The Economics of Firms' Public Disclosure: Theory and Evidence

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Abstract

Using a price-theoretic framework, we derive and empirically test a fundamental demand force shaping firms' *public* disclosure decisions. Our framework suggests that the number of firms' transacting stakeholders, not just their shareholders, is a major determinant of disclosure demand and, hence, firms' decision to disclose publicly. Exploiting comprehensive data on stakeholders' revealed preferences for *private* firms' public disclosure, our empirical analysis supports the predicted importance of the number of transacting stakeholders for firms' public disclosure across several settings and disclosure margins. Our framework is particularly suited for guiding the growing literature investigating non-standard public disclosure settings such as private firms and the influence of stakeholders other than shareholders.

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1. Introduction

Through the lens of the large literature on public firms' disclosure, voluntary public disclosure by private firms appears puzzling. Private firms exhibit concentrated investor bases, limiting the capital-market benefits of public disclosure and facilitating private communication. Private communication with investors in turn allows avoiding the dissipation of proprietary information to competitors. Hence, "[i]t is not obvious that *public* disclosure […] confers any benefits to the *disclosing private firm*" (Shroff, 2016, p. 330). Yet, recent studies document that a substantial share of private firms voluntarily discloses financial statements publicly.[1] To explain this pattern and unpack the black box of private firms' public disclosure behavior, we exploit unique data on the actual demand for private firms' public disclosures.

Our empirical examination is guided by a price-theoretic framework that highlights the role of a dispersed stakeholder base, not just investor base, as an important factor motivating public disclosure. Extending prior studies on stakeholders other than investors (e.g., Bowen et al., 1995), we model disclosure as a lubricant facilitating a firm's exchange of goods and services with various stakeholders. By complementing the firm's goods and services, disclosure unfolds benefits if it allows negotiating better terms of trade (e.g., price, payment terms, or quantity). Thus, disclosure benefits originate from those stakeholders who are interested in the firm's financial statements *and* (consider to) transact with the firm.[2] We label these stakeholders "transacting stakeholders."

[1] Schlauss (2010), Collis (2008), Minnis and Shroff (2017), and Bernard (2016), for example, document voluntary public disclosure rates of 10%, 25%, 36%, and 45% among private firms in Europe. We document similar rates in our sample (Figure A.1).

[2] A construction firm, for example, obtains disclosure benefits from a customer who checks for the firm's financial health in deciding whether to hire the firm to construct her house. Thus, the customer is a transacting stakeholder. By contrast, the firm does not obtain disclosure benefits from a customer who does not care about the firm's financial statements in his decision process (as he is not interested in the firm's financial statements) or from a reporter who is solely interested in gathering financial information about the construction firm (as he is not exchanging goods or services with the firm).

We predict that the number of transacting stakeholders is a key determinant of firms' public disclosure. This prediction follows as the firm benefits from these stakeholders' reduced uncertainty via better terms of trade. The larger the number of transacting stakeholders from which the firm can collect these benefits, the greater the firm's incentives to disclose its financial statements publicly to all transacting stakeholders at once.

We test for the importance of the number of transacting stakeholders for firms' public disclosure using exclusive and comprehensive data on German private (limited liability) firms' public disclosures and their users' interest in these disclosures (online views) from the official publication platform, the Federal Gazette (Bundesanzeiger). Our sample firms must prepare a full set of financial statements, but must only publish some of this information, depending on their firm size, on a central online publication platform similar to SEC EDGAR.

This setting provides three important advantages. First, by investigating private instead of public firms, we can focus on the importance of transacting stakeholders other than the well-studied public capital market investors for firms' public disclosure decision. Second, by examining a regulatory environment (preparation mandate, central disclosure platform) comparable to the one for public firms studied in prior literature, we can hone in on firms' decision to disclose their available financial statements publicly (e.g., Ball and Shivakumar, 2005; Burgstahler et al., 2006). In particular, the regulatory requirements alleviate concerns that non-disclosure may be due to firms not preparing financial statements (due to prohibitive preparation costs; e.g., Allee and Yohn, 2009; Lisowsky and Minnis, 2018) or unobservability of financial statements (due to disclosure on unknown or untracked platforms; e.g., Boulland et al., 2019; Crowley, 2016). Third, since few alternative information sources exist for our sample firms, we can focus on first-order disclosures of financial statement information that are highly relevant to stakeholders, but not otherwise publicly available. This feature provides us

not only with important disclosure outcomes, but also with a comprehensive measure of stakeholder interest in firms' disclosures: the number of online views of firms' disclosures on the central platform.

We test for the relation between the number of transacting stakeholders and firms' public disclosure by regressing disclosure quantity (the length of financial statements), timeliness (publication lag), and quality measures (external audit) on the number of online views, our proxy for the number of transacting stakeholders. We regard the number of online views as a useful proxy for the number of transacting stakeholders because it directly captures a key dimension of our transacting stakeholder definition: their interest in firms' financial statements. As such, our proxy is not confounded by stakeholders who exchange goods or services with the firm, but do not use the firm's public financial statements in these transactions and, hence, do not incentivize the firm to disclose publicly.

Clearly, however, the number of online views does not exclusively capture financial statement users considering to transact with the firm. It also includes non-transacting stakeholders, such as nosy neighbors or competitors. Institutional and theoretical arguments suggest this limitation may not be detrimental. Institutionally, the vast majority of views of a firm's disclosure can be expected to result from stakeholders interested in transacting with the firm. The platform is mostly used for business purposes (e.g., by banks and other corporations: Arrunada, 2011; Breuer et al., 2018a) and the typical private firm is not known to the general public. Accordingly, views from nosy neighbors or the general public are unlikely to make up a substantial share of the online views. Theoretically, including non-transacting stakeholders (e.g., the general public or competitors) in our transacting stakeholder proxy can be expected to attenuate the predicted positive relation of our proxy with firms' public disclosure. Nosy neighbors, for example, do not incentivize firms to use public disclosure. Even more so, competitors, if anything, provide a disincentive for public disclosure. It, however, is not clear that this disincentive increases monotonically in the number of competitor views. For example, competitive

costs of public disclosure may be higher in concentrated markets with few competitors rather than competitive markets with many competitors (e.g., Ali et al., 2014). Accordingly, we expect the vast amount of variation in online views to capture differences in the number of transacting stakeholders across firms, making it an a priori useful proxy.

Turning to the data, we first assess the determinants of the number of online views. We find that online views are strongly positively associated with and explained by variables capturing firm size and the breadth of specific stakeholder groups (e.g., investors, banks, suppliers, customers, and employees). Compared to these determinants, variables such as profitability and industry structure, capturing the extent and threat of competition, add only limited explanatory power. Taken together, these results suggest online views are indeed a useful summary measure of the number of transacting stakeholders.

We next investigate the relation between online views and firms' public disclosure quantity, timeliness, and quality. We find that the number of online views is strongly positively associated with disclosure quantity, quality, and timeliness. These associations are robust to controlling for size-based differences in reporting requirements, firm size, and specific stakeholder breadth variables (e.g., the number of investors or employees). They are consistent with our predicted positive impact of the number of transacting stakeholders on private firms' public disclosure.

Besides our demand-based explanation, there are two important alternative explanations for the positive relation between online views and firms' public disclosure: the omission of effective controls for firm complexity and reverse causality. Firm complexity might confound our main result if more complex firms provide greater disclosures simply because they have more to report on. Reverse causality could drive our main result if greater public disclosure attracts a greater number of online views. While we lack an experiment allowing us to cleanly identify our first-order demand-

based explanation (i.e., an exogenous and substantial shock to firms' number of transacting stakeholders), we fortunately can exploit two natural experiments created by regulatory details to gauge the importance of the two most prominent alternatives.

To alleviate the concern that firm complexity explains our results, we exploit a regulatory reform that gives smaller firms the choice to restrict access to their otherwise publicly available financial statements. This reform allows investigating whether the number of transacting stakeholders before the reform predicts firms' explicit decision to publish their financial statements. We find that firms with more online views in the pre-reform period are less likely to take advantage of the new option to restrict public access to their financial statements after the reform. This result is consistent with our demand-based explanation. By contrast, it is unlikely to be explained by firm complexity. While firm complexity may manifest in firms' disclosure quantity, it is unclear why greater firm complexity would manifest in a greater propensity of firms to opt for public access to their financial statements. In this vein, it is also unclear why firm complexity would manifest in greater disclosure timeliness and reliance on external audits, our other two public disclosure outcomes.

To gauge the relevance of the reverse causality explanation, we exploit size-based disclosure and auditing requirements assigned to otherwise similar firms generating plausibly exogenous variation in firms' public disclosure quantity and quality. The discontinuous requirements allow investigating whether firms' public disclosure quantity and quality chiefly drive firms' online views. We find that more extensive and credible (mandatory) disclosures do not lead to a substantial increase in online views. This result refutes the concern that reverse causality, rather than our predicted demand force, is the primary explanation for the positive association between firms' online views and disclosure.

Our study contributes to the literature in several ways. On the empirical side, our study provides novel evidence on and an explanation for private firms' public disclosure using unique data.

It adds to a nascent literature on public disclosure determinants among private firms (e.g., Bernard, 2016; Dedman and Lennox, 2009). It further complements the literature examining determinants of private versus public firms' earnings quality (e.g., Ball and Shivakumar, 2005; Burgstahler et al., 2006). This literature documents that public firms provide higher earnings quality than private firms due to greater information demand from public capital markets. Our study complements this literature by exploring an explanation for why some private firms may have public disclosure incentives (Shroff, 2016). Our study suggests that it is the number of transacting stakeholders, not just the dispersion of investors in public capital markets that incentivizes firms, even private ones, to choose public over private disclosure, and by extension, to provide high earnings quality (Bernard et al., 2016).

On the analytical side, our study contributes a price-theoretic framework that is specific to firms' public disclosures, but can be broadly applied to a wide range of settings. This framework complements seminal theories of generic (private or public) disclosure couched in the capital market setting. To that end, it embeds special features of public disclosure and derives firms' disclosure benefits starting from stakeholders' individual disclosure demands. As a result, it traces the origins of firms' public disclosure benefits and provides a classification of firms' stakeholders and their relevance for firms' public disclosure decision (see Gassen and Muhn (2018) for an early adoption of this classification). These features make our framework particularly suitable for guiding the emerging literature on firms' public disclosure of non-financial information (e.g., ESG disclosures) or in non-standard settings (e.g., for private firms).

Our study is closely related to studies concerned with the relation between firm size and public disclosure (e.g., Buzby, 1975).[3] Consistent with our framework, these studies often advance intuitive

[3] For example, prior studies document that firm size is positively associated with disclosure quality as reflected in analyst ratings (Lang and Lundholm, 1993), the adoption of more sophisticated accounting procedures (Allee and Yohn, 2009), and the decision to disclose proprietary information voluntarily (Dedman and Lennox, 2009; Ellis et al., 2012). To explain

arguments (e.g., fixed cost spreading making public disclosure more attractive for larger firms) for the positive association between size and disclosure. We complement these studies by providing a formal framework to investigate the relation between firm size and public disclosure and by employing a more direct proxy for the relevant dimension of firm size: transacting stakeholders as measured by online views. By using online views of financial statement disclosures, our study is also related to recent studies using online access statistics to explore who is accessing firms' disclosures (Heinrichs et al., 2018) and when firms' disclosures are accessed (Drake et al., 2012, 2015, 2016). We add to these studies by using the access statistics to ask a different question: do firms' disclosures respond to stakeholders' information demand as proxied by online views.

2. Economic Framework

2.1. Public Disclosure as a Good

We provide a price-theoretic framework to explore the fundamental forces driving firms' decision to provide public disclosure. Public disclosure is a special good because one quantity is provided "for free" to all interested stakeholders. To account for these features, we turn to the theories of public goods (Buchanan, 1968) and complements (Becker and Murphy, 1993). Similar to the case of public goods, multiple stakeholders consume the same quantity of public disclosure (non-rivalry) and firms cannot separately sell their public disclosure quantity to each interested stakeholder (non-excludability). Given the inability to directly sell public disclosure, firms do not provide public disclosure as an individual good, but bundled with—that is, as a complement to—their other goods. These other goods can be thought of as control rights (e.g., ownership shares), capital returns (e.g., debt repayment), employment opportunities (e.g., labor use and compensation), production outputs (e.g., consumption or investment goods/services), and the like. We can think of public disclosure as

this correlation, prior literature has advanced arguments related to firms' desire to reach multiple stakeholders at once in a cost efficient way (e.g., Dedman and Lennox (2009), Bernard (2016)).

a lubricant facilitating the exchange of other goods with transacting stakeholders. Accordingly, the shadow price of public disclosure received by firms results from increased demand (translating into higher prices and/or greater quantities) for their other goods due to reduced information frictions (e.g., Verrecchia, 2001).

2.2. Demand for Public Disclosure

We derive social and private demand curves for public disclosure using a simple reduced-form assumption of stakeholders' preferences for the good "public disclosure." We start with individual stakeholders' demand curves and eventually derive firms' aggregate demand curves.

