

To tell or not to tell? Examining voluntary disclosure of customers' identities under capital market pressure

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Abstract

Using China's short-sell reform as a quasi-natural experiment, we find that firms respond to short-sell pressure by reducing the disclosure of their major customers' identities after controlling for the influence of proprietary costs. Nondisclosure is more common among firms with highly concentrated customer bases, more discretionary revenues, and greater public scrutiny. Our results suggest that negative information transmission and potential agency issues between economically linked partners prompt firms to withhold customer identity. Our results are robust to a series of rigorous tests, including constructing a propensity score matching sample, conducting a placebo analysis, and using alternative measures for customer identity disclosure. Finally, a non-disclosing strategy benefits firms by reducing stock price fluctuations and lowering the probability of fraud detection.

JEL classification: D80, G10, L10, M41

Keywords: Short-selling pressure; Voluntary disclosure; Customer identity; Proprietary Costs

“Nikola’s much-touted multi-billion dollar order book is filled with fluff. U.S. Xpress reportedly accounts for a third of its reservations, representing ~\$3.5 billion in orders. U.S. Xpress had only \$1.3 million in cash on hand last quarter.”

— “Nikola’s Order Book: More Fluff Than Substance,” Hindenburg Research, September 10, 2020.¹

1. Introduction

Large corporate customers often constitute significant stakeholders of a firm, since they purchase the firm's products and/or services and also generate a major share of the firm’s revenues. Capital market investors rely on information about a firm's major customers, such as their identities, purchase amounts and terms, and degree of concentration (Ellis et al., 2012). The disclosure of a customer's identity is the first and foremost important piece of information that potential investors need to understand a firm's customer base and product market. Through the disclosure of customer identities, investors can gain a better understanding of a firm's target market, the strength of supplier-buyer relationships, and the buyer's influence on the supplier firm. This information can be particularly useful for investors to assess a firm's customer concentration, the bargaining power of major customers, and how the loss of a large customer could affect the firm's revenues and future earnings (Fee et al., 2006; Ellis et al., 2012; Dhaliwal et al., 2016; Wong et al., 2023).

Capital markets are currently experiencing a growing demand for firms to disclose customer information (Chen et al., 2022) and for information exchange and transparency between suppliers and customers (Lee et al., 2000). Ideally, from an information supply perspective, managers are motivated to facilitate information exchange and improve transparency by providing customer information to the public. However, the disclosure of customer information is a double-edged sword since it could potentially make the information available to the firm's competitors and enable potential competitors to enter the product market, leading to heightened competition. Thus, when determining whether to disclose customer information, managers must navigate the trade-off between the benefits of improving information transparency for capital market participants and the proprietary costs of harming the firm's

¹ From *Nikola: How to Parlay an Ocean of Lies into a Partnership with the Largest Auto OEM in America* (<https://hindenburgresearch.com/nikola/>). Hindenburg Research is known for its short-sell activities in the U.S. stock markets. The firm publishes reports via its website that allege corporate fraud and illegal business or financial reporting practices. In another research report, the short-seller found out a company has fabricated customer orders to inflate its revenues. Hindenburg Research pointed out that “Lordstown recently announced a 14,000-truck deal from E Squared Energy, supposedly representing \$735 million in sales. E Squared is based out of a small residential apartment in Texas that doesn’t operate a vehicle fleet.”

competitive position in its product market (Ellis et al., 2012). As a result, several studies have consistently found evidence regarding the influence of proprietary costs on the disclosure of customer information (e.g., Ellis et al., 2012; Li et al., 2018).

We explore firms' strategies on the voluntary disclosure of customers' identities, while taking into consideration the weight of capital market pressure, an important motivation in addition to the influence of proprietary costs. In particular, we propose that by divulging the identities of their major customers, firms would not only incur significant proprietary costs by assisting their product market rivals, but also aid short sellers, a group of knowledgeable and astute capital market participants, who can utilize the information to make a profit (e.g. Dai et al., 2017). Revealing customer identities could prompt short sellers to investigate the revenue sources and customer base of a firm, which would enable them to assess the firm's risk of losing a significant customer. Consequently, short sellers can initiate a short position on a firm's stock ahead of negative news (Guan et al., 2015; Chu et al., 2018). There is anecdotal evidence consistent with this probability. Hindenburg Research, a well-known short-selling firm, issued a short call on the electric vehicle manufacturer Nikola's stock on September 10, 2020, claiming that the company's much-touted multi-billion-dollar order book with its so-called "largest" customer was merely fabricated, causing Nikola's stock to plummet by 13% on that day.

Short sellers possess the resources and capacity to assess a firm's proprietary costs, such as how competitors can use the disclosed information and whether the firm's competitive advantage might be compromised. As sophisticated information processors, they also use supply chain information to examine economically linked firms (e.g. Dai et al., 2017). The risk of supply chain partners as a source of external threats to a focal firm is well-documented (Cohen and Frazzini, 2008; Menzly and Ozbas 2010; Titman, 2021). To the extent that a supplier firm depends on its major customers for revenue, its value is significantly affected by the risks its customers face. These types of risks might include a major customer becoming financially distressed or reducing its demand for the firm's products. Short sellers with strong information-processing abilities may exploit the disclosure of customer identity and short the supplier's stocks before the market fully recognizes the risk associated with the focal firm's customer. Considering this *negative information transmission effect* in the supply chain between economically linked firms, we expect firms to withhold the identities of their major customers under pressure from short-sellers. Moreover, customer identity disclosure also has a potential *agency issue detection effect*. In particular, the revealed business relationship between a firm and its customers may

enable short sellers to anticipate agency issues and detect misconduct by target firms because financial fraud is typically committed by firms in cooperation with their customers (Li, 2020). Customer information disclosed by a supplier firm, combined with customers' own accounting information, can be used to detect a supplier's revenue fraud (Li et al., 2021). Both the agency issue detection effect and the negative information transmission effect could make the disclosing firm a potential target for short-sellers, thereby reducing the firm's propensity to disclose its customers' identities under market pressures from short-sellers.

Short selling is an important market trading mechanism, and it can enhance stock price discovery and information efficiency by facilitating the incorporation of unfavorable news into stock prices (Diamond and Verrecchia, 1987; Duffie et al., 2002; Bris et al., 2007; Boehmer et al., 2008; Saffi and Sigurdsson, 2011). The literature on the effects of short selling on corporate decisions and managerial behaviors has reported that short selling helps detect financial misconduct (Karpoff and Lou, 2010), discipline earnings management (Massa et al., 2015), and improve accounting conservatism (Jin et al., 2018). Other studies have examined the effects of short-selling pressure on a firm's information environment, such as financial reporting quality and corporate disclosure (e.g. Li and Zhang, 2015; Fang et al., 2016). These studies use management forecasts to measure voluntary disclosure, and their results may not be generalized to other types of voluntary disclosure (Healy and Palepu, 2001), such as the disclosure of customer information, which is our focus.

By utilizing the deregulation of short-selling in China as a quasi-natural experiment, we conduct a comprehensive study to examine the effects of short-selling pressure on firms' voluntary disclosure of the identities of their major customers. China provides an excellent setting for our investigation because of three distinct institutional attributes. First, the deregulation program was initiated by the China Securities Regulatory Commission (CSRC, equivalent to the U.S. Securities and Exchange Commission) on March 31, 2010. The CSRC selected the pilot stocks eligible for short-selling based primarily on market capitalization and daily trading volume, among other criteria (for additional details, see Appendix A). Since the program's main objective was to "enlarge the supply and demand of funds and securities and to increase the trading volume, thus leading to active liquidity in the securities market,"² it is unaffected by the firms' information disclosure requirements. Moreover, the program involves a

² Source: http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201506/t20150612_278881.html (in Chinese)

staggered series of events that alleviate potential selection bias concerns (Bertrand and Mullainathan, 2003) and allow us to obtain more reliable empirical evidence based on a difference-in-differences (DiD) approach. Second, unlike many developed markets where multiple short-selling instruments (such as stock options and futures) are simultaneously available, Chinese investors have no alternative trading tactics for short-selling stocks. This aspect enables us to construct a distinct analysis by effectively minimizing the influence of other noisy or confounding factors. Third, the disclosure of major customers' identities in the annual report is voluntary for Chinese listed firms, whereas U.S. firms are required to identify any customer whose business comprises more than 10% of a firm's consolidated revenues and report total sales to these customers (Ellis et al., 2012). Therefore, Chinese firms' disclosure of customer identities is more likely to stem from strategic considerations of the cost-benefit trade-off under capital market pressure, which enables us to provide new insights into firms' information disclosure strategies.

We conduct empirical tests using a panel of 18,286 firm-year observations spanning the 2006-2018 period. The pilot stocks selected by the CSRC constitute our treatment group, while the remaining stocks serve as our control group. We find that pilot firms significantly reduce their customer identity disclosure by approximately 3.2% relative to the control group after their inclusion in the short-sell list. We include firm fixed effects to control time-invariant and unobservable firm characteristics. We also control time-varying industry-level characteristics that might influence the level of a firm's disclosure. To corroborate the parallel trends assumption, we do not find significant differences in disclosure between pilot and non-pilot firms prior to the pilot firms' addition to the short-sell list. The significant divergence in disclosure between the two groups emerges following program launch and persists for several years.

Prior studies (Ellis et al., 2012; Li et al., 2018) find that proprietary costs play a critical role in determining a firm's decision on customer identity disclosure. In the baseline regression, we use R&D expenditure as a proxy for proprietary costs. After accounting for proprietary costs, our analysis reveals that pilot firms are inclined to decrease customer information disclosure under short-selling pressure. This result implies that the lack of customer identity disclosure under short-selling pressure is not solely attributable to proprietary costs. Given the importance of proprietary costs in customer identity disclosure, we further analyze the relation between the nondisclosure effect of capital market pressures and proprietary costs. We classify pilot firms into two groups, one with high proprietary costs and the

other with low proprietary costs, based on the firm's R&D expenditures and industry concentration. Our results indicate that capital market pressure from short-sellers is an important determinant of firms' non-disclosure of customer information for both high and low proprietary costs groups. Moreover, the effect of short-selling pressure is more substantial for pilot firms with higher proprietary costs. These results contribute significantly to the literature by providing evidence that in addition to proprietary costs, capital market pressure represents another determining factor in a firm's strategic disclosure of its customers' identity.

We conduct several cross-sectional analyses to explore the underlying channels that influence firms to decrease customer identity disclosure under short-selling pressure. The first cross-sectional test examines whether the economic ties between a focal firm and its primary customers influence the firm's disclosure strategy under short-selling pressure. We find that the adverse effect of short-selling pressure on customer identity disclosure becomes more pronounced for firms with a highly concentrated customer base. This result implies that firms abstain from revealing customer identities to preserve the supplier-buyer relationship and avoid the negative spread of information along the supply chain. In effect, supplier firms with concentrated customer bases are more likely to suffer from unfavorable customer news (Dhaliwal et al., 2016). In the second cross-sectional test, we investigate whether managers who face severe agency issues are more likely to restrict customer identity disclosure during short-selling pressure. Our results indicate that the negative effect of short-selling pressure on customer identity disclosure is stronger for firms with high discretionary revenues. Since fraud detection usually targets discretionary revenues, concealing customer identities can mitigate a firm's risk of being targeted by fraud detection through the divulged supplier-customer relationship. Moreover, we find that the negative effect of short-selling pressure on customer identity disclosure intensifies when firms face heightened public scrutiny. Overall, our results are consistent with the hypothesis that firms decrease customer identity disclosure when they confront greater short-selling pressure in capital markets.

