Institutional Dual Ownership and Voluntary Greenhouse Gas Emission Disclosure

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Abstract

This paper shows evidence of a positive and statistically significant relationship between institutional dual holders, who hold both equity and debt in a firm, and voluntary greenhouse gas (GHG) emission disclosure. Considering dual holders as particularly risk-sensitive institutional investors, we document that voluntary GHG emission disclosure improvements are motivated by not only climate-conscious but also risk-related considerations. The positive effect of institutional dual ownership is more pronounced when firms face severe environmental risks, where disclosure enables explanations and prevents exaggerated reactions. The impact of dual ownership is also stronger in firms with poor information environments, where dual holders exploit their salient monitoring capacity from gathering information from their public equity and private debt holdings. Supporting our risk-based explanation, voluntary GHG emission disclosure reduces the cost of equity and increases firm valuation in firms with higher dual ownership.

Keywords: climate change, greenhouse gas emission disclosure, institutional investors, dual holders

JEL Classification: G30, M40, Q56

1 Introduction

Rising GHG emissions are perceived as one of the main drivers of climate change (IPCC, 2023). However, they do not only pose a risk to the environment but also to the emitting firms themselves. High polluting firms risk an impaired perception by critical stakeholders (e.g., customers, employees, and regulators) as well as an increased likelihood of facing compliance costs, fines, liabilities, litigation, and costs to adapt to future legislation and mandatory environmental standards (Sharfman and Fernando, 2008; Matsumura et al., 2014; Griffin et al., 2017; Bolton and Kacperczyk, 2021b). Due to these risks, polluting firms trade at a discount (Matsumura et al., 2014; Griffin et al., 2017).

Reliable information on a firm's GHG emissions is a prerequisite to evaluate emission-related risks efficiently, properly assess firm value, and ultimately make informed investment decisions (Krueger et al., 2020). Supporting this notion, Ilhan et al. (2023) show that 79% of institutional investors believe climate-related reporting is at least as important as financial reporting, with 28% stating that climate-related reporting is even more important. However, this information is scarce and often insufficient without mandatory GHG emission disclosure.

Voluntary GHG emission disclosure may benefit the disclosing firms through improved firm valuation (Matsumura et al., 2014), lower cost of capital (Bolton and Kacperczyk, 2021a), a positive signal to the market (Al-Tuwaijri et al., 2004), and the potential influence of future legislations in the yet unregulated area of environmental disclosure (Ilhan et al., 2023). Nevertheless, not all firms disclose GHG emissions voluntarily (Bolton et al., 2021). Direct costs arising from compiling, preparing, and disseminating information as well as indirect costs from revealing internal business information to competitors and other counterparties (i.e., proprietary costs) may hinder firms from voluntarily disclosing their emissions (Ilhan et al., 2023).

Albeit voluntary GHG emission disclosure is likely to reduce firm risk because it enables stakeholders to better evaluate the firm's risk and prevents exaggerated actions, due to the

existence of transaction costs, the decision to voluntarily disclose GHG emissions is not trivial to all firms. Transaction costs lead to heterogeneity in ownership structure, owner types, and control across firms. Such heterogeneities are an endogenous outcome of a firm value maximizing process. Because ownership structure, defining the rights of the firm's residual claimants, represents the foundation of economic organizations (Alchian and Demsetz, 1972), heterogeneity in ownership and owner types is a determinant of sustainable corporate policies (Demsetz and Lehn, 1985; Demsetz and Villalonga, 2001; Gillan and Starks, 2007; Villalonga, 2018).

One type of owner constitutes a particularly powerful group that influences sustainable policies: institutional investors. This is because they control a large enough capital stake and possess superior specialization and sophistication compared to retail investors (Christensen et al., 2021). For example, institutional investors are critical for pressuring firms to initiate and subsequently adjust corporate sustainability reporting (Solomon et al., 2011; Pawliczek et al., 2021). Moreover, Stroebel and Wurgler's (2021) survey shows that academics and practitioners view institutional investors as the most powerful financial mechanism to force corporate changes in response to climate risk exposure.

Acknowledging that not all institutional investors are identical but rather differ in their views and incentives (Dasgupta et al., 2021), previous literature shows evidence that voluntary GHG emission disclosure is driven by subgroups of institutional investors that are considered to be particularly climate-conscious (Döring et al., 2023; Ilhan et al., 2023). However, because GHG emissions pose a risk not only to the environment but also to the polluting firm itself, the decision to voluntarily disclose GHG emissions should be driven by environmental considerations but also have an economic rationale. Our study shifts the focus from institutional investors as a homogenous investor block to institutional dual holders, a subgroup of institutional investors that is particularly sensitive to the risk implications of corporate actions.

In this context, institutional dual holders,[1] i.e., institutional investors holding both equity and debt of a certain firm, offer a unique setting for analyzing institutional investors with particular sensitivity to risk. As their holdings consist not just of equity, they do not have the pure character of a call option that increases in value with firm risk. This is because the debt part of their holdings is rather a decreasing function of firm risk (Merton, 1974). Consequently, this debt component makes dual holders more sensitive to an increase in firm risk and incentivizes them to monitor and reduce risk. Given that voluntary GHG emission disclosure reduces firm risk by better managing stakeholder demands and preventing exaggerated reactions to the firm, it is reasonable to assume that higher dual ownership enhances voluntary GHG emission disclosure. In addition to the motive to reduce risk, dual holders, who gather information from both the equity and the debt side of their holding, have salient monitoring capabilities (Antón and Lin, 2020; El Ghoul et al., 2023) that enable them to enforce these risk-reduction goals.

Using data on corporate GHG emission disclosure from the Carbon Disclosure Project (CDP) and dual ownership estimates based on LPC Deal Scan and Thomson Reuters 13F data, we find that the relationship between dual ownership and three measures of voluntary GHG emission disclosure is consistently positive and statistically significant. This supports the notion that dual holders foster voluntary GHG emission disclosure because it improves general stakeholder information and prevents exaggerated reactions. However, we do not find an overall effect of institutional ownership on voluntary GHG emission disclosure, highlighting that the heterogeneity amongst institutional investors matters. We also find no impact of non-dual institutional owners.

Despite our robust findings across three measures of voluntary GHG emission disclosure, endogeneity is a natural concern in empirical tests on ownership structures (Demsetz and

[1] For brevity, we use primarily "dual holders" and "dual ownership" when referring to institutional dual holders and their ownership throughout the text.

Lehn, 1985; Demsetz and Villalonga, 2001). We minimize potential biases through additional tests. First, we address the concern of *reverse causality* by conducting a natural experiment similar to Chen et al. (2020) based on exogenous shocks to dual holders' attention. If more voluntary GHG emission disclosure attracts more dual ownership, we should not observe an impact of dual ownership distraction. This is because the decision to invest in a particular firm was made before dual ownership was distracted. Suppose dual holders, however, are actively involved in enhancing voluntary GHG emission disclosure to reduce their exposure to the firm's environmental risk. In that case, dual holder distraction should have a negative impact on voluntary GHG emission disclosure. Given the consistently negative and statistically significant coefficients on the distraction indicator, we conclude that reverse causality should not be a concern in our analysis. Second, we address a potential *selection bias*, which could arise if a firm's inclusion in our sample is not random but depends on the CDP's decision to send out the questionnaire by conducting a Heckman (1979) selection correction. This two-stage correction process indicates that our results remain qualitatively unchanged. Third, although we already include a large set of fixed effects and commonly used control variables that account for various industry, time, and firm characteristics, we alleviate the remaining concerns of an *omitted variable bias*. We include additional control variables to our baseline regression, which may impact the relationship between dual ownership and voluntary GHG emission disclosure. Our main results, however, remain qualitatively unchanged across all tests.

In additional analyses, we investigate heterogeneities in the impact of dual ownership on voluntary GHG emission disclosure across firms. In line with the particular risk sensitivity of dual holders, the impact of dual ownership on voluntary GHG emission disclosure is magnified if firms are specifically exposed to climate-related risks. In these situations, voluntary disclosure improves stakeholder information and avoids exaggerated reactions. Furthermore, in line with dual holders' salient monitoring capacity, we find that the impact of dual ownership

on voluntary GHG emission disclosure is more pronounced when information asymmetries arising from low analyst coverage and high corporate complexity are high.

Our study contributes to the literature in three key ways. First, we add to the literature on GHG emission disclosure. Although it already considers a variety of external and internal determinants of the disclosure decision (see Borghei (2021) and He et al. (2022) for reviews), evidence on the impact of ownership structure and the role of institutional investors (Döring et al., 2023; Ilhan et al., 2023) is still scarce. Given that measuring and reporting GHG emissions are prerequisites to reducing corporate GHG emissions (Bolton et al., 2021), we provide a new factor that must be considered to foster the goal of a "net zero" economy.

Second, we add to the literature on institutional ownership in general. On the one hand, by finding a significant impact of institutional dual owners on voluntary GHG emission disclosures, we confirm that institutional investors are a powerful financial mechanism for corporate change in response to climate risk exposure (Stroebel and Wurgler, 2021). On the other hand, by outlining the differences between institutional dual and non-dual holders, we contribute to the literature that examines the heterogeneity among institutional investors and how different owners perform on social and environmental dimensions (Dasgupta et al., 2021; Döring et al., 2023; Ilhan et al., 2023).

Third, we enrich the literature on dual ownership. Recognizing that simultaneous holding of equity and debt in the same firm increases investors' risk-reduction incentives, we provide evidence for risk that arises from climate change, a new type of risk that receives increasing attention across all stakeholder groups. We complement the literature by showing that dual holders impact not only financial aspects like loan yield spreads (Jiang et al., 2010), payout ratios (Chu, 2018), covenants (Chava et al., 2019), shareholder voting (Keswani et al., 2020), innovation (Yang, 2021), executive compensation (Chen et al., 2023), and the cost of debt (El Ghoul et al., 2023), but also environmental dimensions like GHG emissions disclosure.

