

Firm Boundaries and Voluntary Disclosure*

Thomas Bourveau[†] John D. Kepler[‡] Guoman She[§]

Lynn Linghuan Wang[¶]

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Abstract

We study how firm boundaries shape public disclosures. Theory suggests that firms can use public disclosure to credibly coordinate with supply chain partners, and predicts less public disclosure about future strategy when the firm is more vertically integrated. Using data on the degree of vertical integration within firms, we find that more vertically integrated firms reduce their public disclosure about their product strategy, and that the reduction is more pronounced for firms with supply chain relationships that are more reliant on public disclosure.

Keywords: Firm Boundaries; Vertical Integration; Product Disclosure; Coordination Role of Disclosure

JEL Classification: D83; G14; L14; M41

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[†]Columbia University, Graduate School of Business - tb2797@columbia.edu

[‡]Stanford University, Graduate School of Business - jdkepler@stanford.edu

[§]The University of Hong Kong - gshe@hku.hk

[¶]Bocconi University - lynn.wang@unibocconi.it

1 Introduction

We examine how firm boundaries shape public disclosures. A long line of literature examines the role of firms' voluntary disclosures in facilitating monitoring and valuation by capital providers.¹ Another extensive stream of literature considers how the costs arising from disclosing information publicly can benefit a firm's competitors, thereby motivating managers to withhold private information.² Yet, despite anecdotal and survey evidence on the benefits of private firms' public information for contracting purposes ([Arruñada, 2011](#)), combined with early evidence by [Bowen et al. \(1995\)](#) on the role of various stakeholders (including suppliers and customers) on firms' accounting choices, little is known empirically about the role of stakeholders other than investors and competitors in shaping firms' disclosures. In this paper, we focus on the demand for public disclosure from a different set of stakeholders, namely suppliers and customers, and specifically analyze how a firm's choice to operate as a vertically integrated organization versus the use of arms' length contracting with suppliers and customers affect its provision of voluntary public information.

Several theories in accounting and economics suggest that disclosure can serve a complementary role to contracting relationships by both adding credibility to privately communicated information and signaling to participants without a credible private communication channel. For example, [Ferreira and Rezende \(2007\)](#) models public disclosure about a firm's strategy as a commitment device for the firms' managers not to change their strategic directions which, in turn, induces a firm's partners to undertake investment related to the disclosing firm's strategy. Another recent study by [Breuer et al. \(2020\)](#) models firms' public disclosure as a function of the benefits derived by all of its stakeholders' individual disclosure demands. Consequently, the expansion of firm boundaries through vertical integration reduces the demand for public information arising from contracting suppliers and customers, thereby reducing the benefit of public disclosure.

¹See [Healy and Palepu \(2000\)](#) for a review.

²See [Hayes and Lundholm \(1996\)](#) for early evidence, along with other recent studies that draw similar inferences using different settings intended to establish a causal relation between proprietary costs and disclosure (e.g., [Glaeser, 2018](#); [Li et al., 2018](#); [Sran, 2021](#)).

Therefore, we predict that vertical integration leads to lower levels of public voluntary disclosure that would otherwise be useful for coordination with suppliers and customers.

The notion that firms have incentives to publicly disclose information to current and potential suppliers and customers is predicated on the notion that firms cannot perfectly and credibly exchange information privately with their suppliers and customers; otherwise public disclosure would be redundant and could not serve as a coordination mechanism (Gigler, 1994). Vertically integrated firms — in which firms conduct business activities within the confines of firm boundaries — render any benefits of providing disclosure to current and potential suppliers and customers for coordination purposes redundant.³ Moreover, prior literature emphasizes that vertical integration facilitates efficient transfers of intangible knowledge, such as intellectual property and R&D capital (e.g., Teece, 1982). While transacting parties can arguably exchange information through private channels, we argue that public information can facilitate communication for non-vertically integrated firms for at least two reasons. First, public disclosure may be the most efficient form of communication in the presence of a large number of current and potential suppliers and customers that all concern about the firm’s future business plans in order to meet their production needs (Crawford et al., 2020). Second, firms may prefer public disclosure as a communication channel due to the credibility that arises from the costs associated with untruthful disclosure (e.g., Skinner, 1997; Kogan et al., 2017).

We focus on firms’ voluntary disclosure about product strategy since such disclosure is particularly informative for contracting parties along the supply chain. In particular, in our context product strategy disclosure serves two main purposes. First, it can smooth the development of new production strategies. For example, a supplier that anticipates the production of a new product can engage earlier in the necessary investment to supply its existing client. Second, product disclosure also reflects a firm’s competitive advantage and production capacity. Thereby, it signals a firm’s ability to fulfill its implicit contractual claims.

³Many firms own links of production chain. In particular, instead of buying production inputs from spot market or via arm’s length contracts, firms frequently expand their boundaries by organizing transactions within the firm (vertical integration). A growing literature establishes that vertical integration promotes intra-firm information sharing (Brickley et al., 2012; Atalay et al., 2014).

Illustrating the role that public disclosure about firms’ overall product strategy can serve as a coordination device between firms and their suppliers and customers, the chief procurement officer at Mondi Group recently highlighted the role of transparency about ongoing innovation between her group and its suppliers to improve their own products, acknowledging that “supplier-enabled innovation means that you build working relationships with selected suppliers, with full transparency around areas of innovation where you match, so you can enhance innovation together.”⁴ As another example, [Entwistle \(1999\)](#) surveyed companies and analysts extensively about the purpose of R&D disclosure in the context of public firms in Canada, and finds that “the most common [purpose of R&D disclosure] being enhancing the firm’s credibility or reputation with outside parties”.

An increased reliance on vertical integration should reduce the need to provide public product strategy disclosures that facilitate coordination along the supply chain. To the extent that firms use disclosure to coordinate along the supply chain, we expect that increases in the degree of vertical integration leads to a reduction in the coordination benefits of product-related disclosures. To study how such firm boundaries shape public disclosure decisions, we primarily use data on firms’ degree of vertical integration as a research setting in which firms have a reduced need to communicate with current and potential supply chain partners publicly. We collect information about the degree of firms’ vertical integration using the measure developed by [Fresard et al. \(2020\)](#).

In our first test, we examine whether vertical integration shapes the *demand* for firms’ public disclosure. Using the methodology developed by [Bernard et al. \(2020\)](#), we measure the public information about a firm that is acquired by its suppliers and customers. In particular, we obtain information on public firms’ main suppliers and customers through FactSet Revere Database, and use the SEC EDGAR Log File Data Set to measure the frequency a firm’s SEC filings are downloaded by its suppliers and customers in a given year. Using a sample of 28,792 observations over the 2003-2016 time period, we find a negative association between a firm’s degree of vertical integration and the download activity of its SEC filings by its main suppliers and customers. This

⁴The complete interview is available [here](#).

association is consistent with our prediction that more vertical integration reduces the demand for public disclosure from suppliers and customers.

In our remaining tests, we examine whether vertical integration affects the *supply* of public information. To do so, we rely on two distinct measures of product disclosures. First, we follow [Merkley \(2014\)](#) and count the number of keywords and sentences dedicated to product a firm refers in the MD&A section of a firm’s annual report. Second, we complement this measure with the RavenPack dataset and count the number of product-related press releases issued by the firm during the year. Using a sample of 62,231 (38,636) firm-year observations over the 1997-2017 (2003-2017) period for our MD&A (press release) measures, we find that vertical integration is negatively correlated with product disclosure across a wide range of fixed effect structures that control for unobserved heterogeneity across firms and industries over time (e.g., specifications including firm and industry-year fixed effects, respectively). These results are consistent with our prediction that vertical integration reduces the need for coordination between a firm and its strategic partners through public disclosure.

To better attribute the decrease in disclosure for vertically integrated firms to a reduction in the usefulness of disclosure in coordinating with supply chain partners, we perform two distinct sets of cross-sectional tests. First, we examine whether the reduction in disclosure following an increase in vertical integration depends on the credibility of firms’ public disclosures, proxied by whether the firm has recently: (i) restated its financial statements due to an intentional misstatement, or (ii) undergone an SEC investigation. Using each of these measures, we find consistent evidence that the reduction in product disclosure is less pronounced for vertically integrated firms with less credible public disclosures.

Second, we examine whether the reduction in disclosure depends on the the following two measures of reduced credibility of firms’ private communication, in which cases we expect firms to be more reliant on public disclosure to coordinate with customers and suppliers: (i) young firms, as older firms tend to have more reliable reputations that alleviate the concern of *ex post* misappropriation in repeated supply chain interactions

(Banerjee and Dufflo, 2000), and (ii) shorter supply chain relationships. Using each of these measures of the credibility of private communication, we find evidence of a greater reduction in product disclosure when vertically integrated firms' private communication with suppliers and customers is less credible.

Our results consistently indicate that vertical integration is associated with less voluntary product disclosure, and that this effect is stronger when the credibility of firms' public disclosure is higher and the credibility of firms' private disclosure is lower. A natural concern is that our results reflect a change in other (e.g., capital-market) disclosure incentives rather than a change in the demand for public information by supply chain partners. To rule out this concern, we examine the relation between firms' vertical integration and its financing needs. In untabulated analyses, we find that vertical integration is positively associated with current and subsequent equity issuance. Given the positive capital market consequences of firms' voluntary disclosure (Leuz and Verrecchia, 2000; Leuz and Schrand, 2009), a higher reliance on equity markets should lead to an increase in the provision of voluntary disclosure, and is inconsistent with capital market considerations driving our results.

