $Nondisclosure_j$ equals one if customer *j*'s 10-K/10-Q filing discusses or contains a nondisclosure/confidentiality agreement and zero otherwise. 10-K/10-Q filings containing the keywords of "confidentiality agreement", "confidentiality obligation", "nondisclosure agreement" or "non-disclosure agreement" are classified as discussing or containing a confidentiality agreement. Major customer is defined as a customer accounting for at least 10% of total sales.

Supplier Nondisclosure	=dummy variable that equals one if the firm states a nondisclosure/confidentiality agreement in its 10-K/10-Q filing and zero otherwise. 10-K/10-Q filings containing the keywords of "confidentiality agreement", "confidentiality obligation", "nondisclosure agreement" or "non-disclosure agreement" are classified as discussing or containing a confidentiality agreement.
Size	= the natural logarithm of total book value of assets (AT) at the end of the year.
Market-to-book	= total assets minus book value of common equity (CEQ) plus market value of common equity (shares outstanding times fiscal year-end stock price (CSHO*PRCC_F)), all divided by total assets.
ROA	= Income before extraordinary item (IB), scaled by total assets at the beginning of the year (AT_{t-1}).
Equity_issue	= sale of common and preferred stock (SSTK), minus purchase of common and preferred stock (PRSTKC), all divided by total assets at the beginning of the year (AT_{t-1}). If SSTK or PRSTKC are missing, we set them to zero.
Debt_issue	= long-term debt issuance (DLTIS), minus long-term debt reduction (DLTR), all divided by total assets at the beginning of the year (AT_{t-1}). If DLTIS or DLTR are missing, we set them to zero.
Leverage	= total debt divided by total market value of assets, where total debt is the sum of long-term debt (DLTT) and debt in current liability(DLC). Total market value of assets is total book value of assets (AT), minus book value of common equity (CEQ) plus market value of common equity (shares outstanding times fiscal year-end stock price (CSHO*PRCC_F))
R&D	= Research and development (XRD) divided by total assets at the beginning of the year (AT_{t-1}).
Age	= natural logarithm of one plus firm age. Firm age is calculated as current year minus the first fiscal year of available accounting data in COMPUSTAT.
Num_Exhibits	=natural logarithm of number of exhibits filed with form 10-K or 10-Q

Total_Similarity	= the sum of pairwise similarity scores defined in Hoberg and Phillips (2016). Specifically, the pairwise similarity between firm i and its peer at year t is a "cosine" similarity between a firm's own product word vector at year t and its counterparts' product word vector at the same year.
CustomerM&A	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times Acquisition_j$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. $Acquisition_j$ is the past five-year average of acquisition activity for customer *j*'s industry, where industry is classified based on two-digit SIC. For each industry-year, we first calculate the ratio of total deal value within the industry over the sum of acquirors' sales, then calculate the ratio average over the past five years. $Acquisition = \frac{1}{5}\sum_{t=-1}^{-5}(\frac{\sum_{k=1}^{m} Deal\ value_k}{\sum_{k=1}^{m} Sales_k})_t$, where m is the number of acquisitions within the industry. (Campello and Gao, 2017)
IDD_Treated	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times IDD\_State_j$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. IDD_State_j is a dummy variable set to one if customer *j*'s incorporated state is in AR, CT, FL, GA, IA, IN, KS, MO, OH, TX, UT, WA, DE, IL, MA, MN, NC, NJ, NY, PA, or MI and zero otherwise. The state adopted or subsequently rejected the Inevitable Disclosure Doctrine (IDD) and the corresponding adoption or rejection years are listed in Table 1 of Klasa and et al. (2018).
IDD_Treated_Post	$=\sum_{j=1}^{n} \frac{Sale_{j,i}}{Sale_i} \times IDD\_Post_j$, where $Sale_i$ is total sales for firm *i*, $Sale_{j,i}$ is sales from customer *j* to firm *i*, and *n* is the total number of major customers for firm *i*. IDD_Post_j is a dummy variable set to one if the major customer *j*'s incorporated state is an IDD state and the year is within the two years after the adoption year or within the two years before the rejection year (subsequent to adoption). Otherwise, it is equal to zero. IDD states and the corresponding adoption or rejection years are listed in Klasa and et al. (2018).
Sales growth	= Sales ($SALE_t$) divided by last year's sales ($SALE_{t-1}$).
Idiosyncratic Volatility	=natural logarithm of the standard deviation of daily stock return residuals over each fiscal year. Stock return residuals are estimated by regressing daily stock returns on the three Fama-French factors and the Cahart momentum factor.

Table 1: Sample Selection and Distribution

Panel A. Sample selection

	Firms	Observations
All firms on Compustat from 1996-2015	27,440	231,531
Less:		
Observations with nonpositive assets, sales or equity		(67,270)
Financial firms (SIC 6000-6999), utilities (SIC 4900-4999), Public administration (SIC 9000-9999)		(44,404)
Observations with insufficient data for computing the control variables		(54,025)
Observations without available data in Segment Database		(31,324)
Observations without identifiable major customers		(22,343)
Total observations	2,807	12,165

Panel B. Industry distribution of suppliers in the sample

SIC Codes	Industry	# of Suppliers	# of supplier-years	Percent
0100-0999	Agriculture, Forestry and Fishing	11	51	0.42
1000-1499	Mining	236	940	7.73
1500-1799	Construction	23	107	0.88
2000-3999	Manufacturing	1742	8308	68.29
4000-4999	Transportation, Communications, and Sanitary Service	134	496	4.08
5000-5999	Wholesale and Retail Trade	113	416	3.42
7000-8999	Services	548	1847	15.18
		2,807	12,165	100%

Panel C: Sample Distribution by Year		
Year	No. of Observations	Percent of Total Observations
1996	604	4.97
1997	619	5.09
1998	549	4.51
1999	518	4.26
2000	682	5.61
2001	672	5.52
2002	715	5.88
2003	656	5.39
2004	649	5.33
2005	662	5.44
2006	670	5.51
2007	687	5.65
2008	647	5.32
2009	640	5.26
2010	600	4.93
2011	575	4.73
2012	515	4.23
2013	515	4.23
2014	526	4.32
2015	464	3.81
Total:	12,165	100%

Table 2: Descriptive Statistics

This table provides the variable descriptive statistics over the sample period of 1996 through 2015. All variables are defined in Appendix A.

Panel A

Variable	N	Mean	Std Dev	1st Quartile	Median	3rd Quartile
Redaction	12165	0.322	0.467	0.000	0.000	1.000
CustomerSales	12165	0.316	0.215	0.150	0.243	0.418
CustomerSize	12165	3.156	2.242	1.470	2.401	4.168
CustomerHHI	12165	0.109	0.167	0.022	0.045	0.113
Rank_CustomerHHI	12165	0.500	0.319	0.222	0.556	0.778
Duration	12165	0.370	0.384	0.094	0.264	0.524
CustomerR&D	12165	1.299	1.714	0.000	0.785	1.902
Common Owner	12165	0.046	0.127	0.000	0.000	0.000
Crosscite	12165	0.037	0.120	0.000	0.000	0.000
Size	12165	5.669	1.865	4.281	5.481	6.931
Market-to-book	12165	2.148	2.457	1.127	1.537	2.344
ROA	12165	-0.039	0.283	-0.084	0.029	0.085
Debt_issue	12165	0.024	0.143	-0.015	0.000	0.009
Equity_issue	12165	0.146	0.669	-0.001	0.002	0.024
Leverage	12165	0.132	0.157	0.001	0.073	0.214
R&D	12165	0.094	0.151	0.000	0.029	0.127
Age	12165	2.643	0.724	2.079	2.639	3.135
Num_exhibits	12165	2.875	0.834	2.485	2.996	3.555
Total_similarity	12165	4.941	6.737	1.268	2.083	5.340
Customer Trade Secret	12165	0.120	0.196	0.000	0.000	0.175
Supplier Trade Secret	12165	0.529	0.499	0.000	1.000	1.000
Customer Nondisclosure	12165	0.078	0.161	0.000	0.000	0.120
Supplier Nondisclosure	12165	0.455	0.498	0.000	0.000	1.000
CustomerM&A	8222	0.027	0.027	0.010	0.018	0.034
IDD_Treated	7724	0.240	0.206	0.120	0.182	0.329
IDD_Treated_Post	7724	0.003	0.032	0.000	0.000	0.000

Panel B: Spearman\Pearson correlations. **Bold** indicates statistical significance at the 5% level (or lower).

	Redaction	*Customer Sales*	*Customer Size*	*Customer HHI*	*Rank_ Customer HHI*	*Duration*	*Customer R&D*	*Common Owner*	*Crosscite*
Redaction	**1**	**0.21**	**0.20**	**0.20**	**0.18**	**0.09**	**0.21**	**0.13**	**0.08**
CustomerSales	**0.18**	**1**	**0.96**	**0.86**	**0.87**	**0.64**	**0.66**	**0.26**	**0.22**
CustomerSize	**0.17**	**0.95**	**1**	**0.82**	**0.83**	**0.65**	**0.71**	**0.22**	**0.23**
CustomerHHI	**0.19**	**0.97**	**0.93**	**1**	**0.68**	**0.51**	**0.63**	**0.17**	**0.19**
Rank_CustomerHHI	**0.18**	**0.97**	**0.92**	**0.99**	**1**	**0.60**	**0.54**	**0.20**	**0.19**
Duration	**0.07**	**0.58**	**0.60**	**0.57**	**0.57**	**1**	**0.37**	**0.24**	**0.17**
CustomerR&D	**0.18**	**0.45**	**0.49**	**0.43**	**0.43**	**0.23**	**1**	**0.11**	**0.36**
Common Owner	**0.09**	**0.10**	**0.07**	**0.06**	**0.06**	**0.14**	-0.01	**1**	**0.06**
Crosscite	**0.05**	**0.07**	**0.09**	**0.05**	**0.05**	**0.07**	**0.31**	0.01	**1**
Customer Trade Secret	**0.17**	**0.31**	**0.30**	**0.28**	**0.27**	**0.26**	**0.29**	**0.17**	**0.11**
Customer Nondisclosure	**0.11**	**0.25**	**0.19**	**0.22**	**0.21**	**0.16**	**0.16**	**0.17**	**0.04**
Size	-0.01	**-0.17**	**-0.07**	**-0.20**	**-0.21**	**0.05**	**-0.11**	**0.24**	**0.11**
Market-to-book	**0.17**	**0.06**	**0.04**	**0.07**	**0.07**	**-0.04**	**0.09**	**0.09**	**0.03**
ROA	**-0.17**	**-0.12**	**-0.09**	**-0.13**	**-0.13**	**0.04**	**-0.17**	**0.10**	**-0.06**
Debt_issue	0.01	-0.01	0.00	-0.01	-0.01	-0.01	**-0.02**	**0.04**	**-0.02**
Equity_issue	**0.18**	**0.13**	**0.08**	**0.14**	**0.14**	**-0.11**	**0.19**	**-0.08**	**0.02**
Leverage	**-0.15**	**-0.09**	**-0.05**	**-0.09**	**-0.10**	0.00	**-0.16**	**-0.05**	**-0.05**
R&D	**0.32**	**0.15**	**0.10**	**0.15**	**0.14**	**0.02**	**0.35**	**0.08**	**0.25**
Age	**-0.17**	**-0.13**	**-0.07**	**-0.14**	**-0.15**	**0.17**	**-0.12**	**0.09**	**0.05**
Num_Exhibits	**0.16**	**-0.02**	**0.05**	**-0.04**	**-0.04**	**0.21**	**-0.04**	**0.17**	**-0.06**
Total similarity	**0.25**	**0.16**	**0.13**	**0.15**	**0.15**	**-0.05**	**0.25**	**0.11**	**0.10**

Panel B Cont.

	Customer Trade Secret	*Customer Nondisclosure*	*Size*	*Market-to-book*	*ROA*	*Debt_ issue*	*Equity_ issue*	*Leverage*	*R&D*	*Age*	*Num_ Exhibits*	*Total similarity*
Redaction	**0.22**	**0.15**	-0.01	**0.13**	**-0.19**	0.01	**0.11**	**-0.14**	**0.31**	**-0.17**	**0.17**	**0.30**
CustomerSales	**0.49**	**0.41**	**-0.17**	**0.09**	**-0.15**	0.01	**0.10**	**-0.08**	**0.24**	**-0.15**	-0.01	**0.34**
CustomerSize	**0.46**	**0.33**	**-0.09**	**0.06**	**-0.12**	0.01	**0.07**	**-0.06**	**0.20**	**-0.10**	**0.05**	**0.31**
CustomerHHI	**0.37**	**0.33**	**-0.19**	**0.10**	**-0.18**	0.00	**0.11**	**-0.09**	**0.26**	**-0.15**	**-0.02**	**0.37**
Rank_CustomerHHI	**0.41**	**0.34**	**-0.21**	**0.08**	**-0.13**	0.00	**0.09**	**-0.07**	**0.20**	**-0.16**	**-0.04**	**0.25**
Duration	**0.39**	**0.27**	0.01	**-0.05**	**0.04**	**-0.02**	**-0.09**	-0.01	0.00	**0.14**	**0.17**	**0.07**
CustomerR&D	**0.39**	**0.26**	**-0.12**	**0.10**	**-0.19**	**-0.02**	**0.11**	**-0.14**	**0.35**	**-0.13**	**-0.02**	**0.37**
Common Owner	**0.31**	**0.27**	**0.15**	**0.04**	**0.04**	**0.02**	**-0.04**	**-0.06**	**0.07**	**0.04**	**0.14**	**0.20**
Crosscite	**0.16**	**0.09**	**0.06**	**0.02**	**-0.05**	-0.01	**-0.03**	**-0.05**	**0.13**	0.00	**-0.05**	**0.06**
Customer Trade Secret	**1**	**0.56**	**-0.03**	**0.06**	**-0.07**	0.00	0.01	**-0.12**	**0.17**	-0.01	**0.15**	**0.25**
Customer Nondisclosure	**0.47**	**1**	**-0.10**	**0.07**	**-0.06**	-0.01	**0.04**	**-0.10**	**0.14**	**-0.07**	**0.05**	**0.22**
Size	0.00	**-0.07**	**1**	**-0.10**	**0.25**	**0.11**	**-0.13**	**0.23**	**-0.24**	**0.32**	**0.38**	-0.01
Market-to-book	**0.09**	**0.07**	**-0.03**	**1**	**-0.14**	**-0.02**	**0.35**	**-0.27**	**0.38**	**-0.16**	**-0.07**	**0.21**
ROA	**-0.05**	**-0.04**	**0.27**	**0.21**	**1**	**-0.05**	**-0.46**	**0.03**	**-0.55**	**0.22**	**0.10**	**-0.25**
Debt_issue	0.00	-0.01	**0.12**	**0.02**	0.01	**1**	**-0.01**	**0.21**	-0.01	**-0.05**	**0.04**	**0.04**
Equity_issue	**0.04**	**0.08**	**-0.28**	**0.32**	**-0.20**	**-0.05**	**1**	**-0.14**	**0.50**	**-0.28**	**-0.16**	**0.17**
Leverage	**-0.12**	**-0.12**	**0.31**	**-0.45**	**-0.08**	**0.07**	**-0.19**	**1**	**-0.33**	**0.07**	0.00	**-0.13**
R&D	**0.20**	**0.12**	**-0.21**	**0.40**	**-0.25**	-0.01	**0.31**	**-0.46**	**1**	**-0.26**	**-0.10**	**0.49**
Age	**0.02**	**-0.04**	**0.29**	**-0.13**	**0.18**	0.00	**-0.37**	**0.12**	**-0.17**	**1**	**0.29**	**-0.19**
Num_Exhibits	**0.17**	**0.06**	**0.41**	**0.02**	**0.05**	**0.09**	**-0.16**	**0.05**	**-0.05**	**0.31**	**1**	**0.05**
Total similarity	**0.12**	**0.12**	**0.04**	**0.26**	**-0.17**	**0.07**	**0.26**	**-0.21**	**0.42**	**-0.25**	**-0.02**	**1**

Table 3: Major customer dependency and suppliers' likelihood of redaction

This table presents the Probit regression results testing dependency on major customers (*CustomerSales*, *CustomerSize*, *CustomerHHI*, and *Rank_CustomerHHI*) and the likelihood of redaction (*Redaction*). *CustomerSales* is defined as the fraction of total sales from major customers. *CustomerSize* is the sum of the proportion of sales by each major customer weighted by that customer's firm size in total assets. *CustomerHHI* is the Herfindahl index of sales across all major customers. *Rank_CustomerHHI* is the decile rank of *CustomerHHI*. Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. Year fixed effects and industry fixed effects are included across all specifications. All variables are defined in Appendix A

Variables	(1) *Redaction*		(2) *Redaction*		(3) *Redaction*		(4) *Redaction*	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
CustomerSales	0.672	0.000						
CustomerSize			0.061	0.000				
CustomerHHI					0.756	0.000		
Rank_CustomerHHI							0.455	0.000
Size	0.050	0.002	0.045	0.005	0.048	0.003	0.053	0.001
Market-to-book	0.001	0.942	0.001	0.914	0.000	0.969	0.000	0.996
ROA	-0.250	0.001	-0.251	0.001	-0.234	0.002	-0.251	0.001
Debt_issue	0.030	0.777	0.037	0.726	0.040	0.708	0.032	0.760
Equity_issue	-0.075	0.011	-0.073	0.013	-0.072	0.014	-0.075	0.010
Leverage	-0.302	0.065	-0.310	0.059	-0.289	0.080	-0.322	0.051
R&D	1.419	0.000	1.413	0.000	1.421	0.000	1.419	0.000
Age	-0.406	0.000	-0.410	0.000	-0.412	0.000	-0.409	0.000
Num_exhibits	0.548	0.000	0.546	0.000	0.546	0.000	0.550	0.000
Total_similarity	0.028	0.000	0.029	0.000	0.029	0.000	0.029	0.000
Constant	-2.107	0.000	-2.038	0.000	-1.980	0.000	-2.137	0.000
Industry Fixed Effects	Yes		Yes		Yes		Yes	
Year Fixed Effects	Yes		Yes		Yes		Yes	
Observations	12,165		12,165		12,165		12,165	
Pseudo R-squared	0.215		0.214		0.213		0.215	

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Table 4: Relationship proximity, information sharing and suppliers' likelihood of redaction

This table presents the Probit regression results testing the relation between *Duration*, *CustomerR&D*, *Common Owner*, or *Crosscite* and likelihood of supplier redaction (*Redaction*). *Duration*, is the sales-weighted number of years that the supplier and its major customers have had a business relationship. *CustomerR&D* is defined as the sales-weighted research and development intensity across all major customers. *Common Owner* is a sales-weighted measure of the number of institutional investors who hold equity in both the supplier and major customer. *Crosscite* is the sales-adjusted count of major customers who cross-cite a supplier's patents. Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. All variables are defined in Appendix A.

Variables	(1) *Redaction*		(2) *Redaction*		(3) *Redaction*		(4) *Redaction*	
	coeff.	p-value	coeff.	p-value	coeff.	p-value	coeff.	p-value
Duration	0.244	0.000						
CustomerR&D			0.076	0.000				
Common Owner					0.607	0.000		
Crosscite							0.712	0.000
Size	0.039	0.014	0.042	0.010	0.029	0.072	0.030	0.065
Market-to-book	0.001	0.883	0.001	0.840	-0.000	0.958	0.000	0.984
ROA	-0.253	0.001	-0.238	0.002	-0.255	0.001	-0.231	0.003
Debt issue	0.051	0.633	0.055	0.601	0.039	0.718	0.056	0.599
Equity issue	-0.067	0.021	-0.067	0.021	-0.069	0.017	-0.058	0.042
Leverage	-0.316	0.055	-0.305	0.065	-0.288	0.079	-0.309	0.062
R&D	1.449	0.000	1.342	0.000	1.451	0.000	1.377	0.000
Age	-0.435	0.000	-0.414	0.000	-0.421	0.000	-0.426	0.000
Num_Exhibits	0.548	0.000	0.546	0.000	0.543	0.000	0.548	0.000
Total similarity	0.032	0.000	0.028	0.000	0.031	0.000	0.032	0.000
Constant	-1.923	0.000	-1.889	0.000	-1.805	0.000	-1.828	0.000
Industry Fixed Effects	Yes		Yes		Yes		Yes	
Year Fixed Effects	Yes		Yes		Yes		Yes	
Observations	12,165		12,165		12,165		12,165	
Pseudo R-squared	0.211		0.213		0.210		0.211	

Table 5: Customers' trade secrets and suppliers' likelihood of redaction

This table presents the Probit regression results examining the association between customer trade secret (and the propensity that a supplier redacts its disclosures (*Redaction*). Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. All variables are defined in Appendix A.

Variables	(1) *Redaction*		(2) *Redaction*	
	coeff.	p-value	coeff.	p-value
Customer Trade Secret	0.689	0.000	0.672	0.000
Supplier Trade Secret			0.326	0.000
Size	0.039	0.014	0.037	0.022
Market-to-book	0.000	0.983	0.000	0.950
ROA	-0.255	0.001	-0.224	0.003
Debt issue	0.035	0.742	0.032	0.764
Equity issue	-0.072	0.014	-0.030	0.300
Leverage	-0.305	0.063	-0.260	0.113
R&D	1.457	0.000	1.342	0.000
Age	-0.418	0.000	-0.408	0.000
Num_Exhibits	0.546	0.000	0.524	0.000
Total similarity	0.029	0.000	0.027	0.000
Constant	-1.840	0.000	-1.797	0.000
Industry Fixed Effects	Yes		Yes	
Year Fixed Effects	Yes		Yes	
Observations	12,165		12,165	
Pseudo R-squared	0.214		0.221	

Table 6: Major customers subject to the Inevitable Disclosure Doctrine and suppliers' likelihood of redactions

This table presents the Probit regression results examining how major customers subject to the Inevitable Disclosure Doctrine (IDD) influences a supplier's propensity to redact its disclosures (*Redaction*). *IDD_Treated_Post* is a sales-weighted sum of indicators across all major customers that is equal to one if the major customer's incorporated state is an IDD state and the year is during the two years after the adoption year or the year is two years before the rejection year (for states that enacted IDD and subsequently rejected it). Otherwise it is equal to zero. *IDD_Treated* is a sales-weighted sum of indicators across all major customers that is equal to one if the major customer's incorporated state is an IDD state. Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. Year fixed effects and industry fixed effects are included across all specifications. All variables are defined in Appendix A.

Variables	(1) *Redaction*	
	coeff.	p-value
IDD_Treated_Post	1.334	0.005
IDD_Treated	0.672	0.000
Size	0.048	0.019
Market-to-book	-0.001	0.961
ROA	-0.414	0.001
Debt issue	-0.104	0.464
Equity issue	-0.157	0.015
Leverage	-0.226	0.272
R&D	1.773	0.000
Age	-0.455	0.000
Num_Exhibits	0.565	0.000
Total similarity	0.032	0.000
Constant	-1.841	0.000
Industry Fixed Effects	Yes	
Year Fixed Effects	Yes	
Observations	7,724	
Pseudo R-squared	0.218	

Table 7: Customers' nondisclosure agreement and suppliers' likelihood of redaction

This table presents the Probit regression results examining the association between customer's effort to protect value-relevant information, proxied by nondisclosure/ confidentiality agreement stated in a customer's 10-K/10-Q (*Customer Nondisclosure*), and the propensity for a supplier to redact its disclosures (*Redaction*). Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. Year fixed effects and industry fixed effects are included across all specifications. All variables are defined in Appendix A.

Variables	(1) *Redaction*		(2) *Redaction*	
	coeff.	p-value	coeff.	p-value
Customer Nondisclosure	0.489	0.000	0.479	0.000
Supplier Nondisclosure			0.502	0.000
Size	0.040	0.012	0.039	0.015
Market-to-book	-0.000	0.956	0.001	0.875
ROA	-0.248	0.001	-0.194	0.009
Debt issue	0.046	0.666	0.015	0.884
Equity issue	-0.074	0.011	-0.035	0.218
Leverage	-0.305	0.063	-0.238	0.145
R&D	1.470	0.000	1.318	0.000
Age	-0.418	0.000	-0.385	0.000
Num_Exhibits	0.545	0.000	0.509	0.000
Total similarity	0.031	0.000	0.028	0.000
Constant	-1.872	0.000	-1.841	0.000
Industry Fixed Effects	Yes		Yes	
Year Fixed Effects	Yes		Yes	
Observations	12,165		12,165	
Pseudo R-squared	0.210		0.231	

Table 8: Results for Instrument Variable Estimation

This table presents the results of the instrumental variables (IV) estimation examining the role of major customer dependency on a supplier's propensity to redact its disclosures (*Redaction*). Columns (1) and (2) present the first stage and second stage results, respectively. *CustomerM&A* is a sales-weighted measure of the average acquisition activity across all major customer industries. *CustomerSize* is a sales-weighted measure of customer sizeacross all identifiable major customers. Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. Year fixed effects and industry fixed effects are included across all specifications. All variables are defined in Appendix A.

	First-Stage		Second-Stage	
	(1)		(2)	
Variables	*CustomerSale*		*Redaction*	
	coeff.	p-value	coeff.	p-value
CustomerM&A	4.220	0.000		
CustomerSale			0.219	0.002
Size	-0.011	0.000	0.019	0.001
Market-to-book	0.000	0.773	0.000	0.991
ROA	0.013	0.195	-0.080	0.004
Debt issue	0.010	0.452	0.040	0.251
Equity issue	0.003	0.501	-0.017	0.123
Leverage	0.034	0.152	-0.085	0.067
R&D	-0.004	0.910	0.446	0.000
Age	-0.004	0.503	-0.084	0.000
Num_Exhibits	-0.002	0.561	0.122	0.000
Total similarity	0.006	0.000	0.010	0.000
First-Stage F-test	223.420	0.000		
Kleibergen_Paap LM Stat	319.440	0.000		
Industry Fixed Effects	Yes		Yes	
Year Fixed Effects	Yes		Yes	
Observations	8,222		8,222	

Table 9: Idiosyncratic volatility and sales growth

This table presents the regression results examining how redaction influences supplier idiosyncractic volatility and sales growth divided between suppliers with high dependency and low dependency on major customers. Panel A presents the idiosyncratic volatility results. Panel B presents the results for sales growth. We define high (low) *CustomerSale* as firm-years where *CustomerSale* is above (equal to or below) the overall sample mean (See Table 2). Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. Year fixed effects and industry fixed effects are included across all specifications. All variables are defined in Appendix A.

Panel A Idiosyncratic volatility

	(1)		(2)		(3)	
	Whole sample		High *CustomerSale*		Low *CustomerSale*	
Variables	coeff.	p-value	coeff.	p-value	coeff.	p-value
Redaction	0.063	0.000	0.058	0.016	0.061	0.003
Size	-0.138	0.000	-0.146	0.000	-0.133	0.000
Market-to-book	-0.004	0.068	-0.003	0.275	-0.004	0.251
ROA	-0.198	0.000	-0.169	0.000	-0.258	0.000
Debt issue	0.029	0.525	0.117	0.060	-0.041	0.550
Equity issue	0.010	0.300	0.012	0.386	-0.005	0.727
Leverage	0.600	0.000	0.501	0.000	0.682	0.000
R&D	0.094	0.192	0.006	0.949	0.202	0.041
Age	-0.115	0.000	-0.130	0.000	-0.106	0.000
Num_Exhibits	-0.034	0.066	-0.037	0.169	-0.026	0.290
Total similarity	0.010	0.000	0.010	0.000	0.009	0.000
Constant	2.244	0.000	2.359	0.000	2.173	0.000
Industry Fixed Effects	Yes		Yes		Yes	
Year Fixed Effects	Yes		Yes		Yes	
Observations	2,984		1,374		1,610	
Adjusted R-squared	0.618		0.607		0.627	

Panel B Sales growth

	(1)		(2)		(3)	
	Whole sample		High *CustomerSale*		Low *CustomerSale*	
Variables	coeff.	p-value	coeff.	p-value	coeff.	p-value
Redaction	0.030	0.024	0.042	0.028	0.019	0.303
Size	-0.008	0.164	-0.007	0.498	-0.009	0.171
Market-to-book	0.006	0.080	0.007	0.139	0.007	0.317
ROA	-0.028	0.469	-0.015	0.756	-0.055	0.394
Debt issue	0.115	0.011	0.065	0.310	0.170	0.008
Equity issue	0.005	0.773	-0.009	0.675	0.020	0.469
Leverage	-0.176	0.003	-0.138	0.127	-0.207	0.020
R&D	-0.142	0.109	-0.121	0.304	-0.135	0.316
Age	-0.044	0.001	-0.054	0.027	-0.037	0.012
Num_Exhibits	0.035	0.128	0.041	0.241	0.035	0.188
Total similarity	0.007	0.004	0.008	0.017	0.006	0.096
Constant	1.248	0.000	1.364	0.000	1.179	0.000
Industry Fixed Effects	Yes		Yes		Yes	
Year Fixed Effects	Yes		Yes		Yes	
Observations	4,676		2,186		2,490	
Adjusted R-squared	0.049		0.041		0.058	

Table 10: Customers' trade secrets and suppliers' likelihood of having nondisclosure agreements

This table presents the regression results examining how the disclosure of customer trade secrets (*Customer Trade Secret*) influences the disclosure of a nondisclosure/confidentiality agreement in a supplier's filings (*Supplier Nondisclosure*) Coefficient estimates are reported to the left, while p-values, based on firm-clustered robust standard errors, are reported to the right of each variable. Year fixed effects and industry fixed effects are included across all specifications. All variables are defined in Appendix A.

	(1)		(2)	
Variables	*Supplier Nondisclosure*		*Supplier Nondisclosure*	
	coeff.	p-value	coeff.	p-value
Customer Trade Secret	0.350	0.001	0.309	0.004
Supplier Trade Secret			0.930	0.000
Size	-0.015	0.344	-0.009	0.546
Market-to-book	-0.001	0.910	-0.002	0.766
ROA	-0.250	0.002	-0.213	0.005
Debt issue	0.260	0.013	0.249	0.015
Equity issue	-0.099	0.005	-0.007	0.831
Leverage	-0.459	0.003	-0.311	0.044
R&D	0.964	0.000	0.612	0.005
Age	-0.335	0.000	-0.272	0.000
Num_Exhibits	0.734	0.000	0.498	0.000
Total similarity	0.023	0.000	0.019	0.000
Constant	-2.278	0.000	-1.995	0.000
Industry Fixed Effects	Yes		Yes	
Year Fixed Effects	Yes		Yes	
Observations	11,817		11,817	
Pseudo R-squared	0.205		0.261	