Individual disclosure demand

A stakeholder j obtains utility $v_{ji}(x_i, q_i)$ from consuming public disclosures q_i and transacting another good of uncertain value x_i with firm i:

$$v_{ji}(x_i, q_i) = \left[E[x_i \mid q_i] - \frac{1}{2}\rho_j Var(x_i \mid q_i) \right] - p_{ji}(x_i, q_i) + \varepsilon_{ji}(q_i),$$

where ρ_j denotes the risk aversion of stakeholder j, $p_{ji}(x_i, q_i)$ denotes the price charged by firm i to stakeholder j for transacting the other good x_i given disclosure quantity q_i, and $\varepsilon_{ji}(q_i)$ denotes stakeholder j's preference for firm i's disclosure independent of the transaction with the firm (e.g., information externalities). This utility formulation can be derived from constant absolute risk aversion (CARA) preferences:

$$v_{ji}(x_i, q_i) \propto u_{ji}(x_i, q_i) = -\exp\left[-\rho_j \left(x_i - p_{ji}(x_i, q_i) + \varepsilon_{ji}(q_i) \right) \right],$$

where the value of the other good conditional on public disclosure is distributed as: $x_i \mid q_i \sim N(\bar{x}_i, \frac{\sigma_i^2}{q_i})$. Our formulation of the conditional distribution resembles a simplified Bayesian updating where the disclosure (for simplicity) does not affect the conditional expectation, but reduces

the conditional variance. Thus, the firm's disclosure enters the stakeholder's utility function through a reduction of uncertainty about the transacted good and other net benefits the stakeholder obtains from consuming the information independent of her transaction with the firm.[4]

Given the specific distribution for $x_i \mid q_i$, we have the following (latent) utility expression:

$$v_{ji}(x_i, q_i) = \left[\overline{x}_i - \frac{1}{2} \rho_j \frac{\sigma_i^2}{q_i} \right] - p_{ji}(x_i, q_i) + \varepsilon_{ji}(q_i) .$$

Stakeholder j makes the discrete choice whether to consume q_i as follows:

$$d_{ji} = \begin{cases} 1 & if \quad v_{ji}(x_i, q_i) > \max[0, \varepsilon_{ji}(q_i), v_{ji}(x_i)] \\ 1 & if \quad \varepsilon_{ji}(q_i) > \max[0, v_{ji}(x_i, q_i), v_{ji}(x_i)] . \\ 0 & otherwise \end{cases}$$

In the first case, stakeholder j consumes the disclosures and transacts the other good x_i with firm i.[5] For example, a customer could obtain information about the firm's financial health before eventually deciding to buy a good with a warranty. In the second case, stakeholder j consumes the disclosures without transacting with firm i. For example, a credit bureau or rating agency may collect financial statement information from all disclosing firms in an industry to learn about current industry conditions. In the last case, stakeholder j does not consume firm i's disclosures (independent of whether the stakeholder transacts with the firm or not). This can be the case, for example, when processing costs are prohibitively high (e.g., for financially illiterate stakeholders), the price of firms'

[4] With this formulation, we explicitly deviate from prior disclosure studies concerned with firms' disclosure behavior conditional on firms' news content (e.g., profits versus losses). By focusing on the unconditional public disclosure demand and supply, our analysis is most applicable to the ex ante decision of committing to a certain quantity and quality of public disclosure. In this sense, our formulation is akin to Admati and Pfleiderer (2000) and Goldstein and Yang (2017).

[5] The condition $. v_{ji}(x_i, q_i) > v_{ji}(x_i) .$ ensures that transacting without consuming financial disclosures (yielding $v_{ji}(x_i)$) is not optimal in this case.

other goods is relatively low (e.g., for everyday mass-products), or the uncertainty about firms' other goods is negligible (e.g., for repeat customers). (Figure 4 summarizes the stakeholder types.)

Stakeholder j's social disclosure demand curve is his marginal benefit of firm i's disclosure (holding the price of the transacted good fixed: $\frac{\partial p_{ji}(x_i, q_i)}{\partial q_i} \overset{!}{=} 0$) as a function of the disclosure quantity:[6]

$$p_{ji}^{S}(q_i) = d_{ji} \begin{cases} \frac{1}{2}\rho_j \frac{\sigma_i^2}{q_i^2} + \frac{\partial \varepsilon_{ji}(q_i)}{\partial q_i} & \text{if} \quad v_{ji}(x_i, q_i) > \varepsilon_{ji}(q_i) \\ \frac{\partial \varepsilon_{ji}(q_i)}{\partial q_i} & \text{otherwise} \end{cases}.$$

Aggregate disclosure demand

The aggregate social demand curve for firm i's public disclosure quantity q_i is the *sum* of all interested stakeholders' social disclosure demand for firm i's disclosure at a given quantity q_i:

$$p_i^S(q_i) = \sum_{j=1}^{N_i^I} p_{ji}^S(q_i).$$

This aggregation is a special feature of non-excludable and non-rival goods. It reflects the fact that all interested stakeholders can consume one and the same disclosure quantity q_i.

The social demand curve reflects the aggregate marginal benefit of firm i's public disclosure to all N_i^I interested stakeholders consuming the disclosure irrespective of whether this benefit is shared with the firm or not (where N_i denotes all stakeholders of firm i and $N_i^I = \sum_{j=1}^{N_i} d_{ij}$ denotes all interested stakeholders).

[6] We work with inverse demand and supply curves, stating price as a function of quantity.

The private demand curve relevant for firm i's public disclosure decision, by contrast, only incorporates stakeholders' marginal benefits appropriable by the firm. Hence, the private demand curve reflects the aggregate shadow price the firm can collect for its public disclosure. This shadow price derives from reduced uncertainty discounts on the transacted good (e.g., due to stakeholders' price protection) and is collected only from stakeholders transacting with the firm. These N_i^T transacting stakeholders are a subset of all N_i^I interested stakeholders:

$$N_i^T = \sum_{j=1}^{N_i} d_{ij} 1\left(v_{ji}(x_i, q_i) > \varepsilon_{ji}(q_i)\right) = \sum_{j=1}^{N_i^I} 1\left(v_{ji}(x_i, q_i) > \varepsilon_{ji}(q_i)\right).$$

The shadow price paid by a transacting stakeholder j can be thought of as a part of the price paid for the other good x_i. For simplicity, we assume additive separability between the price for the expected value of x_i ($p_{ji}(\bar{x}_i)$) and the "shadow price" (or additional revenue on the other good: $p_{ji}(q_i)q_i$) for public disclosure (Becker and Murphy, 1993):

$$p_{ji}(x_i, q_i) = p_{ji}(\bar{x}_i) + p_{ji}(q_i)q_i.$$

The shadow price for public disclosure amounts to the marginal benefit of uncertainty reduction of transacting stakeholder j or less depending on the bargaining power of the firm:[7]

$$p_{ji}(q_i) \leq \frac{1}{2}\rho_j \frac{\sigma_i^2}{q_i^2}.$$

Thus, the aggregate private demand curve relevant for firm i's disclosure decision is given by:

[7] An interesting implication of this derivation is that the degree of competition in the firms' market for the other good is relevant for its disclosure demand. The greater the competition, the more stakeholders can rely on market prices without expanding additional search costs related to analyzing firms' public financial statements (e.g., Hoberg and Phillips, 2010; Stigler, 1961).

$$p_i(q_i) = \sum_{j=1}^{N_i^T} p_{ji}(q_i).$$

This aggregate private demand curve can be reformulated as the product of the number of transacting stakeholders (N_i^T) and the average shadow price of disclosure per transaction ($\overline{p}_i(q_i)$):

$$p_i(q_i) = N_i^T \left(\frac{1}{N_i^T} \sum_{j=1}^{N_i^T} p_{ji}(q_i) \right) = N_i^T \overline{p}_i(q_i).$$

We can consider the non-transacting stakeholders consuming firm i's disclosure ($N_i^N = N_i^I - N_i^T$) as paying a zero shadow price for disclosure:

$$p_i(q_i) = N_i^T \overline{p}_i(q_i) = N_i^I \overline{\overline{p}}_i(q_i),$$

where $\overline{\overline{p}}_i(q_i) = \frac{1}{N_i^I} \left(\sum_{j=1}^{N_i^T} p_{ji}(q_i) \right) \leq \overline{p}_i(q_i)$.

Firms' public disclosure is less sensitive to the number of interested stakeholders than to the number of transacting stakeholders, because the fraction of non-transacting stakeholders is not taken into account in firms' public disclosure decision. If this fraction is approximately constant though, the number of interested stakeholders should still be positively associated with firms' public disclosure.[8]

2.3. Supply of Public Disclosure

Unlike the demand curve derivation, the supply curve derivation is quite standard. There is only one conceptual difference between the supply curve for a normal good and the supply curve for public disclosure. In case of a normal good, the firm produces several units of the good. In case of

[8] Absent a direct measure of transacting stakeholders, in our subsequent empirical tests, we rely on the assumption that the number of interested stakeholders (approximated by online views of firms' public disclosure) is correlated with the number of transacting stakeholders. A priori, we regard this as a reasonable assumption given that the transacting stakeholders, by definition, are a part of the interested stakeholders. Hence, a higher number of transacting stakeholders, ceteris paribus, should manifest in a higher number of interested stakeholders.

public disclosure, the firm produces one unit of the good, but chooses its "quality" as captured by the quantity of information contained in one unit of public disclosure.

Hence, firm i produces one public disclosure quantity to be consumed by all interested stakeholders. This quantity can be thought of as a "free" good provided by the firm as a complement to its other good x_i.

Firm i's disclosure supply curve is derived from its disclosure cost function:

$$C_i(q_i) = c_i(q_i) + f_i,$$

where $c_i(q_i)$ denotes variable costs and f_i denotes fixed costs of public disclosure. These costs encompass direct preparation and dissemination costs as well as proprietary, agency, privacy, coordination, and similar disclosure costs.[9] Importantly, these costs of *public* disclosure do not scale with the number of interested stakeholders. They are incurred upon public disclosure, largely independent of the number of stakeholders. For example, the competitive cost of proprietary information loss is arguably the strongest in concentrated industries where few firms compete for one market (e.g., Ali et al., 2014). This feature of public disclosure costs sharply contrasts with private communication costs. In case of private communication, the direct costs increase in the number of stakeholders to whom the information is separately disseminated (e.g., due to certification or other transaction costs).

Firm i's disclosure supply curve then is simply the marginal cost of disclosure at a given disclosure quantity q_i:

[9] These costs can vary by the news content; e.g., losses may be more expense to disclose than profits. In our economic analysis, we abstract from the effect of news content on firms' disclosure decision. In our empirical tests, however, we find some evidence consistent with greater costs of loss disclosures, consistent with prior literature.

$$\frac{\partial C_i(q_i)}{\partial q_i} = \frac{\partial c_i(q_i)}{\partial q_i}.$$

Voluntary disclosure

Firm i determines its disclosure quantity by equalizing the marginal revenue curve with the supply curve. Firm i uses the marginal revenue curve (rather than taking the "shadow price" of public disclosure as fixed) as it faces a downward sloping demand curve for its disclosure. This follows because firm i is a monopolist in its own disclosure production decision (as there are only imperfect substitutes for its own disclosure (e.g., peer disclosures)).[10]

The marginal revenue curve provides the marginal disclosure revenue for each disclosure quantity q_i:

$$\frac{\partial}{\partial q_i}\left(N_i^T \overline{p}_i(q_i) q_i\right) = N_i^T \overline{p}_i(q_i) + q_i\left(\frac{\partial N_i^T}{\partial q_i} p_{N_i^T i}(q_i) + \sum_{j=1}^{N_i^T} \frac{\partial p_{ji}(q_i)}{\partial q_i}\right),$$

where $N_i^T \overline{p}_i(q_i) q_i$ is disclosure revenue (i.e., the private demand curve times quantity), $\frac{\partial N_i^T}{\partial q_i} = \frac{\partial}{\partial q_i}\left(\sum_{j=1}^{N_i} d_{ji} 1\left(v_{ji}(q_i) > \varepsilon_{ji}(q_i)\right)\right) > 0$ denotes the increase in transacting stakeholders due to greater disclosure, and $\frac{\partial p_{ji}(q_i)}{\partial q_i} = -\rho_j \frac{\sigma_i^2}{q_i^3} < 0$ denotes the decreasing marginal value of additional disclosures.

Firm i's equilibrium disclosure quantity q_i^* is then determined by the intersection of the supply and the marginal revenue curves:

[10] The firm essentially faces a downward sloping *residual* demand/marginal revenue curve. This curve is the residual demand arising from transacting stakeholders after using other (e.g., cheaper and/or more useful) information sources such as peer disclosures, analyst reports, and the like.

$$N_i^T \overline{p}_i(q_i^*) + q_i^* \left(\frac{\partial N_i^T}{\partial q_i} p_{N_i^T i}(q_i^*) + \sum_{j=1}^{N_i^T} \frac{\partial p_{ji}(q_i^*)}{\partial q_i} \right) = \frac{\partial c_i(q_i^*)}{\partial q_i}.$$

This condition is essentially the familiar "marginal cost equals marginal benefit" condition used in extant disclosure theory. Importantly, our micro-foundation of this familiar condition, derived via demand and supply curves, illustrates the central role of the number of stakeholders in firms' disclosure decision.

Figure 1 depicts firms' public disclosure choice at the intensive margin. We depict the marginal revenue curve as steeper than the demand curve. This holds if the gain of marginal revenue associated with an increase of the number of transacting stakeholders due to additional public disclosure is lower than the loss of marginal revenue associated with a decrease of the shadow price due to additional public disclosure, i.e.:

$$\left| \frac{\partial N_i^T}{\partial q_i} p_{N_i^T i}(q_i) \right| < \left| \sum_{j=}^{N_i^T} \frac{\partial p_{ji}(q_i)}{\partial q_i} \right|.^{11}$$

The equilibrium public disclosure quantity q_i^* is given by the quantity at which the marginal revenue curve intersects with the supply curve (S) (Figure 1). The net benefit of disclosure before fixed costs ($\pi_i(q_i^*) + f$) is maximized for this public disclosure quantity and represented by the blue area in Figure 1.