2 Literature review and hypothesis development

2.1 Voluntary greenhouse gas emission disclosure

The rise in public attention to global warming and climate change forced firms to deal with the associated consequences on their business operations. GHG emissions, in particular, not only pose a risk to nature by accelerating ongoing climate change, but also pose risks to the emitting firm itself. Following Krueger et al. (2020) and Flammer et al. (2021), these risks include physical risk (e.g., droughts, extreme temperatures, floodings), regulatory risks (e.g., emission restrictions, pricing), and a wide variety of other risks (e.g., technological disruption, changing consumer preferences, reputation threats). While firms face some of these risks irrespective of their own behavior (e.g., natural catastrophes), other risks are directly linked to their individual environmental actions (e.g., stakeholder dissatisfaction, reputation threats). High GHG emissions are, therefore, often connected to higher likelihoods of compliance costs, fines, liabilities, litigations, as well as costs to adapt to future legislation and mandatory environmental standards (Sharfman and Fernando, 2008; Matsumura et al., 2014; Griffin et al., 2017; Bolton and Kacperczyk, 2021b). Consequently, the capital market substantially discounts high-polluting firms' valuations (Hughes, 2000; Clarkson et al., 2004, 2015; Chapple et al., 2013; Matsumura et al., 2014; Griffin et al., 2017).

Although attenuating these risks (and the resulting valuation discount) implies reducing GHG emissions, this option is unsuitable for many firms due to the nature of their business operations and often missing capabilities. However, a firm can mitigate the associated risks by voluntarily disclosing its emissions to the public. Without mandatory GHG emission disclosure, a higher scope and quality of voluntary GHG emission disclosure may help stakeholders evaluate the consequences the firm potentially faces over its emissions. This enables more informed interactions with the firm and prevents exaggerated reactions.

Reducing information asymmetries and adverse selection costs that arise from better transparency increases the market valuation of voluntary disclosing firms (Matsumura et al., 2014) and reduces its cost of capital (Plumlee et al., 2015; Jung et al., 2018; Bolton and Kacperczyk, 2021a). It is perceived as a positive signal to the financial market that a firm can measure its own GHG emissions, which is considered a prerequisite for effectively managing them (Al-Tuwaijri et al., 2004; Matsumura et al., 2014). Looking further forward, the voluntary disclosing firm's active commitment in a yet unregulated area offers the potential to shape pending regulations to its standards, reducing the risks of future adoption costs to externally determined standards (Ilhan et al., 2023).

On the downside, while voluntary GHG emission disclosure provides benefits to disclosing firms, it comes with direct costs of compiling, preparing, and disseminating the disclosed information, as well as indirect costs from potential revelations of internal business information to competitors and other counterparties (Verrecchia, 1983; Ilhan et al., 2023).

2.2 Institutional dual ownership

Acknowledging the benefits and detriments of voluntary GHG emission disclosure, the decision to voluntarily disclose GHG emissions seems to be a complex trade-off. Given the difficulty of the decision, it seems reasonable to look at institutional investors, commonly seen as the most sophisticated market participants. They should be able to weigh the advantages and disadvantages of voluntary GHG emission disclosure and effectively enforce their view within the firm. According to Stroebel and Wurgler's (2021) survey among practitioners and academics, institutional investors are viewed as the most powerful financial mechanism to induce climate-related changes within firms. More generally, institutional investor ownership is the endogenous outcome of a maximizing process, which should also determine sustainable corporate policies in general and voluntary GHG emission disclosure in particular (Villalonga, 2018).

Although Ilhan et al. (2023) show that 79% of their surveyed institutional investors think climate-related disclosure is important, they also provide evidence that the actual impact of institutional ownership on implementing such disclosure is heterogeneous. In particular, the implementation is driven by climate-conscious institutional investors expected to follow stewardship codes from their country of origin, institutional investors located in countries with more climate-conscious norms, or institutional investors perceived as universal owners.[2] Similarly, Döring et al. (2023) find that institutional investors from countries with a strong preference for environmental responsibility, i.e., those from civil law countries, enhance disclosure scope and reliability. Acknowledging the existence of heterogeneous views among institutional investors (Dasgupta et al., 2021), and building on previous evidence that voluntary GHG emission disclosure is driven by a certain subgroup of institutional investors rather than by institutional ownership as a whole, this study introduces a new group of institutional investors to the area of climate-related disclosure: dual holders, i.e., institutional investors that provide at the same time debt and equity to a firm.

Considering dual holders complements the previous research on different institutional investors' attitudes towards voluntary GHG emission disclosure by moving the focus from investors' preference for sustainability and CSR to investors' individual risk motives. The simultaneous holding of equity and debt puts dual holders in a unique position with regard to firm risk perception and monitoring capacity.

Concerning the perception of firm risk, dual holders show higher sensitivity and aversion as they do not benefit from increases in firm risk as much as institutional investors that only hold equity. While both shareholders and debtholders share the downside of a firm's business operations, only shareholders benefit from any upside potential. This potential, however, is only valuable for shareholders if it exceeds the firm's obligation towards the debtholders.

[2] Universal owners are institutional investors that own a broad cross-section of the economy (Ilhan et al., 2023).

Therefore, shareholders favor firm risk to increase the value of their equity, while debtholders try to reduce excessive risk-taking to secure their promised repayments (Merton, 1974; Jensen and Meckling, 1976). Managers, who only have the fiduciary duty to cater to the needs of the firm's shareholders, would consequently only focus on maximizing equity value rather than debt value and often take more risk than debtholders desire. In this situation, however, dual holders, who internalize the conflict between shareholders and debtholders, would counteract such behavior to avoid wealth expropriation and agency costs between the two parts of their holding. They would instead work towards a value increase of their holding as a whole by better catering to the needs of the debt part of their holding.

Previous literature underlines this notion by showing that dual holders protect debtholders with a higher propensity to vote in line with their interests at shareholder meetings (Keswani et al., 2020). Moreover, dual ownership reduces overall risk-shifting at the expense of debtholders through lower payout ratios (Chu, 2018) and less risky innovation activities (Yang, 2021). Combining these arguments about the behavior of dual holders with the risk-reducing effect of voluntary environmental disclosure (Benlemlih et al., 2018), it seems reasonable that institutional dual owners foster the scope and quality of voluntary GHG emission disclosure.

With respect to their monitoring capacity, dual holders are in a privileged position of collecting information from their public equity holdings and their non-public debt contracts. This superior access to information allows them to better monitor their portfolio firms and oversee the measures to efficiently reduce firm risk. Corroborating this notion, previous literature shows that higher dual ownership leads to lower loan yield spreads (Jiang et al., 2010), looser covenants (Chava et al., 2019), improved investment efficiency (Antón and Lin, 2020), a greater willingness to accept performance pricing provisions in loan contracts (Lim et al., 2022), and more CSR engagement (Lopatta et al., 2022).

Taken together, building on the dual holders' risk-reduction motive and their improved monitoring capacity, we hypothesize:

Hypothesis: *Higher institutional dual ownership improves the scope and quality of voluntary GHG emission disclosure.*

3 Data and methodology

3.1 Greenhouse gas emission disclosure

We start our sample construction with information on voluntary GHG emission disclosure from responses to the annual questionnaires of the CDP.[3] The CDP is an international non-profit organization that aims to improve corporate awareness of carbon and climate change risk by increasing and facilitating corporate GHG emission disclosure. It annually sends to the portfolio firms of its participating institutional investors standardized questionnaires that request environmental information, including the actual GHG emissions and their external verification. Although responding to these questionnaires and providing GHG emission information is voluntary, the CDP tracks the firm behavior in every case, which allows it to classify no answer as an active non-disclosure decision. Firms that opt to answer the questionnaire and disclose their GHG emissions and external verification provide this information according to the three scopes defined in the Greenhouse Gas Protocol (2004). Scope 1 considers all direct GHG emissions of the firm. Scope 2 addresses all indirect GHG emissions for the generation of purchased energy. Scope 3 subsumes all other indirect GHG emissions that are associated with a firm's business operations (e.g., production of purchased materials, outsourced services, employee business travel, product use).

[3] Other recent papers that use data on environmental disclosure from the CDP include Kolk et al. (2008), Matsumura et al. (2014), Clarkson et al. (2015), Liao et al. (2015), Ben-Amar et al. (2017), Griffin et al. (2017), Jung et al. (2018), Elijido-Ten and Clarkson (2019), Flammer et al. (2021), Barg et al. (2023), Döring et al. (2023), and Ilhan et al. (2023).

The CDP survey allows us to construct a sample of 5,347 firm-year observations between 2010 and 2019. Providing further insight into this sample, Table 1 shows that although the CDP sent out 5,347 questionnaires (column (1)), only 3,063 answers were received. Among these, only 2,455 contain information on at least scope 1 emissions of the firms (column (3)) and only 1,396 provide external verification for the stated scope 1 emissions (column (4)). These numbers show a sharp decrease from a response rate of 57.28% over a disclosure rate of 45.91% to a verification rate of 26.11%. This indicates considerable room for improvement in the voluntary disclosure of GHG emissions.

Insert Table 1 here

Based on the CDP data, we develop three measures to account for different aspects of voluntary GHG emission disclosure. First, we define *disclosure scope* as the extent to which a firm discloses its GHG emissions. It takes the value of 0 if no emissions are disclosed, 1 if only scope 1 is disclosed, 2 if scopes 1 and 2 are disclosed, and 3 if all three scopes are disclosed. Second, as a proxy for the GHG emission disclosure's quality, we define *disclosure verification* as the extent to which a firm's GHG emission disclosure is externally verified. This measure takes the value of 0 if no emission disclosure is externally verified, 1 if only scope 1 is externally verified, 2 if scopes 1 and 2 are externally verified, and 3 if all three scopes are externally verified. The construction of *disclosure scope* and *disclosure verification* is based on the transparently available information on how many of a firm's GHG emission scopes are disclosed or externally verified. Thus, it circumvents apparent inconsistencies and intertemporal changes within scores calculated (opaquely) by different providers of sustainability data (Busch et al., 2020; Berg et al., 2021; Kishan, 2022).