Another concern with our tests is that trends in other factors (other than capital-market incentives) may simultaneously drive firms' decisions to vertically integrate and change their product disclosures. To account for this empirical challenge, we perform two sets of additional tests. We first provide evidence that this does not seem to be the case by showing that the reduction in disclosure immediately coincides with large increases of vertical integration compared to a matched sample of economically similar but non-vertically integrated firms. Second, we use a series of regulatory interventions that generate plausibly exogenous variation in the costs to contracting with suppliers to examine the relation between vertical integration and product disclosure. Given that firms rely more on vertical integration in the absence of contract enforcement mechanisms (Williamson, 1971; Klein et al., 1978), we exploit cross-country legal reforms that facilitate contract enforcement mechanisms and reduce the expected costs of partnering with arms' length suppliers (e.g., Chemin, 2020). When foreign countries that firms with economic

ties to adopt such reforms, U.S firms have incentives to outsource to suppliers rather than rely solely on vertical integration, and this variation should be largely exogenous to the economic conditions surrounding U.S. firms. We find that firms' exposure to foreign contract enforcement reforms leads to less vertical integration and subsequently leads to persistent increases in firms' product disclosure, consistent with affected firms sharing more public information about their strategic decision to coordinate with these foreign suppliers following a reduction in vertical integration.

This paper contributes to the literature on how industrial organization shapes firms' disclosure decisions.⁵ Recent studies in this stream of literature have developed empirical strategies that help establish a causal link between firms' proprietary costs and disclosure choices (Glaeser, 2018; Li et al., 2018). Other studies show that competitions from incumbents versus potential entrants have different implications for firms' voluntary disclosure (Huang et al., 2017; Burks et al., 2018). An emerging set of studies draws more prominently from the industrial organization literature in how inter-firm contracts appear to be a first-order consideration in firms' disclosure decisions beyond the traditional proprietary costs channel. These studies identify how voluntary disclosure can bring credibility to capacity expansion plans (Bloomfield and Tuijn, 2019) or contribute to tacit collusion arrangements (Bourveau et al., 2020; Bertomeu et al., 2021). The closest study to ours in this nascent literature is perhaps the recent paper by Kepler (2021), which shows that changes in firms' horizontal structure (through strategic alliances) reduced the need for coordination between firms through public disclosure. Our study contributes to this recent literature by suggesting that expanding firm boundaries through vertical integration reduces the need for coordination with supply chain partners through public disclosure.

While the vast majority of the empirical disclosure literature focuses on capital providers or competitors as the primary recipients of public disclosures, our results shed light on a novel, albeit important stakeholder that public disclosures are also useful to — namely current and potential suppliers who wish to better understand the details of firms' future

⁵This literature is reviewed in details in Beyer et al. (2010). Most studies in this literature examine how firms' disclosure choices are related to measures of industry concentration (e.g., Li, 2010; Ali et al., 2014).

production and technological capacities. Our results complement recent studies that focus on voluntary public disclosure by private firms. While private firms' concentrated ownership structure leads to limited capital-market benefits from providing public disclosures, several recent studies document a positive relation between the number of transaction stakeholders and firms' overall voluntary disclosure provision (Muhn and Gassen, 2018; Breuer et al., 2020). By focusing on U.S. public firms with a relatively richer information environment, we are able to link disclosure specifically relevant to contracts between firms and their customers and suppliers, and document that a reduction in the number of contracting parties along the supply chain is associated with a decrease in the provision of voluntary disclosure that can facilitate coordination in supply chain relationships.

This paper proceeds as follows. Section 2 provides our conceptual underpinnings. Section 3 describes our sample and measurement. Section 4 describes our primary research designs and findings. Section 5 describes our supplemental research designs and findings and considers potential alternative explanations that we address. Section 6 provides concluding remarks.

2 Conceptual Underpinnings

Information sharing between suppliers and customers is critical to supply chain collaboration due to the information asymmetry inherent in supply chain relationships (Baiman and Rajan, 2002). For example, customer firms directly interact with end users and thus possess more precise information about market demand. In addition, imperfect observation about a contracting partner's behavior increases concern of renegeing (Holmström, 1979). Therefore, information sharing is important in the process of supply chain collaboration for inter-firm communication and monitoring purposes (Cachon and Fisher, 2000; Gavirneni et al., 1999; Lee et al., 2000).

Public disclosure can serve as an information sharing mechanism to contracting relationships along the firm's supply chain. While supply chain partners can arguably communicate with partners through private channels, public disclosure may still be incre-

mentally useful for several reasons. First, information conveyed through public channels might be more credible than private statements as management of listed company is often subject to litigation and reputation considerations when making public disclosures (e.g., [Skinner, 1994, 1997](#); [Kogan et al., 2017](#)).⁶ Second, public disclosure is more cost-effective in the presence of a large number of current and potential supply chain partners that all concern about the firm’s future business plans in order to meet their production needs ([Dedman and Lennox, 2009](#); [Crawford et al., 2020](#)).

Two recent studies provide a general theoretical framework highlighting the potential coordination role of public disclosure.⁷ [Ferreira and Rezende \(2007\)](#) assume that information about managers’ intended future investment and strategic choices is “soft” (i.e., not perfectly credible), and public disclosure increases the credibility of the information about corporate strategy, which in turn encourages contractual partners to engage in relationship-specific investments. Another recent study by [Breuer et al. \(2020\)](#) models firms’ public disclosure and derives the benefits of public disclosure from stakeholders’ (including suppliers and customers) individual disclosure demands. Consistent with the impact of customer-supplier relationships on corporate accounting practices, [Hui et al. \(2012\)](#) find that firms demand more conservative accounting from suppliers and customers to reduce information asymmetry about losses, and [Raman and Shahrur \(2008\)](#) and [Dou et al. \(2013\)](#) show that relationship-specific investment affects the attributes of financial reporting, implying that public financial disclosure serves as an important communication device between supply chain partners.

We predict that the expansion of firm boundaries through vertical integration reduces the demand for certain kinds of public information from contracting suppliers and customers, thereby reducing the marginal benefit of public disclosure. Put differently,

⁶Notably, private and public disclosures might work in tandem. For instance, public disclosure can serve as a certification of the credibility of information conveyed through private channels.

⁷Other theoretical studies in accounting examine the incentives to voluntarily disclose information in the context of client-supplier relationships (e.g., [Arya and Mittendorf, 2013](#); [Arya et al., 2014, 2015, 2019](#)). While several results from these studies lead to predictions that voluntary disclosure helps improve economic efficiency, these studies typically model disclosure about the demand for inputs and rest on specific assumptions about the demand function for inputs by customers. Such assumptions are difficult to identify for large public firms and we leave it to future research to test these predictions. Instead, we focus on a more general prediction that public disclosure benefits to partners along the supply chain.

integrated firms are expected to substitute public disclosure with intra-firm exchange of information that would be otherwise useful for coordination with suppliers and customers.

To test our predictions, we focus on disclosure about product-related strategies, which is an important type of information that can be used in supply chain contracting, as such the information smooths the supply chain collaboration around different stages of product development, including the planning, research, design, development, manufacturing and commercialization of products. Theories of the firm emphasize that vertical integration facilitates efficient transfers of intangible knowledge inputs including research and development of products (Arrow, 1975; Riordan and Sappington, 1987).⁸ Specifically, product information serves two roles in the process of supply chain coordination. On the one hand, exchange of product information smooths the development of product strategies and the creation of production synergies, for example, by allowing a supplier to engage earlier in the necessary investment in anticipation of its clients' product announcement (Cachon and Fisher, 2000; Gavirneni et al., 1999; Lee et al., 2000). On the other hand, product achievement is a key factor driving a firm's competitive advantage and production capacity (Chaney et al., 1991; Calantone and Schatzel, 2000); product disclosure thus signals a firm's ability to fulfill its contractual claims.⁹

Based on these arguments, we posit that an increased reliance on vertical integration should reduce the need to provide public product disclosures to coordinate with supply chain partners as they can rest on more efficient intra-firm communication. Therefore, we expect firms to reduce public product disclosure following the expansion of firm boundaries through vertical integration.

⁸The increased efficiency of information sharing could be due to the change of organizational and institutional interfaces for the execution of intrafirm information transfer (Teece, 1982), the reduction in the concern of strategic use of information by otherwise independent partners (e.g., to bargain for favorable contract terms (Crocker, 1983; Li, 2002; Zhang, 2009)), and the concern of leaking proprietary information by otherwise independent partners (Demski et al., 1999; Baccara, 2007).

⁹Indeed, Monteverde (1995) and Atalay et al. (2014) provide large sample evidence that the efficiency of intangible knowledge exchange is a key factor explaining supply chain structure.

3 Sample, Data, and Variables

3.1 Sample

Our sample begins with all nonfinancial firms covered by Compustat database from 1997 to 2017. The sample period spans from 1997 to 2017 due to the availability of the measure of vertical integration provided by [Fresard et al. \(2020\)](#). We next gather information about firms' disclosure from annual reports and RavenPack database. Finally, we obtain financial information from Compustat database, stock return information from CRSP database, institutional ownership from Thomson Reuters, and analyst forecast from I/B/E/S. Our full sample consists of 62,231 firm-years covering 8,216 unique firms after requiring the availability of all control variables used in the baseline regression specification and the availability of MD&A sections of annual reports for textual analyses.

3.2 Measure of Vertical Integration

We measure the degree of a firm's vertical integration using the vertical integration score recently developed by [Fresard et al. \(2020\)](#). This vertical integration score (VI) reflects the degree to which a firm's products spans vertically-related markets. It is constructed by linking product vocabularies from the Bureau of Economic Analysis (BEA) Input-Output (IO) tables to firms' product descriptions in annual reports filed with the Securities and Exchange Commission (SEC). Because annual reports are updated annually, the score varies across years. The measure is constructed using the following three-step procedure.

First, The BEA IO tables detail the value of 'commodity' outputs (any good or service) produced and used by each industry, which allows the computation of the extent to which a given commodity is vertically linked (upstream or downstream) to another commodity. The vertical relatedness between each commodities pair is captured by a matrix V , with dimension $C \times C$ (C is the number of commodities). Element $V_{c,d}$ is bounded between 0 and 1, with a larger value indicating a stronger vertical relationship between commodities c and d .

Next, each firm-year on Compustat database is linked to BEA IO commodities by

computing the similarity between the given firm’s business description and the textual description of each BEA commodity. This procedure generates a vector with dimension C , indicating which IO commodities a given firm’s products are most similar to. An entry B_c (column c) is the cosine similarity of the text in the given IO commodity c and that in the firm’s business description. To illustrate, a firm manufacturing photocopying equipment will display a large similarity with the the ‘photographic and photocopying equipment’ commodity (say c), so that the element B_c will be large.

Finally, the degree of vertical integration (VI) is computed as $B \times V \times B'$. As such, VI indicates the potential of the given firm’s products to be vertically related to the other products sold by the same firm. Intuitively, a firm displays a higher degree of vertical integration (VI) when its product vocabulary spans vertically-related markets. Indeed, [Fresard et al. \(2020\)](#) finds that a firm’s VI is positively correlated with the firm’s mentioning of “vertical integration” in annual reports, and it increases significantly following the acquisition of vertically related firms.

Compared to other proxies such as whether a firm engages in a vertical M&A, the vertical integration score VI is particularly advantageous for two main reasons. First, a firm can integrate its supply chain through various mechanisms. For example, in addition to vertical M&A, firms may purchase product lines of upstream firms or directly invest in upstream manufacturing plants, which are often unobservable to researchers. Relying on a single type of events will not fully reflect the degree of integration of firms’ business. Second, VI is a continuous measure with meaningful cross-firm and within-firm variations. Compared to a discrete measure such as whether a firm has two segments that are vertically related, VI allows us to track the evolution of firms’ boundaries over time and relate it to the variation of firms’ product disclosure choices.

3.3 Measures of Product Disclosure

3.3.1 MD&A Product Disclosure

Annual reports constitute an important outlay where managers communicate with various stakeholders (e.g., [Brown and Tucker, 2011](#); [Lehavy et al., 2011](#)). Annual reports typically

contain discussions over firms’ strategies such as product and technology development (Entwistle, 1999; Merkley, 2014; James and Shaver, 2016).

We start with 99,767 annual reports from fiscal year 1997 to 2017. We count the number of sentences a firm refer to product-related keywords (product-related sentence) in the Management Discussion and Analysis (MD&A) section of its annual reports. Our list of product-related keywords is borrowed from Merkley (2014). Although Merkley (2014) label his keywords as “R&D disclosure,” the list indeed reflects different stages of production activities, including the research in production, clinical trails, product development and product commercialization, and thereby is suitable to study firms’ product disclosure (Cao et al., 2018). To control for the length of the MD&A section that is highly correlated with firm size and complexity, we scale the number of product-related sentences by the total number of sentences of the MD&A sections (*MD&A ProductDisc*). We exclude MD&A sections with less than 250 words from our tests, resulting in 62,231 annual reports with available variables used in our analyses.

3.3.2 Press Release (PR) Product Disclosure

We obtain data on firm-initiated press releases from RavenPack, which has been widely used in accounting studies (e.g., Drake et al., 2014; Kim et al., 2020; Bushee et al., 2020). We follow prior studies (e.g., Chapman (2018), Seo (2021)) and use the PR Edition database to collect firm-initiated press releases issued on the four main newswires (i.e., PRNewswire, BusinessWire, MarketWire, and Globe Newswire), requiring a relevance score of 100, a global event novelty score of 100, and a news type of “press release.” Ravenpack classifies press releases into a set of predefined event categories. To identify product-related disclosure, we start with all press-releases under the collection (RavenPack GROUP) “products-services,” which consists of 29 classes of events (RavenPack TYPE). We remove four classes of events that are unlikely to be relevant to product strategy — namely “business combination,” “award,” “government-contract,” and “business-contract”.

Appendix II lists the classes of events that we focus on in our paper, including clinical

trials, product releases, product warnings, supply guidance, and market entry, etc. We define *PR ProductDisc* as the natural logarithm of one plus the number of press releases initiated by firms in 12 months following the fiscal period end. As the data is available since 2004, we restrict our sample for the press-release analyses to the 2003-2017 period. We also exclude firms that are not covered by the RavenPack to reduce measurement error. Collectively, these procedures result in a sample of 38,636 firm-year observations.

3.4 Control Variables

We control for a set of covariates that are fundamentally related to firms' disclosure policies following prior studies (e.g., [Merkley, 2014](#)). First, to control for firms' information environment that shapes the demand for firm disclosure, we include the number of analysts following the firm (*Analyst Following*) and the percentage of institutional ownership (*InstOwn*). Second, we control for information uncertainty as proxied by the standard deviation of daily stock returns during the year (*Return Volatility*) and that of operational cash flows during the past 20 quarters (*CFO Volatility*). We do so because external parties might have greater demand for disclosure in the presence of greater information uncertainty. Next, we include returns on asset (*ROA*), leverage ratio (*Leverage*), market-to-book ratio (*MTB*), and the fraction of tangible assets (*Tangibility*) to control for firm fundamental performance, reliance on debts, growth opportunity, and investment mix. Finally, we include RD intensity (*R&D Intensity*) and output ($\ln(1+\#Patents)$) to control for changes in production and technological activities that might drive product disclosure. Appendix I provides detailed information about variable definition.

3.5 Descriptive Statistics

Table 1 displays the descriptive statistics of the main variables used in our analysis. We winsorize all continuous variables at the top and bottom 1% of the distribution. The mean value of *MD&A ProductDisc* is 0.019 and the total number of sentence in MD&A is 321 (untabulated), which implies that the average firm discloses 6.10 product-related sentences in the MD&A section. Firms on average initiate 1.4 product-related press

releases each year. VI has a mean value of 0.011 and standard deviation of 0.011, which represents a sizable variation in the degree of vertical integration. Consistent with prior literature, statistics in Table 1 indicate that the average firm size in our sample is about \$402 million ($\approx e^{5.996}$). The average ROA, leverage, and market-to-book ratio are -0.037, 0.222, and 1.853, respectively. Finally, the sample firms have an average of 3.49 analysts following and consist of 50.9% of institutional ownership.

4 Research Design and Results

4.1 Demand of Public Information

Before investigating the impact of vertical integration on the *supply* of voluntary disclosure, we first verify the premise that supply chain partners of non-vertically integrated firms do use public disclosure for coordination purpose, whereas vertical integration reduces the demand for public disclosure. Put it differently, compared with vertically integrated firms, non-integrated firms' public disclosures are expected to be used more frequently by their supply chain partners. We use the SEC EDGAR Log File Data Set, which provides information on the searches of a firm's public SEC filing, to track the acquisition of public information by supply chain partners. We define *PubInfo Acq*, the information acquired by suppliers and customers, as the natural logarithm of one plus the frequency of a firm's SEC filings being downloaded by its suppliers and customers in a year.¹⁰ The SEC EDGAR Log File Data Set is available from 2003 to June 30, 2017, we thus restrict the sample to 2003-2016. The final sample consists of 28,792 firm-years.

We regress *PubInfo Acq* on VI to study the association between the degree of vertical integration and the acquisition of public information by supply chain partners. Table 2 shows the results. In column (1), we include year fixed effects and the control variables as described in section 3.4. We find a negative cross-sectional correlation between VI and *PubInfo Acq*, suggesting that independent supply chain partners have greater demand for

¹⁰We thank Terrence Blackburne for sharing the data on the annual search of SEC filings between Compustat firms. We identify suppliers and customers of a firm using both FactSet Revere database and Compustat Segment database, and exclude firms that are not covered by these databases.

public information. Column (2) further includes firm fixed effects and shows that VI is negative and significant at the 5% level, suggesting that supply chain partners increase the demand for a firm’s public disclosure when the firm becomes less integrated. These results together validate the premise that supply chain partners use public information to facilitate coordination.

4.2 Baseline Results

To assess the correlation between the degree of firms’ vertical integration and product disclosure, we estimate the following regression:

$$Disclosure_{i,t+1} = \beta_0 VI_{i,t} + \beta_1 X_{i,t-1} + \tau_t + v_i + \epsilon_{i,t}, \quad (1)$$

where i and t index firm and year, respectively. The key independent variable of our interest, $VI_{i,t}$, is the degree of firm i ’s vertical integration in fiscal year t . The dependent variable, $Disclosure_{i,t+1}$ refers to our two measures of firm i ’s product disclosure choice. The MD&A-based product disclosure (*MD&A ProductDisc*) is measured using the annual report of fiscal year t , which is often disclosed to the public three or four months after the fiscal year end. The press release-based product disclosure (*PR ProductDisc*) is measured using a one-year window following the fiscal year end. We include year fixed effects (τ_t) to rule out macro-level factors related to corporate disclosure policies, and firm fixed effects (v_i) to control for time-invariant firm characteristics. Since the measure of vertical integration is constructed at the firm level, we cluster standard errors at the firm level.