The equilibrium disclosure quantity q_i^* describes firm i's optimal intensive margin choice; that is, the optimal disclosure quantity neglecting fixed costs. Given the existence of fixed costs f_i

[11] We later document that the elasticity of the number of transacting stakeholders with respect to public disclosure changes is negligible, suggesting that the marginal revenue curve is indeed steeper than the demand curve (consistent with usual monopoly pricing diagrams).

and alternative private communication channels (yielding net benefit ϕ_i^*), firm i also makes an extensive margin decision; that is, whether to disclose the optimal quantity q_i^* or not:

$$D_i = \begin{cases} 1 & \pi_i(q_i^*) > \max[0, \phi_i^*] \\ 0 & otherwise \end{cases}.$$

Hence, the observed voluntary disclosure quantity q_i^{**} is given by the product of the extensive and the intensive margin:

$$q_i^{**} = D_i q_i^*.$$

The firm chooses public disclosure if it is net beneficial compared to its alternative options: no disclosure at all or private communication. The firm's incentives to use public disclosure increases in the number of transacting stakeholders because the costs of private communication and public disclosure scale differentially with the number of transacting stakeholders. The costs of private communication (e.g., certification or other transaction costs) scale with the number of transacting stakeholders since private communication requires separate information dissemination to individual stakeholders. By contrast, the costs of public disclosure, provided to all stakeholders, do not scale with the number of transacting stakeholders. (For a formal representation of the firm's net benefits from private communication, please refer to Appendix A. For a brief discussion of the socially optimal disclosure, please refer to Appendix B.)

2.4. Predictions

Our framework provides several predictions about firms' public disclosure. We explicitly focus on two central and interrelated predictions. Our framework predicts that the number of transacting stakeholders is a prime determinant of firms' public disclosure demand (Prediction 1), and that firms' public disclosure demand chiefly drives firms' public disclosure behavior (Prediction 2).

Both insights follow because a single public disclosure quantity is provided to all transacting stakeholders. A greater number of transacting stakeholders, all else equal, means greater demand for a given level of public disclosure. At the same time, a greater number of transacting stakeholders, all else equal, means a less elastic demand curve with respect to shadow prices, or equivalently, a more elastic demand curve with respect to public disclosure quantities. This implies that a given shift of the demand curve moves disclosure quantities more strongly than a similar shift of the supply curve.

We can illustrate these predictions graphically, a key benefit provided by our translation of firms' public disclosure decision problem into supply and demand curves (Weyl, 2019). Figure 2 Panel A depicts the disclosure quantities chosen by two firms with identical supply curves, but differing demand curves. Firm 2 has twice as many transacting stakeholders as firm 1, while the average shadow price per transacting stakeholder is the same for both firms. Due to vertical aggregation of stakeholders' individual demand, the greater number of transacting stakeholders results in an outward shift and a steepening of the downward sloping aggregate demand curve and the corresponding marginal revenue curve of firm 2 relative to firm 1.

The outward shift illustrates that a greater number of transacting stakeholders, all else equal, increases disclosure demand (Prediction 1) and firms' public disclosure (Prediction 2). In the example above, firm 2 chooses a larger public disclosure quantity than firm 1 (on the intensive margin: $q_2^* > q_1^*$), and is more likely to disclose (on the extensive margin: $\pi(q_2^*) > \pi(q_1^*)$). Intuitively, firm 2 can obtain larger net benefits for a given disclosure quantity since it can collect shadow prices from a greater number of stakeholders while incurring the same public disclosure costs (compared to firm 1). This also holds when both firms can use private communication: Public disclosure constitutes a relatively cheaper means of communication (compared to private communication) for firm 2 than for firm 1, because the private communication costs increase with the number of transacting stakeholders.

The steepening of the downward sloping demand curve implies that parallel marginal revenue curve shifts become relatively more important for disclosure quantities (not necessarily for the extensive margin decision) than supply curve shifts. Figure 2 Panel B illustrates this relation. The figure depicts the relative impacts on firms' disclosure quantity of parallel shifts of relatively steep (i.e., inelastic) marginal revenue curves compared to parallel shifts of relatively flat (i.e., elastic) supply curves. We observe that marginal revenue curve shifts move firms' public disclosure more than equal supply curve shifts (on the intensive margin: $q_2^{\Delta MR*} > q_2^{\Delta S*}$), because the marginal revenue curve is steeper (i.e., less elastic) than the supply curve (Prediction 2). Hence, the disclosure quantity observed in equilibrium is chiefly driven by the marginal revenue curve; that is, demand-side factors.

3. Empirical Analysis

Our framework highlights the importance of the number of transacting stakeholders for firms' public disclosure decision. This prominent role of the number of stakeholders could be a key to understanding why even some private firms may prefer public disclosure. Hence, in this section, we empirically investigate it in a sample of private firms.

3.1. Empirical strategy

To test the predictions of our framework, we need to map the theoretical constructs to empirical proxies, as summarized in Figure 3. On the construct level, we want to test whether the number of transacting stakeholders increases firms' public disclosure demand (Prediction 1), and whether firms' public disclosure demand in turn chiefly determines firms' disclosure decisions (Prediction 2). Empirically, we do not observe firms' public disclosure demand separately from their disclosure decision. Accordingly, we rely on a joint test of Predictions 1 and 2. In particular, we examine the relation between the number of transacting stakeholders (proxied by online views) and firms' disclosure outcomes. With this approach, we essentially use the number of transacting

stakeholders as an instrument for public disclosure demand (following Prediction 1). Our approach can be illustrated by the following two-stage representation:

[First stage] $D_{i,t} = \alpha' + \beta_1 N^I_{i,t} + \varepsilon'_{i,t}$

[Second stage] $Y_{i,t} = \alpha + \beta_2 \hat{D}_{i,t} + \varepsilon_{i,t}$

where $D_{i,t}$ denotes public disclosure demand, $Y_{i,t}$ denotes firm i's disclosure outcome in fiscal year t, and $N^I_{i,t}$ denotes the number of interested stakeholders of firm i's public disclosure in fiscal year t. By Prediction 1, we expect $\beta_1 > 0$ and by Prediction 2, we expect $\beta_2 > 0$. Absent a direct measure of firms' disclosure demand $D_{i,t}$, we estimate the models of the following structure in our empirical section:

[Reduced form] $Y_{i,t} = \alpha + \beta N^I_{i,t} + \varepsilon_{i,t}$.

The coefficient of interest in this reduced form estimation, β, corresponds to the product of the first and second stage coefficient (i.e., $\beta = \beta_2 \beta_1$). Thus, a positive association between the (approximate) number of transacting stakeholders ($N^I_{i,t}$) and firms' public disclosure ($\beta > 0$) would be consistent with the joint validity of Prediction 1 ($\beta_1 > 0$) and Prediction 2 ($\beta_2 > 0$).[12]

3.2. Institutional setting

We test our predictions in the setting of German private firms. In Germany, all limited-liability firms—public and private ones—are mandated to disclose their financial statements on an official publication platform, the Federal Gazette. There are, however, substantial differences in disclosure requirements based on firm size (for an overview, refer to Table 2). "Small" firms only need to disclose a basic balance sheet and accompanying notes, whereas "medium" firms need to provide a

[12] We implement our empirical strategy in different specifications that we explain in detail in Section 3.4 together with our empirical results.

full set of audited financial statements with only minor exemptions. A firm is classified as "medium" if it exceeds any two of three size thresholds (total assets: approx. 5 million Euro; sales: approx. 10 million Euro, employees: 50) in two consecutive years. In 2011, public disclosure requirements were relaxed for so-called "micro" firms (with total assets of less than 350,000 Euro, sales of less than 700,000 Euro and/or less than ten employees). Besides a reduction of minimum disclosure quantities, the reform granted micro firms the option to restrict public access to their filings by requiring user registration and a small fee.

This setting provides us with different sources of variation in firms' public disclosure decisions for our distinct empirical tests. First, the general disclosure mandate allows us to observe public disclosure outcomes and, importantly, stakeholders' interest in these disclosures (online views) for a comprehensive set of firms, spanning a broad range of firm sizes. We exploit the substantial *across*-firm variation in firm sizes to test the link between transacting stakeholders and firms' public disclosure decision at the intensive margin. Second, the regulatory relaxation of the disclosure requirements for "micro" firms constitutes a natural experiment, allowing us to examine firms' public disclosure decision at the extensive margin. We use this regulatory change to investigate whether the number of transacting stakeholders of a firm (observed before the relaxation) predicts firms' decision to restrict public access to their regulatory filings after the regulatory change. Third, the discontinuous reporting requirements applying to "small" and "medium" firms provide us with exogenous shifts in firms' public disclosure supply which are unrelated to firms' stakeholder base. We use the variation *within* firms switching regulatory size classes (as a result of minor firm-size changes around the regulatory thresholds) to examine reverse causality concerns.

3.3. Empirical proxies and data sources

Number of stakeholders

We use online views of firms' public disclosures on the Federal Gazette (the official publication platform described in the previous section) to proxy for the number of transacting stakeholders. This measure can be expected to be relatively comprehensive and free from selection because the platform serves as the central information register for firm information in Germany, it provides firm information free-of-charge and without registration needs, and there are—by law—no other competing (free of charge access) information providers during our sample period.

Online views do not only capture transacting stakeholders, but rather reflect the number of *all* stakeholders interested in firms' public disclosures. We assume that the number of all interested stakeholders is positively correlated with the number of transacting stakeholders in the cross-section, allowing us to approximate the latter with the number of online views. We regard this assumption as a priori plausible for two reasons. For one, the number of transacting stakeholders is a subset of the number of interested stakeholders (Figure 4). Hence, more transacting stakeholders should manifest in more interested stakeholders, all else equal. For another, transacting stakeholders likely make up a substantial part of the interested stakeholders for our sample firms which are mostly small and medium-sized private firms. These firms are unlikely to be known by and of substantial interest to the wider public. Thus, their set of interested stakeholders is likely comprised mostly of the narrow set of stakeholders actually transacting or considering transacting with the firm. In conclusion, we expect any noise introduced in our empirical tests due to non-transacting stakeholders to attenuate the predicted positive association between the number of stakeholders and firms' disclosure decisions (as discussed in our analytical derivation (2.2)).[13]

[13] Consistent with these arguments, we later document that industry-level competition adds almost nothing to explaining the variation in online views and provide empirical evidence suggesting that the relation between firms' disclosure outcomes and online views is not substantively confounded by competitors.

Firms' public disclosures

Our main proxy for firms' intensive margin disclosure decision is the total number of characters in a firms' filing to capture the quantity of firms' public disclosure. This number comprises symbols, letters, and numbers. It provides a summary measure of the level of disaggregation of firms' financial statements (e.g., line items reported in the balance sheet (Chen et al., 2015)) and the information provided in the notes and MD&A (such as narrative information or additional schedules).

Some of the across-firm variation in the number of characters is determined by the mandatory disclosure requirements rather than firms' voluntary disclosure choices. The influence of disclosure requirements on firms' disclosure outcomes raises two issues. First, the size-based regulation may spuriously introduce a correlation between observed disclosure outcomes and firm size (related to transacting stakeholders) by prescribing greater disclosure requirements for larger firms. To account for the differences in disclosure requirements across firms, we focus on variation *within* regulatory size classes in our main tests. Second, within a regulatory size class, firms' disclosures may mechanically relate to their business complexity to the extent that firms with a more diverse business structure have more mandatory items to report. Although a major mechanical influence of business complexity seems unlikely because our regulation prescribes only few mandatory line items, we provide empirical evidence mitigating this concern in our robustness section using alternative disclosure outcomes. Third, the minimum disclosure requirements provide a floor for firms' disclosure outcomes. To the extent that some firms' voluntary (intensive margin) disclosure quantity falls short of their minimum requirements, the observed disclosures outcomes are truncated from below (Breuer et al., 2018b). This truncation reduces the variation in disclosure outcomes and attenuates any positive relation between observed disclosures and firms' transacting stakeholders. So long as at least some firms' disclosure incentives exceed the prescribed minimum requirements, we can still examine cross-sectional differences in firms' *voluntary* disclosure (e.g., similar to cross-sectional studies of firms'

disclosure quality in US capital markets (e.g., Botosan, 1997; Chen et al., 2015). (For a validation of this measure, see Figure A.1 in the Online Appendix.)

Data sources

We use data from the Federal Gazette, Germany's official publication platform for firms' public disclosure of financial statement, and Bureau van Dijk's *dafne* database, the largest private information provider. From the Federal Gazette, we obtain public disclosure data for German private limited-liability firms for fiscal years 2006 to 2012 and summary statistics of online views of public disclosures made after December 2011. From Bureau van Dijk's *dafne* database, we obtain data on complementary firm characteristic for our sample of private limited-liability firms. We truncate ratio variables to their natural boundaries and firm-size variables at the top and bottom 1% of their distribution within a regulatory size class. Finally, we obtain data on industry concentration from the official report of the German Monopoly commission.[14] Descriptive statistics and univariate correlations are provided in the Appendix (Table A.1 and Table A.2).

3.4. Results

Determinants of the number of online views

As a first step, we examine how online views, our proxy for transacting stakeholders, relate to various firm characteristics. Table 3 Columns (1) and (2) show that only 1% of the residual variation in firms' online views, after accounting for county-year, regulatory size class, and legal form fixed effects, is explained by capital structure and industry competition. Column (3) (Column (4)) indicates that the within R-squared increases to 23% (30%) when including proxies for several aspects of firm size related to transacting stakeholders such as total assets and the number of owners (plus firms' sales, employees, and accounts payable). Decomposing the R-squared into the contribution by different

[14] The official report is available online: http://www.monopolkommission.de/images/PDF/HG/HG19/anlage_a.pdf (last accessed 31 January 2020).

groups of regressors further reveals that transacting-stakeholder related firm-size dimensions account for the major share in explanatory power, while the relative contribution of industry competition to the models' R-squared is close to zero.

The strong relation between the number of online views and proxies for firms' distinct transacting stakeholder groups is further reflected in the coefficient magnitudes. Transacting-stakeholder-related variables such as total assets, banks, sales, and employees display the largest standardized coefficients. By contrast, the standardized coefficient on the Herfindahl-Hirschman index of a firm's industry is comparably small (0.031, compared to, e.g., a standardized coefficient of 0.261 for total assets). Taken together, these results support the construct validity of the number of online views as a cross-sectional proxy for the number of firms' transacting stakeholders.

Number of transacting stakeholders and firms' public disclosure

To investigate the association between the number of stakeholders and firms' disclosure decisions, we estimate the following cross-sectional regression with OLS:

$$Y_{i,t} = \beta N^{I}_{i,t} + \varphi X'_{i,t} + \alpha_{c,t} + \delta_{s} + \lambda_{l} + \varepsilon_{i,t}.$$

$Y_{i,t}$ denotes firm i's disclosure outcome in fiscal year t (proxied by the number of characters, publication timeliness, and choice of voluntary audit), $N^{I}_{i,t}$ denotes the number of interested stakeholders of firm i's public disclosure in fiscal year t (proxied by the logarithm of the number of online views), $X'_{i,t}$ denotes a vector of firm-specific controls relating to a firm's profitability and capital structure, $\alpha_{c,t}$ denotes the constant for county c in fiscal year t, δ_{s} denotes the constant for regulatory size class s ("small", "medium," or "large"), and λ_{l} denotes the constant for legal form l.

We do not include other size controls (such as sales, the number of owners, or employees) in our main specification as our prediction is *not* that the number of stakeholders—holding, for example,

the sales of firms' other goods constant—is positively related to firms' public disclosure. Rather, our prediction is that the number of those stakeholders actively contributing to firms' size through transacting firms' other goods at greater quantities or higher prices (e.g., due to lower uncertainty discounts) after reviewing firms' financial positions increases public disclosure demand and firms' public disclosures.[15]

Table 4 reports the corresponding estimates. Without any size controls, the number of transacting stakeholders explains 4% of firms' public disclosure quantities (within R-squared in Column (1) of Table 4). Although this magnitude does not appear large per se, it amounts to a substantial share of explanatory power of our most extensive model including several firm-size controls (4.3/17.1=25% of the entire within R-squared of our model in Column (3)). Notably, the limited ability of even our most extensive model to explain disclosure outcomes reflects the fact that firms' disclosure outcomes are constrained by regulatory requirements in our setting. For example, firms' regulatory size classes which prescribe minimum disclosure quantities explain as much as a third of the variation in their public disclosure quantities (R-squared within a given county-year and legal form, untabulated).

Turning our focus to the coefficient estimates, we observe that the number of firms' transacting stakeholders as captured by online views is strongly positively associated with firms' public disclosure quantity (proxied by the number of characters) across all specifications (Columns (1), (2), and (3) of Table 4). While the coefficient magnitude of the number of online views remains fairly unaffected by including controls for firms' capital structure and industry competition (Column (2) of Table 4), it decreases in magnitude when further controlling for other size-related characteristics such as total assets and number of owners, but remains statistically significant at the 1% level (Columns (3),

[15] As a firm's size can be expected to be rather constant over time, we focus on the variation in firm size *between* firms and hence do not include firm fixed effects.

(6), and (9) of Table 4). This attenuation upon inclusion of size/transacting-stakeholder-related controls is expected and, if anything, reassuring rather than troubling. The attenuation reflects the fact that our proxy for the number of transacting stakeholders is strongly positively correlated with several dimensions of firm size (see also Table 3).

3.5. Robustness

The positive association between the number of firms' online views and the number of characters in firms' filings is consistent with our prediction that the number of transacting stakeholders is a prime determinant of firms' public disclosure behavior. The cross-sectional association, however, is prone to several biases threatening the validity of this inference. In the following subsections, we document that our main result does not primarily reflect firms' internal complexity, is not merely driven by greater disclosure quantity leading to more transacting stakeholders, and is not unduly confounded by interested, but non-transacting stakeholders (e.g., competitors).

Correlated omitted factor: firms' internal complexity

An important concern is that the positive association between the number of online views and characters might reflect differences in firms' *internal* (operating) complexity rather than differences in their *external* disclosure demand originating from transacting stakeholders. For example, larger, more complex firms may simply have more line items to report in their mandatory filings and exhibit a larger number of interested outsiders viewing their financial statements.

On institutional grounds, we expect the confounding influence of internal complexity on the relation between the number of online views and characters to be modest. Notably, the disclosure requirements in our setting allow for high levels of aggregation in the financial statements (especially compared to 10-Ks provided by US public firms). The maximum number of mandatory line items to be disclosed by "small" ("medium") firms on the balance sheet is 22 (39). The number of mandatorily disclosed line items, hence, is unlikely to vary substantially across firms of different internal complexity

or with different business models. To further mitigate concerns about the confounding influence of firms' internal complexity, we investigate the association between the number of online views and three further proxies capturing firms' public disclosure decisions: firms' publication lag, voluntary audits, and public access restrictions.

First, we use firms' publication lag between fiscal year-end and the publication date of their filing as a proxy for the timeliness of their public disclosure. We expect firms with a greater external disclosure demand to publish more timely financial statements, manifesting in a negative association between the number of transacting stakeholders and firms' publication lag. Notably, the preparation and filing of financial statements of internally complex firms, all else equal, should rather be expected to require more time, resulting in longer, not shorter, external filing lags. Consistent with firms' disclosure incentives increasing in the number of transacting stakeholders, we find a strongly negative association between online views and firms' filing lag (Columns (4) and (6) of Table 4).[16]

Second, we use "small" firms' voluntary external audits as a proxy for the quality of their public disclosures. External audits are a mechanism to reduce information frictions between firm insiders and external stakeholders (e.g., DeFond and Zhang, 2014). Accordingly, we expect that firms facing greater disclosure demand from their transacting stakeholders are more likely to incur the cost of enhancing the quality of their public disclosures by obtaining an audit. We acknowledge that more internally complex firms may also benefit from audits (e.g., to reduce information-related agency frictions between management hierarchies and/or subsidiaries). Yet, our "small" sample firms are unlikely to exhibit several layers of internal hierarchies and subsidiaries. Moreover, it is not clear why these firms would decide to obtain and publicly communicate the external audit rather than invest in

[16] Our measure of online views is measured over the twelve months following firms' publication of their financial statements rather than their fiscal year-end. This fixed window approach yields a comparable measure of online views across firms and years and avoids a mechanical link between online views and publication lag.

internal auditing and controls to manage their internal complexity. Again consistent with firms' disclosure incentives increasing in the number of transacting stakeholders, we find a strongly positive association between online views and "small" firms' choice to obtain and disclose an external audit (Columns (7) and (9) of Table 4).

Lastly, we use an indicator taking the value of one for firms restricting access to their financial statements as a proxy for firms' extensive margin decision. From fiscal year 2012 onwards, "micro" firms can choose to restrict public access to their filings. We expect "micro" firms with more transacting stakeholders to be less likely to restrict public access to their financial statements. By contrast, it is not clear why internally more complex firms should be more likely to continue allowing public access. If anything, one may expect more internally complex and sophisticated firms to be more likely to restrict public access in the first year after the reform due to their greater awareness of the regulatory change (e.g., Gassen and Muhn, 2018).

To test the association between the number of stakeholders and "micro" firms' disclosure decision at the extensive margin, we estimate the following regression:

$$Y_{i,t} = \beta N^{I}_{i,t-1} + \varphi X'_{i,t-1} + \alpha_{y,c} + \lambda_{l} + \varepsilon_{i,t}.$$

$Y_{i,t}$ denotes an indicator variable taking the value of one if the firm i makes use of the option to restrict public access to its financial statements in fiscal year $t = 2012$ (and zero otherwise), $N^{I}_{i,t-1}$ denotes the number of interested stakeholders (logarithm of online views) of firm i's public disclosure in the latest period before the regulatory change became effective (fiscal year $t-1 = 2011$), $X'_{i,t-1}$ denotes a vector of controls measured in in fiscal year $t-1 = 2011$ for firm i's profitability and, $\alpha_{y,c}$ denotes the constant for industry y in county c, and λ_{l} denotes the constant for legal form l.

The specification resembles a difference-in-differences design with a continuous treatment variable (e.g., Carpenter and Dobkin, 2011). Our outcome variable, the change in firms' disclosure behavior from the pre- to the post-reform year, represents the temporal difference (pre vs. post). The number of interested stakeholders represents the continuous treatment variable sorting firms based on the intensity of treatment (less vs. more treated). Notably, this specification is less prone to concerns that some omitted characteristics (e.g., firms' internal complexity) affect the association between the number of stakeholders and public disclosure outcomes.

Table 5 presents the corresponding coefficient estimates. Table 5 Columns (1) – (2) document that the (lagged) number of online views is strongly negatively associated with the likelihood that firms' exercise the option to restrict access to their public disclosure. This evidence suggests that firms with more disclosure demand are more likely to make their financial statements public on a voluntary basis, consistent with public disclosure being a more suitable communication device compared to private communication for firms with a larger transacting stakeholder base. Interestingly, the (lagged) amount of total assets is strongly positively associated with the likelihood that firms' exercise the option to restrict disclosure access. This could suggest that more sophisticated firms (as measured by total assets) were among the first firms to be aware and take advantage of the new disclosure restriction in the first year of the option (i.e., our sample year 2012); consistent with evidence in Gassen and Muhn (2018). Thus, this result also supports the notion that our click-based measure of transacting stakeholders is key to disentangle empirically demand-side explanations of disclosure outcomes such as ours from supply-side explanations such as higher sophistication of larger firms.

Taken together, our empirical tests suggest that firms' public disclosures decisions are positively associated with their number of transacting stakeholders. This robust pattern holds for

different disclosure proxies and disclosure margins, mitigating concerns that our tests merely pick up variation in firms' internal complexity.

Reverse causality: disclosures driving demand

A further important concern is that our findings may be the result of reverse causality: firms' public disclosure could determine the number of online views. For example, firms' public disclosures could attract attention and, hence, increase the number of existing and potential transacting stakeholders. Moreover, longer filings with more characters could take longer to read so that stakeholders click on them several times.

To address the reverse causality concern, we investigate whether exogenous shifts in firms' public disclosure actually lead to sizeable shifts in the number of interested stakeholders. If this is not the case, reverse causality cannot explain the robust positive empirical relationship between the number of interested stakeholders and firms' public disclosure documented above. As a source of plausibly exogenous variation in firms' public disclosures, we use that the regulation assigns distinct disclosure requirements to otherwise similar "small" and "medium" firms. Specifically, we estimate the following two first-difference specifications:

$$\Delta Y_{i,t} = \beta \Delta Class_{i,t} + \varphi \Delta X'_{i,t} + \alpha_{c,y,t} + \lambda_l + \varepsilon_{i,t},$$

$$\Delta N^I_{i,t} = \beta \Delta Class_{i,t} + \varphi \Delta X'_{i,t} + \alpha_{c,y,t} + \lambda_l + \varepsilon_{i,t},$$

where $\Delta Y_{i,t}$ denotes the change in public disclosure quantity (i.e., change in logarithm of the number of characters of public disclosure) of firm i from fiscal year $t-1$ to fiscal year t, $\Delta N^I_{i,t}$ denotes the change in the number of interested stakeholders (logarithm of online views) of firm i from fiscal year $t-1$ to fiscal year t, $\Delta Class_{i,t}$ takes the value of 1 if firm i switches from the "small" into the "medium" regulatory size class in fiscal year t, $\Delta X'_{i,t}$ denotes a vector of differenced controls

including firm i's regulatory size dimensions (total assets, sales, and employees), $\alpha_{y,c,t}$ denotes the constant for industry y in county c in fiscal year t, and λ_l denotes the constant for legal form l.

By using first differences, we exploit the within-firm variation that results from firms growing out of the "small" into the "medium" regulatory size class and vice versa. For these firms, we investigate whether firms' public disclosure and the number of interested stakeholders increase after switching from the "small" into the "medium" class. In contrast to our main tests where we focused on the cross-sectional variation in the number of stakeholders, we now aim at isolating the effect of a change in firms' public disclosures on their number of stakeholders, holding firm size dimension approximately constant. Clearly, the switch from one size class to another is mechanically caused by rather than unrelated to a change in firms' size. In the spirit of a regression discontinuity design, however, our key assumption is that the year-over-year (*within*-firm) change in firm size causing the regulatory class switch is rather limited (compared to the cross-sectional variation in size exploited in our main tests), whereas the change in disclosure quantities due to discontinuous disclosure requirements is substantial. Accordingly, any effect on firms' disclosure demand (e.g., their number of transacting stakeholders) resulting from a switch of the regulatory size class is plausibly attributable to the stark and discontinuous change disclosures rather than the limited change in firm size. To the extent the within-firm size change confounds this estimation, we expect a mechanical increase in firms' number of stakeholders, biasing the estimated coefficient upward. This bias would work against us (i.e., would falsely indicate a reverse causality issue).

Table 6 reports the corresponding estimates. Table 6 Panel A Column (1) documents that firms switching into the "medium" class increase their disclosure quantity by 125%. By contrast, Panel

A Column (2) documents that for firms switching into the "medium" class, stakeholders' online views even slightly decrease by a statistically and economically insignificant 1%.[17]

This low elasticity of the number of stakeholders with respect to public disclosure quantity shifts reinforces two points. For one, the low elasticity suggests that our prior empirical results cannot be due to reverse causality (greater disclosure quantity causing greater demand); the effect of public disclosure on the number of interested stakeholders is too small to explain the robust relation between firms' public disclosure and their number of interested stakeholders. For another, the low elasticity of the number of interested stakeholders suggests that it is the characteristics of the other goods offered by firms that chiefly determine the disclosure demand, not the characteristics of firms' public disclosure *per se*. This evidence is consistent with our view of public disclosure as a complement to firms' other goods taken in our microeconomic analysis.

Correlated measurement error: non-transacting stakeholders

A remaining concern is that online views may measure the number of firms' transacting stakeholders, the construct of interest, with error. In our microeconomic analysis, we posit that disclosure demand influences firms' public disclosures due to a shadow price paid by transacting stakeholders. In our empirical tests, we approximate the number of transacting stakeholders by the number of online views which reflect the number of all interested stakeholders. Since this proxy includes stakeholders paying a zero shadow price, the relation between disclosure demand and disclosure outcomes as reflected in the associations presented above is potentially understated. In particular, one would expect firms' disclosure to be negatively related to online views that originate from competitors; that is, interested, but non-transacting stakeholders which pay a zero price for firms'

[17] These inferences are confirmed for the longer-run impact of class switch (beyond the effect in the first year) found using firm fixed effects specification (Table 6 Panel B). Hence, the low elasticity is not merely due to greater noise in changes of online clicks compared to their levels (Cochrane, 2012).

public disclosure and, additionally, levy (proprietary) costs of public disclosure on the firms (i.e., shift firms' supply curve up).

To shed light on the distinct relations between the number of different stakeholder types and firms' public disclosure, we decompose the number of online views into two parts: online views related to firms' competitive environment as captured by their industry's Herfindahl-Hirschman-Index ("competition" online views), and online views orthogonal to firms' competitive environment ("non-competition" online views). While we expect the competition-related views to be negatively related to firms' disclosures as they capture disclosure demand from non-transacting stakeholders, we expect the non-competition views and the disclosure demand captured by them to stem mainly from transacting stakeholders and thus be positively associated with firms' public disclosures.

Table 7 present the corresponding estimates. Consistent with our predictions, the number of interested stakeholders purged of variation due to competitors (as captured by non-competition views) remains strongly positively associated with firms' public disclosure quantity, timeliness, and quality with magnitudes and *t*-values virtually unchanged from our main specification. Hence, other non-transacting stakeholders (in particular, competitors) do not appear to confound or attenuate the association between our proxy for transacting stakeholders and disclosure outcomes unduly. This finding is also consistent with our previous analysis of the determinants of the number of online views (Table 3) which suggested that firms' industry competition does not explain a substantial part of and exerts a strong influence (in terms of coefficient magnitude) on firms' online views.

We further find that the number of non-transacting stakeholders related to firms' competitive environment is strongly negatively associated with firms' disclosure quantity, and less strongly positively associated with firms' disclosure timeliness and quality (in terms of *t*-statistics). The negative correlation of competition-related online views and public disclosure quantity suggests that

competitors not only provide zero shadow prices for firms' public disclosure quantity, but also increase firms' public disclosure costs; hence, affecting firms' disclosure quantity decisions via a supply curve channel. The positive associations of competition-related online views and firms' disclosure timeliness and auditing propensity likely reflect factors other than disclosure costs and benefits. For example, industrial organization-based considerations likely explain the positive association between industry concentration and the propensity to provide audited financial statements. In particular, more concentrated industries tend to go hand in hand with greater entry barriers and larger firm sizes (e.g., more subsidiaries, more internal control issues) resulting in reliance on audits for reasons other than transacting and non-transacting stakeholders (e.g., competitors).

4. Conclusion

Viewing public disclosure as a good, we frame firms' public disclosure decision in terms of supply and demand curves. This framing uncovers intuitive, nonetheless novel predictions: the number of transacting stakeholders is a key determinant of firms' public disclosure demand, and firms' public disclosure demand chiefly shapes firms' public disclosure decisions. Across a number of specifications, settings, and disclosure margins (intensive margin vs. extensive margin, quantity vs. quality), we provide empirical support for these predictions using a broad sample of private firms.

Our framework and tests uncover a fundamental demand force which can explain why even some private firms may find public disclosure worthwhile. A better understanding of the first-order supply and demand forces shaping firms' public disclosure is important (Ball, 2008), because it informs our understanding of whether market forces are sufficient to generate corporate transparency or whether there is a role for regulation. Our paper suggests that larger firms transacting with several stakeholders (e.g., suppliers and customers) are incentivized to resort to public disclosures. This finding limits the role of financial-reporting regulation in improving resource allocation (e.g., Breuer, 2019), because the most important firms in an economy's network may already voluntarily disclose.

Our framework rather suggests that there may be a role for environmental, social, and governance (ESG) reporting regulation in addressing social issues (e.g., Christensen et al., 2019), because those firms affecting most people's lives (e.g., through pollution of the environment) may not be the ones transacting with many stakeholders (e.g., fracking companies). Absent regulatory interventions, these firms may not respond to the disclosure demands of their (non-transacting) stakeholders (e.g., their neighbors).

Appendix A: Net Benefits of Private Communication

To better understand the difference between public disclosure and private communication, we provide a simple formulation of the net benefit of private communication (which we have left unspecified above):[18]

$$\phi_i^* = \max_{\{q_{ji}\}_{j=1,\ldots,N_i^T}} \left\{ \sum_{j=1}^{N_i^T} \left(p_{ji}(q_{ji}) q_{ji} - C_{ji}(q_{ji}) \right) \right\} = \sum_{j=1}^{N_i^T} \max_{q_{ji}} \left\{ p_{ji}(q_{ji}) q_{ji} - C_{ji}(q_{ji}) \right\} = \sum_{j=1}^{N_i^T} \phi_{ji}^* .$$

In contrast to the public disclosure decision, the firm chooses not one but multiple, stakeholder-specific disclosure quantities (denoted by the subscript j). This implies that the firm incurs disclosure costs for each stakeholder to which it discloses. Of course, these costs differ in type and magnitude from those incurred by public disclosure (e.g., proprietary costs may be lower because of a more targeted information dissemination excluding competitors).

Notably, our formulation of the private communication decision implies that the total net benefit of private communication (ϕ_i^*) increases in the number of transacting stakeholders by the *net* benefit obtained from the marginal stakeholder:

$$\frac{\partial \phi_i^*}{\partial N_i^T} = \phi_{N_i^T i}^* .$$

By contrast, the total net benefit of public disclosure increases in the number of transacting stakeholders by the *gross* benefit obtained from the marginal stakeholder:

[18] For simplicity, we neglect the endogeneity of the total number of firms' transacting stakeholders with respect to the disclosure decision here. Our view of disclosure as a complement to a firm's other goods implies that the effect of disclosure on the total number of transacting stakeholders is anyways negligible relative to the effect of the quality, quantity, and price (absent disclosure) of the other goods.

$$\frac{\partial \pi_i^*}{\partial N_i^T} = p_{N_i^T i}(q_i^*) q_i^* .$$

As the marginal gross benefit of public disclosure likely exceeds the marginal net benefit of private communication, the firm's incentive to choose public disclosure rather than private communication (or no communication at all) increases in the number of transacting stakeholders.

Appendix B: Socially Optimal Disclosure

In contrast to firm i's weighing of marginal revenue and costs to determine its voluntary disclosure quantity, the social planner would choose the intersection of the social demand curve and the firm's (social) supply curve to obtain the optimal disclosure quantity:

$$p_i^S(q_i^{S*}) = \frac{\partial c_i^S(q_i^{S*})}{\partial q_i^S} .$$

As Dye (2017) highlights, it is unclear whether this quantity is larger or smaller than the firm's voluntary disclosure because, both, the supply and demand curve are different. The social demand curve encompasses the externalities of public disclosure (e.g., demand by interested, but non-transacting stakeholders) and could thus be expected to be shifted outward relative to the private demand curve. In combination with the fact that the social planner would equate the supply with the demand rather than the marginal revenue curve, one may expect a larger amount of social relative to voluntary disclosure. This conclusion, however, is not general and obviously also depends on the form of the supply curve. While one would mostly expect that the social supply curve may be shifted inwards because proprietary costs tend not to (fully) represent social costs, the cost function can also be shifted outward if negative externalities of firms' public disclosure (e.g., destruction of risk sharing and risky investment opportunities; Goldstein and Yang, 2017; Hirshleifer, 1971; Kurlat and Veldkamp, 2015) are taken into account.

In any case, the social planner's extensive margin choice would be:

$$D_i^S = \begin{cases} 1 & if \quad \int_0^{q_i^{S*}} \left(p_i^S(k) - \frac{\partial c_i^S(k)}{\partial q_i^S} \right) dk > f_i^S + \max[0, \phi_i^*] \\ 0 & otherwise \end{cases}$$

where ϕ_i^* denotes firm i's total net benefits of private communication.

Hence, the socially optimal disclosure quantity q_i^{S**} would be given by the product of the socially optimal extensive and the intensive margin:

$$q_i^{S**} = D_i^S q_i^{S*}.$$

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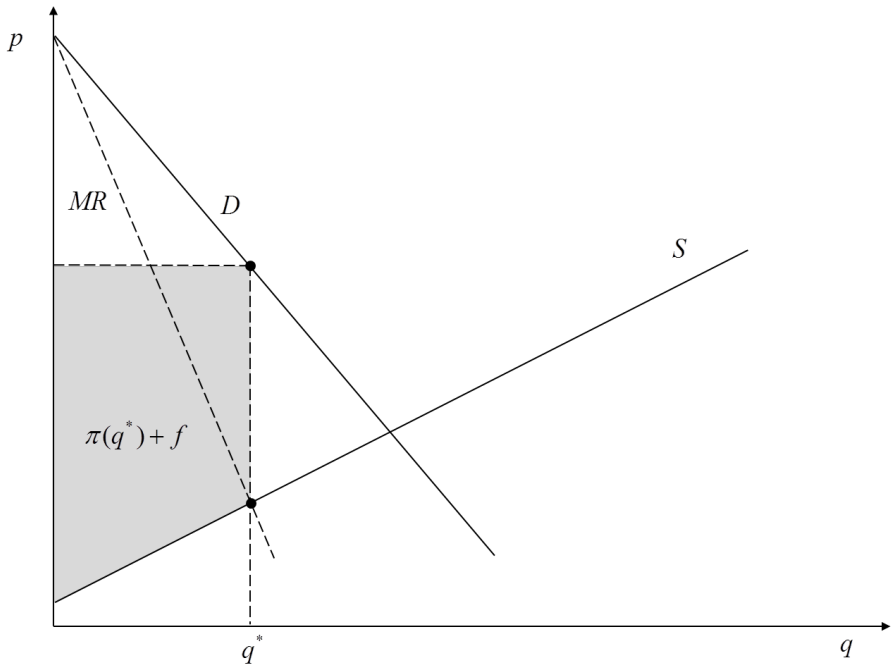
Figures & Tables

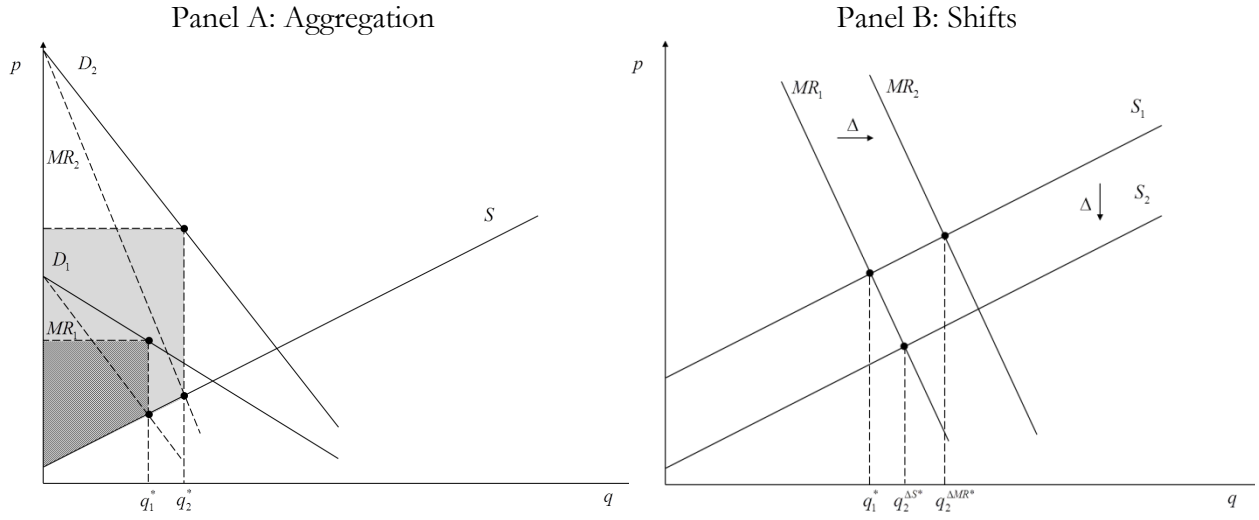
Figure 1

Equilibrium



This figure depicts the private demand curve (D), the marginal revenue curve (MR), and the supply curve (S) of firms' public disclosure in the typical ("shadow") price-quantity graph. The intersection of the marginal revenue and the supply curve determines the optimal intensive margin quantity (q^*). The net benefit of public disclosure (before fixed costs) is provided by the grey area ($\pi(q^*)+f$).

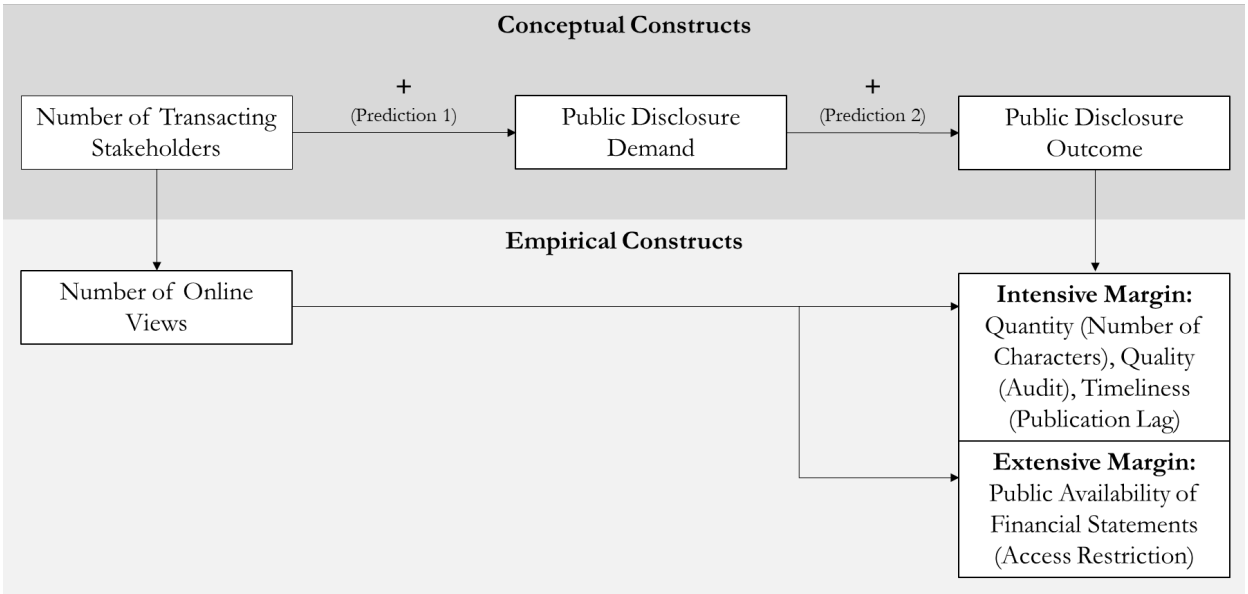
Figure 2



This figure depicts the impact of an increase in the number of transacting stakeholders (in Panel A) and the relative impact of marginal revenue versus supply curve shifts (Panel B). The graph in Panel A illustrates a central property of public goods: the vertical aggregation of the demand curve. A doubling of the number of transacting stakeholders shifts the original demand curve (D_1) outwards and steepens its slope (D_2). The marginal revenue curves behave similarly. The graph illustrates that the doubling of the number of transacting stakeholders increases the optimal intensive margin disclosure quantity from q_1^* to q_2^* and enlarges the net benefit (before fixed costs) of public disclosure from the dark grey/shaded area by the light grey area (thereby increasing the incentive to provide public rather than private communication or no disclosure). The graph in Panel B illustrates the relative impacts of shifts in curves of different elasticities. The marginal revenue curves are drawn less elastic (with respect to "shadow" price changes) than the supply curves. Thus, an outward shift of the marginal revenue curve has a greater impact on the optimal intensive margin disclosure quantity than an equally-sized downward shift of the supply curve ($q_2^{\Delta MR^*} > q_2^{\Delta S^*}$). As the vertical aggregation of the public disclosure demand curve results in a rather steep (i.e., price-inelastic) demand and marginal revenue curve, this suggests that demand curve shifts have greater impacts on public disclosure quantities (at the intensive margin) than similar supply curve shifts.

Figure 3

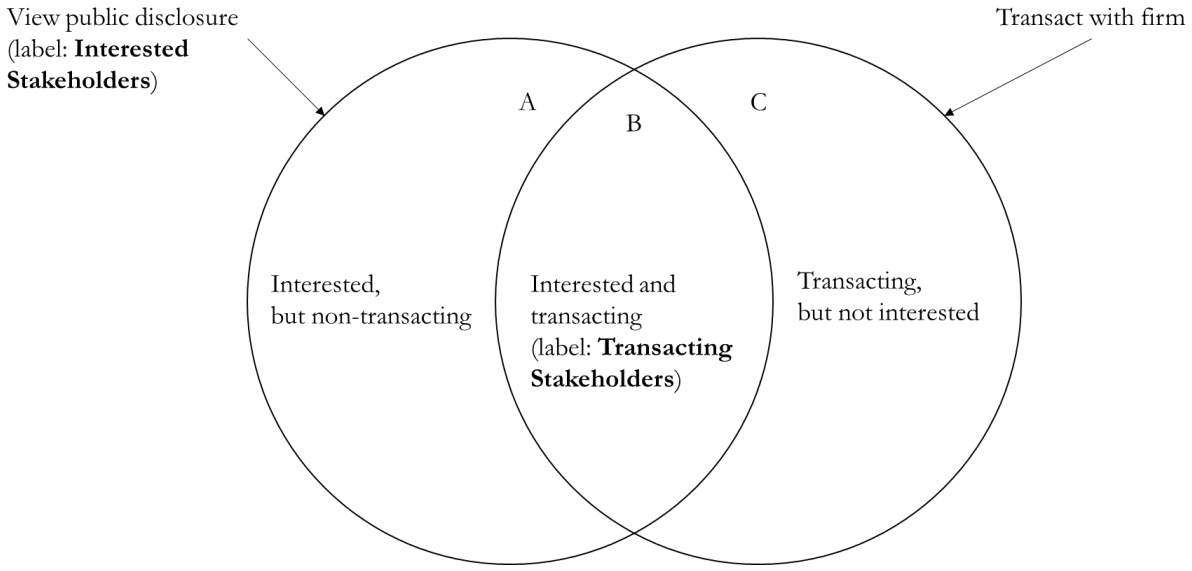
Summary of Empirical Approach



This figure illustrates our empirical approach in the vein of Libby boxes. On a conceptual level, our predictions imply a positive association between the number of transacting stakeholders and public disclosure demand, and between public disclosure demand and public disclosure outcomes. In our operationalization of these conceptual constructs, we approximate the number of transacting stakeholders by the number of online views. The number of online views provides a direct measure for the number of interested stakeholders. Our approximation of the number of transacting stakeholders using the number of interested stakeholders relies on the assumption that the number of transacting stakeholders is (strongly) positively correlated with the number of interested stakeholders. We view this assumption as a priori reasonable given that the number of interested stakeholders, by definition, is made up of the number of transacting and non-transacting stakeholders interested in firms' public disclosures. We then use the number of online views (our proxy of the number of transacting stakeholders) as our explanatory variable which we relate to a number of proxies for firms' public disclosure choices (e.g., intensive margin disclosure quantity approximated by the number of characters in firms' public disclosure). Notably, we directly relate our proxy for the number of transacting stakeholders with disclosure outcomes in our operationalization. This is owed to the absence of a direct measure of firms' public disclosure demand and is akin to a "reduced form" estimation of the joint validity of Prediction 1 and Prediction 2.

Figure 4

Stakeholder Typology



Stakeholder typology	Area	Condition
Interested stakeholders	**A+B**	$\max[\nu_{ji}(x_i, q_i), \varepsilon_{ji}(q_i)] > \max[0, \nu_{ji}(x_i)]$
Interested, non-transacting stakeholders	A	$\varepsilon_{ji}(q_i) > \max[0, \nu_{ji}(x_i, q_i), \nu_{ji}(x_i)]$
Transacting stakeholders	**B**	$\nu_{ji}(x_i, q_i) > \max[0, \varepsilon_{ji}(q_i), \nu_{ji}(x_i)]$
Transacting, but not interested stakeholders	C	$\nu_{ji}(x_i) > \max[0, \nu_{ji}(x_i, q_i), \varepsilon_{ji}(q_i)]$
Transacting (interested and not interested) stakeholders	B+C	$\max[\nu_{ji}(x_i, q_i), \nu_{ji}(x_i)] > \max[0, \varepsilon_{ji}(q_i)]$

This figure provides an illustration of the stakeholder types differentiated in our microeconomic analysis. The area A+B contains all stakeholders interested in firms' public disclosures (labeled: "interested stakeholders"). The area B+C comprises all stakeholders transacting (other goods) with firms independent of whether they are interested in firms' public disclosures or not. The intersection of the two main types of stakeholders is given by area B. This area comprises those stakeholders transacting (other goods) with firms, but only in conjunction with or after reviewing firms' public disclosures (labeled: "transacting stakeholders"). The table below the illustration provides a summary of the stakeholder typology including the analytical conditions defining the distinct areas.

Table 1

Variable Definitions	
Variable Name	Variable Definition
Public Disclosure Variables	
Number of Characters	Natural logarithm of the number of characters in a firm's public disclosure in a given year
Publication Lag	Natural logarithm of the number of days between a firm's fiscal year-end and the publication of its disclosure
Audit Dummy	Dummy variable equal to 1 if a firm's disclosures are audited in a given year, 0 otherwise
Medium	Dummy variable equal to 1 if a firm falls into the "medium" regulatory size class in a given year, 0 if a firm falls into the "small" regulatory size class in a given year
Number of Stakeholders	
Number of Online Views	Natural logarithm of the number of clicks a firm's disclosure receives during the twelve months after its publication (plus one)
Size-Related Control Variables	
Total Assets	Natural logarithm of total assets in a given year
Age	Natural logarithm of one plus the number of years between a firm's foundation and its fiscal year-end
Number of Owners	Natural logarithm of a firm's number of owners in a given year
Number of Banks	Natural logarithm of one plus a firm's number of banks in a given year
Institutional Dummy	Dummy variable equal to one if a firm has an institutional owner in a given year, zero otherwise
Complexity Dummy	Dummy variable equal to one if a firm operates in more than one industry, zero otherwise
Bank Dummy	Dummy variable equal to one if a firm has a bank relationship recorded in *dafne*, zero otherwise
Other Control Variables	
HHI	Industry Herfindahl-Hirschman index, obtained from the German Monopoly Commission
Cash	Cash over total assets in a given year
Tangibility	Tangible over total assets in a given year
Leverage	Liabilities over total assets in a given year
ROA	Net profit over total assets in a given year
Loss Dummy	Dummy variable if a firm records a loss in a given year, zero otherwise

Table 2

Regulatory Size Thresholds and Mandatory Public Disclosure

Panel A: Thresholds implemented in German company law

Fiscal Year	Classification	Total Assets (million EUR)	Sales (million EUR)	Employees	Statutory Source
Since 2008	*Small*	X ≤ 4.84	X ≤ 9,68	X ≤ 50	s. 267 German Commercial Code
	Medium	4.84 < X ≤ 19.25	9,68 < X ≤ 38.5	50 < X ≤ 250	
	Large	X > 19.25	X > 38.5	X > 250	
Since 2012	*Micro*	X<0.35	X<0.7	X<10	s. 267a German Commercial Code

Panel B: Reporting requirements

	Balance sheet	Income statement	Notes	Management Report	Audit
Small	Abbreviated (22)	None	Major exemptions	No	No
Medium	Condensed (39)	Condensed (20/25)	Minor exemptions	Yes	Yes, by chartered bookkeeper
Large	Full (63)	Full (27/31)	Full	Yes	Yes, by statutory auditor
Micro	Abbreviated (10)	None	None	No	No

This table reproduces Table A.1 of the Online Appendix of Breuer et al. (2018b). It summarizes the regulatory size thresholds and associated mandatory disclosure requirements. Panel A of this table presents the threshold values for the assignment into one of the three regulatory size categories as implemented in Germany during our sample period. A firm is classified as medium-sized or large if it exceeds the thresholds of any two of the three size criteria in two consecutive years. Panel B of this table displays the differential reporting requirements applying to the three regulatory size categories. The numbers in brackets in the balance sheet and income statement column refer to minimum number of single-line items that need to be disclosed. For medium-sized and large firms, the number of positions in the income statement reflect the number of positions required under function of expense and nature of expense method, respectively.

Table 3

Determinants of Online Views				
	Number of Online Views			
	(1)	(2)	(3)	(4)
Cash	-0.017***	-0.016***	0.005**	-0.013*
	(-9.14)	(-8.86)	(2.90)	(-2.24)
Tangibility	-0.009**	-0.009**	-0.078***	-0.090***
	(-3.24)	(-2.97)	(-36.28)	(-15.24)
Leverage	0.103***	0.104***	-0.000	-0.002
	(33.78)	(34.42)	(-0.20)	(-0.34)
HHI		0.019***	0.026***	0.031***
		(9.35)	(16.46)	(5.83)
ROA			-0.019***	-0.002
			(-8.81)	(-0.24)
Loss Dummy			-0.044***	0.003
			(-18.81)	(0.45)
Total Assets			0.444***	0.261***
			(102.86)	(38.54)
Owners			0.047***	0.064***
			(15.76)	(11.61)
Banks			0.205***	0.158***
			(58.03)	(19.64)
Age			-0.096***	-0.067***
			(-28.11)	(-10.56)
Complexity Dummy			0.042***	0.052***
			(19.32)	(10.47)
Bank Dummy			-0.074***	-0.116***
			(-18.92)	(-12.66)
Institutional Dummy			-0.019***	0.001
			(-5.27)	(0.15)
Accounts Payable			0.054***	0.046***
			(37.49)	(9.73)
Sales				0.163***
				(18.77)
Employees				0.194***
				(24.40)
County-Year FE	Yes	Yes	Yes	Yes
Regulatory-Class FE	Yes	Yes	Yes	Yes
Legal-Form FE	Yes	Yes	Yes	Yes
Observations	1,451,166	1,451,166	1,119,679	44,410
# Clusters (Counties)	399	399	399	398
Adjusted R-Squared	0.011	0.012	0.233	0.300

Relative R-Squared Contributions:			
Capital Structure	97.98%	4.55%	2.18%
HHI	2.02%	0.19%	0.62%
Profitability		3.04%	0.72%
Size		92.21%	46.80%
Additional Size Criteria (Sales, Employees)			49.68%

This tables presents estimates of the determinants of our proxy for the number of stakeholders. The determinants include proxies of a firm's capital structure (cash, tangibility, and leverage), profitability (ROA, loss dummy), and different dimensions of firm size (total assets, owners, banks, age, complexity dummy, institutional ownership, bank dummy, and trade credit). In column (4), we include additional controls on firms' sales and employees which are available only for a subset of firms.

In all specifications, we account for county-year, regulatory size class, and legal form fixed effects. The R-Squared reflects the within-R-Squared after purging these fixed effects. R-Squared contributions are obtained from a Shorrocks-Shapley decomposition of different groups of regressors. Coefficients have been standardized for unit variance in the dependent and independent variables. *t*-statistics in parentheses are based on standard errors clustered by county. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4

Number of Stakeholders and Firms' Public Disclosure									
	Quantity (Characters)			Timeliness (Publication Lag)			Quality (Voluntary Audit)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Online Views	**0.208*** **	**0.191*** **	**0.052*** **	**-0.095*** **	**-0.100*** **	**-0.109*** **	**0.035*** **	**0.037*** **	**0.017*** **
	(96.44)	**(111.14)**	**(24.68)**	**(-35.44)**	**(-39.30)**	**(-45.22)**	**(19.48)**	**(19.99)**	**(8.95)**
Cash		0.015***	0.042***		-0.061***	-0.051***		0.001	0.007***
		(4.11)	(11.85)		(-23.62)	(-18.86)		(0.81)	(4.13)
Tangibility		0.098***	0.049***		-0.047***	-0.050***		0.014***	0.009***
		(49.88)	(26.10)		(-33.65)	(-34.61)		(7.15)	(3.97)
Leverage		0.155***	0.089***		0.032***	0.027***		-0.018***	-0.034***
		(43.67)	(24.36)		(17.76)	(14.01)		(-12.54)	(-16.01)
HHI		-0.033***	-0.029***		-0.003**	-0.001		0.008***	0.008***
		(-15.97)	(-17.28)		(-3.10)	(-0.53)		(5.48)	(5.21)
ROA			-0.019***			-0.006***			-0.024***
			(-9.82)			(-4.80)			(-13.50)
Loss Dummy			0.017***			0.046***			-0.006***
			(8.34)			(31.35)			(-3.68)
Total Assets			0.311***			0.049***			0.057***
			(113.79)			(22.05)			(22.57)
Owners			0.016***			-0.006***			0.001
			(9.58)			(-4.06)			(0.59)
Banks			0.005			0.022***			-0.005
			(1.48)			(8.41)			(-1.40)
Age			0.030***			-0.029***			-0.003
			(10.92)			(-11.47)			(-1.83)
Complexity Dummy			0.016***			0.008***			-0.001
			(11.38)			(6.86)			(-0.87)
Bank Dummy			0.035***			-0.039***			0.001
			(11.41)			(-15.62)			(0.36)
Institutional Dummy			0.009			-0.042***			0.024***
			(1.69)			(-6.22)			(8.83)
Accounts Payable			0.057***			-0.009***			0.020***
			(38.10)			(-5.85)			(10.55)

County-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulatory-Class FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Legal-Form FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,451,166	1,451,166	1,119,679	1,451,166	1,451,166	1,119,679	1,414,831	1,414,831	1,084,907
# Clusters (Counties)	399	399	399	399	399	399	399	399	399
Adjusted R-Squared	0.043	0.084	0.171	0.009	0.015	0.022	0.001	0.002	0.005

This table shows estimates of cross-sectional associations between the number of interested stakeholders (measured by online views) and disclosure outcomes. The dependent variables are disclosure quantity, measured by the natural logarithm of the number of characters (Columns (1) – (3)), publication lag measured by the natural logarithm of the number of days between publication date and fiscal year-end (Columns (4) – (6)), and a dummy variable indicating whether a small firm obtained a voluntary audit (Columns (7) – (9)). Columns (1), (4), and (7) show specifications with demand as only explanatory variable (but accounting for county-year, regulatory size class, and legal form fixed effects). In Columns (2), (5), and (8), we additionally control for firms' capital structure and industry competition. In Columns (3), (6), and (9), we further add several size-related control variables. In all specifications, we account for county-year, regulatory size class, and legal form fixed effects. The R-Squared reflects the within-R-Squared after purging these fixed effects.

Coefficients have been standardized for unit variance in the dependent and independent variables. *t*-statistics in parentheses are based on standard errors clustered by county. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5

Number of Stakeholders and Firms' Public Disclosure of Financial Statements

	Access Restriction to Financial Statements (Changes)	
	(1)	(2)
Online Views (t-1)	**-0.017*** **	**-0.019*** **
	(-4.79)	**(-5.08)**
Cash	-0.008	-0.027***
	(-1.44)	(-4.91)
Tangibility	0.010***	-0.005
	(3.94)	(-1.78)
Leverage	0.029***	-0.001
	(7.63)	(-0.15)
ROA		-0.002
		(-0.43)
Loss Dummy		0.015**
		(3.08)
Total Assets		0.024***
		(6.97)
Owners		-0.004
		(-1.10)
Banks		-0.003
		(-0.42)
Age		0.005
		(1.05)
Complexity Dummy		-0.001
		(-0.15)
Bank Dummy		-0.002
		(-0.28)
Institutional Dummy		-0.045***
		(-5.52)
County-Industry FE	Yes	Yes
Legal-Form FE	Yes	Yes
Observations	150,527	119,475
# Clusters	398	398
Adjusted R-Squared	0.001	0.004

This table shows estimates of the association between "micro" firms' disclosure choice after a relaxation of the disclosure requirements (i.e., in 2012) and number of their interested stakeholders in the prior period (i.e., in 2011). The dependent variables is a dummy variable indicating whether a micro firm made use of the option to restrict access to its financial statements of 2012.

In all specifications, we account for county-industry and legal form fixed effects. The R-Squared reflects the within-R-Squared after purging these fixed effects. Coefficients have been standardized for unit variance in the dependent and independent variables. *t*-statistics in parentheses are based on standard errors clustered by county. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6

Disclosure Requirements, Disclosure Quantities, and Number of Stakeholders

Panel A: Regulatory Class Changes

	Characters (Changes)	Online Views (Changes)
	(1)	(2)
Switch Up (Small-Medium)	0.813***	-0.013
	(9.57)	(-0.18)
Switch Down (Medium-Small)	-0.701***	0.104
	(-7.79)	(1.10)
Sample Firms	Small, Medium	Small, Medium
County-Industry-Year FE	Yes	Yes
Legal Form FE	Yes	Yes
Controls (Changes)	All	All
Observations	9,951	9,951
# Clusters (Counties)	348	348
Adjusted R-Squared	0.252	0.033

Panel B: Fixed Effects

	Characters	Online Views
	(1)	(2)
Medium Dummy	0.768***	0.015
	(14.84)	(0.33)
Sample Firms	Small, Medium	Small, Medium
Firm FE	Yes	Yes
Year FE	Yes	Yes
Controls	All	All
Additional Size Controls (Sales, Employees)	Yes	Yes
Observations	43,882	43,882
# Clusters (Counties)	398	398
Adjusted R-Squared	0.210	0.044

This table shows estimates of first differences (Panel A) and fixed effects (Panel B) regressions investigating the effect of a firm's assignment to a regulatory size class (small or medium) on its disclosure quantity (Column (1)) and the number of interested stakeholders (Column (2)). In Column (1), the dependent variable is the natural logarithm of the number of characters in a filing. In Column (2), the dependent variable is the natural logarithm of the number of online views. We control for (changes in) a broad set of time-variant firm characteristics (including total assets, cash, tangibility, leverage, return on assets, a loss dummy, the number of owners, the number of banks, and a bank dummy) as well as (changes in) all three regulatory size criteria (total assets, sales, and employees). *t*-statistics based on standard errors clustered by county in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. This table is reproduced from Table 5 of Breuer et al. (2018b).

Table 7

Decomposed Number of Stakeholders and Firms' Public Disclosure						
	Quantity (Characters)		Timeliness (Publication Lag)		Quality (Voluntary Audit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Online Views	**0.191*** **		**-0.100*** **		**0.037*** **	
	(110.73)		**(-39.34)**		**(20.01)**	
Competition Views		**-0.169*** **		**-0.028*** **		**0.051*** **
		(-14.27)		**(-5.01)**		**(5.93)**
Non-Competition Views		**0.190*** **		**-0.099*** **		**0.037*** **
		(111.14)		**(-39.30)**		**(19.99)**
Cash	0.016***	-0.014***	-0.061***	-0.064***	0.001	0.008***
	(4.28)	(-4.45)	(-23.56)	(-22.91)	(0.63)	(4.31)
Tangibility	0.099***	0.083***	-0.047***	-0.049***	0.013***	0.016***
	(50.72)	(38.71)	(-33.62)	(-32.72)	(6.99)	(7.82)
Leverage	0.157***	0.338***	0.032***	0.049***	-0.019***	-0.063***
	(42.52)	(25.71)	(18.07)	(9.10)	(-13.07)	(-7.70)
County-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Regulatory-Class FE	Yes	Yes	Yes	Yes	Yes	Yes
Legal-Form FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,451,166	1,451,166	1,451,166	1,451,166	1,414,831	1,414,831
# Clusters (Counties)	399	399	399	399	399	399
Adjusted R-Squared	0.083	0.084	0.015	0.015	0.002	0.002

This table shows estimates of the association between the decomposed number of online views and firms' public disclosure. The dependent variables are disclosure quantity, measured by the natural logarithm of the number of characters (Columns (1) – (2)), publication lag measured by the natural logarithm of the number of days between publication date and fiscal year-end (Columns (3) – (4)), and a dummy variable indicating whether a small firm obtained a voluntary audit (Columns (5) – (6)). Columns (1), (3), and (5) provide the association between online views and firms' disclosure outcomes (controlling for capital structure) as a reference point. Columns (2), (4), and (6) show estimates for which the number of online views is decomposed into a predicted and residual component. Competition Views (Other Views) are the predicted values (residuals) from a regression of the number of online views on industry competition and other controls as in Column (2) of Table 2.

In all specifications, we account for county-year, regulatory size class, and legal form fixed effects. The R-Squared reflects the within-R-Squared after purging these fixed effects. Coefficients have been standardized for unit variance in the dependent and independent variables. *t*-statistics in parentheses are based on standard errors clustered by county. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Online Appendix

The Economics of Firms' Public Disclosure: Theory and Evidence

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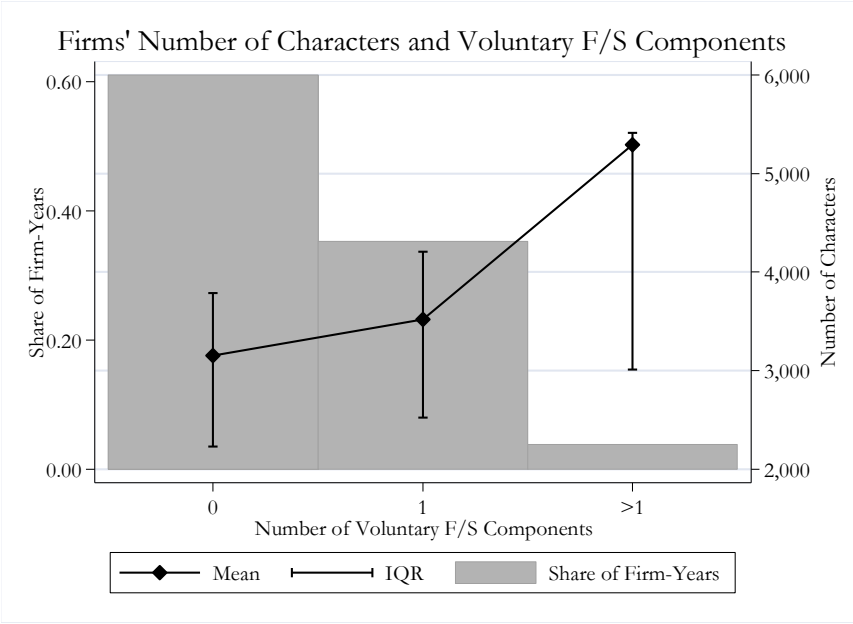
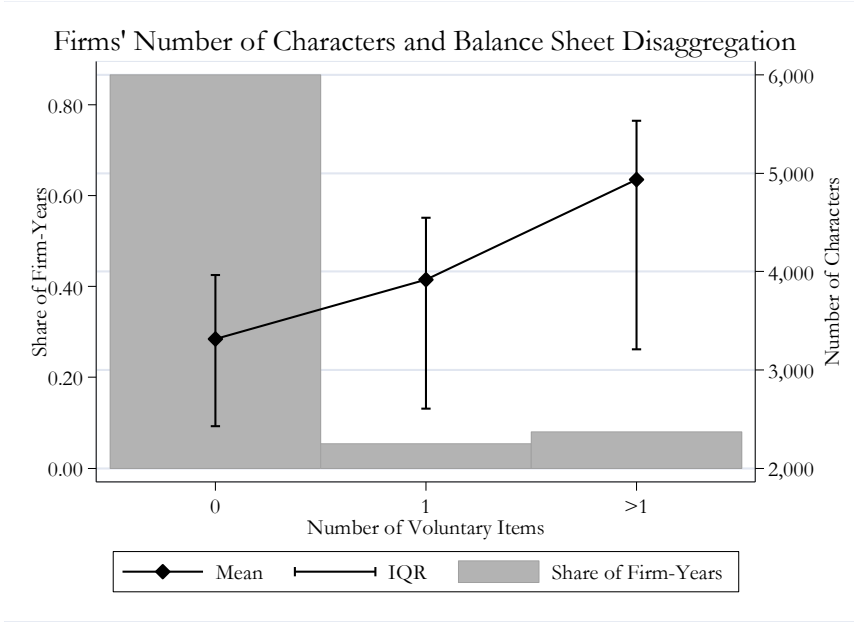
Figure A.1

Panel A



Total fraction of firm-years with voluntary disclosure: 39%

Panel B



Total fraction of firm-years with voluntary disclosure: 13%

This figure shows the relation between "small" firms voluntary disclosure behavior and their number of characters. We plot the mean and interquartile ranges for different groups of "small" firms conditional on the voluntary disclosure behavior. The gray bars in the background present the share of firm-years of each group. In Panel A, we group "small" firms based on their voluntary disclosure of financial statement component. Voluntary financial statement components of "small" firms include, e.g., an MD&A or profit declaration. In Panel B, we group "small" firms based on voluntary disaggregation of their liabilities position on their balance sheet, closely following the logic in Chen et al. (2015). This figure reproduces Figure A.1 of Breuer et al. (2018b).

This figure supports the use of the number of characters in constructing our main disclosure variables. It documents, first, that a non-negligible fraction of "small" firms decides to voluntarily provide information in their publicly disclosed financial statements. Across both measures of voluntary disclosure behavior, we observe some voluntary disclosure in 47% of all "small" firm-years. Second, it documents that firms' decision to provide such voluntary information strongly correlates with the number of characters in their financial statements.

Table A.1

Descriptive Statistics

Panel A: Small Firms

	N	Mean	SD	P25	P50	P75
Public Disclosure Outcomes						
Number of Characters (Count)	1,414,973	3,496.67	1,585.46	2,505.00	3,253.00	4,173.00
Number of Characters	1,414,973	8.08	0.4	7.83	8.09	8.34
Publication Lag	1,414,973	365.93	100.3	346	373	395
Publication Lag	1,414,973	5.86	0.31	5.85	5.92	5.98
Audit Dummy	1,414,973	0	0.06	0	0	0
Number of Stakeholders						
Number of Online Views (Count)	1,414,973	7.53	12.9	1	4	9
Number of Online Views	1,414,973	1.63	1	0.69	1.61	2.3
Profitability and Capital Structure (Columns (1) and (2) in Table 3)						
Cash	1,414,973	0.18	0.25	0	0.06	0.27
Tangibility	1,414,973	0.17	0.25	0	0.05	0.23
Leverage	1,414,973	0.48	0.36	0.11	0.48	0.84
HHI	1,414,973	0.26	0.42	0.04	0.1	0.38
Size-Related Variables (Column (3) in Table 3)						
Total Assets (000 EUR)	1,085,068	696.14	1,520.03	63.05	209.62	629.96
Total Assets	1,085,068	12.27	1.56	11.05	12.25	13.35
Age (Years)	1,085,068	16.21	17.21	6	12	21
Age	1,085,068	2.46	0.93	1.95	2.56	3.09
Number of Owners (Count)	1,085,068	1.89	2.43	1	2	2
Number of Owners	1,085,068	0.46	0.52	0	0.69	0.69
Number of Banks (Count)	1,085,068	1.07	0.9	0	1	2
Number of Banks	1,085,068	0.63	0.44	0	0.69	1.1
Institutional Dummy	1,085,068	0.03	0.14	0	0	0
Complexity Dummy	1,085,068	0.28	0.45	0	0	1
Bank Dummy	1,085,068	0.73	0.44	0	1	1
Accounts Payable	1,085,068	0.01	0.07	0	0	0
ROA	1,085,068	0.03	0.25	-0.03	0.03	0.12
Loss Dummy	1,085,068	0.33	0.47	0	0	1
Additional Size-Related Variables (Column (4) of Table 3)						
Sales (000 EUR)	32,197	1,663.99	2,078.08	390	900	2,020.00
Sales	32,197	13.64	1.27	12.87	13.71	14.52
Employees (Count)	32,197	14.43	18.37	3	8	18
Employees	32,197	2.23	1	1.39	2.2	2.94

Panel B: Medium Firms						
	N	Mean	SD	P25	P50	P75
Public Disclosure Outcomes						
Number of Characters (Count)	29,968	20,943.64	7,301.45	16,244.50	19,566.00	24,134.50
Number of Characters	29,968	9.9	0.32	9.7	9.88	10.09
Publication Lag (Days)	29,968	373.86	86.6	350	377	404
Publication Lag	29,968	5.9	0.25	5.86	5.93	6
Audit Dummy	29,968	0.98	0.12	1	1	1
Number of Stakeholders						
Number of Online Views (Count)	29,968	54.75	44.06	26	45	71
Number of Online Views	29,968	3.75	0.78	3.3	3.83	4.28
Profitability and Capital Structure (Columns (1) and (2) in Table 3)						
Cash	29,968	0.13	0.16	0.01	0.06	0.19
Tangibility	29,968	0.24	0.24	0.05	0.16	0.38
Leverage	29,968	0.51	0.28	0.29	0.53	0.74
HHI	29,968	0.33	0.58	0.05	0.13	0.35
Size-Related Variables (Column (3) in Table 3)						
Total Assets (000 EUR)	29,099	12,217.76	13,344.52	6,029.90	8,852.77	13,643.36
Total Assets (Log)	29,099	16.05	0.66	15.61	16	16.43
Age (Years)	29,099	33.92	34	14	23	40
Age	29,099	3.22	0.82	2.71	3.18	3.71
Number of Owners (Count)	29,099	2.73	5.15	1	2	3
Number of Owners	29,099	0.73	0.65	0	0.69	1.1
Number of Banks (Count)	29,099	2.28	1.35	1	2	3
Number of Banks	29,099	1.1	0.45	0.69	1.1	1.39
Institutional Dummy	29,099	0.05	0.2	0	0	0
Complexity Dummy	29,099	0.32	0.47	0	0	1
Bank Dummy	29,099	0.94	0.24	1	1	1
Accounts Payable	29,099	0.07	0.12	0	0.01	0.09
ROA	29,099	0.05	0.11	0	0.04	0.09
Loss Dummy	29,099	0.16	0.37	0	0	0
Additional Size-Related Variables (Column (4) of Table 3)						
Sales (000 EUR)	7,214	22,073.53	15,132.61	10,765.85	16,154.41	33,113.27
Sales	7,214	16.67	0.73	16.19	16.6	17.32
Employees (Count)	7,214	105.87	87.22	52	85	136
Employees	7,214	4.36	0.87	3.97	4.45	4.92

Panel C: Large Firms						
	N	Mean	SD	P25	P50	P75
Public Disclosure Outcomes						
Number of Characters (Count)	6,369	32,557.84	15,035.15	23,062.00	29,147.00	38,010.00
Number of Characters	6,369	10.3	0.41	10.05	10.28	10.55
Publication Lag (Days)	6,369	350.59	102.06	298	363	403
Publication Lag	6,369	5.82	0.31	5.7	5.9	6
Audit Dummy	6,369	0.99	0.1	1	1	1
Number of Stakeholders						
Number of Online Views (Count)	6,369	102.71	96.86	43	77	130
Number of Online Views	6,369	4.3	0.87	3.78	4.36	4.88
Profitability and Capital Structure (Columns (1) and (2) in Table 3)						
Cash	6,369	0.08	0.13	0	0.02	0.11
Tangibility	6,369	0.24	0.26	0.01	0.14	0.39
Leverage	6,369	0.43	0.29	0.19	0.42	0.67
HHI	6,369	0.44	0.63	0.08	0.21	0.6
Size-Related Variables (Column (3) in Table 3)						
Total Assets (000 EUR)	5,671	122,798.49	202,897.78	27,391.48	50,401.79	120,234.96
Total Assets	5,671	17.91	1.13	17.13	17.74	18.6
Age (Years)	5,671	34.88	35.84	12	22	43
Age	5,671	3.18	0.9	2.56	3.14	3.78
Number of Owners (Count)	5,671	2.56	3.33	1	2	3
Number of Owners	5,671	0.66	0.66	0	0.69	1.1
Number of Banks (Count)	5,671	2.33	1.56	1	2	3
Number of Banks	5,671	1.09	0.5	0.69	1.1	1.39
Institutional Dummy	5,671	0.08	0.23	0	0	0
Complexity Dummy	5,671	0.35	0.48	0	0	1
Bank Dummy	5,671	0.92	0.27	1	1	1
Accounts Payable	5,671	0.12	0.16	0.02	0.06	0.14
ROA	5,671	0.03	0.09	0	0.01	0.07
Loss Dummy	5,671	0.14	0.35	0	0	0
Additional Size-Related Variables (Column (4) of Table 3)						
Sales (000 EUR)	5,199	179,281.23	248,355.65	45,065.55	71,442.39	213,977.46
Sales	5,199	18.41	1.07	17.62	18.08	19.18
Employees (Count)	5,199	429.13	505.03	120	269	530
Employees	5,199	5.44	1.29	4.8	5.6	6.27

Panel D: Micro Firms						
	N	Mean	SD	P25	P50	P75
Public Disclosure Outcomes						
Restricted Access Dummy	153,295	0.85	0.36	1	1	1
Number of Stakeholders (t-1)						
Number of Online Views (t-1) (Count)	153,295	4.01	7.04	1	2	5
Number of Online Views (t-1)	153,295	1.19	0.87	0.69	1.1	1.79
Profitability and Capital Structure (Column (1) in Table 5)						
Cash	153,295	0.23	0.29	0.01	0.09	0.37
Tangibility	153,295	0.16	0.25	0	0.03	0.2
Leverage	153,295	0.41	0.37	0.04	0.33	0.77
Size-Related Variables (Column (2) in Table 5)						
Total Assets (000 EUR)	122,221	218.65	541.72	38.93	90.07	204.39
Total Assets	122,221	11.44	1.2	10.57	11.41	12.23
Age (Years)	122,221	14.06	12.17	5	11	20
Age	122,221	2.38	0.87	1.79	2.48	3.04
Number of Owners (Count)	122,221	1.8	1.86	1	1	2
Number of Owners	122,221	0.42	0.5	0	0	0.69
Number of Banks (Count)	122,221	0.92	0.83	0	1	1
Number of Banks	122,221	0.56	0.43	0	0.69	0.69
Institutional Dummy	122,221	0.03	0.16	0	0	0
Complexity Dummy	122,221	0.24	0.43	0	0	0
Bank Dummy	122,221	0.68	0.47	0	1	1
ROA	122,221	0.04	0.26	-0.02	0.04	0.13
Loss Dummy	122,221	0.32	0.47	0	0	1

This table shows descriptive statistics for our sample firms by regulatory class.

Table A.2

Pairwise Correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Characters	1.0000											
(2)	Publication Lag	-0.0406*	1.0000										
(3)	Audit Dummy	0.5995*	0.0043*	1.0000									
(4)	Online Views	0.3425*	-0.0558*	0.3165*	1.0000								
(5)	Total Assets	0.5018*	-0.0310*	0.3507*	0.4747*	1.0000							
(6)	Age	0.1903*	-0.0743*	0.1173*	0.1464*	0.2870*	1.0000						
(7)	Owners	0.0857*	-0.0088*	0.0528*	0.0835*	0.1672*	0.0381*	1.0000					
(8)	Banks	0.2248*	-0.0755*	0.1449*	0.2583*	0.3193*	0.6082*	0.0526*	1.0000				
(9)	Institutional Dummy	0.0368*	-0.0468*	0.0400*	-0.0133*	0.0617*	-0.0412*	-0.0260*	-0.0549*	1.0000			
(10)	Complexity Dummy	0.0236*	0.0102*	0.0169*	0.0455*	-0.0003	-0.1281*	-0.0108*	-0.0752*	0.0050*	1.0000		
(11)	Bank Dummy	0.1715*	-0.0873*	0.0677*	0.1806*	0.2588*	0.5816*	0.0265*	0.8766*	-0.0574*	-0.0787*	1.0000	
(12)	HHI	-0.0204*	-0.0079*	0.0332*	0.0242*	-0.0336*	0.0027*	0.0116*	0.0012	-0.0007	0.0556*	-0.0090*	1.0000

This table shows pairwise correlations across firms from all regulatory categories (N = 1,418,036). * denotes significance at the 10% level.