In light of our setting, one concern is that the government does not randomly select pilot firms but rather imposes certain requirements for eligibility. To alleviate this non-random selection issue, we follow prior research (e.g. Meng et al., 2020; Ni and Yin, 2020; Zhang et al., 2020) and use a propensity score matching (PSM) approach to generate a 1:1 matching control sample of non-pilot stocks without replacement based on major firm characteristics. The main results are robust to using the PSM sample, suggesting that the observable differences in characteristics do not influence our results. We also

conduct a placebo analysis to examine whether our results are merely attributable to chance (Li et al., 2018; Gao and Zhang, 2019). Specifically, we randomly select a group of pilot firms as pseudo-treated firms and randomly select a pseudo-shortable year for each pseudo-treated firm, and then re-estimate the effect of these pseudo-short-selling pressure on firms' customer identity disclosure. After repeating this exercise 1,000 times and plotting the probability density function of the placebo coefficients, we find that the estimated treatment effect from the placebo test is, on average, statistically indistinguishable from zero, further verifying that our main result is unlikely to be attributable to chance. Finally, we provide corroborating evidence by examining whether the reduction in customer identity disclosure benefits pilot firms. We find a significant decline in both the volatility of stock prices and the probability of fraud detection for pilot firms.

Our evidence contributes to several streams of research. First, it contributes to the literature on supply chain information disclosure. Prior researchers exploring on supply chain transparency have primarily focused on supply-side or upstream transparency, while downstream transparency, such as a firm's disclosure of its main customers, has been viewed as a mere advertising strategy. Hence, firms often ask their suppliers not to disclose their names as customers, as noted by Sodhi and Tang's (2019). Another reason for the non-disclosure, as suggested by several accounting studies, is proprietary costs. For example, Ellis et al. (2012) are one of the first teams of researchers to find evidence suggesting the important effect of proprietary costs on firms' customer information disclosure. Li et al. (2018) find strong evidence further corroborating the proprietary costs hypothesis by using the adoption of the inevitable disclosure doctrine by U.S. state courts as an exogenous shock. Utilizing China's removal of the short-sell ban as a quasi-natural experiment, we extend this line of research by providing evidence suggesting that in addition to proprietary costs or advertising concern, capital market pressure is an important factor in firms' strategic disclosure of customer identity. Our perspective is innovative and provides a better understanding of firms' strategic decisions regarding customer information disclosure. Our study complements Li (2020) who finds that firms committing financial fraud against their customers are more likely to withhold customers' identities. We investigate how an exogenous increase in outside pressure from short-sellers prompts managers to reduce their disclosure of major customers' information, resulting in less stock price fluctuation and a reduced likelihood of financial misconduct detection.

Second, our evidence that supplier firms with high concentrated customers reduce the disclosure of customer information when facing high capital market pressure contribute to a stream of research examining the influence of customer base concentration on supplier firms. Prior operations management and accounting studies have reported important effects of customer concentration on firm profitability (Hui et al., 2019), inventory efficiency (Ak and Patatoukas, 2016), productivity (Serpa and Krishnan, 2017), accounting performance (Patatoukas, 2012), and cost of equity (Dhaliwal et al., 2016; Peng et al., 2019). We find new empirical evidence suggesting that high customer base concentration accelerates negative information transfers and risk spillover along the supply chain, thereby affecting supplier firms' voluntary disclosure of customer information under capital market pressure.

Third, our evidence contributes to the literature on how short selling influences corporate behavior, such as financial misconduct (Karpoff and Lou, 2010), earnings management (Massa et al., 2015), accounting conservatism (Jin et al., 2018) and agency costs of controlling shareholders (Chen et al., 2018). Regarding information disclosure, Li and Zhang (2015) report that that managers under short-selling pressure reduce the precision and readability of bad news to maintain stock prices. Xie et al., (2021) find that short selling pressure influences corporate environmental disclosure strategies. Bhattacharya et al. (2022) find that the threat of increased short selling significantly constrains aggressive non-GAAP reporting. We add to this stream of the researches by focusing on customer identity information, which allows investors to better identify a firm's target market and evaluate the strength of its supplier-buyer relationships. Our results suggest that policy-makers should implement policies to incentivize firms to improve information transparency.

The remainder of this paper proceeds as follows. Section 2 reviews the related literature and develops our empirical predictions. Section 3 describes the data, sample, and key variables. Section 4 presents the main empirical analyses and several cross-sectional tests. In section 5, we conduct robustness checks. Section 6 concludes the paper.

2. Literature review and hypothesis development

2.1 Literature review

Our investigation relates to the literature that examines the transmission of information in economically interconnected relationships between suppliers and customers. For example, Cohen and Frazzini (2008) provide evidence of return predictability across these relationships, while Cho et al.

(2020) find that information transfer within supply chains affects supplier firms' voluntary disclosure of earnings guidance. Moreover, Chen et al. (2021) find that the expansion of derivative disclosures by critical customers under financial accounting standard results in a short-term positive information externality in supply chains, as reflected by an increase in suppliers' stock liquidity. Suppliers also experience an information externality around the time of customers' quarterly earnings announcements, as evidenced by a positive correlation with their market-adjusted returns on these days (Pandit et al., 2011).

Several studies in operations management have examined how downstream customers' performance and business policies influence suppliers' operating performance and business policies. For instance, Radhakrishnan et al. (2014) find that the operating performance of upstream supplier firms is affected by the capital information quality of their customers. Similarly, Kim et al. (2015) find that the earnings performance of major customers affects the contract terms of loans to supplier firms. Moreover, customers' business policies have a spillover effect on upstream suppliers, with Gu et al. (2017) reporting that suppliers' relation-specific investments change with the risk-taking incentives of customers' CEOs. Leung et al. (2020) find that suppliers' operating performance begins to decline following the establishment of labor unions by customer firms. Moreover, disruptions in downstream customer firms, such as bankruptcies and horizontal mergers and acquisitions, have an adverse effect on supplier firms (Houston et al., 2015; Fee and Thomas, 2004).

Another stream of research examines how market pressure or stock short selling influences corporate disclosure, including reporting quality and disclosure strategies. Highlighting the disciplining role of short sellers due to their expertise in uncovering negative firm information, several studies (i.e., Massa et al., 2015; Fang et al., 2016; Cai and Guo, 2018) have reported significant reductions in both accrual-based and real earnings management under the threat of short selling. Zhang et al. (2020) find a shift from accrual-based to real earnings management for Chinese firms in the short-sell deregulation setting in China. Regarding information disclosure, Li and Zhang (2015) find that pilot firms around the implementation of the Regulation SHO in the U.S. start to reduce the precision of bad news and the readability of their annual reports in response to increased short-selling pressure. Xie et al. (2021) provide evidence that short-sell deregulation shapes corporate environmental disclosure by increasing hard and reducing soft disclosures.

Our study closely relates to a growing body of research exploring whether short-sellers, who are informed investors and have strong information processing capability, take advantage of customer news revelation. Dai et al. (2017) find that short selling of suppliers' stocks increases with their customers' post-news negative stock returns. Hyder and Khoshnoud (2020) find evidence of a negative association between supplier's stock short interests and their customer's one-month future stock returns. However, empirical evidence is relatively sparse regarding whether and how short selling influences customer identity disclosure. Customer identities are typically considered important trade secrets, and this information is difficult for the public to obtain unless a firm discloses it. Ellis et al. (2012) are among the first to examine a firm's disclosure of customer information. They argue that managers trade the benefits of reduced information asymmetry against the costs of revealing proprietary information about customer identity. These types of costs include aiding product market competitors and making themselves more vulnerable to scandal. Li (2020) provides an accounting manipulation explanation by suggesting that firms that engage in customer-related fraud are more inclined to conceal the identities of their customers. Our study extends the proprietary costs hypothesis by considering the role of short-sellers, who can exploit the revealed customer information for short positions. Our focus is on whether exogenously increased pressure from capital markets (e.g. short-sellers) affects managers' strategic choice concerning voluntary customer identity disclosure.

2.2 Hypothesis development

Short sellers may short a stock on the basis of not only a firm's own information but also news concerning firms with economic ties (e.g. Dai et al., 2017). In the wake of short-sell deregulation in China, the disclosure of customer identities may result in pilot stocks becoming a target of short-sellers, leading to a decrease in stock price and firm value. In particular, there are two potential effects of customer identity disclosure that may induce capital market costs, as illustrated in Figure 1. The first is the *negative-information transmission effect* within the supply chain (Guan et al., 2015; Dai et al., 2017; Chu et al., 2018), illustrated by the horizontal line from Customer to Firm in Figure 1. Prior research concludes that partner firms in a supply chain pose external risks to the primary firm, with the stocks and insolvency risks of these partner firms contributing to the focal firm's overall risk (Cohen and Frazzini, 2008; Hertz et al. 2008; Menzly and Ozbas 2010). The financial distress or reduced demand of a major customer could signal future losses for the supplier firm, thereby affecting its value (Hertz et al. 2012; Dhaliwal et al., 2016; Kolay et al., 2016). To the extent that a supplier firm depends

on its major customers for revenue, a firm's value can be significantly affected by shocks from its customers. Although customer identity disclosure can allow for timely information dissemination within the supply chain, it can also be leveraged by short-sellers with strong information processing abilities. By analyzing the disclosed customer information, short-sellers can short the supplier firm's stocks before the market fully understands the unfavorable news about the customer. Dai et al. (2017) find that short selling of supplier stocks has increased with the post-news returns of customer stocks. Additionally, from the perspective of the customer, increased short-selling pressures on supplier stocks could negatively influence the customer and their stocks. If a supplier firm becomes a target of short-sellers, its major customers may request that their identities remain undisclosed.

The second effect is the *agency issue detection effect* associated with the disclosure of customer identity, represented by the diagonal line from Shorts to Supplier Firm in Figure 1. Short sellers may use information of the revealed supplier-customer relationship to anticipate the agency issues of the supplier firms, even if there are no external shocks to the customers. Anecdotal evidence suggests that firms commit financial frauds with their customers' cooperation. For instance, firms may overstate their revenues by "cooking the books", fabricating fictitious clients, or accelerating revenue recognition via channel stuffing. Li et al. (2021) find that customer information disclosed by a supplier firm, combined with customers' own accounting information, can be used to detect the supplier's revenue fraud. However, it is difficult for retail investors to collect and analyze customer information due to the high information costs and limited investor attention. Short selling pressure can facilitate the public discovery of financial misconducts and discipline a pilot firms' manipulative behaviors (e.g., Desai et al., 2006; Fang et al., 2016; Karpoff and Lou, 2010).