Despite the benefits of these two variables, we additionally use the CDP-provided (but now-discontinued) *integrated disclosure score* to enable comparisons with other studies that

include this ready-to-use variable.[4] For the integrated disclosure score, the CDP assesses the detailedness and comprehensiveness of the disclosure and assigns values from 0 (worst) to 100 (best). We transform these values into numerical categories of 1 to 3 based on empirical terciles for comparability with our other two measures. Firms with an original disclosure score of 0 also receive a score of 0 after the transformation as well as those firms that opt not to disclose or respond to the CDP.

3.2 Institutional dual ownership

To construct our main explanatory variable, we collect institutional investor data from Thomson Reuters 13F and syndicated loan data from LPC DealScan. Using loans instead of bonds to determine dual holders captures a more dedicated debt relationship because loan providers have stronger monitoring incentives due to the lower liquidity of loans compared to bonds (Amihud et al., 1999).

Based on these data, we determine the level of total institutional ownership by the percentage of shares held by institutional investors in a given year (*institutional ownership*). Then, using Chu's (2018) identification of dual holders, we estimate *institutional dual ownership* in a focal firm as the percentage of shares held by institutional investors that also provide a loan to that focal firm. For completeness, we determine the level of institutional ownership not held by dual holders to account for the impact of all institutional investors in our following regressions. We calculate this *institutional non-dual ownership* as the difference between institutional ownership and institutional dual ownership.

[4] Although the CDP reports data for its integrated disclosure score only until 2015, we observe a high correlation of this score with our disclosure scope and disclosure verification variables. Therefore, we impute the missing values of 2016 to 2019 based on a first-stage OLS regression of disclosure scope and disclosure verification on the integrated disclosure score during the years of available data.

3.3 Controls

We include various control variables in our analyses that may affect our results. In line with previous literature on the determinants of voluntary GHG emission disclosure (Barg et al., 2023; Döring et al., 2023), we include firm size, payout ratio, leverage, profitability, capex, and book-to-market ratio. We construct these variables based on Compustat data. Detailed information on their respective definitions is provided in Appendix Table A1.

3.4 Summary statistics

We obtain our final sample by following the common practice of excluding firm-years with missing data for the explanatory and control variables. We also exclude firms from the finance industry (SIC codes 6000–6999) as this industry tends to be heavily regulated. We winsorize all continuous control variables at the 1% and 99% levels to correct for outliers. The varying data availability and cleaning steps finally leave us with 5,347 firm-year observations for disclosure scope and verification, and 4,824 for the integrated disclosure score between 2010 and 2019 in the U.S. A detailed overview of the summary statistics is given in Table 2. The correlations between the dependent and main explanatory variables are shown in Table 3.

Insert Tables 2 and 3 here

3.5 Research design

Acknowledging the ordinal structure of our dependent variables, we estimate an ordered logit model for our baseline analysis:

$$disclosure_{i,j,t} = \beta_1 \cdot dual\ ownership_{i,t} + \sum_{c \in C} \beta_c \cdot control_{c,i,t} + \mu_j + \tau_t + \varepsilon_{i,j,t}. \quad (1)$$

i, j, and *t* index firms, industries, and years; *disclosure* represents disclosure scope, disclosure verification, or integrated disclosure score; *dual ownership* describes the percentage of shares

held by dual holders; and *control* denotes control *c* out of the entirety of controls *C*. We account for constant unobserved industry characteristics and temporal shocks by including industry fixed effects μ_j and year fixed effects τ_t. $\varepsilon_{i,j,t}$ denotes the error term.

It is important to note that although estimating an ordered logit model is well suited to the ordinal structure of our data, there are two important differences compared to estimating linear regression models. First, although ordered logit models produce coefficient estimates with the correct sign and significance levels, we cannot interpret the coefficients as marginal effects (Beck et al., 2006). This also means we cannot directly compare the coefficients' magnitudes across subsamples. We overcome this lack of comparability and interpretation by introducing an additional panel to our main and subsample analyses that reports the model's elasticities with respect to dual ownership. The elasticities represent the percentage impact of a 1% increase in dual ownership on the average firm's probability of having a certain disclosure scope, disclosure verification, or integrated disclosure score.[5]

Second, considering an interaction of the explanatory variable with another moderating variable, Norton et al. (2004, p. 154) point out "that the marginal effect of a change in both interacted variables is not equal to the marginal effect of changing just the interaction term. More surprisingly, the sign may be different for different observations." Therefore, the popular usage of variable interactions to analyze how the effect of the explanatory variable on the dependent variable is affected by the moderating variable does not seem appropriate in an ordered logit setting. Nevertheless, we introduce several sample split analyses to examine heterogeneities in the effect of dual ownership on voluntary GHG emission disclosure.

[5] Following the common practice for determining elasticities, the average firm is defined at the mean of the model's independent variables.

4 Results

4.1 Main results

Table 4 presents the results of estimating the ordered logit model from equation (1). In columns (1) to (3), we find no statistically significant impact of total institutional ownership on the scope and quality of voluntary GHG emission disclosure in our sample. However, dividing institutional ownership into dual and non-dual ownership, columns (4) to (6) paint a very different picture. While the coefficient estimates for non-dual ownership (i.e., pure equity ownership) are still statistically insignificant, we observe positive and statistically significant coefficient estimates for dual ownership. Dual ownership is positively related to the disclosure scope, disclosure verification, and integrated disclosure score, indicating that dual ownership improves a firm's voluntary GHG emission disclosure regardless of the choice of measure.

Insert Table 4 here

Panel A of Table 4 provides additional interpretation of the coefficient estimates from Panel B. It shows the change in the average firm's probability of having a certain disclosure scope, disclosure verification, and integrated disclosure score when dual ownership increases by 1%. Accordingly, we see in the first line that a 1% increase in dual ownership decreases the average firm's probability of having the lowest level of emission disclosure, emission verification, and integrated disclosure score significantly by 0.099%, 0.021%, and 0.117%, respectively. At the same time, the fourth line shows that the probability of having the highest level in each category increases through a 1% increase in dual ownership by 0.209%, 0.195%, and 0.209%, respectively. Because the level of dual ownership overall is low, a 1% increase in this fraction leads to only a marginal increase in percentage points. The effect of dual ownership on voluntary GHG emission disclosure becomes clearer when expressing it in changes of standard deviations: A one-standard-deviation increase in dual ownership decreases the average

firm's probability of having the lowest level of our voluntary GHG emission disclosure variables by 8.361%, 1.773%, and 9.881%, respectively, and increases the average firm's probability of having the highest levels by 17.651%, 16.469%, and 17.651%, respectively.

These statistically significant and economically meaningful results confirm our main hypothesis: Higher dual ownership improves the scope and quality of voluntary GHG emission disclosure. These results indicate that, on aggregate, the risk-reducing benefits of transparency toward stakeholders outweigh the potential risks of revealing information to competitors.

4.2 Robustness checks

Our findings suggest a positive and statistically significant relationship between dual ownership and voluntary GHG emission disclosure. To further strengthen the validity of these results, the following section alleviates common concerns in empirical research by specifically addressing potential reverse causality, selection bias, and omitted variable bias.

4.2.1 Addressing reverse causality

A common source of endogeneity in empirical research is reverse causality. Unlike our interpretation, one could argue that dual holders do not actively enhance voluntary GHG emission disclosure, but firms with better voluntary GHG emission disclosure attract more dual holder investments. One would observe a positive β_1 coefficient from estimating equation (1) in both cases. Like Chen et al. (2020), we adopt a natural experiment based on exogenous shocks to the dual holders' attention to the focal firm to address this concern. Suppose dual holders actively enhance voluntary GHG emission disclosure to reduce their exposure to the firm's environmental risk. In this case, there should be a negative impact on voluntary GHG emission disclosure when a firm's dual holders are highly distracted. In contrast, if firms with better voluntary GHG emission disclosure only attract more dual ownership, we should not

observe an impact of dual holder distraction. This is because the decision to invest has already been made, and dual holders' attention does not matter anymore as they do not engage.

To identify firms with highly distracted dual holders, we first calculate Kempf et al.'s (2017) measure of distraction for every firm in our sample with regard to their dual holdings. For each quarter, we compute

$$D_{fq} = \sum_{i \in F_{q-1}} \sum_{IND \neq IND_f} w_{ifq-1} \cdot w_{iq-1} \cdot IS_q^{IND}, \tag{2}$$

where *i, f,* and q denote dual holder, firm, and quarter; F is the entirety of dual holders within firm *f*; *IND* the Fama–French 12 industry; and *IS* an industry shock (i.e., an attention-grabbing event). w_{ifq-1} captures the importance of dual holder *i* in firm *f* in quarter *q-1* (measured as the fraction of dual holding) and w_{iq-1} the importance of industry *IND* for dual holder *i* in quarter *q-1* (measured as the industry's market value weight in the dual holder's portfolio). The distraction D_{fq} of firm *f*'s dual holders in quarter q is higher if the other industry in which the attention-grabbing event happens is more important to firm *f*'s dual holders and if the affected dual holders make up a higher fraction of firm *f*'s dual holdings. To align with the rest of our annual data, we create a yearly distraction measure by averaging the quarterly measures each year. In a final step, we identify the firms with the most distracted dual holders. For each year, our indicator *distracted dual ownership* takes the value of 1 if a firm's dual holder distraction is in the top tercile, and 0 otherwise.