We examine the effect of vertical integration on firms’ product disclosure choices. Panel A of Table 3 shows the results using our MD&A-based product disclosure measure. Column (1) includes only year fixed effects to exploit the cross-sectional correlation between vertical integration and MD&A product disclosure. As predicted, VI is negatively associated with *MD&A ProductDisc* and is significant at the 1% level, suggesting that more integrated firms provide less public discussion about products. Column (2) further includes firm fixed effects to control for time-invariant firm characteristics. VI continues to load significantly positive at the 1% level, suggesting that firms reduce their disclo-

sure about product strategies following an increase in the degree of vertical integration. Economically, the estimation shows that a one standard deviation increase in vertical integration score reduces product disclosure by 4% relative to the within-firm variation. In column (3), we further include firm characteristics and R&D intensity and outputs to control for firms' adjustment of technological and production activities. Both the precision and the magnitude of the effect are similar to that of column (2). It is worth to point that, as expected, we find a positive correlation between product disclosure and both R&D expenses and the number of patents. This indicates that, on average, managers tend to provide more product disclosure when they have more intensive product research and development activities.

One concern is that our results could be driven by common industry shocks that simultaneously alter both the optimal level of vertical integration and disclosure. For example, a technological shock in an industry might, on the one hand, increase the demand for integration to coordinate productions while on the other hand, increases the costs of leaking know-hows to rivals. To account for such potential time-varying industry confounding events, we replace our year fixed effects with industry-year fixed effects in our model. The results of this specification are reported in column (4). The coefficient on VI remains negative and statistically significant.

Next, we acknowledge that a firm's scale likely grows with the degree of vertical integration. We thus include year times terciles of firm size fixed effects or year times age fixed effects to ensure that the estimates are not driven by heterogeneous trends among large firms (Barrot and Sauvagnat, 2016). Results reported in columns (5) and (6) indicate that our coefficient of interest remains negative and statistically significant. Similarly, in column (7) we include year times terciles of profitability fixed effects to control for heterogeneous trends among profitable firms, for example, the time-varying exposure to investigations by antitrust regulators that could drive both vertical integration and disclosure choices. Overall, the results in Panel A Table 4 are robust to the inclusion of stringent fixed effects, suggesting that all these alternative explanations are unlikely to explain our documented association.

In Panel B of Table 3, we estimate and tabulate the same specifications as in Panel A but replace our dependent variable with *PR ProductDisc*, our second product voluntary disclosure measure.¹¹ Consistent with our findings from Panel A, we document a negative and statistically significant association between *VI* and *PR ProductDisc* across all specifications with varying sets of covariates and fixed effects. Overall, the results in Table 3 indicate that a reduction in the number of contracting stakeholders (suppliers and customers) through vertical integration is associated with a decrease in product-related voluntary disclosure.

4.3 Cross-sectional Analysis

4.3.1 Credibility of Public Disclosure

In our next set of tests, we focus on how the reduced coordination role of product disclosures in vertically integrated firms is moderated by the credibility of the firm’s existing public disclosures. The intuition for these tests is that public disclosure is less likely to facilitate coordination with a firm’s suppliers and customers when the existing public disclosure is less credible. Therefore, we expect the reduction in voluntary disclosure to be less pronounced for firms with less credible public disclosures. To test this prediction, we re-estimate Specification (1) after interacting *VI* with measures of the credibility of public disclosure.

We measure the credibility of public disclosure using two variables that capture the lower credibility of a firm’s public disclosures, and expect a less negative association between vertical integration and public product disclosure. First, prior literature suggests that public financial reports that are subsequently restated tend to be less reliable (e.g., [Armstrong et al., 2019](#)), thus we use financial restatements as our first measure of the credibility of public disclosure. Second, firms under investigation by the SEC are under suspicious of violating securities regulation and therefore less likely to provide credible public disclosures (e.g., [Blackburne and Quinn, 2020](#); [Blackburne et al., 2021](#)). These observations suggests that firms with misstated financial reports and/or SEC investigations

¹¹All of our findings are robust using the product disclosure in earnings calls as the dependent variables.

are less likely to be able to successfully use their public disclosures to credibly coordinate with supply chain partners.

Table 4 presents results. For parsimony we do not report coefficients on control variables. Columns (1) and (3) report the results using *Restatement*, a binary variable indicating the announcement of financial restatements in the preceding three years, to proxy for low credibility. We find that $Restatement \times VI$ is positively significant, suggesting that the relation between vertical integration and public product disclosure is less pronounced for firms with less credible financial reports. Results are similar when we further consider SEC investigation as an additional proxy of low credibility in columns (2) and (4). Overall, these findings are consistent with a smaller reduction in the coordination benefits of disclosure for firms with less credible public disclosures.

4.3.2 Reliance on Public Disclosure

Our second set of cross-sectional tests examine firms' reliance on public disclosure to coordinate supply chain. If the observed negative correlation between disclosure and the degree of vertical integration is due to the switch from public disclosure to private communication following vertical integration, then we should expect the result to concentrate on firms which rest on public disclosure in the absence of vertical integration. We hypothesize that non-integrated firms tend to rely more on public disclosure when the information conveyed through private channels is less truthful.

Our first proxy of the credibility of information conveyed through private channels explores the variation of firm ages. [Banerjee and Duflo \(2000\)](#) argue that firm age is a source of reputation that alleviates the concern of cheating. In particular, assume that there is a possibility that the public become informed about firms' unreliable behavior over time. Guilty firms are likely to exit the market since no one will contract with them once the information is revealed. Therefore, an older firm is more reliable given it has been in the industry for a long time without any black marks against it. We thus posit that younger firms are more likely to use public disclosure as a communication device to enhance the credibility of the information ([Skinner, 1994, 1997](#); [Kothari et al., 2009](#)), so

the documented effect should be stronger among younger firms. We construct a binary variable, *Young Firm*, to indicate firms whose age is smaller than the yearly median, and interact it with *VI*. Results in columns (1) and (3) of Table 5 show that the effect is more pronounced for young firms.

The second proxy explores the duration between the firm and its supply chain partners. We posit that a long-term relationship between a firm and its counterparts fosters trust that reduces the concerns of counterpart renege (Banerjee and Duflo, 2000; McMillan and Woodruff, 1999). Based on the customer-supplier relationship database provided by Compusat Segment database, for each firm-year we compute the weight-average of the duration between a firm and its current supply chain counterparts in the year. The weight is set to the transaction volume between a firm and its counterparts. We develop a binary variable, *Short Duration*, that equals one if the weight-average duration of supply chain relationship is smaller than the sample median. Columns (2) and (4) of Table 5 show that $Short\ Duration \times VI$ is significantly negative, suggesting that the effect concentrates on short-term relationships where public disclosure is likely to be used as a communication outlay by non-integrated firms.

5 Alternative Research Designs and Additional Analyses

In this section, we conduct two sets of additional analyses to support our inferences. We first conduct a matched sample analysis that compares a sample of firms with large increases in *VI* to a sample of otherwise similar firms, and also examine a natural experiment that provides arguably exogenous variation in vertical integration.

5.1 Propensity Score Matching

To construct our matched sample, we first identify firms with large increases in vertical integration (*VI*) as our treatment group (e.g., Armstrong et al., 2019; Kepler, 2021). Specifically, we compute the annual growth in *VI* score and sort firm-years with positive

growth into quintiles. We define firm-years in the top quintile as treatment events with large increase in *VI*. To ensure the large increase is not temporary or due to measurement errors, we exclude events where the *VI* score reverses to the original level in the subsequent three years. Next, we select control group firms whose maximum annual growth in *VI* is lower than sample median. Then, we regress a binary variable indicating treatment events of large increase in *VI* on the list of control variables. For each treated firm, we select a control firm based on the same year, same SIC industry, and closest propensity score. We require the difference in the Logit of p-score to be within 0.2 of the standard deviation. The final matched sample consists of 33,199 firm-year observations for the MD&A analyses and 22,340 for the press release analyses. We define *Post Large Increase in VI* as a binary variable that equals one for treated firms following the large increase in *VI* score and replace *VI* in Specification (1) with *Post Large Increase in VI*. Thus, we are able to examine product disclosure for firms immediately after the large increase of vertical integration, compared to that for a matched sample of economically similar but non-vertically integrated firms.

Panel A of Table 6 shows the effectiveness of this matching procedure. The sample means of control variables for matched treated and control firms are not significantly different. Our estimates in the PSM sample are reported in Table 6, Panel B. Columns (1) and (2) continue to show a significant reduction in product disclosure in MD&A and press release.

5.2 Evidence from a Natural Experiment

5.2.1 Identification Strategy

Our tests thus far suggest that vertical integration is associated with a reduction in product disclosure. However, a risk that both firms' boundaries and disclosure choices are jointly determined by an unobservable factor renders causality difficult to infer. To address potentially lingering endogeneity concerns, we exploit U.S. firms' exposure to the reforms of judicial systems across foreign countries that improve the effectiveness of contract enforcement (Chemin, 2020). The transaction costs theory (Williamson, 1971;

Klein et al., 1978) predicts that firms rely more on vertical integration in the absence of contract enforcement. Specifically, once contracts cannot be reliably enforced, contracting parties can engage in opportunistic behavior *ex post* despite the completeness of the contract.¹² This results in considerable transaction costs and thereby leads to greater vertical integration.