[Insert Figure 1 about here]

In sum, both the negative information transmission effect and the agency issue detection effect make a firm less likely to reveal its customers' identities when it is targeted by short sellers. We propose our main hypothesis as follows:

H1: Under pressure from short-sellers, pilot firms are more likely to withhold the identities of their major customers.

3. Data, sample, and key variables

3.1 Data and sample

Our initial sample comprises firms in China that are listed on the Shanghai and Shenzhen stock exchanges from 2006 to 2018. We obtain information about the eligibility of pilot firms to be shorted and the dates of their inclusion or exclusion from the list from the WIND database. We acquire firm financial accounting, governance, and customer information from the China Securities Markets and Accounting Research (CSMAR) database and Chinese Research Data Services (CNRDS) database. Our sample starts in 2006, four years prior to the introduction of the pilot program in 2010. We exclude firms that fall into one of the following criteria: (1) those in the financial industry; (2) those that are removed from the short-sell list during the sample period; (3) those that are listed after 2010 (the first year of the pilot program); or (4) those with missing values for control variables. Our final sample includes 18,286 firm-year observations (1,558 unique firms). To minimize the effect of outliers, we winsorize all of the continuous variables at the 1st and 99th percentiles in each year.

3.2 Disclosure of customer identity

With regard to the disclosure of customer identity, since 2001, the CSRC has mandated that all listed firms reveal the combined procurement of their top five customers (major customers) in their annual reports. The disclosure of each major customer's information, however, is not compulsory. Instead, the CSRC encourages firms to voluntarily disclose their major customers' names and procurements in their annual reports. Consequently, firms have a wide range of discretion in whether and how they disclose their customers' information. In practice, some firms voluntarily reveal procurements from their major customers but do not disclose the identities of these customers; and some conceal both the identity and procurement information. In approximately 30.6% of the observations in our final sample, the firms voluntarily disclose at least one major customer's identity in their annual reports.

Following Li et al. (2018), we construct two measures of customer identity disclosure. The first measure is an indicator variable, *DISCLOSE_DUMMY*, which equals one if a firm discloses the identity of at least one major customer and zero if otherwise. The second measure is a consecutive measure, *DISCLOSE_RATIO*, which is the percentage of reported customers with identity information. We also use a sales-weighted version of the *DISCLOSE_RATIO* in the robustness analysis.

3.3 Regression design

We adopt a staggered difference-in-differences method to examine the effect of short-selling pressure on firms' voluntary customer identity disclosure. Following prior research (Bertrand and Mullainathan, 2003; Ni and Yin, 2020), we specify the regression as follows:

$$DISCLOSE_{i,t} = \beta_0 + \beta_1 SHORT_{i,t} + \sum \gamma_n Controls_{i,t} + \mu_i + \lambda_{j,t} + \varepsilon_{i,t} \quad (1)$$

where i indexes the firm, j indexes the industry, and t indexes the year. *DISCLOSE* represents the two variables of customer identity disclosure, as defined in the previous section. *SHORT* is an indicator variable that equals one in and after year t when a firm is added to the short-sell list, and zero if otherwise. We include firm fixed effects (μ_i) to control for unobservable, time-invariant firm characteristics that may influence disclosure choices, thereby allowing us to observe the change in disclosure before and after a firm's placement on the short-sell list. We also include industry-by-year fixed effects ($\lambda_{j,t}$) to control for contemporaneous changes in macroeconomic conditions at the industry level. We cluster standard errors at the firm level. The coefficient β_1 captures average changes in the customer identity disclosure level of the pilot firms relative to the contemporaneous changes in disclosure levels of firms that are not on the short-sell list (non-pilot firms).

To control for other firm-specific factors that could affect a firm's customer identity disclosure decision, we follow previous research (e.g., Ellis et al., 2012; Li et al., 2018) and include several control variables. These include firm size (*SIZE*), leverage ratio (*LEV*), return on assets (*ROA*), book-to-market ratio (*BTM*), and revenue growth rate (*GROWTH*). We also include control variables that proxy for the proprietary costs of disclosure, including research and development expenses (*R&D*), and an indicator variable that equals one if a firm discloses *R&D* expenditures, and zero if otherwise (*R&D dummy*). We include an indicator variable for whether a firm conducts a seasoned equity offering in the following year (*SEO*) to control for the capital market incentive for disclosure. To control for the corporate governance factors that may affect a firm's disclosure decision, we include the percentage of shares held by the largest shareholder (*TOP1*), board size (*BOARD*), the percentage of independent directors on the board (*INDEPRATIO*), CEO duality (*DUAL*), an indicator variable that equals one if a firm is audited by a Big 4 auditor and zero if otherwise (*BIG4*), and whether a firm is a state-owned enterprise (*SOE*). We provide detailed definitions of these variables in Appendix B.

4. Empirical results

4.1 Descriptive statistics

Table 1 reports the summary statistics of the variables used in the regression analysis. The mean value of the variable *SHORT* is 0.227, indicating that about 22.7 percent of the firm-year observations in our sample are included in the short-sell pilot program. The mean of *DISCLOSE_DUMMY* is 0.306, which suggests that on average, around 30% of firms voluntarily disclose at least one of their major customers' identities. The mean of *DISCLOSE_RATIO* is 0.288, which implies that about 28.8% of major customers' identities are disclosed by firms in our sample.

[Insert Table 1 about here]

4.2 Baseline regression results

Table 2 presents the baseline regression results. Columns 1 and 2 report the results of using *DISCLOSE_DUMMY* as the dependent variable, while columns 3 and 4 report the results using *DISCLOSE_RATIO*. In columns 1 and 3, the coefficient on *SHORT* is significantly negative at the 1% level, without including the control variables ($\beta = -0.043$ and -0.045 , respectively). In columns 2 and 4, the coefficient on *SHORT* remains negative and significant at the 5% level ($\beta = -0.032$ and -0.036 , respectively), indicating that the pilot firms reduce their voluntary customer identity disclosure by 3.2% (3.6% for *DISCLOSE_RATIO*) when they become eligible for short selling. This effect is economically significant, compared to the average disclosure level of 30.6% (the mean of *DISCLOSE_DUMMY*, as reported in Table 1).

[Insert Table 2 about here]

The regression results of the control variables are generally consistent with previous studies. In line with Li et al. (2018), the coefficient on *SIZE* is significantly negative at the 1% level, indicating that larger firms are less likely to voluntarily disclose their major customers' identities. The coefficient on *GROWTH* is significant and positive at the 10% level, suggesting that growing firms are more likely to disclose major customers' identities, as these firms have strong motivations to raise capital. Notably, the coefficients on the proxies of proprietary costs (*R&D* and *R&D dummy*) are not significantly different from zero. One possible explanation for this result could be that the proprietary costs effect is absorbed by firm and industry-by-year fixed effects.

4.3 Parallel trends test

To test the validity of our interpretation of the influence of short-selling pressure on customer identity disclosure, we conduct a timing test to examine whether the pilot firms and non-pilot firms exhibit parallel trends absent of changes in the short-sell deregulation. Following Bertrand and

Mullainathan (2003) and Li et al. (2018), we substitute the *SHORT* dummy with several dummy variables: $SHORT^{-3}$ ($SHORT^{-2}$, $SHORT^{-1}$) equals one for observations 3 (2, 1) years prior to a firm's addition to the short-sell list; $SHORT^0$ equals one in the year a firm is added to the short-sell list; $SHORT^{+1}$ ($SHORT^{+2}$, $SHORT^{+3}$) equals one for observations 1 (2, 3) years following a firm's inclusion on the short-sell list; and $SHORT^{4+}$ equals one if a firm was added to the short-sale list at least four years ago. Consistent with model 1 in Table 2, we control for firm-fixed effects in the parallel trends test to ensure that we are comparing within-firm trends in customer identity disclosure between the pilot and non-pilot firms.

We present the results of the parallel trends test in Table 3. When the dependent variable is *DISCLOSE_DUMMY* or *DISCLOSE_RATIO*, the coefficients on $SHORT^{-3}$, $SHORT^{-2}$, and $SHORT^{-1}$ are not statistically significantly different from zero, implying that there is no difference in the pre-existing trends of customer identity disclosure between the pilot and non-pilot firms before they are added to the short-sell list. In addition, the coefficient on $SHORT^0$ is significantly negative in both columns 1 and 2, indicating that the pilot firms begin reducing the disclosure of customers' identities in their annual reports in the year they were added to the short-sell list. Specifically, the significant coefficients on $SHORT^{+1}$, $SHORT^{+2}$, $SHORT^{+3}$, $SHORT^{4+}$ indicate the persistent influence of short selling pressure on the concealment of customer identity. We also plot various coefficients on Figure 2. Overall, we find that the parallel trends assumption is satisfied, and that the effect of short-selling pressure on voluntary customer identity disclosure is not attributable to reverse causality.

[Insert Table 3 about here]

[Insert Figure 2 about here]

4.4 The effect of proprietary costs

Prior research concludes that proprietary costs play a crucial role in a firm's disclosure of customer identity information (Ellis et al., 2012; Li et al., 2018). In our baseline regression analysis, we control for R&D expenditure and industry-year fixed effect to account for proprietary costs influence, and find that capital market pressures from short-sellers exert a significant effect on firms' strategies for disclosing customer identity information. Given the importance of proprietary costs in customer information disclosure, we further analyze the influence of capital market pressures by dividing the sample into two groups based on proprietary costs. In particular, short-sellers have the capacity to assess

the proprietary costs of a potential target firm, such as the extent to which competitors can use the disclosed information and the potential damage to a firm's competitive advantage. Thus, proprietary costs and capital market pressure may not be substitutes but complements, which leads us to expect that short-selling pressure has a stronger effect on pilot firms with higher proprietary costs.

Following prior studies (e.g. Crawford et al., 2020), we classify pilot firms into the high (low) proprietary costs group if they have high (low) R&D expenditures or belong to an industry with a high (low) concentration based on the industrial Herfindahl-Hirschman (HHI).³ Higher R&D expenditures indicate that a firm has invested more in developing new or innovative products, resulting in higher proprietary costs (Wang, 2007; Ellis et al., 2012). High industry concentration implies that a few firms account for a significant fraction of the industry's aggregate output. Disclosing information in this type of industry may provide more reliable information for rivals, resulting in higher proprietary costs (Ali et al., 2009; Ali et al., 2014). We classify pilot firms into high (low) proprietary costs groups if the ratio of R&D expenditures to sales is above (below) the sample median or the HHI is above (below) the sample median. We then conduct the baseline regression analysis for the high and low proprietary costs subsamples and report the results in Table 4.