Table 5 shows the results of the ordered logit regression on voluntary GHG emission disclosure, in which we added the *distracted dual ownership* variable to our baseline specification.[6] As expected, distracted dual ownership is associated with negative and statistically significant coefficient estimates for each of our voluntary GHG emission disclosure variables.

[6] To alleviate concerns regarding the impact of non-dual ownership distraction, we also include a dummy variable *distracted non-dual ownership* that is analogously defined as *distracted dual ownership*. We find no significant impact when non-dual holders are distracted. The results remain qualitatively unchanged when considering the two distraction variables independently of each other.

This suggests that the impact on voluntary GHG emission disclosure is reduced when dual holders are highly distracted and cannot be actively involved with a particular firm. Accordingly, we can conclude that reverse causality should not be a major issue in our analysis.

Insert Table 5 here

4.2.2 Addressing selection bias

Since the CDP has discretionary power, to a certain extent, as to which firms it considers for its survey, including a firm in our sample is not completely random but depends on the CDP's decision to send out its questionnaire. This raises the concern of a selection bias in our results. To alleviate this concern, we conduct a Heckman (1979) selection correction based on all firms for which we have non-missing data for the explanatory and control variables. Accordingly, we run a first-stage probit regression on a dummy variable (*CDP sample*) that equals 1 if the CDP contacted the focal firm, and 0 if not. Based on the predictions of this first-stage regression, we calculate the inverse Mills ratio (*lambda*). We then include lambda as a correction for the potential selection bias in the second-stage ordered logit regressions on disclosure scope, disclosure verification, and integrated disclosure score.

Meeting Lennox et al.'s (2012) demand for at least one exclusion restriction in the first stage to effectively control for the selection bias, we add two additional variables to the variables and fixed-effects already contained in the baseline model. Both additional variables are intended to influence the selection decision in the first stage only, not the disclosure outcomes in the second stage. Our first additional variable follows Matsumura et al. (2014) and Bose et al. (2020) and is defined as the percentage of firms in the same industry contacted by the CDP (*industry fraction covered by CDP*). This is because, with a growing proportion of firms in a given industry contacted by the CDP, the CDP becomes more efficient at identifying and processing the information of additional firms. Consequently, the likelihood increases that new

firms in that industry are included among the CDP targets. The second additional variable follows Griffin et al. (2017) and is defined as a dummy variable that equals 1 if the CDP had contacted the firm in the previous year, and 0 if not (*inclusion in previous year's CDP sample)*. This is in line with the argument that once a firm is included in the CDP database, it is very likely that the CDP contacts this firm in the subsequent year.

Although both variables meet the condition of influencing the probability of being included in the CDP sample, they would not be suitable as exclusion restrictions if they would also impact the dependent variables of the second stage. In our case, however, this concern should not be an issue. Once a firm starts to disclose information voluntarily, it likely continues to do so in subsequent years because the stakeholders expect it (Stanny, 2013; Matsumura et al., 2014). At the same time, due to these expectations of continuance, managers will try to avoid disclosure levels that are too difficult to maintain in the future (Graham et al., 2005). Consequently, although managers choose to continue voluntary disclosure, they select levels of disclosure that are manageable for them. In our context of voluntary GHG emission disclosure, this implies that repeated interaction with the CDP only impacts the continuance of disclosure but not the extent to which firms disclose their GHG emissions. The decision concerning the scope and quality of the voluntary GHG emission disclosure remains an independent decision, which fulfills the requirement that our additional variables do not impact the second-stage dependent variables.

The results of the Heckman (1979) selection correction are presented in Table 6. Column (1) shows the coefficient estimates of the first-stage probit on the *CDP sample* dummy. As desired, both our exclusion restrictions influence the probability of being included in the CDP sample positively and significantly. Columns (2) to (4) show the coefficient estimates of the second-stage ordered logit regressions on disclosure scope, disclosure verification, and integrated disclosure score. Even after including *lambda* to correct for a potential selection bias,

the results remain qualitatively unchanged compared to our baseline results. This lets us conclude that selection bias should not be a major problem in our analyses.

Insert Table 6 here

4.2.3 Addressing omitted variable bias

We add a set of control variables to our baseline regression to alleviate concerns about omitted variables. Details of these variables are provided in Appendix Table A1. Panel A of Table 7 refers to additional controls capturing disclosure and environmental performance. In columns (1) to (3), we add a dummy variable *EPA* to our baseline specification that is equal to 1 if a firm is subject to the Mandatory Reporting of Greenhouse Gases rule of the U.S. Environmental Protection Agency (EPA, 2009), and 0 if not (Stanny, 2013; Matsumura et al., 2014).[7] This is because one could argue that firms that already have to report environmental information mandatorily have lower incentives or efforts to disclose additional voluntary GHG emission information. In columns (4) to (6), we account for the *general voluntary disclosure level* approximated by the information content of a firm's website (Boulland et al., 2021). The motivation for this inclusion arises from the argument that firms that already provide substantial information voluntarily tend to also disclose GHG emission voluntarily. In columns (7) to (9), we also include a firm's *environmental performance*, measured by Dyck et al.'s (2019) environmental score based on Thomson Reuters ESG data, as previous literature proposes a correlation between environmental disclosure and environmental performance (Döring et al., 2023). In all cases, the results on the impact of dual ownership on voluntary GHG emission disclosure remain qualitatively the same.

[7] This rule requires all fossil fuel suppliers, industrial gas suppliers, direct greenhouse gas emitters, and manufacturers of heavy-duty and off-road vehicles and engines to report GHG emissions on a facility level to the EPA.

Panel B of Table 7 extends our robustness tests to several additional corporate governance variables. For example, monitoring and/or advising by the board of directors or influential shareholder groups may also impact a firm's environmental behavior. In columns (1) to (3), we account for the impact of the board of directors on a firm's disclosure decision by including a *board factor* that is the first component of a principal component analysis on several commonly used board characteristics. In columns (4) to (6), we account for the influence of other ownership variables by including dummy variables equal to 1 if the firm has family or block ownership higher than 25% (*family ownership dummy* and *block ownership dummy*). Similar to Panel A, the results of Panel B remain qualitatively unchanged compared to our baseline results. Therefore, we conclude that dual ownership still impacts a firm's disclosure scope, disclosure verification, and integrated disclosure score even after including a set of variables to account for other possible confounding influences. In particular, we continue to find a positive effect of dual ownership on voluntary GHG emission disclosure.

Insert Table 7 here
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5 Heterogeneity across firms

Having established the causal relationship between dual ownership and the scope and quality of voluntary GHG emission disclosure, this section highlights differences in the cross-section of firms. Considering the benefits and costs associated with voluntary GHG emission disclosure, as already explained in section 2.1, our heterogeneity analyses enable more detailed insights into the risk sensitivity of dual holders and their superior monitoring capabilities that allow them to curb risks. Following their motive to reduce the risks in their overall holding of equity and debt in the same firm, dual holders should foster voluntary GHG emission disclosure in firms where it is particularly beneficial to do so. Moreover, given their privileged access to information from both their equity and debt involvement, dual holders' monitoring abilities

should be more important in firms with high information asymmetries that are more difficult to monitor.

5.1 Environmental risk exposure

We begin our heterogeneity analysis by considering the benefits of voluntary GHG emission disclosure. Considering dual holders' aim to reduce overall firm risk to increase the combined value of their equity and debt holdings, we examine their role when firms face high climate-related risks. Since voluntary GHG emission disclosure enables stakeholders to better evaluate a firm's actual situation and prevent exaggerated reactions, we expect dual holders to promote voluntary GHG emission disclosure when climate-related risks are high.

Acknowledging heterogeneous interpretations and perceptions of risk, we test this hypothesis by considering three different indicators of climate-related risk. First, we determine whether a firm operates in a high-polluting industry. This implies that the firm will be under special scrutiny by the public in general and regulators in particular, increasing the probability of litigation and introducing new pollution-related regulations, which can be costly for firms in these industries. Second, we consider whether a firm faces media coverage of so-called corporate social *irresponsibility* (CSI). Kölbel et al. (2017) document that CSI is positively associated with firm risk due to the increased potential for stakeholder sanctions. Third, we account for a firm's own perception by considering how it deals with firm-level climate change risks during conference calls.

To analyze how the impact of dual ownership on voluntary GHG emission disclosure varies along different levels of these three risk indicators, we split our sample along the respective median values into subsamples with high risk and subsamples with low risk. In particular, we measure industry emissions by taking the mean across the scope 1 emissions of all firms

with the same 2-digit SIC code. Media coverage of CSI stems from RepRisk,[8] a data provider that systematically screens daily a broad range of media outlets in multiple languages for coverage of CSI. Finally, firm-level climate change risk is taken from Sautner et al. (2023), who construct this proxy from textual analysis of the transcripts of earnings conference calls. It is a count of the relative frequency of climate change bigrams mentioned in the same sentence with the words "risk", "uncertainty", or their synonyms.

Table 8 provides the results of sample split analyses where we re-estimate our ordered logit regression from equation (1) for each subsample. Panel A deals with industry emissions, Panel B with media coverage of CSI,[9] and Panel C with firm-level climate change risk. All second subpanels, which contain the regression estimates, show that the coefficient estimates of dual ownership are consistently positive and statistically significant among firms that face higher climate-related risks (columns (2), (4), and (6)). Looking at the respective first subpanels, indicating the magnitudes of the effect, we find that the marginal effect of dual ownership on the average firm's probability of having the highest score of our emission disclosure variables is consistently higher among the firms facing higher climate-related risks compared to those facing lower climate-related risks.