The reforms of these judicial systems improve the judiciary’s quality, speed, and accessibility and thereby enhance the enforceability of inter-firm contracts. For instance, foreign aid agencies might devote resources to train court officials and streamline procedures, reduce the backlog of cases and build courts. Consistent with this argument, Chemin (2020) empirically shows that judicial system increases firms’ perceptions of judicial efficiency and facilitates arm’s length transactions which rely heavily on contract enforcement mechanisms. We therefore expect that an increase in the effectiveness of contract enforcement due to the reform of judicial system fosters supply chain outsourcing and reduces vertical integration.

In particular, we explore the reform of judicial system in foreign countries where a U.S. firm procures inputs and argue that the reform in a country encourages the firm to use outsourcing rather than vertical integration in the given country. We construct a continuous variable that we call *Foreign Reform* and estimate it as the weighted average of the reforms of judicial system in all other countries:

$$Foreign\ Reform = \sum_k w_{ki} Reform_{kt}, \quad (2)$$

where k denotes a foreign country, i denotes a firm, and t denotes year. $Reform_{kt}$ is an indicator variable that takes a value of 1 if country k has implemented judicial system reform by year t , and zero otherwise. We use the list of judicial system reform provided by Chemin (2020), who identifies the reforms of judicial system of 74 countries using 4,568 judicial projects implemented by 500 foreign aid agencies from 2006 to 2016. As shown in Appendix II, we identify 45 countries with at least one judicial system reform from 2006 to 2016.¹³ As Chemin (2020) confirms that these countries did not have reforms

¹²See MacLeod (2007) for a survey of contract enforcement.

¹³If a country has multiple reforms during the sample period, we use the earliest one.

between the wave of Enterprise Survey took place between 2004 and 2006, we limit our sample to period after 2004 in this test to ensure that the countries did not have reforms of judicial system in the pre-period.

w_{kit} is the weight capturing the relative offshore-input intensity of firm i in country k . Specifically, we measure a firm’s offshore-input intensity in a country using the number of mentions of the firm procuring inputs from the country in its annual reports (Hoberg and Moon, 2017, 2018). The weight equals the frequency of the reference to a country where the firm procures inputs in its annual report scaled by the frequency of the reference to all countries where the firm procures inputs. To avoid spurious correlation due to changes in global supply chain structure, we remove the time variation and base the weights on the data in year 2003, the year before our regression sample starts.

To illustrate, consider a firm procuring production inputs only from two countries, Afghanistan and Angola. In its annual report, it mentions twice that it procures from Afghanistan, and eight times from Angola. The weight for Afghanistan is $2/(2+8)=0.2$, and that for Angola is $8/(2+8)=0.8$. As Afghanistan had a reform in 2008 and Angola do not have one during the sample period, the measure is equal to zero for the period before 2008 and 0.2 since 2008.

The variable ranges from zero when reform was not implemented by any country where the firm procures inputs to, theoretically, one when all foreign countries where the firm procures inputs have reforms. As it is based on decisions made outside of the U.S., *Foreign Reform* should be largely exogenous to the domestic political and economic conditions surrounding U.S. firms.

5.2.2 Foreign Judicial Reform and Product Disclosure

We estimate the following Difference-in-Differences framework resembling Specification (1) excepted that we replace $VI_{i,t}$ with *Foreign Reform* $_{i,t}$.

$$Disclosure_{i,t+1} = \beta_0 Foreign Reform_{i,t} + \beta_1 X_{i,t-1} + \tau_t + v_i + \epsilon_{i,t} \quad (3)$$

The sample in this test consists of 29,265 observations. Panel A of Table 7 re-

ports the descriptive statistics of variables used in this analysis. The average exposure, $Foreign\ Reform_{i,t}$, is 0.036 and the standard deviation is 0.127, suggesting a sizable variations. 595 unique firms (i.e., 18% of sample firms) experience at least one judicial system reforms in our sample period.

We first provide validation test to examine if reforms of foreign judicial systems make outsourcing more preferable, i.e., they reduce vertical integration. We estimate Specification (3) using VI as the dependent variable and show the results in panel B of Table 7. Results in columns (1) and (2) show that $Foreign\ Reform$ is negatively associated with VI , which is in line with the argument that an increase in contract enforcement encourages outsourcing and reduces the benefits of vertical integration.

Panel C of Table 7 reports the results on product disclosure. The coefficients of $Foreign\ Reform$ are positive and statistically significant across the specifications. Since firms rest more on arm's length transaction following the reforms of foreign judicial system, they start sharing public information about their production activities to cooperate with their foreign suppliers. This result is consistent with our main finding that product disclosure decreases with the degree of vertical integration.

5.2.3 Parallel Trends

The causal interpretation of the DiD estimation rests on the assumption that the trends of product disclosure would be similar for treated and control firms in the absence of the reform (Angrist and Pischke, 2013). To validate this parallel trend assumption, we investigate firms' product disclosure choice in the pre-period and confirm that firms do not change their disclosure in the year before the reform of foreign judicial system. To this end, we estimate the following specification.

$$Disclosure_{i,t} = \beta_{0,-1} Foreign\ Reform(T = -1)_{i,t} + \beta_{0,0} Foreign\ Reform(T = 0)_{i,t} + \beta_{0,1} Foreign\ Reform(T \geq +1)_{i,t} + \beta_1 X_{i,t-1} + \tau_t + v_i + \epsilon_{i,t} \quad (4)$$

$Foreign\ Reform(T = \tau)$ is $\sum_k w_{ki} Reform_{k,t=\tau}$, where $Reform_{k,t=\tau}$ is a binary variable that indicates the year τ relative to the year when country k implements the reform

of judicial system. For example, $Reform_{k,t=-1}$ equals one in one year before country k implemented the reform. $Reform_{k,t>\geq+1}$ equals one if country k has implemented the reform at least one year before. Columns (3) and (6) of Table 7, Panel C show the dynamic effects of the exposure to foreign judicial reforms on the degree of vertical integration and product disclosure, respectively. Results confirm the parallel trend assumption — *Foreign Reform* ($T=-1$) is statistically indifferent from zero. The effect on both the degree of vertical integration and product disclosure manifests only after the implementation of judicial reforms.

5.3 Additional Analyses

Standard models of voluntary disclosure suggest that an increase in proprietary costs, in addition to a decrease in either managers' private information or investors' uncertainty, can lead to a reduction in public disclosure (e.g., [Dye \(1985\)](#); [Verrecchia \(1990\)](#)). In the context of our research setting, these forces would need to systematically vary with (i) firms' vertical integration strategies, (ii) the credibility of firms' public disclosures, (iii) the attributes leading to a greater reliance on private communication with supply chain partners, and (iv) the staggered adoption of foreign judicial reforms. Although we consider this unlikely, we conduct several additional analyses to assuage concerns about these forces in our setting.

First, with regard to an increase in proprietary costs, we report similar results for disclosures that are more likely to be proprietary (e.g., demand and production information from press releases) and disclosures that are likely to be non-proprietary (e.g., the MD&A section of the annual report; e.g., [Lang and Sul \(2014\)](#); [Glaeser \(2018\)](#)), but can nevertheless serve a coordination role in supply chains. In addition, while we include time-varying controls for factors that drive disclosure costs stemming from changes in proprietary technology in all of our regressions (e.g., R&D, patent activity), in untabulated results we find that our results are robust to controlling for additional time-varying factors related to industry competition (i.e., industry concentration; [Lang and Sul \(2014\)](#)) and product homogeneity ([Hoberg et al., 2014](#)). Second, with regard to a decrease in

managers' private information, in untabulated analyses, we examine the relation between vertical integration and (i) management forecast accuracy, and (ii) management forecast precision, respectively. We do not find any evidence of a relation between vertical integration and management forecast accuracy or precision, which is inconsistent with vertical integration reducing managers' private information. Finally, with regard to a decrease in investors' uncertainty, in untabulated analyses, we find no relation between vertical integration and the downloading of firms' public filings by investors. We also find a greater external financing for vertically integrated firms. These findings are inconsistent with vertical integration reducing investors' uncertainty, but are instead symptomatic of an increase in investors' uncertainty in light of reduced public disclosure accompanied by increased financing.

6 Conclusion

Theories at the intersection of accounting and industrial organization suggest that public disclosure can facilitate coordination among partners along the supply chain. Applying these theories to how firm boundaries are shaped, we examine how vertical integration influences firms' public product disclosure decisions. Vertical integration expands firm boundaries and negates any coordination benefits of disclosure by creating a direct channel of private communication within firm boundaries.

Consistent with our predictions, we find that firms that become more vertically integrated reduce public disclosure about their product and that the reduction is (i) less pronounced for vertically integrated firms in relationships that entail less credible public disclosures, (ii) more pronounced among firms whose customers rely more on public disclosures when private communication is less feasible *ex ante*. Finally, we use a matched sample and the staggered adoption of foreign regulations that reduce the costs of contracting with outside suppliers as an exogenous shock to vertical integration, and find consistent results that an increase in vertical integration reduces voluntary product disclosures.

Thus, while most prior disclosure literature focuses on the monitoring and valuation roles of public disclosure, the collective results of our study provide evidence of another important role of public disclosure: namely, facilitating coordination among supply chain partners.

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Appendix I. Variable Definitions

Variable	Definitions
<i>Dependent Variables</i>	
MD&A ProductDisc	The number of sentences with product related phrases in the MD&A section of annual reports, scaled by the total number of sentences.
PR ProductDisc	The log of one plus the number of firm-initiated product-related press release in RavenPack database. Appendix II lists the categories of firm-initiated product-related press release.
PubInfo Acq	The log of one plus the number of SEC filing downloaded from the EDGAR database by firm's suppliers and customers in a year. A firm's suppliers and customers are identified using FactSet database. The variable is in the period of 2003-2016 due to the data availability.
<i>Independent Variables</i>	
VI	The degree of vertical integration constructed by Fresard et al. (2020) .
Foreign Reform	The weight average of the exposure to the judicial reforms by foreign countries. The weight is the firm's relative outsourcing intensity in a country in 2003, i.e., the frequency of the reference to a country where the firm has outsourcing activities in 2003 annual report, scaled by the frequency of the reference to all countries where the firm has outsourcing activities (Hoberg and Moon, 2017).
R&D Intensity	Research and development expenditure, scaled by total assets. Missing value is set to zero.
#Patents	The number of patents filed in the year (Kogan et al., 2017).
CFO Volatility	The standard deviation of operating cash flows during the previous 20 quarters.
Size	The natural logarithm of total assets.
ROA	Earnings before extraordinary items, scaled by total assets.
Leverage	The sum of short term and long term debt, scaled by total assets.
Return Volatility	The standard deviation of daily stock returns during the year.
MTB	The market to book ratio.
Tangibility	The ratio of tangible assets to total assets.
InstOwn	The proportion of outstanding shares owned by institutional investors.
Analyst Following	The natural logarithm of one plus the number of analysts covering the firm.
<i>Cross-sectional Variables</i>	
Restatement	A binary that equals one if the firm has financial restatement that is not coded as errors by AuditAnalytics in three years before entering year t.
Suspect	A binary that equals one if the firm has either financial restatement or was under SEC investigation in three years before entering year t.
Young Firm	A binary variable that equals one if firm age is smaller than the sample median, and zero otherwise. Firm age is the number of year since the firm first appeared on the Compustat database.
Short Duration	A binary variable that equals one if the weight-average duration of supply chain relationship is smaller than the yearly median, and zero otherwise. Based on the customer-supplier relationship database provided by WRDS, for each firm-year we compute the weight-average of the duration between a firm and its current supply chain counterparts in the year. The weight is set to the transaction volume between a firm and its counterparts.

Appendix II. Categories of Firm-initiated Product-related Press Release from RavenPack

Category	Description
patient-enrollment-complete	The Company completes enrollment of patients for a clinical trial
patient-enrollment-start	The Company begins enrollment of patients for a clinical trial
patient-enrollment-suspended	The Company suspends enrollment of patients for a clinical trial
product-catastrophe	A product or service provided by the Company yields human casualties including injury or death
product-delayed	The Company delays the launch of a new product or service or an upgrade to an existing one
product-discontinued	The Company discontinues the commercialization of one of its products or services
product-outage	The provision of the Company's products or services is interrupted due to malfunction
product-price-cut	The Company reduces the price of one of its products or services
product-price-raise	The Company increases the price of one of its products or services
product-recall	The Company makes a request for return of a defective product
product-release	The Company launches a new product or service or an upgrade to an existing one
product-resumed	The Company resumes or restores the provision of a product or service
product-side-effects	The Company's product or service may have unintended harmful side effects
production-outlook	The Company expresses a view or opinion about production targets for the period
production-outlook-negative	The Company expresses negative or pessimistic production targets for the period
production-outlook-positive	The Company expresses positive or optimistic production targets for the period
project-abandoned	The Company delays or abandons a project towards the development of a product or service
clinical-trials	The Company discloses general information about its clinical trials
clinical-trials-complete	The Company completes a phase in the clinical trial process or the development of a new drug
clinical-trials-filed	The Company files to commence a clinical trial
clinical-trials-negative	The Company discloses negative results about a clinical trial
clinical-trials-positive	The Company discloses positive results about a clinical trial
clinical-trials-start	The Company starts the development of a drug or clinical trial
clinical-trials-suspended	The Company suspends the development of a drug or ongoing clinical trials
regulatory-product-application	The Company submits a product application to an official regulatory body
regulatory-product-application-authority	The Entity that receives the Company's product application
regulatory-product-application-withdrawn	The Company withdraws its product application from an official regulatory process
regulatory-product-application-withdrawn-authority	The Entity that receives the Company's product application withdrawal
regulatory-product-approval-conditional	The Company receives conditional regulatory approval to market a product or service
regulatory-product-approval-conditional-authority	The Entity that issues a conditional regulatory approval to market a product or service
regulatory-product-approval-denied	The Company is denied regulatory approval to market a product or service
regulatory-product-approval-denied-authority	The Entity that denies approval to develop or market a product or service
regulatory-product-approval-granted	The Company receives regulatory approval to develop or market a product or service
regulatory-product-approval-granted-authority	The Entity that grants approval to develop or market a product or service
regulatory-product-review-negative	An official regulatory body issues a negative review of the Company's product or service
regulatory-product-review-negative-authority	The Entity that issues a negative review of the Company's product or service
regulatory-product-review-positive	An official regulatory body issues a positive review of the Company's product or service
regulatory-product-review-positive-authority	The Entity that issues a positive review of the Company's product or service
regulatory-product-warning	An official regulatory body issues a warning on the Company's product or service
regulatory-product-warning-authority	The Entity that issues a warning on the Company's product or service
supply-decrease	The Entity announces a decrease in the production of its goods or services
supply-decrease-commodity	The production or supply of the Commodity decreases or is interrupted
supply-decrease-rater	The Entity that announces supply related information

Appendix II. Categories of Firm-initiated Product-related Press Release from RavenPack (continued)

Category	Description
supply-guidance-decrease	The Entity forecasts a decrease in the production of its goods or services
supply-guidance-decrease-commodity	The production or supply of the Commodity decreases or is interrupted
supply-guidance-decrease-rater	The Entity that announces supply related information
supply-guidance-increase	The Entity forecasts an increase in the production of its goods or services
supply-guidance-increase-commodity	The production or supply of the Commodity increases
supply-guidance-increase-rater	The Entity that announces supply related information
supply-guidance-unchanged	The Entity forecasts that the production of its goods or services will remain unchanged
supply-guidance-unchanged-commodity	The production or supply of the Commodity is projected to remain unchanged
supply-guidance-unchanged-rater	The Entity that announces supply related information
supply-increase	The Entity announces an increase in the production of its goods or services
supply-increase-commodity	The production or supply of the Commodity increases
supply-increase-rater	The Entity that announces supply related information
supply-unchanged	The Entity announces that the production of its goods or services remains unchanged
supply-unchanged-commodity	The production or supply of the Commodity remains unchanged
supply-unchanged-rater	The Entity that announces supply related information
demand-decrease	The Entity experiences a decrease in the total quantity of goods and services consumers are willing and able to buy
demand-decrease-commodity	The demand of the Commodity decreases or is interrupted
demand-decrease-rater	The Entity that announces demand related information
demand-guidance-decrease	The Entity forecasts a decrease in the total quantity of goods and services consumers are willing and able to buy
demand-guidance-decrease-commodity	The demand of the Commodity is seen to decrease or be interrupted
demand-guidance-decrease-rater	The Entity that announces demand related information
demand-guidance-increase	The Entity forecasts an increase in the total quantity of goods and services consumers are willing and able to buy
demand-guidance-increase-commodity	The demand of the Commodity increases
demand-guidance-increase-rater	The Entity that announces demand related information
demand-guidance-unchanged	The Entity forecasts no change in the total quantity of goods and services consumers are willing and able to buy
demand-guidance-unchanged-commodity	The demand of the Commodity is projected to remain unchanged
demand-guidance-unchanged-rater	The Entity that announces demand related information
demand-increase	The total quantity of goods and services of the Entity that consumers are willing and able to buy increases
demand-increase-commodity	The demand of the Commodity increases
demand-increase-rater	The Entity that announces demand related information
demand-unchanged	The Entity announces no change in the total quantity of goods and services consumers are willing and able to buy
demand-unchanged-commodity	The demand of the Commodity remains unchanged
demand-unchanged-rater	The Entity that announces demand related information
market-entry	The Company enters a new industry or market
market-entry-location	The Place where the company enters into a new industry or market
market-guidance	The Entity issues a view or forecast on a particular market sector or industry
market-guidance-commodity	An entity issues guidance on the size of the Commodity market
market-guidance-down	The Entity issues a negative view or forecast on a particular market sector or industry
market-guidance-down-commodity	An entity issues guidance on the Commodity market size
market-guidance-up	The Entity issues a positive view or forecast on a particular market sector or industry
market-guidance-up-commodity	An entity issues guidance on the Commodity market size
market-share	The Company announces information about its share of the marketplace for a particular product or service
market-share-gain	The Company increases its share of the marketplace for a particular product or service
market-share-loss	The Company decreases its share of the marketplace
orphan-drug-designation	A regulator grants the Company incentives to develop drugs that treat rare diseases and conditions
orphan-drug-designation-authority	The Organization that grants special status to the Company's drug or biological product

Appendix III. List of Countries with Judicial Reform

Country	Reform Year	Country	Reform Year
Afghanistan	2008	Mali	2009
Albania	2010	Mauritania	2008
Armenia	2009	Mexico	2009
Azerbaijan	2011	Moldova	2012
Bangladesh	2007	Mongolia	2011
Bhutan	2014	Montenegro	2010
Bolivia	2009	Namibia	2011
Bosnia and Herzegovina	2009	Nepal	2011
Burundi	2006	Nigeria	2008
Cambodia	2013	Pakistan	2007
Congo, Dem. Rep.	2008	Philippines	2013
Croatia	2008	Rwanda	2006
El Salvador	2007	Senegal	2010
Ethiopia	2011	Serbia	2011
Georgia	2009	Tajikistan	2012
Honduras	2006	Tanzania	2008
Indonesia	2009	Timor-Leste	2011
Kenya	2009	Uganda	2009
Kosovo	2010	Ukraine	2008
Lao PDR	2009	Uzbekistan	2011
Macedonia, FYR	2009	Vietnam	2009
Madagascar	2011	Zambia	2007
Malawi	2010		

Table 1. Summary Statistics

This table summarizes the statistics of the main variables. Variable definition is in Appendix I.

Variable	N	Mean	Std	P25	P50	P75
<i>Dependent Variables</i>						
MD&A ProductDisc	62,231	0.019	0.034	0.000	0.003	0.026
PR ProductDisc	38,636	0.400	0.671	0.000	0.000	0.693
PubInfo Acq	28,492	0.677	1.086	0.000	0.000	1.099
<i>Independent Variables</i>						
VI	62,231	0.011	0.011	0.003	0.008	0.015
Size	62,231	5.996	1.959	4.516	5.872	7.358
ROA	62,231	-0.037	0.235	-0.042	0.030	0.072
Leverage	62,231	0.222	0.216	0.015	0.182	0.354
Return Volatility	62,231	0.037	0.020	0.022	0.032	0.046
CFO Volatility	62,231	0.030	0.047	0.009	0.016	0.032
MTB	62,231	1.853	1.723	0.862	1.274	2.118
Tangibility	62,231	0.268	0.240	0.078	0.184	0.396
InstOwn	62,231	0.509	0.317	0.223	0.522	0.783
Analyst Following	62,231	1.548	0.954	0.693	1.609	2.303
R&D Intensity	62,231	1.511	1.889	0.000	0.208	2.890
Ln(1+#Patents)	62,231	0.643	1.256	0.000	0.000	0.693
<i>Cross-sectional Variables</i>						
Restatement	62,231	0.078	0.268	0.000	0.000	0.000
Suspect	62,231	0.116	0.320	0.000	0.000	0.000
Firm Age	62,231	19.597	15.189	8.000	14.000	27.000
Duration	21,640	4.688	5.160	1.000	3.000	6.667

Table 2. Public Information Acquisition by Suppliers and Customers

This table shows the results of the effect of vertical integration on public information acquisition by suppliers and customers. The dependent variable is *PubInfo Acq*, measured by the log of one plus the number of SEC filing downloaded from the EDGAR database by a firm's suppliers and customers in a year. *VI* is the degree of vertical integration of the firm. Columns (1) controls for year fixed effects and column (2) controls for firm and year fixed effects. Variable definition is in Appendix I. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the firm level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	PubInfo Acq	
	(1)	(2)
VI	-4.740*** (1.122)	-3.250** (1.590)
Size	0.286*** (0.014)	0.213*** (0.023)
ROA	-0.124*** (0.046)	-0.072* (0.038)
Leverage	-0.078 (0.063)	0.046 (0.062)
Return Volatility	2.695*** (0.668)	1.717*** (0.499)
CFO Volatility	0.165 (0.205)	0.238 (0.264)
MTB	0.036*** (0.007)	0.024*** (0.006)
Tangibility	0.008 (0.060)	0.160 (0.120)
InstOwn	-0.359*** (0.048)	-0.137*** (0.047)
Analyst Following	-0.004 (0.018)	0.034** (0.014)
R&D Intensity	0.603*** (0.129)	0.415*** (0.153)
Ln(1+#Patents)	0.100*** (0.014)	0.042*** (0.014)
Firm FE	No	Yes
Year FE	Yes	Yes
Obs.	28,492	28,492
Adj. R ²	0.269	0.606

Table 3. Vertical Integration and Voluntary Disclosure

This table shows the results of the effect of vertical integration on firm disclosure from 1997 to 2017. The dependent variable is *MD&A ProductDisc* in Panel A and *PR ProductDisc* in Panel B. *VI* is the degree of vertical integration of the firm. Column (1) controls for year fixed effect. Columns (2) and (3) control for firm and year fixed effects. Columns (4) - (7) control for industry-year, industry-year and size-year, industry-year and age-year, and industry-year and profitability-year fixed effects, respectively. Variable definition is in Appendix I. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the firm level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Product Disclosure based on MD&A							
	MD&A ProductDisc						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VI	-0.663*** (0.031)	-0.052*** (0.016)	-0.048*** (0.015)	-0.038** (0.016)	-0.038** (0.015)	-0.034** (0.015)	-0.047*** (0.015)
Size			0.001*** (0.000)	0.000* (0.000)	0.001** (0.000)	0.001*** (0.000)	0.001* (0.000)
ROA			0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.006*** (0.001)
Leverage			-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)
Return Volatility			0.044*** (0.007)	0.022*** (0.007)	0.034*** (0.007)	0.035*** (0.007)	0.041*** (0.007)
CFO Volatility			0.026*** (0.005)	0.019*** (0.005)	0.023*** (0.005)	0.023*** (0.005)	0.023*** (0.005)
MTB			0.001*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Tangibility			-0.001 (0.001)	-0.004*** (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)
InstOwn			0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Analyst Following			-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)
R&D Intensity			0.028*** (0.003)	0.026*** (0.003)	0.027*** (0.003)	0.028*** (0.003)	0.028*** (0.003)
Ln(1+#Patents)			0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Firm FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	No	No	No	No
Year-Industry FE	No	No	No	Yes	Yes	Yes	Yes
Year-Size FE	No	No	No	No	Yes	No	No
Year-Age FE	No	No	No	No	No	Yes	No
Year-Profitability FE	No	No	No	No	No	No	Yes
Obs.	62,231	62,231	62,231	62,231	62,230	62,231	62,231
Adj. R ²	0.050	0.865	0.869	0.875	0.870	0.871	0.870

Table 3. Vertical Integration and Voluntary Disclosure (continued)

	Press Release (PR) ProductDisc						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VI	-5.896*** (0.663)	-1.450** (0.690)	-1.477** (0.688)	-1.434** (0.717)	-1.539** (0.728)	-1.522** (0.722)	-1.435** (0.720)
Size			0.013 (0.009)	0.014 (0.010)	0.016 (0.011)	0.013 (0.010)	0.020* (0.010)
ROA			0.021 (0.023)	0.028 (0.024)	0.028 (0.024)	0.029 (0.024)	0.014 (0.027)
Leverage			0.006 (0.029)	-0.005 (0.030)	0.001 (0.030)	-0.005 (0.030)	-0.011 (0.030)
Return Volatility			0.202 (0.251)	-0.072 (0.264)	0.035 (0.265)	-0.046 (0.263)	0.010 (0.268)
CFO Volatility			-0.068 (0.122)	-0.003 (0.124)	0.047 (0.123)	0.014 (0.125)	0.035 (0.124)
MTB			0.004 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Tangibility			-0.085* (0.050)	-0.112** (0.053)	-0.116** (0.053)	-0.116** (0.053)	-0.106** (0.053)
InstOwn			-0.172*** (0.021)	-0.172*** (0.022)	-0.183*** (0.022)	-0.173*** (0.022)	-0.173*** (0.022)
Analyst Following			0.004 (0.008)	0.001 (0.008)	0.002 (0.008)	0.001 (0.008)	-0.001 (0.008)
R&D Intensity			-0.022 (0.082)	0.030 (0.084)	0.028 (0.084)	0.026 (0.084)	0.021 (0.085)
Ln(1+#Patents)			0.023** (0.009)	0.022** (0.009)	0.017* (0.009)	0.021** (0.009)	0.021** (0.009)
Firm FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	No	No	No	No
Year-Industry FE	No	No	No	Yes	Yes	Yes	Yes
Year-Size FE	No	No	No	No	Yes	No	No
Year-Age FE	No	No	No	No	No	Yes	No
Year-Profitability FE	No	No	No	No	No	No	Yes
Obs.	38,636	38,636	38,636	38,636	38,635	38,636	38,636
Adj. R ²	0.028	0.602	0.604	0.605	0.607	0.605	0.605

Table 4. Cross-sectional Tests: Credibility of Public Disclosure

This table shows the results of the effect of vertical integration on firm disclosure from 1997 to 2017, conditional on credibility of public disclosure. The dependent variable is *MD&A ProductDisc* in columns (1) and (2) and *PR ProductDisc* in columns (3) and (4). *VI* is the degree of vertical integration of the firm. *Restatement* is a binary that equals one if the firm has financial restatement that is not coded as errors by AuditAnalytics in three years before entering year *t*. *Suspect* is a binary that equals one if the firm has either financial restatement or was under SEC investigation in three years before the year. All columns report results controlling for firm and year fixed effects. Variable definition is in Appendix I. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the firm level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	MD&A ProductDisc		PR ProductDisc	
	(1)	(2)	(3)	(4)
VI	-0.052*** (0.015)	-0.054*** (0.016)	-1.638** (0.689)	-1.717** (0.693)
Restatement × VI	0.064*** (0.021)		1.499* (0.881)	
Restatement	-0.001*** (0.000)		-0.021 (0.014)	
Suspect × VI		0.067*** (0.019)		1.478** (0.747)
Suspect		-0.001*** (0.000)		-0.015 (0.012)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	62,231	62,231	38,636	38,636
Adj. R ²	0.869	0.869	0.604	0.604

Table 5. Cross-sectional Tests: Reliance on Public Disclosure

This table shows the results of the effect of vertical integration on firm disclosure from 1997 to 2017, conditional on the reliance on public disclosure. The dependent variable is *MD&A ProductDisc* in columns (1) and (2) and *PR ProductDisc* in columns (3) and (4). *VI* is the degree of vertical integration of the firm. *Young Firm* is a binary variable that equals one if firm age is smaller than the sample median, and zero otherwise. Firm age is the number of year since the firm first appeared on the Compustat database. *Short Duration* is a binary variable that equals one if weight-average duration of supply chain relationship is smaller than the yearly median, and zero otherwise. All columns report results controlling for firm and year fixed effects. Variable definition is in Appendix I. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the firm level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

	MD&A ProductDisc		PR ProductDisc	
	(1)	(2)	(3)	(4)
VI	-0.016 (0.016)	-0.044 (0.028)	-1.026 (0.736)	-1.272 (1.451)
Young Firm×VI	-0.093*** (0.030)		-1.831* (0.943)	
Young Firm	0.004*** (0.001)		0.015 (0.017)	
Short Duration×VI		-0.054* (0.027)		-2.146* (1.106)
Short Duration		0.001 (0.001)		0.041** (0.020)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	62,231	21,640	38,636	14,209
Adj. R ²	0.870	0.884	0.604	0.661

Table 6. Matched Sample Analysis

This table shows the results of the effect of vertical integration on firm disclosure from 1997 to 2017 using a matched sample analysis. Panel A displays results of the test of covariate balance both before and after the propensity-score matching. Column “Large Increase” (“Non-Increase”) indicates the sample mean of the variable of firm-years with (without) a large increase in the measure of vertical integration. Panel B displays the regression results. The dependent variable is *MD&A ProductDisc* in column(1) and *PR ProductDisc* in column (2). *Post Large VI Increase* is a binary variable that equals one following the large increase in the measure of vertical integration. All columns report results controlling for firm and year fixed effects. Variable definition is in Appendix I. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the firm level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Covariate Balance

	Before Matching				After Matching			
	Large Increase	Non-Increase	Diff.	T-stat	Large Increase	Non-Increase	Diff.	T-stat
Size	6.080	6.012	0.068*	1.852	6.069	5.994	0.075	0.770
ROA	-0.051	-0.035	-0.016***	-3.631	-0.035	-0.035	0.000	-0.005
Leverage	0.213	0.222	-0.009**	-2.308	0.193	0.198	-0.005	-0.568
Return Volatility	0.038	0.036	0.001***	3.765	0.036	0.036	0.000	-0.378
CFO Volatility	0.027	0.030	-0.003***	-4.090	0.028	0.028	0.000	-0.066
MTB	1.805	1.847	-0.042	-1.404	2.015	2.033	-0.018	-0.280
Tangibility	0.245	0.270	-0.025***	-5.640	0.249	0.250	-0.001	-0.110
InstOwn	0.545	0.510	0.034***	5.780	0.538	0.534	0.003	0.263
Analyst Following	1.610	1.552	0.059***	3.240	1.651	1.614	0.037	0.846
R&D Intensity	0.064	0.057	0.007***	3.228	0.075	0.072	0.003	0.570
Ln(1+#Patents)	0.738	0.701	0.037	1.507	0.945	0.841	0.104	1.352

Table 6. Matched Sample Analysis (continued)

Panel B: Regression Results		
	MD&A ProductDisc	PR ProductDisc
	(1)	(2)
PSM Sample		
Post Large VI Increase	-0.001** (0.001)	-0.040** (0.019)
Size	0.001*** (0.000)	0.008 (0.015)
ROA	0.005*** (0.001)	-0.054 (0.042)
Leverage	-0.009*** (0.002)	0.014 (0.049)
Return Volatility	0.043*** (0.013)	0.097 (0.439)
CFO Volatility	0.025*** (0.009)	-0.541*** (0.194)
MTB	0.001*** (0.000)	0.007 (0.005)
Tangibility	0.002 (0.003)	-0.124 (0.087)
InstOwn	-0.001 (0.001)	-0.202*** (0.035)
Analyst Following	-0.000 (0.000)	0.002 (0.014)
R&D Intensity	0.027*** (0.005)	-0.208 (0.138)
Ln(1+#Patents)	0.001* (0.000)	0.006 (0.014)
Firm FE	Yes	Yes
Year FE	Yes	Yes
Obs.	33,199	22,340
Adj. R ²	0.861	0.629

Table 7. Natural Experiment: Foreign Contracting Reform

This table shows the results of the effect of vertical integration on firm disclosure from 2004 to 2017, using a Difference-in-Differences regression. *Foreign Reform* is the weight average of the exposure to the judicial reform by foreign countries. The weight is the firm's relative outsourcing intensity in a country in 2003, i.e., the frequency of the reference to a country where the firm has outsourcing activities in 2003 annual report, scaled by the frequency of the reference to all countries where the firm has outsourcing activities (Hoberg and Moon, 2017, 2018). Panel A provides the descriptive statistics of variables used for the test. Panel B provides the validity tests by relating *Foreign Reform* to the degree of vertical integration. Panel C provides the results relating *Foreign Reform* to *MD&A ProductDisc* and *PR ProductDisc*. All columns report results controlling for firm and year fixed effects. Variable definition is in Appendix I. All continuous variables are winsorized at the 1% and 99% levels. Standard errors are clustered at the firm level and displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Descriptive Statistics

Variable	N	Mean	StD	P25	P50	P75
MD&A ProductDisc	29,265	0.016	0.031	0.000	0.003	0.021
PR ProductDisc	28,202	0.417	0.702	0.000	0.000	0.693
VI	29,265	0.011	0.010	0.003	0.008	0.015
Foreign Reform	29,265	0.036	0.127	0.000	0.000	0.000
Size	29,265	6.454	2.035	4.957	6.440	7.851
ROA	29,265	-0.016	0.259	-0.016	0.037	0.077
Leverage	29,265	0.217	0.232	0.014	0.179	0.333
Return Volatility	29,265	0.031	0.018	0.019	0.026	0.037
CFO Volatility	29,265	0.023	0.041	0.007	0.013	0.025
MTB	29,265	1.739	1.683	0.881	1.267	1.989
Tangibility	29,265	0.259	0.237	0.075	0.174	0.376
InstOwn	29,265	0.606	0.318	0.349	0.683	0.864
Analyst Following	29,265	1.651	0.988	0.693	1.792	2.398
R&D Intensity	29,265	0.054	0.135	0.000	0.002	0.058
Ln(1+#Patents)	29,265	0.731	1.401	0.000	0.000	0.693

Table 7. Natural Experiment: Foreign Contracting Reform (continued)

Panel B: Validity Tests			
	VI		
	(1)	(2)	(3)
Foreign Reform	-0.002** (0.001)	-0.002* (0.001)	
Foreign Reform (T=-1)			0.001 (0.002)
Foreign Reform (T=0)			-0.005** (0.002)
Foreign Reform (T>=+1)			-0.002* (0.001)
Size		0.001*** (0.000)	0.001*** (0.000)
ROA		-0.000 (0.000)	-0.000 (0.000)
Leverage		0.000 (0.000)	0.000 (0.000)
Return Volatility		-0.007*** (0.003)	-0.007*** (0.002)
CFO Volatility		0.001 (0.001)	0.001 (0.001)
MTB		0.000 (0.000)	0.000 (0.000)
Tangibility		0.000 (0.001)	0.000 (0.001)
InstOwn		0.000 (0.000)	0.000 (0.000)
Analyst Following		-0.000** (0.000)	-0.000** (0.000)
R&D Intensity		0.001** (0.000)	0.001** (0.000)
Ln(1+#Patents)		0.000*** (0.000)	0.000*** (0.000)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	29,265	29,265	29,265
Adj. R ²	0.834	0.835	0.835

Table 7. Natural Experiment: Foreign Contracting Reform (continued)

Panel C: The Effects on Product Disclosure

	MD&A ProductDisc			PR ProductDisc		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign Reform	0.004*** (0.001)	0.004*** (0.001)		0.094** (0.047)	0.097** (0.047)	
Foreign Reform (T=-1)			-0.001 (0.003)			-0.162 (0.157)
Foreign Reform (T=0)			0.001 (0.003)			-0.115 (0.189)
Foreign Reform (T>=+1)			0.005*** (0.001)			0.107* (0.056)
Size		0.000 (0.000)	0.000 (0.000)		0.013 (0.012)	0.013 (0.012)
ROA		0.001 (0.001)	0.001 (0.001)		-0.006 (0.023)	-0.006 (0.023)
Leverage		-0.007*** (0.002)	-0.007*** (0.002)		0.002 (0.028)	0.003 (0.028)
Return Volatility		0.004 (0.007)	0.004 (0.007)		-0.188 (0.225)	-0.187 (0.225)
CFO Volatility		0.016** (0.007)	0.016** (0.007)		0.049 (0.131)	0.050 (0.131)
MTB		-0.000 (0.000)	-0.000 (0.000)		0.003 (0.003)	0.003 (0.003)
Tangibility		0.000 (0.002)	0.000 (0.002)		-0.097 (0.061)	-0.096 (0.061)
InstOwn		0.001 (0.001)	0.001 (0.001)		-0.179*** (0.024)	-0.178*** (0.024)
Analyst Following		-0.000 (0.000)	-0.000 (0.000)		-0.004 (0.009)	-0.004 (0.009)
R&D Intensity		0.007** (0.003)	0.007** (0.003)		-0.021 (0.048)	-0.021 (0.048)
Ln(1+#Patents)		0.001*** (0.000)	0.001*** (0.000)		0.053*** (0.010)	0.053*** (0.010)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	29,265	29,265	29,265	28,202	28,202	28,202
Adj. R ²	0.890	0.892	0.892	0.623	0.626	0.626