In Table 4, the coefficients on *SHORT* are negative and significant across the board. Consistent with the baseline regression results reported in Table 2, these results imply that short-selling pressure exerts a significant effect on voluntary customer identity disclosure even after controlling for the effect of proprietary costs. Moreover, in panel A of Table 4, when *DISCLOSE_RATIO* is the dependent variable, we observe that the coefficients on *SHORT* are -0.048 ($t = -2.482$) and -0.035 ($t = -1.694$) for the high and low R&D expenditures group, respectively. The difference in the estimated coefficients for these two groups is insignificant (p -value = 0.126). When the dependent variable is *DISCLOSE_DUMMY*, the coefficients on *SHORT* are -0.040 ($t = -1.974$) and -0.037 ($t = -1.703$) for the high and low R&D expenditures group, respectively, and the difference in the estimated coefficients for these two groups is also insignificant (p -value = 0.397). Similarly, in Panel B of Table 4, the coefficients on *SHORT* are more negative for the high HHI group than for the low HHI group. The difference in the

³ There are three measures for proprietary costs in Ellis et al (2012): R&D intensity, intangible assets net of goodwill, and advertising expenses. We use R&D intensity in our study because the latter two measures may be related to our measures for agency costs. Note that in the baseline regression, we do not include the HHI as a proxy for the proprietary costs, as we have already controlled for industry-year fixed effect. However, when including the HHI and controlling for firm and year fixed effect in the baseline regression, the untabulated result reveals that HHI has a significant and negative coefficient, suggesting that the proprietary costs have important effect on firm disclosure of customer's identities.

estimated coefficients between the two groups is significant when the dependent variable is *DISCLOSE_DUMMY* and insignificant when *DISCLOSE_RATIO* is the dependent variable.

Taken together, the results from Table 4 indicate that capital market pressure from short-sellers remains a critical factor in determining firms' customer identity disclosure, even after accounting for proprietary costs. Proprietary costs can be considered an important internal factor in this decision-making process, as illustrated in Figure 3. Short-selling pressure and product market pressure (e.g. disclosure of proprietary information to competitors) are not mutually exclusive, but rather complement one another in explaining firms' customer identity disclosure decisions. As anticipated, the effect of short-selling pressure is even more pronounced among firms with higher proprietary costs.

[Insert Table 4 about here]

[Insert Figure 3 about here]

4.5 Cross-sectional test

We next perform several cross-sectional analyses to shed additional light on the underlying channel of short-selling pressure on firms' voluntary customer identity disclosure.

4.5.1 Effect of customer base concentration

Thus far, our evidence suggests that pilot firms facing short-selling pressure tend to decrease their voluntary customer identity disclosure. As negative shocks propagate through the supply chain and increase the risk exposure of economically linked firms, revealing customers' identities could increase a firm's likelihood of being targeted by short-sellers. Naturally, suppliers that rely heavily on a few customers for the majority of their revenue are particularly vulnerable to risk (Chen et al., 2021). A firm's customer concentration is thus an important factor in assessing the extent to which the disclosure of customers' identities could negatively influence the firm (e.g. Hertznel and Officer, 2012; Dhaliwal et al., 2016; Kolay et al., 2016). We proceed to examine whether the decrease in voluntary customer identity disclosure under short-selling pressure becomes more pronounced for firms with highly concentrated customer base.

We follow prior studies and measure *Customer Concentration* as the proportion of a firm's total sales that are attributable to major customers (Banerjee et al., 2008; Dhaliwal et al., 2016). Major customers are defined as the top five customers disclosed in a firm's annual report. A firm is classified

as having high (low) customer concentration if its *Customer Concentration* is above (below) the sample median each year. We estimate model 1 separately for the high versus low customer concentration subsamples and expect the short-selling pressure on voluntary customer identity disclosure to be stronger in the high subsample.

Panel A of Table 5 reports the results. The coefficient on *SHORT* is negative and significant for firms with high customer concentration ($\beta = -0.043$, $t = -1.673$) when the dependent variable is *DISCLOSE_DUMMY*. When the dependent variable is *DISCLOSE_RATIO*, the coefficient on *SHORT* remains negative and significant ($\beta = -0.050$, $t = -1.995$). For firms with low customer concentration, the coefficient on *SHORT* becomes insignificant. Additionally, the difference between the two coefficients is significant. These results suggest that when customer concentration is high, the pilot firms are more likely to decrease voluntary customer identity disclosure, consistent with the negative information transmission effect in the supply chain.

[Insert Panel A of Table 5 about here]

4.5.2 Effect of supplier firms' discretionary revenues

A revealed supplier-customer relationship, combined with the customer's purchase information, can help sophisticated short-sellers to detect financial misconduct by the supplier firm, particularly revenue manipulation (Li et al., 2021). Prior research suggests that discretionary revenues may indicate revenue fraud (Stubben, 2010). We next examine whether the decrease in voluntary customer identity disclosure in response to short-selling pressure is more pronounced for firms with a higher proportion of discretionary revenue.

Following Stubben (2010), we use the revenue model and estimate regression residuals to measure *Discretionary Revenues*.⁴ We then classify the firms into high (low) discretionary revenues groups based on whether a firm's *Discretionary Revenues* is above (below) the sample median in each year. We estimate model (1) separately for the high and low discretionary revenue groups and expect the effect of short-selling pressure on voluntary customer identity disclosure to be stronger in the high discretionary revenue group.

Panel B of Table 5 reports the results. The coefficient on *SHORT* is negative and significant for firms with high discretionary revenues when the dependent variable is either *DISCLOSE_DUMMY* or

⁴ We also use a conditional model to estimate discretionary revenues, and the results are consistent.

DISCLOSE_RATIO, whereas it becomes insignificant for firms with low discretionary revenues. Notably, the difference between the two coefficients is significant. Consistent with the agency problem detection effect of customer identity disclosure, the results indicate that when discretionary revenue is high, firms are more likely to decrease voluntary customer identity disclosure.

[Insert Panel B of Table 5 about here]

4.5.3 Effect of public scrutiny

Firms tend to reduce voluntary customer identity disclosure under short-selling pressure because revealing business relationships increases their risk exposure. The short-selling pressure would be amplified if the pilot firms are subject to greater public scrutiny, such as more media attention. We examine whether the decrease of voluntary customer identity disclosure in reaction to short-selling pressure is more pronounced when firms face greater public scrutiny.

To measure a firm's public scrutiny, we adopt a variable of *Media Coverage*. *Media Coverage* is measured as the number of a firm's financial news reports on the Internet and in newspapers over the fiscal year. Our media data come from the Chinese Research Data Services Platform (CNRDS). A firm is classified as subject to strong (weak) public scrutiny if *Media Coverage* is above (below) the sample median each year. We estimate model 1 separately for the high and low media coverage subsamples and expect the effect of short-selling pressure on voluntary customer identity disclosure to be stronger in the high subsample.

Panel C of Table 5 reports the results. The coefficient on *SHORT* is significantly negative for firms with high media coverage (-0.054 for *DISCLOSE_DUMMY* and $t = -2.350$; -0.055 for *DISCLOSE_RATIO* and $t = -2.565$), whereas it is insignificant for firms with low median coverage (0.003 for *DISCLOSE_DUMMY* and $t = 0.135$; -0.003 for *DISCLOSE_RATIO* and $t = -0.132$). Moreover, the difference between the two coefficients is significant. The results suggest that when subject to greater public attention, pilot firms are more likely to withhold customer identity information.

[Insert Pane C of Table 5 about here]

5. Robustness tests

5.1 Results using a propensity score matching sample

The evidence so far suggests that after being added to the short-sells list, the pilot firms significantly reduce their voluntary customer identity disclosure. Nonetheless, a remaining concern is that pilot firms

in our sample are not randomly selected by the CSRC and that various firm-specific characteristics may influence our results. To alleviate this endogeneity concern, we follow prior research (e.g., Meng et al., 2020; Ni and Yin, 2020; Zhang et al., 2020) and use a propensity score matching (PSM) approach to generate 1:1 matched without replacement control samples of non-pilot stocks. The PSM approach enables us to predict the probability of a particular firm's inclusion in the short-sell program using logistic regression. We consider a series of control variables based on the CSRC's selection criteria, including the outstanding shares ratio, leverage, firm age, return on total assets, stock turnover ratio, stock return volatility, board size, and state ownership status. We measure all of the variables at the year-end before the firm's inclusion in the short-sell program. For any pilot firm on the short-sell list in 2010 (or 2011, 2013, 2014, 2016, 2017, and 2018), we choose a control firm from the non-pilot stocks with the closest propensity score, while imposing a caliper of 0.01 and common support. We finally create a sample with 11,478 firm-year observations, representing 532 unique pairs of matched firms.

We re-estimate our main results using the matched sample, and the results are presented in Panel A of Table 6. Our main results are qualitatively consistent with this alternative sample. The coefficient on *SHORT* remains negative and significant, at least at the 5% level, suggesting that pilot firms are less inclined to disclose their customers' identities after their inclusion in the short-sell list, as compared to similar firms that are not on the short-sell list.

[Insert Panel A of Table 6 about here]

5.2 Placebo test

To enhance the credibility of our results, we conduct a placebo test to verify whether our results are solely attributable to chance (Li et al., 2018; Gao and Zhang, 2019). Specifically, we randomly select a group of pilot firms as pseudo-treated firms and randomly choose a pseudo-shortable year for each pseudo-treated firm to construct an indicator variable, *Placebo SHORT*. We then re-estimate model 1 by replacing *SHORT* with *Placebo SHORT*. We repeat this process 1,000 times and plot the discretized probability density of the placebo coefficients in Figure 4. The placebo coefficient largely follows a normal distribution centered at zero (mean = -0.0001, std. dev. = 0.015 when *DISCLOSE_DUMMY* is the dependent variable; mean = -0.0002, std. dev. = 0.014 when *DISCLOSE_RATIO* is the dependent variable). The actual *SHORT* coefficient (i.e., -0.032 when *DISCLOSE_DUMMY* is the dependent variable; -0.036 when *DISCLOSE_RATIO* is the dependent variable) is more than two standard deviations larger than the means of placebo coefficients. These results collectively corroborate the

notion that pilot firms reduce voluntary customer identity disclosures because of their inclusion in the short-sell list, and not because of confounding factors such as time trends or business cycles.

[Insert Figure 4 about here]

5.3 Other robustness checks

We conduct several additional robustness checks to reinforce the conclusions drawn in our baseline analysis. First, we replace the dummy variable *SHORT* with two ex-post measures for short selling trading activities at the firm level to re-examine the effect of short selling on customer identity disclosure. If our story holds, we expect that a firm is less likely to reveal its customers' identities if it is subject to heightened short-selling activity. Following Ni and Yin (2020), we define two real short-selling trading measures: we define *SHORTSELL1* as the ratio of average daily short volume to a firm's total capitalization and *SHORTSELL2* as the ratio of the short balance to the firm's total capitalization at year-end. We replace *SHORT* with *SHORTSELL1* (*SHORTSELL2*) in model 1, and present the results in Panel B of Table 6. The coefficients on *SHORTSELL1* (*SHORTSELL2*) are significantly negative at least at the 5% level, suggesting that the short-selling of firms' stocks indeed reduces those firms' likelihood of disclosing customer's identity information.

[Insert Panel B of Table 6 about here]

Second, we replace *DISCLOSE_RATIO* with an alternative customer identity disclosure measure, *DISCLOSE_RATIO2*, a procurement-weighted version of *DISCLOSE_RATIO* (Li et al., 2018). It is measured as follows:

$$DISCLOSE_RATIO2 = \frac{\sum \text{the procurement of reported customer with identity}}{\sum \text{the procurement of top 5 customers}}$$

We present the results in column 1 of Panel C of Table 6, the coefficient on *SHORT* is -0.032 and still significant at the 5% level, consistent with our main results.

Third, we examine the robustness of our results by including the pilot firms that are removed from the short-sell list during our sample period and re-estimating model 1. The results, presented in column 2 and column 3 of Panel C of Table 6, suggest the robustness of our results, with the coefficient estimate of *SHORT* remaining significantly negative. Overall, the results in Table 6 indicate that our main results are robust.

[Insert Panel C of Table 6 about here]

5.4 The benefit of withholding customer information

Having explored the association between short selling and customer identity disclosure, we proceed to examine the potential benefits of nondisclosure for pilot firms. We explore the trade-off between the costs and benefits of voluntary disclosure decisions, as articulated by Verrecchia (1983). Specifically, we investigate whether withholding customer identity information can significantly reduce a pilot firm's level of stock price volatility and the probability of fraud detection.

To this end, we measure the stock price volatility (*VOLATILITY*) of pilot firms as the standard deviation of daily abnormal returns over the next fiscal year, multiplied by 100, following prior research (e.g., Chang et al., 2014). We predict the probability of fraud detection using an indicator variable, *DETECT*, which is set to one for the year a firm is announced to have engaged in financial misconduct and zero otherwise. We classify pilot firms as disclosing or non-disclosing short-sell firms, depending on whether they reveal their customers' identities after being placed on the short-sell list. We then pool together disclosing and non-disclosing short-sell firms and all non-short-sell firms to form the disclosure and nondisclosure subsamples, respectively. We estimate model 1 with modified control variables when the dependent variable is *VOLATILITY* or *DETECT* (Zhang et al., 2020).

Table 7 reports the results. In columns 1 and 2, we examine the effect of short selling on stock price volatility in the disclosure subsamples. The coefficients on *SHORT* in columns 1 and 2 are both negative and significant at the 1% level, implying that short selling helps decrease stock price volatility. However, the coefficient on *SHORT* in the nondisclosure subsample is -0.217 and significantly more negative than that in the disclosure subsample ($\beta = -0.180$). This result shows that non-disclosing pilot firms have a greater reduction in stock price volatility than do disclosing pilot firms.

In columns 3 and 4, we examine the effect of short selling on the probability of fraud detection in the disclosure subsamples. The coefficient on *SHORT* in columns 3 and 4 is negative, but it is only significant in the nondisclosure subsample ($\beta = -0.024$, $t = -2.846$), in addition, the magnitude of the coefficient on *SHORT* in the nondisclosure subsample is significantly more negative than that in the disclosure subsample ($\beta = -0.012$, $t = -1.258$). This result suggests that non-disclosing pilot firms experience a significant reduction in the probability of fraud detection relative to disclosing pilot firms. Overall, the results in table 7 indicate that pilot firms withhold customers' identities to avoid severe

stock price fluctuations and to reduce the probability of unresolved misconducts being detected, also consistent with our hypothesis.

[Insert Table 7 about here]

6. Conclusions

We explore the strategies that firms employ to voluntarily disclose their customers' identities, taking into account capital market pressures, a significant motivation in addition to the well-documented influence of proprietary costs. By utilizing the deregulation of short selling in China, we find that increased short-selling pressure decreases managers' propensity to reveal the identities of their major customers. This result is robust and withstands a series of rigorous examinations, including using the PSM sample and conducting a placebo analysis. We also find that the effects of capital market pressure and proprietary costs on customer identity disclosure are not mutually exclusive, but instead work together in a complementary manner. Moreover, the effect of short selling on customer identity disclosure is more pronounced for firms with a highly concentrated customer base, high discretionary revenues, and those facing greater public scrutiny. Lastly, we find that pilot firms withhold customer identity information to minimize stock price volatility and the likelihood of fraud detection.

Our evidence contributes to the literature on firms' strategic customer identity disclosure. We find that in addition to proprietary costs, capital market pressure strongly influences firms' strategic customer identities disclosure. We also contribute to the literature on the real effects of the threat of short selling on corporate disclosure strategy by providing evidence that sophisticated investors can affect a firm's voluntary disclosure of the identities of economically linked firms. Meanwhile, our results have valuable policy implications for regulators. The purpose of the short-selling mechanism is to improve market efficiency, however, short-selling may have the unintended effect of strengthening managers' tendency to obscure information and, consequently, reduce voluntary disclosure. Our results suggest that short selling may lead to reduced supply chain transparency. Therefore, regulators should be aware of this potential issue and improve the regulation of firms' disclosure policies.

References

- Ali, A., S. Klasa, E. Yeung. 2009. The limitations of industry concentration measures constructed with Compustat data: Implications for finance research. *Review of Financial Studies* 22: 3839–71.
- Ali, A., S. Klasa, E. Yeung. 2014. Industry concentration and corporate disclosure policy. *Journal of Accounting and Economics* 58: 240–64.
- Ak, B. K., P. Patatoukas. 2016. Customer-base concentration and inventory efficiencies: Evidence from the manufacturing sector. *Production and Operations Management* 25(2): 258–272.
- Banerjee, S., S. Dasgupta, Y. Kim. 2008. Buyer-supplier relationships and the stakeholder theory of capital structure. *Journal of Finance* 63 (5): 2507–52.
- Bertrand, M., S. Mullainathan. 2003. Enjoying the quiet life? Corporate governance and managerial preferences. *Journal of Political Economy* 111: 1043–1075.
- Bhattacharya, N., T.E. Christensen, Q. Liao, B. Ouyang. 2022. Can short sellers constrain aggressive non-GAAP reporting? *Review of Accounting Studies* 27:391–440.
- Boehmer, E., C. M. Jones, X. Zhang. 2008. Which shorts are informed? *The Journal of Finance* 63: 491–527.
- Bris, A., W. N. Goetzmann, N. Zhu. 2007. Efficiency and the bear: Short sales and markets around the world. *The Journal of Finance* 62: 1029–1079.
- Cai, T., L. Guo. 2018. Short selling and real earnings management. Paper presented at the Financial Management Association.
- Chang, E.C., Y. Luo, J. Ren. 2014. Short-selling, margin-trading, and price efficiency: Evidence from the Chinese Market. *Journal of Banking & Finance* 48: 411–424.
- Chen, G., X. Tian, M. Yu. 2022. Redact to protect? Customers' incentive to protect information and suppliers' disclosure strategies. *Journal of Accounting Economics*, forthcoming.
- Chen J, Y. Dou, Y. Zou. 2021. Information externalities of SFAS 161: Evidence from supply chains. *The Accounting Review* 96 (4): 179–202.
- Chen S., B. Lin, R. Lu, H. Ma. 2018. The disciplinary effects of short sales on controlling shareholders. *Journal of Empirical Finance* 46: 56-76.
- Cho Y J, Y. Kim, Y. Zang. 2020. Information externalities and voluntary disclosure: Evidence from a major customer's earnings announcement. *The Accounting Review* 95 (6): 73–96.
- Chu, Y., X. Tian, W. Wang. 2018. Corporate innovation along the supply chain. *Management Science* 65(6): 2445-2466.
- Cohen, L., A. Frazzini, 2008. Economic links and predictable returns. *Journal of Finance* 63: 1977-2011.
- Crawford, S., Y. Huang, N. Li, Z. Yang, 2020. Customer concentration and public disclosure: evidence from management earnings and sales forecasts. *Contemporary Accounting Research* 37(1): 131–159.
- Dai, R., L. Ng, N. Zaiats. 2017. Customer news and supplier short selling, working paper.
- Desai, H., S. Krishnamurthy, K. Venkataraman. 2006. Do short sellers target firms with poor earnings quality? Evidence from earnings restatements. *Review of Accounting Studies* 11(1): 71–90.
- Dhaliwal, D., S. Judd, M. Serfling, S. Shaikh. 2016. Customer concentration risk and the cost of equity capital. *Journal of Accounting and Economics* 61 (1): 23–48.
- Diamond, D. W., R. E. Verrecchia. 1987. Constraints on short-selling and asset price adjustment to private information. *Journal of Financial Economics* 18: 277–311.

- Duffie, D., N. Garleanu, L. H. Pedersen. 2002. Securities lending, shorting, and pricing. *Journal of Financial Economics* 66: 307–339.
- Ellis, J. A., C. E. Fee, S. E. Thomas. 2012. Proprietary costs and the disclosure of information about customers. *Journal of Accounting Research* 50(3): 685–727.
- Fang, V.W., A. Huang, J. M. Karpoff. 2016. Short selling and earnings management: A controlled experiment. *Journal of Finance* 71(3): 1251–1293.
- Fee, C. E., C. J. Hadlock, S. Thomas. 2006. Corporate equity ownership and the governance of product market relationships. *Journal of Finance* 61: 1217–51.
- Fee, C. E., S. Thomas. 2004. Sources of gains in horizontal mergers: Evidence from customer, supplier, and rival firms. *Journal of Financial Economics* 74(3): 423–460.
- Gao, H., J. Zhang. 2019. SOX Section 404 and corporate innovation. *Journal of Financial and Quantitative Analysis* 54(2): 759–787.
- Gu, T., N. R. Sanders, A. Venkateswaran. 2017. CEO incentives and customer-supplier relations. *Production and Operations Management* 26(9): 1705–1727.
- Guan, Y., M.F. Wong, Y. Zhang, 2015. Analyst following along the supply chain. *Journal of Accounting Research* 23: 144-166.
- Healy, P., K. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting & Economics* 31: 405–40.
- Hertzel, M. G., Z. Li, M. S. Officer, K. J. Rodgers. 2008. Inter-firm linkages and the wealth effects of financial distress along the supply chain. *Journal of Financial Economics* 87: 374–387.
- Hertzel, M. G., M. S. Officer. 2012. Industry contagion in loan spreads. *Journal of Financial Economics* 103 (3): 493–506.
- Hui, K. W., C. Liang, P. E. Yeung. 2019. The effect of major customer concentration on firm profitability: Competitive or collaborative? *Review of Accounting Studies* 24(1): 189–229.
- Houston, J. F., C. Lin, Z. Zhu. 2016. The financial implications of supply chain changes. *Management Science* 62(9): 2520–2542.
- Hyder, F., M. Khoshnoud. 2020. Informed short selling: evidence from economically linked firms. *Review of Behavioral Finance*, forthcoming.
- Jin, Z., B. Lin, X. Yang, T. Zhang. 2018. Accounting conservatism and short selling: Evidence from China. *Journal of Banking Finance and Accounting* 45: 352–394.
- Karpoff, J.M., X. Lou. 2010. Short sellers and financial misconduct. *Journal of Finance* 65 (5): 1879–1913.
- Kim J. B., B. Y. Song, Y. Zhang. Earnings performance of major customers and bank loan contracting with suppliers. *Journal of Banking and Finance*, 2015, 59 (10):384-398.
- Kolay, M., M. Lemmon, E. Tashjian. 2016. Spreading the misery? Sources of bankruptcy spillover in the supply chain. *Journal of Financial and Quantitative Analysis* 51(6): 1955–1990.
- Lee, H. L., K. C. So, C. S. Tang. 2000. The Value of information sharing in a two-level supply chain. *Management Science* 46: 626–643.
- Leung, W. S., J. Li, J. Sun. 2020. Labor unionization and supply-chain partners' performance. *Production and Operations Management* 29(5): 1325-1353.
- Li, C., N. Li, F. Zhang. 2021. Using economic links between firms to detect accounting fraud. Available at SSRN 3780047. *Accounting Review* forthcoming.
- Li, C., 2020. Why do firms hide customer identities? An accounting manipulation explanation. Working paper.

- Li, Y., L. Zhang. 2015. Short selling pressure, stock price behavior, and management forecast precision: Evidence from a natural experiment. *Journal of Accounting Research* 53 (1): 79–117.
- Li, Y., Y. Lin, L. Zhang. 2018. Trade secrets law and corporate disclosure: Causal evidence on the proprietary cost hypothesis. *Journal of Accounting Research* 56(1): 265–308.
- Massa, M., B. Zhang, H. Zhang. 2015. The invisible hand of short selling: does short selling discipline earnings management? *Review of Financial Studies* 28: 1701–1736.
- Meng, Q., X. Li, K. C. Chan, S. Gao. 2020. Does short selling affect a firm's financial constraints? *Journal of Corporate Finance* 60: 101531.
- Menzly, L., O. Ozbas, 2010. Market segmentation and cross-predictability of returns. *Journal of Finance* 65: 1555-1580.
- Ni, X., S. Yin. 2020. The unintended real effects of short selling in an emerging market. *Journal of Corporate Finance* 64: 101659.
- Pandit, S., C. Wasley, T. Zach, 2011. Information externalities along the supply chain: the economic determinants of suppliers' stock price reaction to their customers' earnings announcements. *Contemporary Accounting Research* 28: 1304–1343.
- Patatoukas, P. 2012. Customer-base concentration: Implications for firm performance and capital markets. *Accounting Review* 87(2): 363–392.
- Radhakrishnan, S., Z. Wang, Y. Zhang. 2014. Customers' capital market information quality and suppliers' performance. *Production and Operations Management* 23(10): 1690–1705.
- Saffi, P., K. Sigurdsson. 2011. Price efficiency and short selling. *Review of Financial Studies* 24: 821–852.
- Serpa, J. C., H. Krishnan. 2017. The impact of supply chains on firm-level productivity. *Management Science* 64(2): 495–981.
- Sodhi, M. S., C. S. Tang. 2019. Research opportunities in supply chain transparency. *Production and Operations Management* 28(12): 2946-2959.
- Stubben, S. R. 2010. Discretionary revenues as a measure of earnings management. *The Accounting Review* 85(2): 695–717.
- Titman, S. 2021. Risk transmission across supply chain. *Production and Operations Management* 30(12): 4579-4587.
- Verrecchia, R. E. 1983. Discretionary disclosure. *Journal of Accounting and Economics* 5: 179–194.
- Wang, I. 2007. Private earnings guidance and its implications for disclosure regulation. *The Accounting Review* 82: 1299–332.
- Wong T., G. Yu, S. Zhang, T. Zhang. 2023. Calling for transparency: Evidence from a field experiment. *Journal of Accounting and Economics* forthcoming.
- Xie, G., L. Chen, X. Chen. 2021. The role of short selling threat in corporate environmental disclosure strategies: Evidence from China. *Resource and Energy Economics* 66: 101256.
- Zhang, H., J. Zhu, J. He J, C. Chan. 2020. Two tales of earnings management with short sales deregulation. *Journal of Accounting and Public Policy* 39(4): 106743.

Appendix A: Short-sell deregulation in the Chinese capital market

The China Securities Regulatory Commission (CSRC) launched a pilot program on March 31, 2010, to gradually remove short-sell bans on certain firm stocks in the A-share market. The pilot program designated 90 stocks that could be shorted beginning February 12, 2010. In December 2011, the list was expanded to include 278 stocks. The CSRC then announced the pilot scheme would be permanently adopted and added more stocks to the short-sell list in a staggered fashion. The list has undergone six major revisions (March 2010, November 2011, January 2013, September 2013, September 2014, and December 2016) and grew to include 948 stocks by the end of 2018, accounting for about 26.58% of the stocks in the Chinese capital market. We summarize the dynamic adjustment of the pilot stocks during our sample period in Table A1.

The CSRC set several requirements for a stock to be included in the pilot program: (1) The stock has been traded for at least three months. (2) The stock has at least 20 million outstanding shares or its market capitalization is at least 800 million Chinese Yuan. (3) The stock has at least 4,000 shareholders. (4) The stock does not meet any of the following conditions within the past three months: an average daily turnover rate less than 15% of the market index turnover rate; an average daily stock price range greater than 4% of the market index; or the stock price volatility more than five times the market index volatility. (5) The stock has completed the share split reform so that it has only one class of common stock. (6) The stock is not designated as Special Treatment (ST). Some stocks are removed from the list primarily because they are or will soon be delisted.

Table A1: The staggered addition/removal of stocks on the short-sell list

This table reports the dynamic adjustment of the stocks that could be shorted during the 2010-2018 period. *Stocks added* refers to the number of stocks added to the list each year, and *Stocks removed* refers to the number of stocks removed from the list each year. *Stocks on the list* refers to the number of stocks on the list at the end of each year, and *% of pilot stocks* indicates the proportion of stocks on the list relative to the total number of stocks on the Chinese market.

Year	Stocks added	Stocks removed	Stocks on list	Total stocks in the market	% of pilot stocks
2010	96	6	90	2,041	4.41%
2011	189	1	278	2,318	11.99%
2012	0	0	278	2,471	11.25%
2013	428	6	700	2,469	28.35%
2014	205	6	899	2,592	34.68%
2015	0	8	891	2,809	31.72%
2016	77	18	950	3,033	31.32%
2017	33	33	950	3,468	27.39%
2018	22	24	948	3,566	26.58%

Appendix B: Variable definitions

Variables	Definitions
<i>DISCLOSE_DUMMY</i>	An indicator variable that equals 1 if the firm discloses customers' identities in the current year, and 0 if otherwise.
<i>DISCLOSE_RATIO</i>	The percentage of reported customers without identity information.
<i>SHORT</i>	An indicator variable that equals 1 if a firm is added to the short-sell list in year t , and 0 if otherwise.
<i>BIG4</i>	An indicator variable that equals 1 if audited by a Big 4 auditor and 0 if otherwise.
<i>BOARD</i>	Natural logarithm of the number of board members.
<i>BTM</i>	Calculated as the book value of equity scaled by the market value of equity.
<i>Customer Concentration</i>	The proportion of a firm's total sales that are to major customers.
<i>DETECT</i>	An indicator variable that equals 1 for the year when a firm is announced to have engaged in financial misconduct and 0 if otherwise.
<i>DISCLOSE_RATIO2</i>	A procurement-weighted version of <i>DISCLOSE_RATIO</i> , measured as follows: $DISCLOSE_RATIO2 = \frac{\sum \text{the procurement of reported customer with identity}}{\sum \text{the procurement of top 5 customers}}$
<i>Discretionary Revenues</i>	Discretionary revenues estimated using the Stubben (2010) model. Specifically, the estimation of a firm's discretionary revenues is the residual from the following equation: $\Delta AR_{it} = \alpha + \beta_1 \Delta R1_3_{it} + \beta_2 \Delta R4_{it} + \varepsilon_{it}$ which AR is the accounts receivable, R1_3 is revenues in the first three quarters, and R4 is revenues in the fourth quarter.
<i>DUAL</i>	An indicator variable that equals 1 if the board chair and CEO are the same person and 0 if otherwise.
<i>GROWTH</i>	The change in sells in the current year, scaled by sells in the previous year.
<i>HHI</i>	Industrial Herfindahl-Hirschman index based on sales.
<i>INDEPRATIO</i>	The percentage of independent directors on the board.
<i>LEV</i>	The ratio of total liabilities to total assets.
<i>Media Coverage</i>	The total number of a firm's financial news reports on the internet and in newspapers over a fiscal year.
<i>R&D</i>	R&D expenditures to sales; R&D equals 0 if the data are missing.
<i>R&D Dummy</i>	An indicator variable that equals 1 if the firm discloses R&D expenditures and 0 if otherwise.
<i>ROA</i>	The ratio of net profit to total assets.
<i>SEO</i>	An indicator variable for whether a firm has a seasoned equity offering in the following year.
<i>SHORT⁺¹</i>	An indicator variable that equals 1 for observations 1 years after a firm is added to the short-sale list and 0 if otherwise.

<i>SHORT⁺²</i>	An indicator variable that equals 1 for observations 2 years after a firm is added to the short-sale list and 0 if otherwise.
<i>SHORT⁺³</i>	An indicator variable that equals 1 for observations 3 years after a firm is added to the short-sale list and 0 if otherwise.
<i>SHORT⁰</i>	An indicator variable that equals 1 in the year a firm is added to the short-sale list and 0 if otherwise.
<i>SHORT⁻¹</i>	An indicator variable that equals 1 for observations 1 years before a firm is added to the short-sale list and 0 if otherwise.
<i>SHORT⁻²</i>	An indicator variable that equals 1 for observations 2 years before a firm is added to the short-sale list and 0 if otherwise.
<i>SHORT⁻³</i>	An indicator variable that equals 1 for observations 3 years before a firm is added to the short-sale list and 0 if otherwise.
<i>SHORT⁺⁴</i>	An indicator variable that equals 1 if a firm was added to the short-sale list at least four years ago and 0 if otherwise.
<i>SHORTSELL1</i>	The ratio of average daily short volume to total capitalization
<i>SHORTSELL2</i>	The ratio of the short balance to total capitalization in the year-end
<i>SIZE</i>	Natural logarithm of total assets.
<i>SOE</i>	An indicator variable that equals 1 if the ultimate owner of the firm is a government agency and 0 if otherwise.
<i>TOP1</i>	The percentage of shares held by the largest shareholder.
<i>VOLATILITY</i>	The standard deviation of daily abnormal returns over the next fiscal year and multiply by 100

Figure 1: Two potential effects that induce capital market costs when a firm discloses the identities of its major customers

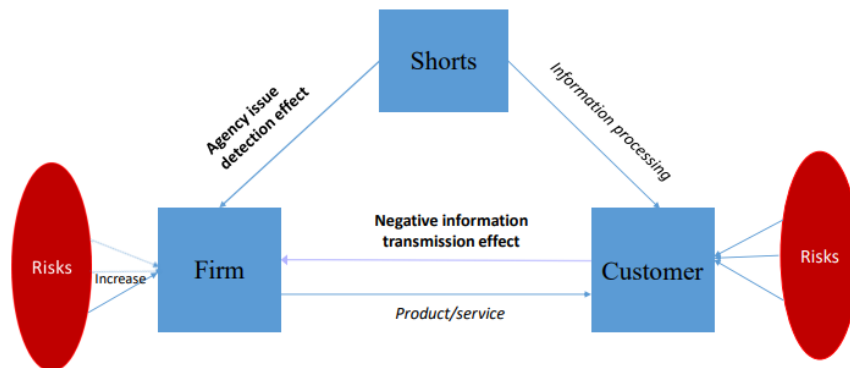


Figure 2: Plot of various coefficients in the parallel test

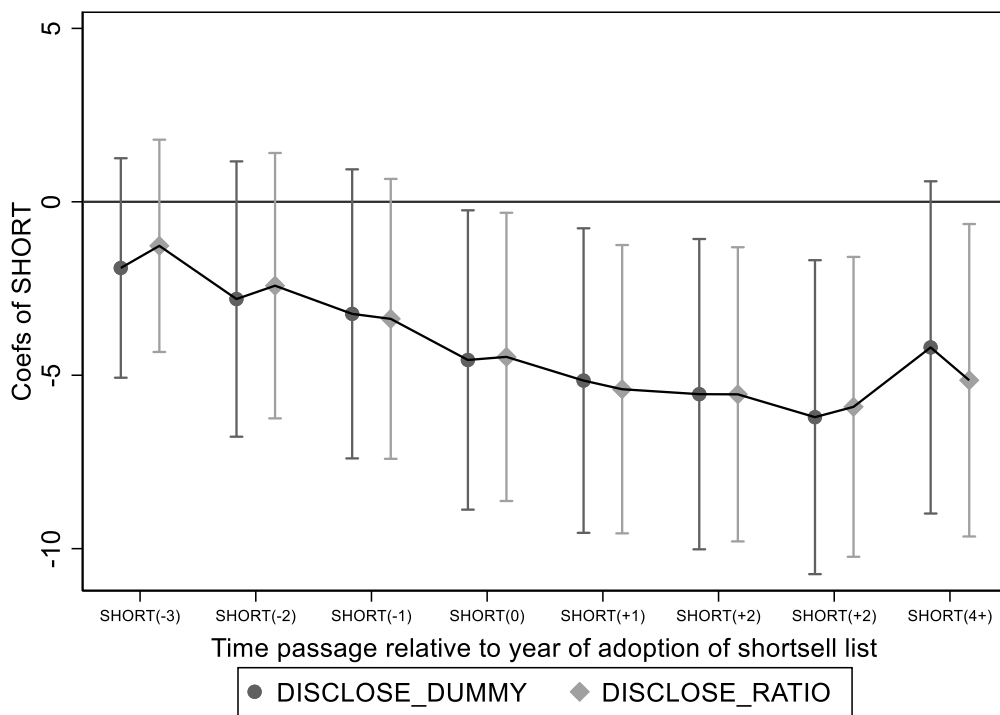


Figure 3: Capital market pressure and other potential factors on a firm's strategic disclosure of customers' identity

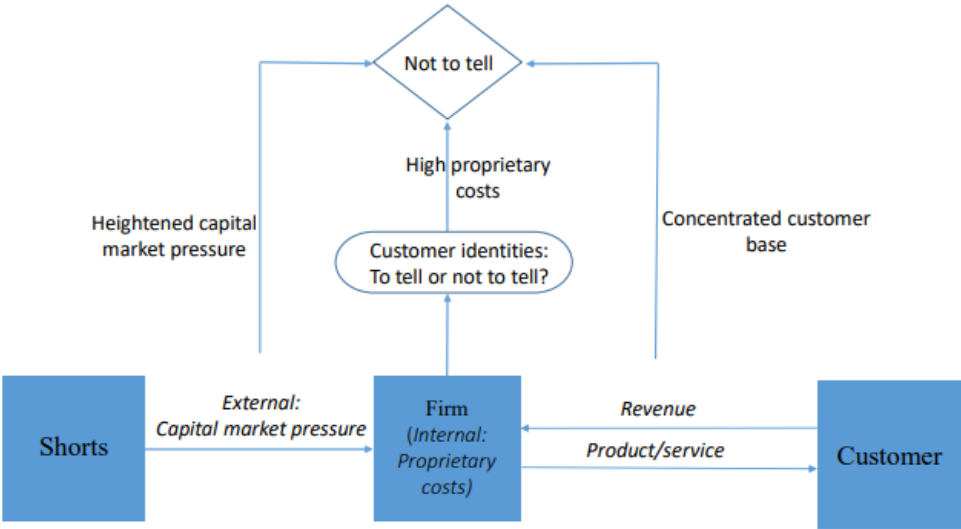
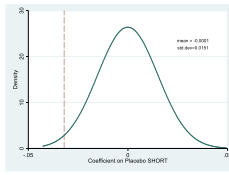
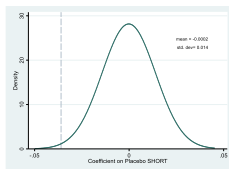


Figure 4: Distribution of short-selling effects in the Placebo test

Panel A: Coefficients Distribution of *Placebo SHORT* on *DISCLOSE_DUMMY*



Panel B: Coefficients distribution of *Placebo SHORT* on *DISCLOSE_RATIO*



The figure presents the distribution of the coefficient on *SHORT* from 1,000 bootstrap simulations of the regression in column 2 and column 4 of Table 2 using randomly selected treatment firms and shortable years. We re-estimate column 2 and column 4 of Table 2 and report the distribution of the coefficients on *Placebo SHORT*. The dashed line represents the actual estimate (-0.032 and -0.036) Table 2.

Table 1. Summary statistics

This table presents the summary statistics of the variables used for the main regressions. The sample period is from 2006 to 2018. The definitions of variables are provided in Appendix B. All continuous variables are winsorized at the 1st and 99th percentiles in each year.

Variables	Obs.	Mean	P25	Median	P75	Std. Dev.
<i>DISCLOSE_DUMMY</i>	18,286	0.306	0.000	0.000	1.000	0.461
<i>DISCLOSE_RATIO</i>	18,286	0.288	0.000	0.000	1.000	0.446
<i>SHORT</i>	18,286	0.227	0.000	0.000	0.000	0.419
<i>SIZE</i>	18,286	22.079	21.112	21.944	22.908	1.390
<i>LEV</i>	18,286	0.504	0.344	0.506	0.654	0.217
<i>ROA</i>	18,286	0.031	0.010	0.030	0.059	0.066
<i>BTM</i>	18,286	0.478	0.263	0.430	0.650	0.294
<i>GROWTH</i>	18,286	0.233	-0.034	0.106	0.275	0.753
<i>R&D</i>	18,286	1.659	0.000	0.162	2.806	2.687
<i>R&D dummy</i>	18,286	0.574	0.000	1.000	1.000	0.495
<i>SEO</i>	18,286	0.125	0.000	0.000	0.000	0.331
<i>TOP1</i>	18,286	0.350	0.228	0.328	0.457	0.152
<i>BOARD</i>	18,286	8.999	8.000	9.000	9.000	1.871
<i>INDEPRATIO</i>	18,286	0.368	0.333	0.333	0.400	0.052
<i>DUAL</i>	18,286	0.177	0.000	0.000	0.000	0.382
<i>BIG4</i>	18,286	0.066	0.000	0.000	0.000	0.249
<i>SOE</i>	18,286	0.558	0.000	1.000	1.000	0.497

Table 2. Short-selling pressure and customer identity disclosure

This table presents the results of the difference-in-differences test that examines the effect of the short sell deregulation on firms' strategies to disclose customers' identities. The dependent variable, *DISCLOSE_DUMMY*, is a dummy variable that equals 1 if the firm discloses the customers' identities in the current year, and 0 if otherwise. *DISCLOSE_DUMMY* is the percentage of reported customers without identity information. *SHORT* equals 1 if a firm is added to the short-sell list in year t , and 0 if otherwise. Other variables' definitions are provided in Appendix B. The sample period is from 2006 to 2018. All continuous variables are winsorized at the 1st and 99th percentiles. t -statistics are based on robust standard errors clustered by firm and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	<i>Dep Var. = DISLOSE_DUMMY</i>		<i>Dep Var. = DISLOSE_RATIO</i>	
	(1)	(2)	(3)	(4)
<i>SHORT</i>	-0.043*** (-2.785)	-0.032** (-2.051)	-0.045*** (-3.070)	-0.036** (-2.382)
<i>SIZE</i>		-0.033*** (-3.114)		-0.028*** (-2.769)
<i>LEV</i>		0.019 (0.481)		0.014 (0.368)
<i>ROA</i>		-0.024 (-0.362)		-0.029 (-0.457)
<i>BTM</i>		0.019 (0.821)		0.011 (0.495)
<i>GROWTH</i>		0.008* (1.792)		0.007* (1.698)
<i>R&D</i>		-0.001 (-0.333)		0.000 (0.181)
<i>R&D dummy</i>		-0.011 (-0.814)		-0.010 (-0.816)
<i>SEO</i>		0.012 (1.409)		0.012 (1.548)
<i>TOPI</i>		0.078 (1.178)		0.036 (0.567)
<i>BOARD</i>		0.031 (0.780)		0.019 (0.488)
<i>INDEPRATIO</i>		-0.093 (-0.819)		-0.107 (-0.968)
<i>BIG4</i>		-0.010 (-0.289)		-0.019 (-0.594)
<i>SOE</i>		-0.001 (-0.046)		-0.003 (-0.134)
Constant	0.316*** (89.998)	0.960*** (3.915)	0.299*** (89.098)	0.888*** (3.756)
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	18,286	18,286	18,286	18,286
Adjusted R-squared	0.450	0.451	0.460	0.460

Table 3. Parallel trends

This table presents the results of the parallel trends test. The dependent variable, *DISCLOSE_DUMMY*, is a dummy variable that equals 1 if a firm discloses its customers' identities in the current year, and 0 if otherwise. *DISCLOSE_RATIO* is the percentage of reported customers without identity information. *SHORT*⁻³ (*SHORT*⁻², *SHORT*⁻¹) equals one for observations 3 (2, 1) years before a firm is added to the short-sell list; *SHORT*⁰ equals one in the year a firm is added to the short-sell list; *SHORT*⁺¹ (*SHORT*⁺², *SHORT*⁺³) equals one for observations 1 (2, 3) years after a firm is added to the short-sell list; *SHORT*⁺⁴ equals one if a firm was added to the short-sale list at least four years ago. Other variables' definitions are provided in Appendix B. All continuous variables are winsorized at the 1st and 99th percentiles. *t*-statistics are based on robust standard errors clustered by firm and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	<i>Dep Var. = DISLOSE DUMMY</i>		<i>Dep Var. = DISLOSE RATIO</i>	
	(1)		(2)	
<i>SHORT</i> ⁻³	-0.019		-0.013	
	(-1.183)		(-0.814)	
<i>SHORT</i> ⁻²	-0.028		-0.024	
	(-1.385)		(-1.240)	
<i>SHORT</i> ⁻¹	-0.032		-0.034	
	(-1.521)		(-1.641)	
<i>SHORT</i> ⁰	-0.046**		-0.045**	
	(-2.073)		(-2.111)	
<i>SHORT</i> ⁺¹	-0.052**		-0.054**	
	(-2.303)		(-2.550)	
<i>SHORT</i> ⁺²	-0.055**		-0.056**	
	(-2.432)		(-2.567)	
<i>SHORT</i> ⁺³	-0.062***		-0.059***	
	(-2.691)		(-2.683)	
<i>SHORT</i> ⁺⁴	-0.042*		-0.051**	
	(-1.719)		(-2.241)	
Constant	0.918***		0.851***	
	(3.724)		(3.576)	
Control variables	YES		YES	
Firm FEs	YES		YES	
Industry-Year FEs	YES		YES	
Observations	18,286		18,286	
Adjusted R-squared	0.451		0.460	

Table 4. The influence of proprietary costs

This table presents the regression results between pilot firms with high and low proprietary costs. *SHORT* equals 1 if a firm is added to the short-sell list in year t , and 0 if otherwise. We classify pilot firms into the high (low) proprietary costs group if they have high (low) R&D expenditures or belong to an industry with a high (low) concentration based on the HHI. All continuous variables are winsorized at the 1st and 99th percentiles. t -statistics are based on robust standard errors clustered by the firm and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: High R&D vs. low R&D firms				
VARIABLES	<i>DISCLOSE_DUMMY</i>		<i>DISCLOSE_RATIO</i>	
	High-PC (1)	Low-PC (2)	High-PC (3)	Low-PC (4)
<i>SHORT</i>	-0.040** (-1.974)	-0.037* (-1.703)	-0.048** (-2.482)	-0.035* (-1.694)
<i>The p-value for diff. in coefficients</i>	0.397		0.126	
Control variables	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	14,346	13,738	14,346	13,738
Adjusted R-squared	0.448	0.452	0.454	0.463
Panel B: High industry concentration vs. low industry concentration firms				
VARIABLES	<i>DISCLOSE_DUMMY</i>		<i>DISCLOSE_RATIO</i>	
	High-PC (1)	Low-PC (2)	High-PC (3)	Low-PC (4)
<i>SHORT</i>	-0.046** (-2.072)	-0.027 (-1.301)	-0.044** (-2.072)	-0.035* (-1.752)
<i>The p-value for diff. in coefficients</i>	0.042		0.158	
Control variables	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	14,058	14,018	14,058	14,018
Adjusted R-squared	0.457	0.444	0.466	0.452

Table 5. Cross-sectional analysis

Panel A presents the results of the effect of customer base concentration. We measure *Customer Concentration* as the proportion of a firm's total sales that are to major customers. Major customers are the top five customers disclosed in a firm's annual report. A firm is classified as having high (low) customer concentration if a firm's *Customer Concentration* is above (below) the sample median each year. Panel B presents the results of the effect of discretionary revenue. We use the revenue model and estimate regression residuals to measure *Discretionary Revenues*. We then classify the firms into high (low) discretionary revenues groups according to whether the residual of the revenue model is above (below) the sample median in each year. Panel C presents the results of the effect of public scrutiny. We use *Media Coverage* to measure the public scrutiny confronted by a firm, which is calculated as the total number of financial news reports on the Internet and in newspapers. A firm is classified as subject to high (low) media coverage if a firm's *Media Coverage* is above (below) the sample median each year. Variable definitions are provided in Appendix B. All continuous variables are winsorized at the 1st and 99th percentiles. *t*-statistics are based on robust standard errors clustered by the firm and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: The effect of customer base concentration

VARIABLES	<i>DISLOSE DUMMY</i>		<i>DISLOSE RATIO</i>	
	High (1)	Low (2)	High (3)	Low (4)
<i>SHORT</i>	-0.043* (-1.673)	-0.012 (-0.530)	-0.050** (-1.995)	-0.012 (-0.573)
<i>The p-value for diff. in coefficients</i>	0.012		0.002	
Control variables	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	8,235	8,471	8,235	8,471
Adjusted R-squared	0.489	0.471	0.493	0.487

Panel B: The effect of discretionary revenues

VARIABLES	<i>DISLOSE DUMMY</i>		<i>DISLOSE RATIO</i>	
	High (1)	Low (2)	High (3)	Low (4)
<i>SHORT</i>	-0.044** (-2.141)	-0.013 (-0.633)	-0.042** (-2.138)	-0.021 (-1.087)
<i>The p-value for diff. in coefficients</i>	0.006		0.061	
Control variables	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	8,976	8,891	8,976	8,891
Adjusted R-squared	0.448	0.461	0.457	0.471

Panel C. The effect of public scrutiny

VARIABLES	<i>DISLOSE DUMMY</i>		<i>DISLOSE RATIO</i>	
	High (1)	Low (2)	High (3)	Low (4)
<i>SHORT</i>	-0.054** (-2.350)	0.003 (0.135)	-0.055** (-2.565)	-0.003 (-0.132)
<i>The p-value for diff. in coefficients</i>	0.000		0.000	
Control variables	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	8,905	9,072	8,905	9,072
Adjusted R-squared	0.455	0.469	0.471	0.474

Table 6. Robustness tests

Panel A presents the effect of short selling pressure on customers' identities disclosure using a propensity score matching (PSM) approach to generate 1:1 matched without replacement control samples of non-pilot stocks. We use logistic regression to predict the probability that a given firm will be added to the short-sell list each year after considering a series of control variables according to the CSRC's selection criteria, including the ratio of outstanding shares, leverage, firm age, return on total assets, stock turnover ratio, stock return volatility, board size, and state ownership status. For any pilot firm included in the short-sell list in 2010 (or 2011, 2013, 2014, 2016, 2017, and 2018), we choose a control firm from the non-pilot stocks with the closest propensity score, while imposing a caliper of 0.01 and common support. Panel B presents the effect of ex-post short selling trading activities on the disclosure of customers' identities. *SHORTSELL1* is defined as the ratio of average daily short volume to a firm's total capitalization and *SHORTSELL2* is the ratio of the short balance to the firm's total capitalization at year-end. Panel C presents the results of using an alternative measure of customer identity disclosure *DISCLOSE_RATIO2*, which is a procurement-weighted version of *DISCLOSE_RATIO*. Other variables' definitions are provided in Appendix B. All continuous variables are winsorized at the 1st and 99th percentiles. *t*-statistics are based on robust standard errors clustered by firm and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Propensity score matching approach

VARIABLES	<i>DISLOSE_DUMMY</i>		<i>DISLOSE_RATIO</i>	
	(1)	(2)	(3)	(4)
<i>SHORT</i>	-0.049*** (-2.588)	-0.044** (-2.335)	-0.047*** (-2.589)	-0.043** (-2.321)
Control variables	NO	YES	NO	YES
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	11,438	11,438	11,438	11,438
Adjusted R-squared	0.464	0.465	0.471	0.472

Panel B. The effects of ex-post short selling trading activities

VARIABLES	<i>Dep Var. = DISLOSE_DUMMY</i>		<i>Dep Var. = DISLOSE_RATIO</i>	
	(1)	(2)	(3)	(4)
<i>SHORTSELL1</i>	-1.903** (-2.563)		-1.647** (-2.320)	
<i>SHORTSELL2</i>		-1.528*** (-2.674)		-1.500*** (-2.769)
Control variables	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	18,286	18,286	18,286	18,286
Adjusted R-squared	0.451	0.451	0.460	0.460

Panel C. Other robustness tests

VARIABLES	<i>DISCLOSE_RATIO2</i>	<i>DISLOSE_DUMMY</i>	<i>DISLOSE_RATIO</i>
	(1)	(2)	(3)
<i>SHORT</i>	-0.032** (-2.133)	-0.027* (-1.907)	-0.031** (-2.281)
Control variables	YES	YES	YES
Firm FEs	YES	YES	YES
Industry-Year FEs	YES	YES	YES
Observations	18,286	19,609	19,609
Adjusted R-squared	0.457	0.451	0.461

Table 7. Additional tests on the benefit of reducing disclosure of customer information

This table presents the benefits of nondisclosure of customer identities after pilot firms are added to the short-sell list. Stock price volatility (*VOLATILITY*) is measured as the standard deviation of daily abnormal returns over the next fiscal year and multiply by 100. An indicator variable, *DETECT*, is used to predict the probability of fraud detection, and it equals 1 for the year when a firm is announced to have engaged in financial misconduct and 0 if otherwise. We then classified the pilot firms as disclosing (non-disclosing) short-sell firms if they do (do not) disclose customers' identities after being placed on the short-sell list. All continuous variables are winsorized at the 1st and 99th percentiles. *t*-statistics are based on robust standard errors clustered by the firm and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	<i>VOLATILITY</i>		<i>DETECT</i>	
	Disclosure (1)	Non-disclosure (2)	Disclosure (3)	Non-disclosure (4)
<i>SHORT</i>	-0.180*** (-8.387)	-0.217*** (-10.500)	-0.012 (-1.258)	-0.024*** (-2.846)
<i>The p-value for diff. in coefficients</i>		0.005		0.023
<i>SIZE</i>	-0.093*** (-7.700)	-0.098*** (-8.546)	-0.020*** (-2.850)	-0.012* (-1.893)
<i>LEV</i>	0.148*** (2.945)	0.099** (2.016)	0.118*** (4.509)	0.102*** (4.116)
<i>ROA</i>	-0.712*** (-6.879)	-0.767*** (-7.592)	-0.009 (-0.152)	-0.022 (-0.405)
<i>GROWTH</i>	0.016** (2.225)	0.015** (2.193)	0.001 (0.318)	-0.001 (-0.233)
<i>TURNOVER</i>	0.010** (2.208)	0.011** (2.471)	-0.001 (-0.299)	-0.003 (-1.405)
<i>TOPI</i>	0.083 (1.035)	0.134* (1.759)	-0.016 (-0.393)	-0.010 (-0.277)
<i>INDEPRATIO</i>	0.115 (0.871)	0.126 (1.053)	-0.030 (-0.395)	0.025 (0.366)
<i>BIG4</i>	-0.116** (-2.325)	-0.108** (-2.482)	-0.019 (-1.131)	-0.032 (-1.626)
<i>SOE</i>	-0.026 (-0.744)	0.005 (0.160)	-0.014 (-0.909)	-0.009 (-0.614)
<i>RET</i>	0.114*** (11.808)	0.113*** (12.031)		
<i>BTM</i>			0.027* (1.673)	0.020 (1.364)
<i>SDRETURN</i>			0.324 (0.615)	0.628 (1.236)
<i>HHI</i>			-0.103* (-1.939)	-0.104* (-1.833)
<i>BOARD</i>			-0.010 (-0.390)	0.004 (0.193)
<i>DUAL</i>			0.000 (0.055)	-0.007 (-0.854)
Constant	4.325*** (16.511)	4.405*** (17.973)	0.472*** (2.996)	0.260* (1.801)
Firm FEs	YES	YES	YES	YES
Industry-Year FEs	YES	YES	YES	YES
Observations	13,617	14,341	13,653	14,381
Adjusted R-squared	0.595	0.597	0.063	0.061