[8] RepRisk screens for environmental issues (animal mistreatment; climate change, GHG emissions, and global pollution; impacts on landscapes, ecosystems, and biodiversity; local pollution; overuse and wasting of resources, waste issues), social issues (child labor, discrimination in employment; forced labor; freedom of association and collective bargaining; human rights abuses, corporate complicity; impacts on communities; local participation issues; occupational health and safety issues; poor employment conditions; social discrimination), governance issues (anti-competitive practices; corruption, bribery, extortion, money laundering; executive compensation issues; fraud; misleading communication; tax evasion; tax optimization), and cross-cutting issues (controversial products and services; products (health and environmental issues); supply chain issues; violation of international standards; violation of national legislation).

[9] Although GHG emissions are an essential topic in ESG/CSR considerations, we acknowledge that one could interpret increased voluntary GHG emission disclosure in response to general ESG/CSR issues as an act of greenwashing rather than purposive risk reduction. However, rerunning the sample split analysis with sample splits that relate even more closely to the matter of GHG emissions does not change the results qualitatively. In particular, when considering only media coverage of environmental issues, or even more granular media coverage of issues associated with climate change, GHG emissions, and global pollution, the effect of dual ownership on our three disclosure variables is still consistently and considerably stronger in the high subsamples than in the low subsamples.

The results across all three sample split analyses support that dual holders foster voluntary GHG emission disclosure to improve their portfolio firm's risk exposure. Better disclosure enables stakeholders to better evaluate the actual situation of the firm and prevents them from exaggerated negative reactions to potential climate-related risks. These dynamics underline the dual holders' goal to reduce risk and suggest that their debt part makes them more risk-averse than other institutional investors.

Insert Table 8 here

5.2 Information asymmetry

Next, we focus on another distinct characteristic of dual holders: their salient monitoring capacity. As dual holders obtain information from their public equity and private debt holdings, they have better access to information than other (institutional) investors and stakeholders. This information advantage is most valuable when the general information environment is poor, and information asymmetry is high. Therefore, the impact of dual holders' monitoring, allowing them to effectively achieve lower risk through better voluntary disclosure, should be more pronounced when publicly available information is scarce or difficult to process.

We build the analysis of this hypothesis on two different drivers of information asymmetries. First, we use a firm's analyst coverage to indicate the amount and quality of publicly available information. Second, we consider a firm's organizational complexity to indicate the difficulty of processing information and understanding the business. Both aspects impact the level of information asymmetry between the firm and outside stakeholders.

In particular, we split the sample along the median value of analyst coverage into subsamples with high and low analyst coverage, and along the median value of organizational complexity into subsamples with high and low organizational complexity. Analyst coverage is

the number of equity analysts that cover a firm in a given year in I/B/E/S. Organizational complexity is the first component of the principal component analysis of firm size, leverage, and the number of business segments (Coles et al., 2008).[10] We re-estimate equation (1) for each of the subsamples.

Table 10 presents the results. Subpanel A2, which contains the results for the analyst coverage split, shows in columns (1), (3), and (5) that the coefficient estimates of dual ownership are consistently positive and statistically significant for the low subgroup, where information availability and quality is poor. Subpanel A1 further indicates that the positive effect of dual ownership on voluntary GHG emission disclosure is consistently greater in magnitude for the low sample compared to the high sample. When the information environment is weak, a 1% increase in dual ownership increases the average firm's probability of having the highest disclosure score, verification score, and integrated disclosure score by 0.226%, 0.211%, and 0.203%, respectively.

Subpanel B2, which contains the results for the organizational complexity split, shows in columns (2), (4), and (6) that the coefficient estimates of dual ownership are consistently positive and statistically significant for the high subgroup, where information is more difficult to process because of the complexity of the firm. In contrast, all estimated coefficients of interest are statistically insignificant in the low subgroup. Looking at the magnitudes of the effect in Subpanel B1, the positive effect of dual ownership on voluntary GHG emission disclosure is consistently greater in the high subsample than for the low subsample. A 1% increase in dual ownership increases the average firm's probability of having the highest disclosure score, verification score, and integrated disclosure score by 0.356%, 0.329%, and 0.398%, respectively, when organizational complexity is high.

[10] For consistency with our previous definitions and analyses, we define firm size differently to Coles et al. (2008) as the natural logarithm of one plus total asset. However, replacing total assets with sales as in Coles et al.'s (2008) original study does not change our results qualitatively.

These results support the assumption that the impact of dual holders' monitoring is especially pronounced when the general information environment is poor. Having two information sources through their simultaneous equity and debt holding seems to give dual holders a distinct advantage in situations of high information asymmetry that arise, for example, from poor information availability and quality or challenging processing and oversight.

Insert Table 9 here
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6 Valuation implication

Although dual holders promote voluntary GHG emission disclosure to reduce environmental risk exposure (especially in firms with high information asymmetries), the question arises whether this contributes to the dual holders' desire to reduce their portfolio firm's overall risk. If the dual holder's involvement in voluntary GHG emission disclosure effectively reduces firm risk, the firm's cost of equity capital should be reduced as investors demand less compensation for the risk they take when investing in the firm.

To test this relationship, we split our sample into firms with lower and higher dual holder involvement along the median value of dual ownership. For each subgroup, we run OLS regressions of our three disclosure proxies on a firm's cost of equity capital. Following Drobetz et al. (2018), we determine the cost of equity capital based on the arithmetic average of the four implied cost of capital (ICC) estimates of Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004), and Ohlson and Juettner-Nauroth (2005). In all regressions, we control, in addition to firm size, payout ratio, leverage, profitability and capex, for total institutional ownership and environmental performance to avoid a selection bias induced by the sample split.

Columns (1) to (6) of Table 11 present the results. We find negative and statistically significant coefficient estimates for all three disclosure proxies among firms with high dual ownership in columns (2), (4), and (6). This confirms that an increase in emission disclosure decreases firm risk and, accordingly, the cost of equity capital. The coefficient estimates in columns (1), (3), and (5), where dual ownership is low, are statistically insignificant. These results suggest that the dual holders' superior access to information and their deliberate weighing of the disclosure's risk implications contribute to the effectiveness of voluntary GHG emission disclosure such that it is credible and ultimately reduces firm risk.

Insert Table 10 here

As a lower cost of equity capital decreases the denominator in a traditional discounted cashflow framework, it should also increase a firm's market valuation. To test this impact, we re-estimate the regressions above after replacing the cost of equity capital with the market-to-book ratio. The market-to-book ratio is the ratio of the market value of equity to the difference between total assets and total liabilities.

Columns (7) to (12) of Table 11 show the results. For the group of firms with high dual ownership (columns (8), (10), and (12)), the coefficient estimates are positive and statistically significant for all of our three disclosure proxies. We find no statistically significant impact on the market-to-book ratio when dual ownership is low (columns (7), (9), and (11)). These results suggest that the risk reduction effect achieved through voluntary GHG emission disclosure is value-relevant only among firms with high dual holder involvement.

7 Conclusion

This paper finds a positive and statistically significant relationship between dual ownership and voluntary GHG emission disclosure. The results remain robust after addressing endogeneity and sample selection. Heterogeneity tests across firms reveal that the effect is more pronounced when voluntary disclosure is associated with risk reduction and when the information environment is poor.

Our results align with previous literature, suggesting an overall risk-reducing motive of dual holders. Since they hold both equity and debt, the value of their holding cannot be interpreted as a pure call option in which value increases with risk. The debt part of their investment is negatively associated with risk and requires a diligent handling of risks, particularly environmental-related risks, to which a firm is exposed. Consequently, they promote voluntary GHG emission disclosure in their portfolio firms to increase transparency and reduce firm risk by enabling stakeholders to evaluate the risks associated with the firm's GHG emissions. Further corroborating a risk-based explanation, our analysis reveals that voluntary GHG emission disclosure reduces the cost of equity capital and increases the valuation in firms with high dual ownership.

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Appendix Table A1: Definitions of variables

Variable	Definition	Source
GHG emission disclosure		
CDP sample	Dummy variable that equals 1 if the CDP asked a firm to answer its questionnaire in a given year, and 0 otherwise.	Authors' calculations based on CDP data
Disclosure scope	Ordinal value that describes the highest scope of GHG emission disclosure. The variable ranges from 0 (no scope is disclosed) to 3 (all three scopes are disclosed).	Authors' calculations based on CDP data
Disclosure verification	Ordinal value that describes the highest scope for which the GHG emission has been externally verified. The variable ranges from 0 (no external verification) to 3 (external verification of Scopes 1, 2, and 3).	Authors' calculations based on CDP data
Inclusion in previous year's CDP sample	Dummy variable that equals 1 if the CDP asked a firm to answer its questionnaire in the year prior to a given year, and 0 otherwise.	Authors' calculations based on CDP data
Industry fraction covered by CDP	Percentage of firms that the CDP contacts to answer its questionnaire in a given year and industry (2-digit SIC code).	Authors' calculations based on CDP data and Compustat
Integrated disclosure score	Disclosure score provided by the CDP that ranks firms based on the quality and completeness of their disclosure on a scale of 0 to 100. For comparability with the disclosure scope and disclosure verification, it is transformed to a scale of 0 (worst) to 3 (best), where 0 describes non-disclosing firms and 1–3 the terciles of the original disclosure score.	Authors' calculations based on CDP data
Institutional ownership		
Distracted dual ownership	Dummy variable that equals 1 if a firm's dual holders' distraction is within the upper tercile in a given year, and 0 otherwise. Distraction is thereby calculated based on Kempf et al. (2017).	Authors' calculations based on LPC Deal Scan and Thomson Reuters 13F data
Distracted non-dual ownership	Dummy variable that equals 1 if a firm's non-dual holders' distraction is within the upper tercile in a given year, and 0 otherwise. Distraction is thereby calculated based on Kempf et al. (2017).	Authors' calculations based on LPC Deal Scan and Thomson Reuters 13F data
Dual ownership	Percentage of equity held by institutional dual holders.	Authors' calculations based on LPC Deal Scan and Thomson Reuters 13F data
Institutional ownership	Percentage of equity held by institutional investors.	Authors' calculations based on Thomson Reuters 13F data
Non-dual ownership	Percentage of equity held by institutional investors that are not dual holders.	Authors' calculations based on LPC Deal Scan and Thomson Reuters 13F data
Firm characteristics		
Book-to-market ratio	Ratio of the difference between total assets and total liabilities to the market value of equity.	Authors' calculations based on Compustat
Capex	Ratio of capital expenditures to total assets.	Authors' calculations based on Compustat
Firm size	Natural logarithm of 1 plus total assets.	Authors' calculations based on Compustat
Leverage	Ratio of long- and short-term debt to total assets.	Authors' calculations based on Compustat
Payout ratio	Ratio of common and preferred dividends to net income.	Authors' calculations based on Compustat
Profitability	Ratio of operating income before depreciation to total assets.	Authors' calculations based on Compustat
Additional firm variables		
Analyst coverage	Natural logarithm of 1 plus the number of analysts following the firm in a given year.	Authors' calculations based on I/B/E/S
Board factor	First component of the principal component analysis on the board characteristics average age, average tenure, board independence, board size, CEO insider dummy, and chair/CEO duality dummy.	Authors' calculations based on ISS Director Data

Average age	Average age of directors.	Authors' calculations based on ISS Director Data
Average tenure	Average tenure of directors.	Authors' calculations based on ISS Director Data
Board independence	Percentage of independent directors on the board.	Authors' calculations based on ISS Director Data
Board size	Number of directors.	Authors' calculations based on ISS Director Data
CEO insider dummy	Dummy variable that equals 1 if the CEO is the only company insider on the board of directors, and 0 otherwise.	Authors' calculations based on ISS Director Data
Chair/CEO duality dummy	Dummy variable that equals 1 if the CEO is also the chair of the board of directors, and 0 otherwise.	Authors' calculations based on ISS Director Data
Cost of equity capital	Arithmetic average of the four implied cost of capital (ICC) estimates of Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004), and Ohlson and Juettner-Nauroth (2005) multiplied by the percentage of equity financing (i.e., 1 minus leverage). Cost of equity capital is measured at the end of the next year and expressed as a percentage.	Authors' calculations based on I/B/E/S and Compustat
Environmental performance	Dyck et al.'s (2019) environmental score based on data from Thomson Reuters ESG.	Authors' calculations based on Thomson Reuters ESG data
EPA	Dummy variable that takes the value of 1 if a firm is subject to the EPA's GHG Mandatory Reporting Rule, and 0 otherwise. Following Stanny (2013) and Matsumura et al. (2014), a firm is subject to this rule if its NAICS is listed in the EPA's publication in the U.S. Federal Register.	Authors' calculations based on Compustat
Family ownership dummy	Dummy variable that takes the value of 1 if an individual family has a block ownership of more than 25% percent in a given firm, and 0 otherwise.	Authors' calculations based on Osiris
Firm-level climate change risk	Sautner et al.'s (2023) relative frequency with which bigrams related to climate change are mentioned together with the words "risk" or "uncertainty" (or synonyms thereof) in one sentence in the transcripts of earnings conference calls. The number of such bigrams is divided by the total number of bigrams in the transcripts.	Data provided by Sautner et al. (2023) on https://osf.io/fd6jq/
General voluntary disclosure level	Natural logarithm of 1 plus the average size of a firm's website (in bytes) per year.	Data provided by Romain Boulland on https://github.com/r-boulland/corporate-website-disclosure
Industry emissions	Average annual scope 1 GHG emission among firms with the same 2-digit SIC code.	Authors' calculations based on CDP data
Market-to-book ratio	Ratio of the market value of equity to the difference between total assets and total liabilities. Market-to-book ratio is measured at the end of the next year.	Authors' calculations based on Compustat
Organizational complexity	First component of the principal component analysis on firm size, leverage, and number of business segments according to Coles et al. (2008).	Authors' calculations based on Compustat

Table 1: Sample distribution by year

This table presents the number of U.S. firms in our sample that were asked by the Carbon Disclosure Project (CDP) to complete their questionnaire between 2010 and 2019 (column (1)). Column (2) shows the number that replied. Columns (3) and (4) show how many firms disclose at least their scope 1 emissions publicly, and how many verify at least scope 1 emissions externally.

Year	(1) Firms contacted by CDP	(2) Firms that replied	(3) Firms that disclosed at least scope 1 emissions publicly	(4) Firms that verified at least scope 1 emissions externally
2010	414	276	209	68
2011	426	284	221	114
2012	623	293	236	134
2013	709	318	252	138
2014	718	329	262	146
2015	514	317	252	151
2016	455	282	240	145
2017	464	301	259	155
2018	446	298	233	157
2019	578	365	291	188
Total	5347	3063	2455	1396

Table 2: Descriptive statistics

This table reports the frequency as well as the mean, 25th percentile, median, and 75th percentile of each variable used in our models. It also shows the respective standard deviations. Detailed variable descriptions are in Appendix Table A1.

	N	Mean	P25	Median	P75	SD
GHG emission reporting						
Disclosure scope	5347	1.258	0	0	3	1.400
Disclosure verification	5347	0.627	0	0	1	1.119
Integrated disclosure score	4824	1.130	0	1	2	1.225
Institutional ownership						
Dual ownership	5347	0.044	0.015	0.039	0.064	0.037
Distracted dual ownership	5347	0.333	0	0	1	0.471
Non-dual ownership	5347	0.738	0.638	0.770	0.872	0.195
Institutional ownership	5347	0.782	0.692	0.823	0.912	0.196
Firm characteristics						
Firm size	5347	9.117	8.261	9.005	9.936	1.260
Payout ratio	5347	0.305	0.000	0.231	0.483	0.571
Leverage	5347	0.300	0.174	0.289	0.400	0.183
Profitability	5347	0.142	0.093	0.133	0.180	0.079
Capex	5347	0.052	0.020	0.038	0.066	0.048
Book-to-market ratio	5347	0.408	0.189	0.338	0.564	0.347

Table 3: Correlation table

This table presents the pairwise correlation of the dependent variables with the main explanatory variables used in our analyses. Correlation coefficients larger than 0.5 are highlighted in bold. Detailed variable descriptions are in Appendix Table A1. * indicates significance at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Disclosure scope	1.000						
(2) Disclosure verification	**0.661***	1.000					
(3) Integrated disclosure score	**0.906***	**0.772***	1.000				
(4) Dual ownership	0.259*	0.201*	0.266*	1.000			
(5) Distracted dual ownership	-0.010	-0.034*	-0.021	0.323*	1.000		
(6) Non-dual ownership	-0.172*	-0.180*	-0.200*	-0.072*	0.035*	1.000	
(7) Institutional ownership	-0.123*	-0.141*	-0.149*	0.118*	0.096*	**0.982***	1.000

Table 4: Institutional dual ownership and GHG emission disclosure

This table presents the estimation results for an ordered logit regression of total institutional ownership (columns (1)–(3)) as well as institutional dual ownership (columns (4)–(6)) and other control variables on disclosure scope, disclosure verification, and the integrated disclosure score. Panel A reports the magnitude of the effect of a 1% increase in institutional dual ownership. It shows the percentage changes in the probability that an average firm has a disclosure scope, disclosure verification or integrated disclosure score of 0, 1, 2, or 3. Panel B presents the regressions' coefficient estimates. Detailed variable descriptions are in Appendix Table A1. Standard errors are clustered at the firm level. *p*-values are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	(1) Disclosure scope	(2) Disclosure verification	(3) Integrated disclosure score	(4) Disclosure scope	(5) Disclosure verification	(6) Integrated disclosure score
Panel A: Magnitude of the effects						
0				-0.099	-0.021	-0.117
1				0.076	0.166	0.051
2				0.114	0.179	0.142
3				0.209	0.195	0.209
Panel B: Regression estimates						
Dual ownership				6.128***	4.618**	5.278***
				(0.001)	(0.013)	(0.001)
Non-dual ownership				-0.543	-0.596	-0.496
				(0.126)	(0.138)	(0.187)
Institutional ownership	-0.226	-0.300	-0.209			
	(0.514)	(0.447)	(0.571)			
Firm size	0.857***	0.966***	1.035***	0.764***	0.902***	0.951***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Payout ratio	0.131	0.122	0.154*	0.116	0.112	0.144*
	(0.105)	(0.144)	(0.051)	(0.148)	(0.181)	(0.065)
Leverage	-0.526	-0.217	-0.794*	-0.647	-0.309	-0.893**
	(0.216)	(0.666)	(0.053)	(0.129)	(0.544)	(0.031)
Profitability	1.576*	2.374**	2.959***	1.400	2.361*	2.860***
	(0.094)	(0.048)	(0.004)	(0.138)	(0.053)	(0.005)
Capex	-4.330**	-1.469	-4.220**	-4.286**	-1.371	-4.167**
	(0.015)	(0.477)	(0.027)	(0.015)	(0.507)	(0.027)
Book-to-market ratio	-0.355*	-0.047	-0.329	-0.297	0.021	-0.264
	(0.095)	(0.849)	(0.146)	(0.168)	(0.932)	(0.248)
N	5347	5347	4824	5347	5347	4824
Pseudo R^2	0.184	0.198	0.209	0.189	0.201	0.213
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES

Table 5: Institutional dual holder distraction and GHG emission disclosure

This table presents the estimation results for an ordered logit regression of institutional dual holder distraction, institutional dual ownership, and other control variables on disclosure scope, disclosure verification, and the integrated disclosure score. Detailed variable descriptions are in Appendix Table A1. Standard errors are clustered at the firm level. *p*-values are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dependent variable:	Disclosure scope	Disclosure verification	Integrated disclosure score
Distracted dual ownership	-0.325***	-0.253*	-0.216*
	(0.004)	(0.058)	(0.055)
Dual ownership	7.584***	5.539***	6.140***
	(0.000)	(0.003)	(0.000)
Distracted non-dual ownership	0.050	0.036	0.037
	(0.564)	(0.704)	(0.658)
Non-dual ownership	-0.483	-0.536	-0.452
	(0.170)	(0.182)	(0.227)
Firm size	0.761***	0.894***	0.947***
	(0.000)	(0.000)	(0.000)
Payout ratio	0.110	0.106	0.141*
	(0.170)	(0.205)	(0.071)
Leverage	-0.514	-0.211	-0.801*
	(0.229)	(0.679)	(0.053)
Profitability	1.165	2.133*	2.688***
	(0.218)	(0.080)	(0.009)
Capex	-4.236**	-1.263	-4.108**
	(0.016)	(0.541)	(0.029)
Book-to-market ratio	-0.241	0.072	-0.224
	(0.261)	(0.767)	(0.322)
N	5347	5347	4824
Pseudo R^2	0.191	0.202	0.213
Year FE	YES	YES	YES
Industry FE	YES	YES	YES

Table 6: Heckman selection correction

This table presents the results of a Heckman selection correction. Column (1) presents the coefficient estimates of the first-stage probit regression of institutional dual ownership and all previously used control variables and fixed effects on a dummy variable (CDP sample). This dummy equals 1 if a firm is contacted by the CDP in a given year, and 0 otherwise. To ensure an effective control for selection bias, the industry percentage covered by CDP and the inclusion in the previous year's CDP sample are included as additional explanatory variables (exclusion restriction). Columns (2)–(4) present the coefficient estimates of the second-stage ordered logit regression of institutional dual ownership and other control variables on disclosure scope, disclosure verification, and the integrated disclosure score, where the inverse Mills ratio (lambda) is included as a control for selection bias. Detailed variable descriptions are in Appendix Table A1. Standard errors are clustered at the firm level. *p*-values are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	First stage		Second stage	
Dependent variable:	CDP sample	Disclosure scope	Disclosure verification	Integrated disclosure score
Industry fraction covered by CDP	6.043***			
	(0.000)			
Inclusion in previous years' CDP sample	3.350***			
	(0.000)			
Dual ownership	1.012	5.945***	4.712**	4.794***
	(0.144)	(0.001)	(0.015)	(0.004)
Non-dual ownership	0.592***	-0.591	-0.661	-0.601
	(0.000)	(0.110)	(0.111)	(0.115)
Firm size	0.638***	0.700***	0.848***	0.880***
	(0.000)	(0.000)	(0.000)	(0.000)
Payout ratio	-0.008	0.124	0.128	0.151*
	(0.861)	(0.139)	(0.141)	(0.058)
Leverage	-0.676***	-0.562	-0.302	-0.853**
	(0.000)	(0.206)	(0.570)	(0.044)
Profitability	0.537**	1.232	2.314*	2.680**
	(0.023)	(0.215)	(0.070)	(0.010)
Capex	1.446***	-4.255**	-1.105	-4.154**
	(0.004)	(0.021)	(0.600)	(0.033)
Book-to-market ratio	-0.433***	-0.251	0.070	-0.189
	(0.000)	(0.260)	(0.785)	(0.414)
Lambda		-0.473***	-0.409**	-0.525***
		(0.000)	(0.030)	(0.000)
N	22881	4884	4884	4453
Pseudo R^2	0.824	0.199	0.202	0.218
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES

Table 7: Additional controls

This table presents the estimation results for various robustness tests. To avoid bias from omitted variables, we add in columns (1)–(4) of Panel A a dummy that indicates whether a firm is subject to the Mandatory Reporting of Greenhouse Gases rule of the U.S. EPA, in columns (5)–(8) a firm's general voluntary disclosure level, and in columns (9)–(12) a firm's environmental performance. Furthermore, Panel B adds additional board characteristics in columns (1)–(4), and additional ownership characteristics in columns (5)–(8) to our baseline ordered logit regressions of institutional dual ownership and other control variables on disclosure scope, disclosure verification, and the integrated disclosure score. Detailed variable descriptions are in Appendix Table A1. Standard errors are clustered at the firm level. *p*-values are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	(1) Disclosure scope	(2) Disclosure verification	(3) Integrated disclosure score	(4) Disclosure scope	(5) Disclosure verification	(6) Integrated disclosure score	(7) Disclosure scope	(8) Disclosure verification	(9) Integrated disclosure score
Panel A: Additional controls with regard to disclosure and environmental performance									
Dual ownership	6.157***	4.614**	5.287***	4.929**	3.647	4.705**	5.670***	3.975*	4.800***
	(0.001)	(0.013)	(0.001)	(0.017)	(0.102)	(0.022)	(0.006)	(0.056)	(0.008)
Non-dual ownership	-0.548	-0.582	-0.492	-0.500	-0.668	-0.355	0.144	0.172	0.103
	(0.120)	(0.140)	(0.188)	(0.281)	(0.223)	(0.490)	(0.763)	(0.750)	(0.830)
Firm size	0.768***	0.904***	0.953***	0.815***	0.936***	1.036***	0.337***	0.498***	0.480***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)
Payout ratio	0.116	0.112	0.145*	0.152	0.160	0.215**	0.087	0.086	0.178*
	(0.148)	(0.183)	(0.064)	(0.125)	(0.142)	(0.034)	(0.406)	(0.435)	(0.090)
Leverage	-0.653	-0.321	-0.891**	-0.951*	-0.479	-1.285***	-0.401	0.333	-0.366
	(0.125)	(0.531)	(0.031)	(0.063)	(0.417)	(0.010)	(0.464)	(0.615)	(0.470)
Profitability	1.336	2.309*	2.828***	0.824	1.407	2.422**	0.234	1.043	1.038
	(0.157)	(0.060)	(0.006)	(0.442)	(0.306)	(0.031)	(0.839)	(0.468)	(0.397)
Capex	-3.847**	-1.052	-3.951**	-5.409***	-1.285	-4.033*	-2.561	1.049	-1.701
	(0.026)	(0.606)	(0.035)	(0.007)	(0.592)	(0.065)	(0.217)	(0.647)	(0.439)
Book-to-market ratio	-0.293	0.018	-0.261	-0.423	-0.184	-0.503*	-0.046	0.524	-0.025
	(0.175)	(0.942)	(0.254)	(0.110)	(0.558)	(0.076)	(0.886)	(0.138)	(0.936)
EPA	-0.405	-0.340	-0.189						
	(0.255)	(0.488)	(0.580)						
General voluntary disclosure level				0.103***	0.116***	0.141***			
				(0.001)	(0.001)	(0.000)			
Environmental performance							0.031***	0.028***	0.030***
							(0.000)	(0.000)	(0.000)
N	5347	5347	4824	4057	4057	3624	3729	3729	3323
Pseudo R2	0.189	0.202	0.213	0.212	0.231	0.244	0.321	0.282	0.310
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Dependent variable:	(1) Disclosure scope	(2) Disclosure verification	(3) Integrated disclosure score	(4) Disclosure scope	(5) Disclosure verification	(6) Integrated disclosure score
Panel B: Additional controls with regard to the board of directors and ownership						
Dual ownership	5.584***	3.390*	4.269**	4.848**	3.196*	4.818***
	(0.004)	(0.092)	(0.017)	(0.012)	(0.099)	(0.010)
Non-dual ownership	-1.107**	-0.960**	-1.059**	-1.082**	-0.859	-0.589
	(0.013)	(0.046)	(0.017)	(0.033)	(0.157)	(0.256)
Firm size	0.744***	0.839***	0.892***	0.765***	0.927***	1.026***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Payout ratio	0.091	0.086	0.124	0.140	0.130	0.225**
	(0.279)	(0.320)	(0.134)	(0.184)	(0.278)	(0.040)
Leverage	-0.499	0.012	-0.693	-0.976**	-0.192	-1.407***
	(0.307)	(0.984)	(0.138)	(0.043)	(0.749)	(0.006)
Profitability	0.925	1.606	1.767	0.905	1.916	2.865**
	(0.423)	(0.244)	(0.134)	(0.381)	(0.152)	(0.018)
Capex	-4.016**	-1.203	-3.951*	-3.487*	-1.335	-3.921*
	(0.046)	(0.594)	(0.060)	(0.053)	(0.543)	(0.061)
Book-to-market ratio	-0.402	-0.134	-0.401	-0.180	0.183	-0.286
	(0.124)	(0.667)	(0.145)	(0.521)	(0.594)	(0.374)
Board factor	0.172**	0.119*	0.131*			
	(0.021)	(0.099)	(0.058)			
Family ownership dummy				-0.588**	-0.472	-0.614**
				(0.041)	(0.193)	(0.049)
Block ownership dummy				-0.614	-0.595	-0.476
				(0.135)	(0.145)	(0.302)
N	4478	4478	4094	3688	3688	3180
Pseudo R2	0.198	0.196	0.205	0.189	0.204	0.230
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES

Table 8: Heterogeneity across firms with regard to environmental risk exposure

For various subsamples, this table presents the estimation results for an ordered logit regression of institutional dual ownership and other control variables on disclosure scope, disclosure verification, and integrated disclosure score. Detailed variable descriptions are in Appendix Table A1. Panel A splits the sample along the median value of industry GHG emissions where industries are classified according to 2-digit SIC codes. Panel B splits the sample along the median value of media coverage of general ESG issues. Panel C splits the sample along the median value of firm-level climate change risk. In all panels, firm-year observations are categorized as "low" if their value is below the respective median value, and "high" if their value is equal to or above the median value. The first subpanel of each panel reports the magnitude of the effect of a 1% increase in institutional dual ownership. It shows the percentage changes in the probability that an average firm has a disclosure scope, disclosure verification, or integrated disclosure score of 0, 1, 2, or 3. Each second subpanel presents the regressions' coefficient estimates. Standard errors are clustered at the firm level. *p*-values are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Disclosure scope		Disclosure verification		Integrated disclosure score	
Panel A: Sample split by industry GHG emissions						
Industry GHG emissions:	Low	High	Low	High	Low	High
Subpanel A1: Magnitude of the effects						
0	-0.071	-0.248	-0.017	-0.074	-0.115	-0.167
1	0.013	-0.005	0.092	0.190	0.017	0.022
2	0.035	0.090	0.101	0.238	0.107	0.142
3	0.105	0.325	0.117	0.286	0.173	0.250
Subpanel A2: Regression estimates						
Dual ownership	3.669*	10.077***	2.973	6.580**	4.666**	6.182**
	(0.096)	(0.000)	(0.267)	(0.012)	(0.033)	(0.016)
Non-dual ownership	-0.419	-0.946	-1.063**	-0.139	-0.582	-0.536
	(0.317)	(0.123)	(0.019)	(0.844)	(0.196)	(0.395)
N	2624	2423	2624	2423	2297	2247
Pseudo R^2	0.118	0.240	0.179	0.213	0.169	0.234
Panel B: Sample split by media coverage of ESG issues						
Media coverage of ESG issues:	Low	High	Low	High	Low	High
Subpanel B1: Magnitude of the effects						
0	-0.014	-0.569	0.002	-0.176	-0.005	-0.416
1	0.030	-0.342	-0.039	0.139	0.005	-0.200
2	0.036	-0.199	-0.040	0.241	0.009	0.058
3	0.049	0.358	-0.041	0.371	0.012	0.365
Subpanel B2: Regression estimates						
Dual ownership	1.348	13.675***	-0.984	7.753***	0.307	9.034***
	(0.583)	(0.000)	(0.736)	(0.001)	(0.895)	(0.000)
Non-dual ownership	-0.320	-0.428	-1.142**	0.420	-1.040*	-0.047
	(0.526)	(0.509)	(0.050)	(0.544)	(0.055)	(0.943)
N	1927	1773	1927	1773	1737	1686
Pseudo R^2	0.181	0.194	0.190	0.158	0.202	0.177
Panel C: Sample split by firm-level climate change risk						
Firm-level climate change risk:	Low	High	Low	High	Low	High
Subpanel C1: Magnitude of the effects						
0	-0.081	-0.162	-0.014	-0.041	-0.107	-0.242
1	0.084	0.155	0.135	0.472	0.045	0.168
2	0.116	0.225	0.143	0.500	0.130	0.348
3	0.195	0.375	0.154	0.525	0.189	0.499
Subpanel C2: Regression estimates						
Dual ownership	5.479***	9.798***	3.603*	11.309***	4.674***	11.415***
	(0.004)	(0.001)	(0.092)	(0.000)	(0.008)	(0.000)
Non-dual ownership	-0.688*	-0.152	-0.883**	1.791**	-0.581	0.693
	(0.086)	(0.837)	(0.040)	(0.040)	(0.170)	(0.348)
N	4047	1059	4047	1059	3644	954
Pseudo R^2	0.199	0.181	0.206	0.225	0.221	0.211
Controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES

Table 9: Heterogeneity across firms regarding the information environment

For various subsamples, this table presents the estimation results for an ordered logit regression of institutional dual ownership and other control variables on disclosure scope, disclosure verification, and integrated disclosure score. Detailed variable descriptions are in Appendix Table A1. Panel A splits the sample along the median value of the natural logarithm of the maximum number of analysts that are covering a firm. Panel B splits the sample along the median value of a firm's organizational complexity, which is following Coles et al. (2008) defined as the first component of the principal component analysis on firm size, leverage, and number of business segments. In all panels, firm-year observations are categorized as "low" if their value is below the respective median value, and "high" if their value is equal to or above the median value. The first subpanel of each panel reports the magnitude of the effect of a 1% increase in institutional dual ownership. It shows the percentage changes in the probability that an average firm has a disclosure scope, disclosure verification or integrated disclosure score of 0, 1, 2, or 3. Each second subpanel presents the regressions' coefficient estimates. Standard errors are clustered at the firm level. p-values are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Disclosure scope		Disclosure verification		Integrated disclosure score	
Panel A: Sample split by analyst coverage						
Analyst coverage:	Low	High	Low	High	Low	High
Subpanel A1: Magnitude of the effects						
0	-0.067	-0.149	-0.012	-0.042	-0.073	-0.153
1	0.131	-0.008	0.195	0.147	0.105	-0.020
2	0.161	0.037	0.203	0.172	0.165	0.092
3	0.226	0.181	0.211	0.203	0.203	0.190
Subpanel A2: Regression estimates						
Dual ownership	6.354**	5.673*	5.196**	4.376	5.054**	4.599*
	(0.013)	(0.050)	(0.042)	(0.113)	(0.039)	(0.054)
Non-dual ownership	0.263	-1.308**	-0.090	-0.789	0.131	-1.090**
	(0.615)	(0.023)	(0.883)	(0.130)	(0.820)	(0.046)
N	2175	2130	2175	2130	1939	1986
Pseudo R^2	0.178	0.230	0.186	0.213	0.213	0.214
Panel B: Sample split by organizational complexity						
Complexity:	Low	High	Low	High	Low	High
Subpanel B1: Magnitude of the effects						
0	-0.006	-0.180	-0.002	-0.033	-0.012	-0.246
1	0.018	0.109	0.124	0.284	0.022	0.073
2	0.020	0.183	0.126	0.306	0.033	0.267
3	0.026	0.356	0.127	0.329	0.038	0.398
Subpanel B2: Regression estimates						
Dual ownership	0.899	7.954***	3.963	5.856**	1.208	7.680***
	(0.798)	(0.004)	(0.464)	(0.021)	(0.734)	(0.003)
Non-dual ownership	-0.572	-0.765	-0.997	-1.043*	-0.125	-1.196*
	(0.357)	(0.256)	(0.153)	(0.077)	(0.854)	(0.094)
N	1673	1812	1673	1812	1488	1666
Pseudo R^2	0.170	0.229	0.212	0.205	0.207	0.235
Controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES

Table 10: Valuation implication

For various subsamples, this table presents the estimation results for an OLS regression of disclosure scope, disclosure verification, integrated disclosure score, and other control variables on cost of equity capital in columns (1)–(6), and on market-to-book ratio in columns (7)–(12). Detailed variable descriptions are in Appendix Table A1. For each year, the sample is split along the median value of institutional dual ownership. Firm-year observations are categorized as "low" if their value is below the median value, and "high" if their value is equal to or above the median value. Standard errors are clustered at the firm level. p-values are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	Cost of equity capital						Market-to-book ratio					
Institutional dual ownership:	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Disclosure scope	0.081	-0.080*					-0.094	0.408*				
	(0.234)	(0.072)					(0.719)	(0.069)				
Disclosure verification			-0.004	-0.106**					0.256	1.005***		
			(0.948)	(0.044)					(0.621)	(0.003)		
Integrated disclosure score					0.068	-0.089*					0.020	0.635**
					(0.386)	(0.098)					(0.961)	(0.036)
Firm size	-0.006	0.203***	0.004	0.213***	0.016	0.212***	-0.131	-0.318	-0.192	-0.476	-0.298	-0.458
	(0.938)	(0.001)	(0.957)	(0.001)	(0.833)	(0.001)	(0.681)	(0.525)	(0.577)	(0.354)	(0.435)	(0.424)
Payout ratio	0.173*	-0.022	0.177*	-0.024	0.158	-0.027	0.093	0.426	0.074	0.442	0.242	0.161
	(0.098)	(0.748)	(0.094)	(0.718)	(0.165)	(0.687)	(0.867)	(0.343)	(0.894)	(0.331)	(0.606)	(0.723)
Leverage	-6.243***	-6.858***	-6.263***	-6.839***	-6.269***	-6.786***	2.888	-0.016	2.953	-0.267	2.977	-0.776
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.423)	(0.996)	(0.416)	(0.940)	(0.442)	(0.841)
Profitability	-1.826	-3.338***	-1.842	-3.333***	-1.567	-3.019***	8.568	18.151***	8.479	17.956***	6.943	18.745***
	(0.114)	(0.000)	(0.113)	(0.000)	(0.182)	(0.002)	(0.252)	(0.001)	(0.248)	(0.001)	(0.384)	(0.001)
Capex	1.708	1.663	1.630	1.885	2.190	1.531	10.336	-3.967	10.348	-5.394	11.196	-5.305
	(0.408)	(0.332)	(0.432)	(0.266)	(0.329)	(0.389)	(0.183)	(0.544)	(0.186)	(0.408)	(0.185)	(0.415)
Institutional ownership	0.269	1.937***	0.276	1.906***	0.189	1.659***	-0.151	-1.297	-0.177	-1.029	-0.088	-1.558
	(0.367)	(0.000)	(0.358)	(0.000)	(0.562)	(0.000)	(0.920)	(0.596)	(0.906)	(0.671)	(0.957)	(0.550)
Environmental performance	-0.004*	0.002	-0.002	0.001	-0.004*	0.001	-0.008	0.005	-0.011	0.002	-0.007	0.002
	(0.075)	(0.232)	(0.211)	(0.293)	(0.061)	(0.475)	(0.350)	(0.671)	(0.182)	(0.791)	(0.432)	(0.874)
N	1515	1829	1515	1829	1333	1659	1586	1891	1586	1891	1391	1710
R^2	0.536	0.609	0.535	0.610	0.548	0.598	0.135	0.119	0.135	0.128	0.144	0.132
Adjusted R^2	0.515	0.595	0.514	0.595	0.525	0.582	0.097	0.088	0.098	0.097	0.101	0.099
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES