Why do Institutional Investors Request Climate Related Disclosures?

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ABSTRACT

We examine whether institutional investors who sign up to the CDP, the world leading repository of corporate climate risk information, do so to effect real change or merely as a marketing front (i.e., greenwashing). We find that CDP signatories positively influence firms to answer the CDP questionnaire and that firms lower their carbon emissions following disclosure. We also find that CDP signatories are more likely to engage with and divest from top emitters disclosing to the CDP. Overall, these results suggest that investors request climate-related information for genuine reasons.

Keywords: Disclosure of carbon emissions; Shareholder activism; Institutional ownership; Greenwashing.

JEL Classifications: G11, Q54, M41

1. Introduction

There is an ongoing debate on the role of institutional shareholders in the current efforts to achieve net-zero emissions by 2050. While some contend that asset managers can contribute significantly to push companies into reducing their carbon footprint, others are more skeptical and recommend authorities to focus on traditional regulatory tools (i.e., carbon taxes, cap-and-trade systems, and prescriptive regulation).[1] This skepticism is fueled by the perception that a substantial number of institutional investors engage in "greenwashing" (i.e., "window-dressing" actions that have little real impact on the reduction of actual emissions).[2] This paper contributes to this debate by exploring why institutional investors demand climate-related information. That is, do investors demand such information to effect real change or is this demand yet another "greenwashing" scheme?[3]

To address this research question, we exploit the unique institutional features of the world's largest platform of (voluntary) climate risk disclosure: the CDP (formerly known as the Carbon Disclosure Project).[4] The CDP is a uniquely suited setting for the purpose of this study. Unlike other institutional networks with an interest in climate change –notably the UN Principles for Responsible Investment (PRI)–, the CDP offers its signatories private access to the corporate climate risk information collected by the platform on their behalf. To the extent that the CDP

[1] For a recent discussion see Tallarita (2021).

[2] Recent regulatory developments illustrate that the concern is perceived as first-order. On November 27, 2019, the European Parliament approved Regulation (EU) 2019/2088 on sustainability-related disclosures in the financial services sector. In March 2021 the US SEC announced the creation of a Climate and ESG Task Force with the goal of identifying climate and ESG-related misconduct.

[3] The reporting of corporate information related to climate risk is in itself an issue of significant public interest in the current economic and social context. In a recently published report examining the potential implications of climate risk for global financial stability, the Financial Stability Board warns that the success of mitigating climate related risks depends directly on the information (i.e., disclosures) available to assess these risks (FSB 2020).

[4] The CDP is a global not-for-profit organization that maintains the world's largest comprehensive database on corporate response to climate change related risks, including carbon emissions.

publicly discloses the list of signatories, signing up to the CDP can be interpreted as a public request for climate-related information.

Our setting offers several advantages from the perspective of empirical identification. First, the CDP covers a wide cross-section of firms around the world, which is particularly important given that our research question relates to a global effort to reduce emissions. Second, institutional investors publicly sign up to the CDP platform, which allows us to examine both cross-sectional and time-series variation in investors' demand for climate risk disclosures. Third, CDP signatories are privy to a substantial part of the CDP information (firms disclosing to the CDP can opt to make their information only available to signatories of the CDP). Fourth, unlike other data sources that house all aspects of ESG (environmental, social, and governance) information, the CDP focuses only on environmental data; empirically, this helps to avoid the potential confounding effect of non-environmental related aspects of ESG scores.

We hypothesize that at least part of the motivation of institutional investors to sign up to the CDP is a genuine desire to obtain information on corporate climate risk. This view is supported by recent research suggesting that, beyond altruistic motivations, a nontrivial number of institutional investors believe that climate risks have financial implications for their portfolio firms and that corporate disclosures are important in understanding these risks (Krueger et al. 2020; Ilhan et al. 2020). Indeed, some major investors have been quite vocal in their support of a sustainable economy and in pledging their commitment to responsible investment.[5] If their behavior were perceived as inconsistent with these public statements, these institutions could suffer substantial reputational losses, potentially resulting in a reduction of their client base.

[5] The CEO of BlackRock, for example, in his 2021 annual letter to CEOs writes: "We have long believed that our clients, as shareholders in your company, will benefit if you can create enduring, sustainable value for *all* of your stakeholders" (see https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter).

However, investors could also sign up to the CDP merely to portray an image of themselves as committed to sustainability (in addition to being highlighted on the CDP website, signatories to the CDP often publicize their signatory status on their annual CSR reports). Outwardly presenting themselves as environmentally responsible could help these investors attract customers seeking green solutions. This possibility is supported by anecdotal evidence and by recent empirical work looking at institutional investors that sign up as PRI signatories (e.g., Gibson et al. 2020; Kim and Yoon 2021; Liang et al. 2021).[6]

Our empirical tests are based on a sample of more than 7,000 public firms from 51 countries during the period from 2003 to 2020. We first explore whether CDP signatories influence firms' decision to respond to the CDP questionnaire. We find a significant relationship between the concentration of CDP signatories in a given firm and that firm's probability of disclosing information to the CDP. These inferences are robust to a demanding battery of tests used to sharpen identification: we use a variety of fixed effect structures, an instrumental variables (IV) approach to isolate plausible exogenous variation in institutional ownership by CDP signatories, and a quasi-natural experiment using additions of stocks into the MSCI ACWI index.

We next examine whether CDP signatories use the information provided in the disclosures to affect real change. We find that disclosing information to the CDP is followed by a decrease in carbon emissions. Critical to our study, the results are robust when restricting the sample to cases where only CDP signatories have access to the CDP disclosures (the CDP offers

[6] Also consistent with this concern, the Securities and Exchange Commission (SEC) has recently expressed suspicion that a significant number of funds could be partaking in deceptive practices. In a recent case that has also drawn the attention of the Justice Department, the former sustainability head of Deutsche Bank's asset-management arm says the company overstated its sustainable investing claims on its annual reports (https://www.wsj.com/articles/u-s-authorities-probing-deutsche-banks-dws-over-sustainability-claims-11629923018).

firms the option to make the information available only to signatory investors). This suggests that the observed emissions reduction is likely attributable to these signatory institutions, rather than other potential users of the CDP information. The results continue to hold when we further restrict the analysis only to cases where CDP signatories own a substantial stake in the firm. That is, to cases in which the CDP signatories have enough clout to influence firm decision-making. We also find similar patterns when we focus the analysis on CDP signatories that are also PRI signatories (that is, institutional investors that have made further public commitments to support a green economy).

Finally, we explore two potential mechanisms by which the signatories use CDP information to induce firms to reduce their carbon emissions, namely engagement and divestment. For tractability purposes, when looking at engagement, our analysis focuses on data from the three largest asset managers - Blackrock, Vanguard, and State Street -, often referred to as the "Big Three". Our results suggest that firms that disclose to the CDP and emit higher levels of carbon emissions are more likely to be engaged by the Big Three. When looking at divestment as another potential mechanism, we find that firms with higher levels of emissions that disclose to the CDP platform are more likely to exhibit lower levels of investment by CDP signatories. These results continue to hold when we restrict the sample to observations in which the information is only disclosed to CDP signatories; to observations where CDP signatories hold a substantial stake in the firm; and to observations where these institutional investors also publicly commit to the UN Principles for Responsible Investment.

Overall, the results presented in this paper are hard to reconcile with the notion that institutional investors' public demand for corporate climate risk information, through their signatory status on the CDP platform, is merely a public relations ploy. Rather, our evidence

suggests that CDP signatories not only push firms to disclose emission information to the CDP, they further use this information to encourage firms to reduce their carbon footprint. That is, institutional investors appear to actively use the CDP information to effect real change.

The results of this paper inform several strands of research in accounting and finance. Most prominently, our paper contributes to the nascent literature exploring the motivation behind institutional investors' public commitment to sustainability. In a survey on climate risk perceptions, Krueger et al. (2020) find that one of the main motivations for institutions to incorporate climate risk into their investment decision processes is to protect their own public image and reputation. This survey evidence also suggests that some investors believe that reducing CO_2 emissions increases the value of their portfolio. However, whether these incentives are strong enough to effect real change is still an open question. Some papers suggest that institutional investors are effective in inducing firms to improve environmental performance (Dimson et al., 2015; Dyck et al., 2019; Azar et al., 2021).[7] In contrast, other recent research highlights inconsistencies between institutional investors' public commitment to sustainability and their actions (Gibson et al. 2020; Kim and Yoon 2021; Liang et al. 2021; Raghunandan and Rajgopal, 2021).[8] We contribute to this research by showing that, at least in our setting,

[7] Dyck et al. (2019) and Barko et al. (2021) focus on the effect of institutional investors' impact on firm-level ESG scores. Most closely related to our study are Dimson et al. (2020), who study the coordinated engagement of PRI members committed to responsible investment, and Azar et al. (2021), who pose that the Big Three induce firms to reduce their carbon emissions. These papers, however, do not look at climate risk disclosure. We study a specific shareholder request for emissions-related information.

[8] Gibson et al. (2020) find no improvement in ESG scores among US firms that sign onto the PRI. However, for institutions domiciled outside of the US these authors find that PRI signatories that claim to incorporate ESG considerations into their active equity holdings have better portfolio ESG scores than non-PRI signatories. Looking at active managers, Kim and Yoon (2021) find that PRI signatories do not improve their ESG scores and experience a decrease in returns. Liang et al. (2021) examine hedge funds and find that PRI signatories underperform both green and non-green matched funds. Raghunandan and Rajgopal (2021) document that the portfolios of self-denominated ESG funds do not exhibit lower emissions.

greenwashing does not appear to be the main driver behind institutional investors' demand for climate-related corporate disclosures.[9]

Our study also contributes to the literature on voluntary disclosure of climate risk information. Some recent papers document that firms that voluntarily disclose climate risk information, and in particular, carbon emissions data, exhibit higher market valuations (e.g., Matsumura et al. 2014) and lower cost of capital (Matsumura et al. 2018). More closely related to our study, a recent working paper by Ilhan et al. (2020) provides survey and archival evidence suggesting that a higher concentration of institutional investors, particularly those from high social norm countries, is associated with a greater likelihood that firms disclose their climate risk information to the CDP. Our paper contributes to this line of research by conducting a systematic empirical investigation on whether signatory investors effectively induce firms to disclose climate-related information and, critically, by showing that these investors then use this information to push for a decrease in firm-level carbon emissions.

Our paper also contributes to the accounting literature on real effects of corporate disclosure and reporting (Christensen et al. 2017; Kanodia and Sapra 2016; Leuz and Wysocki 2016). Our results suggest that the disclosure of climate-related information induces a subsequent reduction in carbon emissions. This is particularly relevant from a regulatory perspective, as this real effect of disclosure (i.e., the reduction in carbon emissions) is one of the arguments used by advocates for the mandatory reporting of sustainability information (Bolton et al., 2022).

[9] Our results are not necessarily inconsistent with those in recent papers concluding that institutional investors engage in greenwashing. First, our evidence is based on a setting that has not been explored by prior work (for example, it is possible that demanding CDP information is less costly for institutional investors than the actions studied by these prior papers). Moreover, these studies often measure the real outcomes of environmental performance using ESG scores, whereas we focus on subsequent reduction in carbon emissions. Finally, our paper, taken together with these prior studies, helps understand to which extent greenwashing is pervasive in the current economy.

Finally, our study informs the literature on the effect of shareholder activism (Smith 1996; Karpoff et al. 1996; Gillan and Starks 2000; Klein and Zur 2011; Bebchuk et al. 2015). Recent research uncovers benefits of hedge fund activism (e.g., Brav et al. 2008; Brav et al. 2015; Klein and Zur 2009), and finds modest effects for "low-cost" activism such as vote-no campaigns and shareholder proposals (Ertimur et al. 2010). We add to this literature by pointing out that institutional investors induce firms to disclose information about carbon emissions.

The remainder of the paper is organized as follows. In Section 2, we provide institutional background on the CDP. We describe our data and sample in Section 3. In Section 4, we explore institutional investors' influence on firms' disclosure of climate-related information. In Section 5, we examine the relationship between firm disclosure and subsequent firm-level carbon emissions. In Section 6, we explore the mechanisms used by investors to influence climate-related corporate behavior. Finally, section 7 concludes.

2. Institutional Background

2.1. The CDP

The CDP is a global nonprofit organization founded in 2000 to help companies and cities disclose their environmental impact. The CDP began sending out climate change disclosures requests in 2003 on behalf of 35 investors, and as such became the first platform attempting to link firm environmental performance with investor fiduciary duty. In response to that first questionnaire, 245 companies disclosed their climate risk information. In 2006, the CDP began sending out questionnaires to constituents of widely-used indexes such as the S&P 500, FTSE 600, ASX 200 and the MSCI ACWI. Today the CDP houses disclosures from over 9,600 global companies, representing over 50 percent of the global market capitalization. It is the largest

global repository of carbon emissions information and the largest comprehensive database on corporate response to climate change related risks.

The CDP platform has been endorsed by numerous institutions and world leaders and some have referred to it as the "gold standard" of environmental reporting.[10] In 2018 the CDP aligned its disclosure platform with the Task Force on Climate-related Financial Disclosure (TCFD), which is endorsed by the Financial Stability Board and supported by major institutional investors. Currently, the CDP represents hundreds of global signatories, with over $106 trillion in assets under management.

2.2 The CDP Questionnaire

The CDP questionnaire includes information related to climate change governance and strategy; greenhouse gas reduction targets; regulatory, physical, and other risks and opportunities; greenhouse gas emissions; external verification, and other topics. Each year the CDP asks companies to report their greenhouse gas emissions according to the Greenhouse Gas (GHG) Protocol (i.e., including scope 1, scope 2, and scope 3).

The CDP collects firms' climate-related information on an annual basis. While exact dates may vary each year, typically the CDP sends out its questionnaires in January. The platform also provides companies with guidance for preparing their information. The CDP's online response system opens up around March/April and firms can provide their information until July/August of a given year. The firms' disclosures are available on the CDP site in October, and the CDP's official scores and annual reports are produced in December/January.

Firms' participation in the CDP questionnaire is voluntary. If a firm decides to respond to the questionnaire and disclose its information to the CDP, it then has the option to mark its

[10] For example, Christiana Figueres, former Executive Secretary of the UN Framework Convention on Climate Change, commented in 2010: "The Carbon Disclosure Project is to the future of business what the x-ray machine was to the then future of medicine. Without it we would never see inside of the patient's health." (www.cdp.net)

response as either "Public" or "Private". Importantly, responses marked as "Private" are available only to the signatory investors of the CDP (non-signatory investors and the general public cannot access this information). Responses marked as "Public" can be accessed by the general public at no cost.[11]

Even though firms self-report climate risk information to the CDP, the disclosed data is commonly perceived as being of reasonable quality. To begin, the CDP encourages firms to verify the data submitted.[12] Moreover, the CDP enhances firms' reporting incentives by publishing annually a list (called the 'A-list') that includes a selected group of firms based on the quality of their disclosures. Firms that make it to the A-list are highlighted on the CDP site. To qualify for entry into the CDP 'A-list' firms must verify at least 70% of both scope 1 and 2 emissions. The CDP data has been used in previous academic studies, which is also consistent with the perception that the information is reliable (e.g., Matsumura et al. 2014, Bolton and Kacperczyk 2020).

2.3 Costs and Benefits of Signing up to the CDP

A unique benefit of becoming a CDP signatory is the access gained to the full set of corporate climate-related disclosures maintained by the CDP. This is particularly important in light of recent survey evidence suggesting that investors use climate-related information not only for portfolio allocation decisions but also for engagement purposes (Krueger et al. 2020).

Investors could also benefit from signing up to the CDP in other ways. Similar to PRI signatories, CDP signatories tout their association on their corporate websites and sustainability

[11] Firms have the option to (1) respond to the questionnaire and allow the CDP to make the responses publicly available: i.e., the response permission is marked "public"; (2) respond to the questionnaire but allow the CDP to make the responses available only to institutional investors who are signatories of the CDP: i.e., the response permission is marked "private"; (3) provide partial information, such as links to information generally available on the firm's website, for instance their CSR reports, without answering the CDP questionnaire; (4) respond indicating their decision to decline participation; or (5) not respond.

[12] A list of verification standards it accepts is available at: https://www.cdp.net/en/guidance/verification.

reports.[13] This suggests that signing up to the CDP could be a commitment mechanism for investment firms, a commitment that could attract environmentally-conscious investors. Moreover, PRI signatories have an added incentive to become CDP signatories in that doing so helps satisfy certain requirements needed to remain active PRI members.[14]

The monetary costs of becoming a signatory to the CDP are relatively low (the annual fee is $1,475 for investors with more than $1bn in AUM and $975 for all others). However, the introduction of the annual membership fee in 2018 led to a decrease in the number of signatories. Joining the platform may also impose non-monetary costs. Critically, the CDP asks signatories to leave if their behavior is deemed inconsistent with the environmental objectives of the initiative. Such an exclusion could damage the institution's public image. In less extreme cases, it could be clients, analysts, or commentators who impose reputational costs by denouncing inconsistencies between investors' commitment to the CDP and these investors' actions.

3. Data and Sample

Our initial sample includes the universe of public firms contacted by the CDP from 2003 to 2020. We start the analysis in 2003 because that was the first year the CDP conducted its survey by sending out its questionnaire to a cross-section of FT Global 500 constituents. We end our analysis in 2020, since that is the last year for which data is available at the time of our study. We obtain greenhouse gas emissions data from Trucost, a commercial provider of corporate carbon emissions data.[15] Trucost collects carbon emission data from publicly available sources.[16]

[13] For examples, see the websites of Troy Asset Management, Janus Henderson Investments, and Franklin Templeton.

[14] In recent years, the PRI has introduced some requirements that increase signatory accountability. Signing up to the CDP helps satisfy PRI Principles 1-4.

[15] Trucost is a widely used source of firm carbon emission data within the corporate sector (for example, both MSCI and S&P use Trucost data in their indexes) and among international organizations such as UNEP FI (i.e., the United Nations Environment Program Finance Initiative). It has also been used and validated in academic studies (e.g., Bolton and Kacperczyk 2020).

When a covered firm does not publicly disclose its carbon emissions, Trucost estimates the firm's annual carbon emissions based on an environmental profiling model. Since only CDP signatories have access to privately disclosed climate questionnaires, we focus our analyses on firms' carbon emissions information.

We obtain data on institutional ownership from the FactSet/LionShares database. FactSet/LionShares gathers institutional ownership for U.S. equities from mandatory SEC filings. For stocks traded outside the U.S., FactSet/LionShares gathers institutional ownership data from national regulatory agencies and stock exchange announcements, as well as direct disclosures of mutual funds, mutual fund industry directories, company proxies and annual reports. We obtain accounting and market data from Compustat Global, Compustat North America, and Datastream/WorldScope. These datasets provide stock price, balance sheet, and income statement information for a large number of international firms.

Table 1 outlines the sample selection procedure. We start with 108,787 firm year observations in the CDP dataset (i.e., the firms to which the CDP sent a request to fill the questionnaire). To be included in our sample, we require non-missing institutional ownership and financial data. The resulting sample consists of 76,621 firm-year observations corresponding to 8,647 firms from 51 countries. Some of the tests require non-missing Trucost data, which is only available from 2005 to 2020. This restricts the sample size in these analyses to 56,452 observations corresponding to 7,157 firms.

Table 2 presents descriptive statistics for our sample (see Appendix A for variable definitions). As shown in Panel A, the average ownership by CDP signatories is 11%, with a standard deviation of 12% and a 75th percentile of 17%. This suggests that, on average, the CDP

[16] The sources of carbon emissions data include companies' websites, annual reports (10-K), CSR reports, the CDP, and direct communications with companies.

signatories can exert substantial influence (for example, in the form of voting) on companies around the world. Total institutional ownership (i.e., the sum of *Signatories_Hldg* and *OtherInst_Hldg*) is 28% on average, a value that is in line with prior studies examining institutional ownership around the world (Bena et al. 2017). Panel A also shows that our sample composition includes a wide variety of firms in terms of size, leverage, and profitability.

Panel B of Table 2 provides descriptive information on our key variables by year. Carbon emissions and institutional ownership are higher in earlier years of our sample period. These patterns are probably due to the fact that the CDP has gradually expanded its coverage (including smaller firms with lower emissions and lower institutional ownership). Panel B also shows an increase in the number of CDP signatories during the sample period and an increase in PRI signatories, especially after the 2015 Paris Agreement.[17]

Panel C of Table 2 presents descriptive statistics by industry. As shown in this panel, our sample covers a wide range of industries and is consistent with prior literature on international investing. In addition, Panel C documents that companies from industries with relatively high level of carbon emissions (e.g., oil and petroleum products, steel works) exhibit a lower probability of disclosing to the CDP.

Panel D of Table 2 presents descriptive statistics by country. As shown in this panel, our sample covers a wide range of countries. Our tests include observations from the main economic regions of the world (Europe, Asia, North and South America, and Middle East). As shown in Panel D, the disclosure to the CDP is more common among companies from Scandinavia and Western Europe.

[17] The decrease in 2018 responds to the introduction of an annual fee by the CDP.

4. Institutional investors and the disclosure of climate-related information

To understand why institutional investors demand information on climate risk, we begin by exploring whether CDP signatories influence the decision to submit such information to the CDP. In particular, we test whether firms are more likely to answer the CDP questionnaire if CDP signatories hold a higher stake in the firm (i.e., when they are more influential). Such finding would suggest that firms believe that CDP signatories are genuinely concerned about this information. In contrast, a lack of association between CDP signatories' ownership and the probability of answering the CDP questionnaire would suggest that firms do not believe that the CDP signatories will take action if the information is not disclosed. As such, a lack of association would be consistent with the notion that investors' signing up to the CDP is a greenwashing scheme.

4.1 The influence of CDP signatories on firms' disclosure to the CDP

To examine the influence of CDP signatories on firm-level climate risk disclosure, we estimate the following model:

$$\begin{aligned} CDP_Disclosure_{it} = \alpha + \beta_1 * Signatories_Hldg_{it-1} \\ + \beta_2 * OtherInst_Hldg_{it-1} + \gamma * Controls_{it-1} + \tau_t + \delta_i + \varepsilon_{it}, \end{aligned} \quad (1)$$

The dependent variable, $CDP_Disclosure_{it}$, is defined as an indicator variable that equals one if company *i* submitted CDP questionnaire in year *t*, and zero otherwise. The experimental variable measuring ownership by CDP signatories, *Signatories_Hldg*, is defined as the fraction of the firm's equity held by institutional investors with CDP signatories status. *OtherInst_Hldg* is the fraction of the firm's equity held by institutional investors other than CDP signatories.

Equation (1) includes a vector of firm-level control variables, *Controls*, defined as follows. *Size* is the logarithm of total assets. We include this variable to control for the volume of

the firm's business activity as well as for potential public pressure over its environmental impact. *Log(BM)* is the logarithm of the book-to-market ratio (book value of equity divided by market value of equity). We include this variable to control for the firm's growth opportunities. We also include two measures of past performance, *ROA*, defined as net income scaled by total assets; *Return*, computed as the buy and hold return over the year. *Leverage* is computed as the sum of the long-term debt and the debt in current liabilities over the firm's total assets. *Tangibility* is the ratio of property, plant, and equipment over the firm's total assets. We include these two variables to measure credit constraints; more leveraged firms have to cope with regular cash outflows, which may preclude financing of environmentally beneficial investments. Conversely, pledgeable assets support more borrowings, which in turn allow for further investment in pledgeable assets. Finally, to control for disbursement to shareholders we include, *Dividends*, measured as total amount of dividends scaled by net income. See also Appendix A for variable definitions.

Because the relationship between *Signatories_Hldg* and *CDP_Disclosure* is likely shaped by country, industry, and economy-wide variation, equation (1) includes country, industry, and year fixed effects. To mitigate the concern that the results may be driven by unobserved time-invariant firm heterogeneity, we also introduce a model specification with firm fixed effects. In equation (1), τ_t and δ_i denote year and firm-fixed effects, respectively. As shown in the Online Appendix (Table OA1), our inferences also hold using a variety of alternative fixed effect structures, namely country-year, industry-year, size-decile-year, and country-industry-year fixed effects. To the extent that they are year-specific, these alternative fixed effects control for any shock affecting the country, the industry, or firms of similar size. The independent variables are measured at the end of the prior year (i.e., they are lagged one period). All continuous variables

are winsorized at the 1 and 99 percentiles to mitigate the effect of outliers. Standard errors are clustered at the firm level (see Appendix OA, Table OA2, for robustness to alternative clustering options). To further check the robustness of our findings to our choice of econometric specification, Table OA3 in the Online Appendix repeats the analysis using a logistic regression (instead of an OLS model). Inferences are unaffected.

Table 3 presents the results of estimating equation (1). In Panel B we replace the variable *Signatories_Hld* with an indicator variable for observations in which *Signatories_Hld* is larger than 5% (*I(Signatories_Hldg>5%*). This alternative variable captures cases in which CDP signatories hold a non-negligible ownership stake and thus can exert substantial influence on the firm. In both panels, columns 1-4 present results for the full sample of observations, and columns 5-8 present results for the subsample with non-missing Trucost data. We include this second set of columns to enhance comparability with other results of the paper (the tests in later sections require restricting the sample to observations with non-missing Trucost data).

The coefficient on *Signatories_Hldg* in Table 3, Panel A, is positive and statistically significant across all specifications, regardless of the fixed effect structure and the sample definition. The magnitude of the coefficient on *Signatories_Hldg* ranges from 0.26 to 0.47, depending on the specification. A coefficient of 0.26 suggests that a one standard deviation increase in *Signatories_Hldg* is associated with an increase of approximately 3% in the probability that the firm answers the CDP questionnaire.

The results in Table 3, Panel B, are consistent with those in Panel A. The coefficient on *I(Signatories_Hldg>5%)* is also positive and statistically significant in all specifications, with the magnitude of the coefficient ranging from 0.03 to 0.14. These estimates corroborate that the CDP signatories influence the probability that the firm answers the CDP questionnaire and

suggest that the magnitude of the effect ranges from 3% to 14%. Overall, the results from Table 3 are consistent with the notion that the presence of signatory investors induce firms to voluntarily disclose climate risk information. As such, these results are hard to reconcile with the idea that signing onto the CDP platform is merely a marketing ploy.

4.2 Instrumental Variable (IV) approach

To further sharpen identification, we conduct an instrumental variables (IV) analysis based on two-stage least squares (2SLS) regressions. Our instrument to isolate plausible exogenous variation in the ownership of CDP signatories is grounded in prior literature (e.g., Aggarwal et al. 2011; Bena et al. 2017). In particular, we use the firm's membership in the MSCI All Country World Index (MSCI ACWI) as an instrument for the ownership of CDP signatories (i.e., *Signatories_Hldg*). To the extent that a large percentage of the investments of CDP signatories are based on this index, the inclusion (exclusion) of a firm in the MSCI ACWI is likely to increase (decrease) the position of these investors in the company (i.e., the relevance assumption of the IV analysis is likely to hold).[18] The resulting variation in *Signatories_Hldg* is plausibly exogenous because the inclusion of a firm in the index is determined by a mechanical rule based on market capitalization. That is, MSCI ACWI membership status is likely to satisfy the exclusion restriction of the IV analysis.

In the first stage we instrument ownership of CDP signatories using the following specification:

$$\begin{aligned} Signatories_Hldg_{it\text{-}1} &= \alpha + \beta_1 * MSCI_{it\text{-}1} \\ &+ \beta_2 * OtherInst_Hldg_{it\text{-}1} + \gamma * Controls_{\ it\text{-}1} + \tau_t + \delta_i + \varepsilon_{it}, \end{aligned} \tag{2}$$

[18] The MSCI ACWI index includes large and mid-cap companies from 23 developed and 23 developing countries. For each country companies are ranked in descending order based on their market capitalization. Companies are sequentially included in the index starting from the largest ones until the cumulative share of index constituents reaches 85% of the free float-adjusted market capitalization of the country's listed equity. To promptly adjust for changes in market capitalizations, MSCI adjusts the set of constituents at the end of every calendar quarter.

where $MSCI_{it}$, the instrumental variable, defined as an indicator equal to one if stock *i* is assigned to the MSCI ACWI Index in year *t*, and zero otherwise. In the second stage, we estimate the following model:

$$CDP_Disclosure_{it} = \alpha + \beta_1 * \widehat{Signatories_Hldg}_{it-1} + \beta_2 * OtherInst_Hldg_{it-1} + \gamma * Controls_{it-1} + \tau_t + \delta_i + \varepsilon_{it}, \quad (3)$$

$\widehat{Signatories_Hldg}_{it-1}$ is the fitted value from the first stage (i.e., equation (2)). In both models (i.e., equations (2) and (3)), the vector of control variables, *Controls* is defined as in equation (1).

To further sharpen identification, we conduct a variant of the previous IV test in which we restrict the analysis to observations in the vicinity of the bottom of the index (i.e., the firms added into MSCI ACWI index in that year). To the extent that these firms are of similar size, the probability of being added/excluded from the index is more likely to be driven by random variation in market values. For each country we compute the market cap threshold of the index as the median market capitalization of the companies that were included into MSCI ACWI index in that year. We then include in the analysis firms with market capitalizations around the threshold.[19]

Table 4 presents the results. Panel A includes all sample observations and Panel B restricts the analysis to firms in the vicinity of the bottom of the index. In both panels, the evidence supports the relevance assumption of the IV analysis (the coefficient on *MSCI* is positive and significant, suggesting that the addition of the firm to the MSCI index is associated with higher signatory institutional investor ownership).[20] In both panels the coefficient on

[19] In particular, we include firms with a market cap between 35% below and 35% above the market cap threshold. Narrower intervals yield similar but weaker results. We exclude years 2003-2005 from the analysis because there is no publicly available data on additions to the MSCI index in those years.

[20] The value of the Kleibergen-Paap F-statistic is greater than 12 in both specifications, which further alleviates the concern that the instrument is "weak" (uncorrelated with the endogenous regressor).

$\widehat{Signatories_Hldg}_{it-1}$ is positive and statistically significant, which corroborates our interpretation of Table 3 (namely that the presence of CDP signatories induces firms to answer the CDP questionnaire).

4.3 Stock additions to the MSCI index

To further fine-tune our identification strategy, we take a second approach; we conduct a quasi-natural experiment using additions of stocks to the MSCI ACWI index. Similar to the analysis in Table 4, this alternative approach is also used by published papers studying the effect of institutional ownership around the world (i.e., Bena et al. 2017). Following this prior literature, we employ a difference-in-differences estimation around the time a stock is added to the MSCI ACWI index. Our treatment group includes firms added to MSCI ACWI index during the sample period. For every treatment and control firm we include observations for a 5-year period (–2; +2) around the treatment year. This requires restricting the sample of potential treatment years to the period 2006-2018. We use propensity scores to match every treatment firm with one non-treated firm from the same industry and year.

Table 5, Panel A, reports the test of covariate balance between the treatment and control groups. The results confirm that the treatment and control groups are comparable; we cannot reject the hypothesis of equal means between the treatment and control groups at the conventional level of statistical significance.

Table 5, Panel B presents the results of the difference-in-differences estimation, using the following specifications:

$$Signatories_Hldg_{it} = \beta_1 * Treatment_i * Post_{it} + \tau_t + \delta_i + \varepsilon_{it}, \quad (4)$$

$$CDP_Disclosure_{it} = \beta_1 * Treatment_i * Post_{it} + \tau_t + \delta_i + \varepsilon_{it}, \quad (5)$$

where *Treatment* is an indicator variable that equals one if a firm *i* is added to the MSCI ACWI Index, and zero otherwise. *Post* is an indicator variable that equals one in the year a firm is added to the MSCI ACWI Index and thereafter, and zero otherwise. For firms in the control group, *Post* is an indicator variable that equals one in the year a corresponding treatment firm is added to the MSCI ACWI Index and thereafter, and zero otherwise. Similar to previous tests, the specification includes firm and year fixed effects. Column 1 shows that compared to the control sample, the ownership of CDP signatories increases significantly after a treated firm is added to the MSCI ACWI. Column 2 reveals that, compared to the control firms, the treated firms are more likely to answer the CDP questionnaire. As such, the evidence in Table 5 further confirms the validity of our interpretation of the results in Table 3, namely that the presence of CDP signatories induces firms to disclose climate-related information to the CDP.

5. Climate-related disclosure and subsequent CO_2 emissions

5.1 CDP disclosures and subsequent CO_2 emissions

The results in the previous section suggest that institutional investors influence firms' decision to disclose climate-related information to the CDP. We next explore whether CDP disclosures are associated with subsequent lower levels of carbon emissions. Finding a decrease in corporate emissions following disclosure to the CDP would be consistent with the idea that signatories use the CDP information to pressure firms to improve environmental performance.

We estimate the following model:

$$Log(CO_2)_{it+s} = \alpha + \beta_1 * CDP_Disclosure_{it} + \beta_2 * Inst_Hldg_{it} + \gamma * Controls_{it} + \tau_t + \delta_i + \varepsilon_{it} \quad (6)$$

where *Log(CO_2)* is the natural logarithm of a firm's GHG emissions measured in equivalents of metric tons of CO_2. *CDP_Disclosure* and the control variables are as previously defined (see

Appendix A for variable definitions). Sub-indexes *i* and *t* refer to firm *i* and year *t*, respectively. All independent variables are measured at the end of the prior year. τ_t and δ_i denote year and firm fixed effects, respectively.

Following the GHG Protocol, we disaggregate total GHG emissions into three "scopes" based on the source of emission. Scope 1 emissions relate to direct GHG emissions from sources that are owned or controlled by the company; scope 2 emissions relate to indirect GHG emissions of the firm, typically from purchased heat and electricity; and finally, scope 3 emissions are the result of the firm's activities, but occur from sources not owned or controlled by the company, such as employee business travel, outsourced business activities, and other parts of the supply chain.

Table 6 presents the results of this test. We conduct the test separately using scope 1 (columns 1 and 2), scope 2 (columns 3 and 4), and scope 3 (columns 5 and 6) emissions as our dependent variable. The results show that the coefficient on our main variable of interest, *CDP_Disclosure*, is negative and statistically significant for scope 1 emissions. The magnitude of the coefficient on *CDP_Disclosure* is –0.08, which indicates that, after disclosing to the CDP, corporate CO_2 emissions are 8% lower on average. In contrast, the coefficient on *CDP_Disclosure* is not significant for scope 2 and 3 emissions in year t+1. Finding that climate risk disclosures are followed by lower scope 1 emissions but not by lower scope 2 and scope 3 emissions is perhaps not surprising considering that scope 1 emissions are under the direct control of the firm and thus are easier for managers to adjust. As shown in the Online Appendix (Table OA4), our inferences are unaffected when we use alternative fixed effect structures (i.e., country-year and industry-year fixed effects).

Table 6 shows that the disclosure to the CDP is followed by lower scope 1 emissions both in t+1 and in t+2. While some strategies to reduce emissions need more than one year to yield results, firms could also curb emissions in relatively quick ways. In particular, companies could rebalance their product mix based on their carbon emissions and/or reduce the amount of input materials (for example, Starbucks recently introduced a strawless cold drink lid).

5.2 First-time disclosure to the CDP

As a first step to sharpen identification, we repeat the previous analysis focusing on a narrow window around the year when firms initiate disclosure to the CDP. We define as "treatment group" the firm-year observations in which the firm discloses to the CDP for the first time. The control group is obtained using propensity score matching (the covariates are the same control variables as in Table 6). We match each treated firm with one control firm (i.e., a firm that does not disclose to the CDP in that year) from the same industry and year. We then take a (–2; +2) year window around the "treatment year" (i.e., the year in which the treatment firm starts disclosing to the CDP). Using this time window requires restricting the overall analysis to the period between 2007 and 2018.

We then estimate the following model:

$$Log(CO_2)_{it} = \beta_1 * Treatment_i * Post_{it} + \gamma * Controls_{it-1} + \tau_t + \delta_i + \varepsilon_{it}, \quad (7)$$

where $Log(CO_2)_{it}$ is natural logarithm of the firm's directs CO_2 emissions (Scope 1). *Treatment* is an indicator variable that equals one if a firm *i* started disclosing its carbon risk information for the first time during the period 2007-2018, and zero otherwise. *Post* is an indicator variable that equals one in the year after the firm files its first CDP questionnaire and thereafter, and zero otherwise. We include *Controls* (i.e., the vector of controls in Table 6) to account for any remaining covariate imbalance. The coefficient on the interaction term, *Treatment*Post*, captures

the differential effect between the treatment and control groups following the firms' initial disclosure to the CDP.

Table 7 presents the results. As shown in Table 7 Panel A, there is covariate balance for the most of the control variables. Table 7, Panel B, presents the results of estimating equation (7). The interaction $Treatment_i*Post_{it}$ is negative and significant indicating that, relative to the control group, firms that disclose to the CDP for the first time exhibit significantly lower CO_2 emissions in the subsequent two years. Table OA5 of the online appendix extends the analysis to test parallel trends prior to the start of the CDP disclosure. As shown in the table, we observe no significant reduction in emissions in the years before the first-time disclosure to the CDP.

5.3 Signatory investors' exclusive access to CDP data

As a second step to enhance identification, we refine the analysis in Table 6 by exploiting a key institutional feature of the CDP platform. As previously explained, if a firm decides to respond to the questionnaire and disclose its information to the CDP, it then has the option to mark its response as either "Public" or "Private". Importantly, responses marked as "Private" are available only to the signatory investors of the CDP (non-signatory investors and the general public cannot access this information). Responses marked as "Public" can be accessed by the general public at no cost (the information is on the CDP website). To the extent that other parties (e.g., other non-signatory institutions, environmental activists, regulators) do not have access to information restricted to CDP signatories, any effect of the CDP disclosure in cases marked as "Private" should be driven by CDP signatories.

In the light of the previous considerations, Table 8 presents results of re-estimating equation (6) by restricting the analysis to observations where a firm opts to grant access to its disclosed information only to CDP signatories. In columns (1) and (2) we exclude firms that

marked their responses as "Public". In columns (3) and (4) we introduce an additional condition; we exclude cases in which CDP signatories own less than five percent of the firm's equity. This restriction ensures that the CDP signatories have enough clout to influence corporate decisions and, in particular, reporting choices. In columns (5) and (6) we introduce a further condition; we impose that the CDP signatories owning more than five percent of the shares are also PRI signatories.[21] That is, we focus on CDP signatories that have made public commitments to sustainability issues.

As shown in Table 8, the coefficient on *CDP_Disclosure* is negative and significant across specifications. The magnitude of this coefficient becomes larger as we impose more restrictions on the tests. The results are strongest in the most restrictive specifications (i.e., models (5) and (6)), namely when the information is only disclosed to CDP signatories, CDP signatories hold a substantial stake in the firm, and these investors also publicly commit themselves to sustainability principles. This is consistent with these restrictions introducing a sequential refinement of the test.

Taken together, the results in Tables 6-8 suggest that the disclosure to the CDP is followed by lower carbon emissions. Importantly, this pattern is observable in cases in which the effect can be attributed to CDP signatories because only they have access to the disclosed information. Critically, this implies that institutional investors could be using the CDP information to exert pressure on firms to reduce corporate emissions. In the next section we provide more direct evidence on the ways investors do so.

6. Mechanisms to influence corporate behavior

[21] The number of CDP signatories and the number PRI signatories do not necessarily go hand-in-hand; while the majority of CDP signatories are PRI signatories, the reverse does not hold. One potential explanation is that the two organizations serve different purposes (the PRI encompasses ESG-related matters whereas the CDP focuses on issues related to the 'E' portion of ESG).

We explore two specific mechanisms used by institutional investors to influence corporate behavior: engagement and divestment.

6.1 Engagement

We start by analyzing investors' engagements with the firms in their portfolio. To keep the analysis tractable, we focus on the three largest CDP signatories; BlackRock, Vanguard, and State Street. We focus on these investment firms – often referred to as the "Big Three"– for the following reasons. The first is data availability; the Big Three recently started publicly disclosing in investment stewardship reports (ISR) detailed data on private engagements with their portfolio firms.[22] Second, while the public disclosure of engagements may not be unique to the Big Three, collecting this data for all the investment funds present in our sample would be prohibitively costly.[23] Third, studying the Big Three is in and of itself interesting in light of the recent debate on the role of these large investment managers in the economy.[24]

We hand collect engagement information from the recent ISRs published by the Big Three. We disregard engagements by letters and include only comprehensive engagements via calls and in-person meetings. The length of the period covered by the ISRs exhibits some variation across the three investors. BlackRock's ISRs include engagements data from 7/1/2017 to 6/30/2020. Vanguard's ISRs include engagements data from 7/1/2018 to 6/30/2020. State

[22] According to the narrative in the ISRs, most engagements go beyond sending a letter to the firm. For example, BlackRock's ISR states that the fund's investment stewardship department had "substantive dialogue with the companies listed as engaged firms." The ISR also states that the fund "engages companies for the following reasons: (1) to ensure that BlackRock can make well-informed voting decisions; (2) to explain its voting and governance guidelines; (3) to convey its thinking on long-term value creation and sound governance practices."

[23] While we empirically examine Big Three engagement for tractability purposes, anecdotal evidence suggests that non-Big Three signatories similarly engage with their portfolio firms. For example, Janus Henderson Investors, in their 2020 Annual Sustainability Report, state that "[t]he Carbon Disclosure Project (CDP) organisation has become the 'gold standard' for reporting globally on carbon emissions, climate change risks, and opportunities. We encourage portfolio companies to participate in the disclosure project. Climate change is a key engagement topic for the strategy."

[24] While acknowledging the advantages of index fund investing in terms of diversification and lower management fees, recent academic work has raised some concerns about the Big Three, including free-riding (i.e., lack of firm monitoring), anti-competitive effects, and concerns related to pricing efficiency and trading behavior (see Azar et al. 2021).

Street's ISRs include engagements data from 1/1/2014 to 12/31/2020. Vanguard and State Street classify engagements into broad categories and report reasons for the engagements. BlackRock simply publishes a list of firms contacted for comprehensive engagement.

We start by analyzing the descriptive statistics of these data (untabulated). In absolute terms, we observe that, during the period covered by the ISR reports, the Big Three engage with a relatively large number of firms; BlackRock engaged with 3,102 firms, State Street engaged with 1,999 firms, and Vanguard engaged with 1,301 firms. In relative terms, however, the Big Three appear to engage with a relatively small percentage of their portfolio firms: BlackRock, Vanguard, and State Street annually engage with 9%, 3%, and 5% of their portfolio firms, respectively.

We next check that our main inference from Table 3 also holds for the Big Three; we re-estimate our benchmark specifications from Table 3 replacing *Signatories_Hldg* with *Big3_Hld*, and replacing *I(Signatories_Hldg>5%)* with *I(Big3_Hldg>5%)*. The results of these tests (presented in Table 9, Panel A) are consistent with those in Table 3; the coefficients on *Big3_Hldg* and *I(Big3_Hldg>5%)* are positive and statistically significant. That is, higher level of ownership by the Big Three institutions is associated with higher probability of CDP disclosure.

Having checked that the Big Three are among the CDP signatories that induce firms to answer the CDP questionnaire, we next conduct a multivariate test on the determinants of the probability that a given firm is engaged by the Big Three. We construct one left-hand-side variable for each investor as an indicator that equals one if the firm is included in the list of engagements disclosed in the ISR of that Big Three institution, and zero otherwise.[25] The

[25] The classification of engagements across the Big Three is not homogeneous. Vanguard includes engagements on environmental issues in the "oversight of strategy and risks" category. State Street includes engagements on

corresponding three variables are labelled as *Engagement by Black Rock*, *Engagement by State Street*, and *Engagement by Vanguard*, respectively.

The right-hand-side variables are defined as follows. *CDP_Disclosure*, as previously noted, is an indicator variable equal to one if the firm answers the CDP questionnaire. *Top_Emitter* is an indicator variable equal to one if the firm is in the top quartile by carbon emissions in its industry. *BlackRock_Hldg* is the fraction of the firm's shares held by funds managed by BlackRock (similar variables are constructed for Vanguard and State Street). The specification also includes a vector of controls for firm characteristics: *Size*, *Log(BM)*, *ROA*, *Leverage*, *Tangibility*, *Dividends* and *Return*, all of them as previously defined (see Appendix A for variable definitions).

Table 9, Panel B, presents the results of estimating OLS regressions based on the variables described above. The coefficient on the interaction *Top_Emitter*CDP_Disclosure* is positive and statistically significant. This result is consistent with the likelihood of a Big Three engagement being higher if the target firm exhibits higher levels of carbon emissions in the previous year and discloses this information through the CDP questionnaire. The coefficients on Big Three ownership (i.e., *BlackRock_Hldg*, *StateStreet_Hldg*, *Vanguard_Hldg*) are positive and statistically significant, which is consistent with the notion that the Big Three are more likely to engage with firms in which these funds are more influential. To the extent that the ownership metrics also measure the economic interest of the Big Three in the firm, the evidence presented is also consistent with the notion that these large investors believe that carbon emissions could affect the value of their portfolios. Finally, the coefficient on *Size* is also positive and significant, confirming that the Big Three focus their engagement efforts on large firms. The focus on large

environmental issues in the "Environmental/Social" category. While Blackrock does not classify engagements into categories, environmental issues are a commonly included in the agenda of Blackrock's engagements with portfolio companies (e.g., BlackRock 2019).

firms is consistent with these firms being more influential (more visible) and having a potentially stronger impact on climate change. As shown in Table OA6 in the Online Appendix, our inferences do not change if we conduct the analysis considering the Big Three as a combined group of investors (i.e., pooling their engagements and holdings).

In sum, the results in Table 9 suggest that the Big Three selectively engage with portfolio firms on environmental issues. But more importantly for the purpose of our paper, the results in Table 9 suggest that the Big Three demand emission information through the CDP platform and use the information to select engagement targets among a plethora of portfolio companies.[26]

6.2 Divestment

We next explore whether signatories use the CDP information for asset allocation purposes. In parallel to our previous test in section 6.1, we examine whether investors use this information to divest from firms with higher emissions. We regress *Signatories_Hldg* (our previously defined measure of the ownership of CDP signatories in the firm) on the interaction of *Top_Emitter* with *CDP_Disclosure* (defined as in Table 9, Panel B). That is, we test whether firms with the highest levels of emissions that disclose to the CDP platform exhibit a reduction in ownership by CDP signatories. The specification also includes the vector of controls for firm characteristics used in prior tests, including *Size*, *Log(BM)*, *ROA*, *Leverage*, *Tangibility*, *Dividends*, and *Return* (see Appendix A for variable definitions).

To mitigate endogeneity issues, the specifications include firm (and year) fixed effects. To sharpen identification, we apply the sequential refinement process described in section 5.3 (see also Table 8). That is, in addition to focusing exclusively on disclosures marked as "Private"

[26] Along these lines, in a recent survey by Krueger et al. (2020) institutional investors responded that they select firms for engagements - on climate related issues - by analyzing their portfolio firms' carbon footprint.

(i.e., restricted to CDP signatories), we impose that CDP signatories hold a substantial stake in the firm and that these investors also publicly commit themselves to sustainability (PRI) principles (as in Table 8, we apply these restrictions sequentially and cumulatively).

Table 10 presents the results. We conduct the analysis measuring *Signatories_Hldg* in *t* and *t*+1 to allow for the possibility that funds incorporate in *t*+1 information disclosed at the end of *t*. The coefficient on the interaction *CDP_Disclosure*Top_Emitter* is negative and significant in the most restrictive specifications (see columns (3) and (5)). This result is consistent with the idea that CDP signatories reduce their ownership in firms that disclose higher levels of carbon emissions in the CDP questionnaire (that is, CDP signatories "vote with their feet" at companies disclosing poor environmental performance).

Table 11 repeats the analysis at the fund level. The dependent variable is the annual change in the holdings of the fund at a firm in a given year (the unit of observation is fund-firm-year). The specification includes fund-year fixed effects (in addition to firm fixed effects). Focusing on the variation within the portfolio of a given fund in a given year allows us to control for the determinants of the funds' investment decisions at the portfolio level. As shown in Table 11, we find that CDP signatories are more likely to adjust their portfolio by decreasing their position in firms that disclose to the CDP with the highest levels of emissions within their industries (see column 1). In contrast, we do not find such a pattern for other funds (see column 2 of Table 11). The results in Table 11 confirms our interpretation of Table 10; signatory investors use the CDP information to divest from firms with higher emissions.

Overall, the results in Tables 9-11 corroborate our interpretation of Tables 3-8, namely that institutional investors induce firms to provide information to the CDP and use this information to exert pressure on firms to reduce corporate emissions. Tables 9-11 provide

evidence on two channels though which investors exert such pressure; engagement and divestment.

7. Conclusion

In this paper we examine why institutional investors demand climate-related information. In particular, we study whether investors demand such information to effect real change or, alternatively, show interest in the data merely to make a good impression on investment clients (in which case investors' information demand would be a "greenwashing" scheme).

To examine our research question, we exploit the unique institutional features of the CDP, the world's largest platform of climate risk disclosure. By signing to the CDP, investors are granted access to information provided to the platform by thousands of firms around the world. To the extent that the CDP publicly discloses the list of signatories, signing up to the CDP can be interpreted as a public request for climate-related information.

We find that firms with a higher ownership stake of CDP signatories are more likely to disclose their climate risk information to the CDP. This result survives a number of tests to sharpen identification, including the use of demanding fixed effect structures, and an instrumental variable approach combined with a quasi-natural experiment.

We also find solid evidence that the disclosure to the CDP is followed by lower carbon emissions. This result also holds when we restrict the sample to observations in which only CDP signatories have access to the CDP information (firms can choose to restrict the access only to CDP signatories); observations in which CDP signatories hold a substantial stake in the firm; and observations in which CDP signatories also publicly commit themselves to sustainability (PRI) principles.

Finally, we provide insight into the ways CDP signatories use the CDP disclosures to induce firms to reduce corporate carbon emissions. We document that investors are more likely to engage with top emitters after they disclose to the CDP. In parallel, we find that investors' holdings are lower among top emitters after they disclose to the CDP.

Taken together, our evidence strongly suggests that CDP signatories induce firms to disclose climate-related information and, in turn, use the disclosed information in a way that encourages firms to reduce their carbon footprint (either directly through engagement or indirectly through divestment). As such, our results are difficult to reconcile with the notion that, on average, investors that sign up to the CDP do so for greenwashing purposes.

Appendix A. Variable definitions

CDP_Disclosure	Indicator variable that equals one if a company submitted CDP questionnaire, and zero otherwise.
Log(CO_2)/Scope 1 CO_2	Logarithm of the firm's direct GHG emissions measured in equivalents of metric tons of CO_2.
Scope 2 CO_2	Logarithm of the GHG emissions due to purchased electricity measured in equivalents of metric tons of CO_2.
Scope 3 CO_2	Logarithm of the firm's other supply chain GHG emissions measured in equivalents of metric tons of CO_2.
Engagement by Black Rock	Indicator variable that equals one if BlackRock engages with the firm from July 1, 2017 until June 30, 2020, and zero otherwise. The data includes all engagements.
Engagement by State Street	Indicator variable that equals one if State Street Global Advisors engages with the firm from January 1, 2014 until December 31, 2020, and zero otherwise. The data includes engagements about Environmental/Social issues.
Engagement by Vanguard	Indicator variable that equals one if Vanguard engages with the firm from July 1, 2018 until June 30, 2020, and zero otherwise. The data includes engagements about "Oversight of strategy and risk" (which include environmental issues).
Inst_Hldg	Fraction of the firm's equity owned by institutional investors.
Signatories_Hldg	Fraction of the firm's equity owned by mutual funds that are currently CDP signatories
I(Signatories_Hldg>5%)	Indicator variable that equals one if CDP signatories own more than 5% of the firm's equity.
Signatories_CDP&PRI_Hldg	Fraction of the firm's equity owned by mutual funds that are concurrently CDP signatories and PRI signatories.
Big3_Hldg	Big Three's holding in the firm, namely, the fraction of the firms' equity owned by mutual funds managed by BlackRock, Vanguard, or State Street Global Advisors.
I(Big3_Hldg>5%)	Indicator variable that equals one if the fraction of the firm's equity owned by mutual funds managed by BlackRock, Vanguard, or State Street Global Advisors is more than 5%.
Blackrock_Hldg	BlackRock's holding in the firm, namely, the fraction of the firms' equity owned by BlackRock's mutual funds.
StateStreet_Hldg	State Street's holding in the firm, namely, the fraction of the firms' equity owned by State Street Global Advisors's mutual funds.
Vanguard_Hldg	Vanguard's holding in the firm, namely, the fraction of the firms' equity owned by State Vanguard's mutual funds.
NonBig3_Hldg	Non-Big Three's holding in the firm, namely, the fraction of the firms' equity owned by funds managed by institutions other than BlackRock, Vanguard, and State Street Global Advisors.
OtherInst_Hldg	Fraction of the firms' equity owned by funds managed by institutions that are not CDP signatories.
MSCI	The instrumental variable, indicator variable that equals one if stock *i* is a member of the MSCI ACWI Index in year *t*, and zero otherwise.
Top_Emitter	Indicator variable that equals one if a company is in top quartile by the amount of CO_2 emissions

	in its industry.
Size	Logarithm of the firm's total assets.
Log(BM)	Logarithm of the book value of common equity scaled by the market value of equity.
ROA	Net income scaled by total assets.
Leverage	Total debt scaled by total assets. Total debt is the sum of long-term debt and the debt in current liabilities.
Tangibility	Property, Plant and Equipment (PPE) scaled by total assets.
Dividends	Total amount of dividends scaled by net income.
Return	Firm's buy and hold return over the year.

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Table 1. Sample Construction

This table describes the procedure to construct our sample.

Sample observations	# Firm-Years	# Distinct Firms
Observations in CDP from 2003 to 2020	108,787	10,640
Observations with non-missing institutional ownership information	81,155	9,015
Observations with non-missing accounting and market data	76,621	8,647
Observations with non-missing Trucost data	56,452	7,157

Table 2. Descriptive Statistics

This table reports descriptive statistics for the sample used in our tests. The sample spans from 2003 to 2020 and includes 76,621 firm-year observations. Panel A presents descriptive statistics for the main variables used in our tests. Panel B presents descriptive statistics by year. Panel C presents descriptive statistics by industry affiliation. Panel D presents descriptive statistics by country. Variables are defined in Appendix A. All continuous variables are winsorized at the top and bottom 1%.

Panel A. Main variables

	# Obs.	Std Dev	P25	Median	Mean	P75
CDP_Disclosure	76,621	0.49	0.00	0.00	0.40	1.00
Inst_Hldg	76,621	0.28	0.07	0.17	0.28	0.39
Signatories_Hldg	76,621	0.12	0.02	0.08	0.11	0.17
OtherInst_Hldg	76,621	0.23	0.02	0.08	0.18	0.21
Size	76,621	1.87	6.87	8.06	8.13	9.33
Log(BM)	76,621	0.97	-1.16	-0.58	-0.70	-0.08
ROA	76,621	0.09	0.01	0.04	0.04	0.08
Leverage	76,621	0.19	0.09	0.23	0.25	0.36
Tangibility	76,621	0.25	0.08	0.24	0.30	0.47
Dividends	76,621	0.64	0.00	0.26	0.38	0.53
Return	76,621	0.52	-0.16	0.04	0.13	0.29

Panel B. By year

	Inst_Hldg	# CDP signatories	*Signatories_Hldg*	# PRI signatories	*CDP_Disclosure*	*Scope 1*	*Scope 2*	*Scope 3*
2003	0.44	35	0.02	-	0.36	-	-	-
2004	0.45	95	0.05	-	0.50	-	-	-
2005	0.46	147	0.07	-	0.58	12.79	12.40	14.59
2006	0.42	215	0.11	85	0.45	12.22	11.47	13.66
2007	0.38	309	0.13	158	0.53	12.10	11.43	13.57
2008	0.33	388	0.12	247	0.50	11.88	11.34	13.27
2009	0.29	461	0.13	358	0.45	11.58	11.17	13.15
2010	0.27	526	0.11	462	0.48	11.38	10.98	12.91
2011	0.26	570	0.11	581	0.46	11.32	11.00	12.93
2012	0.27	663	0.12	718	0.42	11.20	10.94	12.83

2013	0.28	733	0.12	836	0.41	11.12	10.83	12.74
2014	0.28	806	0.12	984	0.38	11.05	10.88	12.69
2015	0.27	854	0.13	1,133	0.38	10.93	10.75	12.57
2016	0.27	845	0.12	1,329	0.37	10.64	10.47	12.34
2017	0.27	821	0.11	1,621	0.37	10.65	10.56	12.44
2018	0.27	676	0.14	2,011	0.32	10.64	10.55	12.44
2019	0.26	542	0.14	2,665	0.34	10.59	10.49	12.34
2020	-	517	0.11	3,575	0.37	10.03	10.08	11.91

Panel C. By industry

Industry	*# Obs.*	*# firms*	*Inst_Hldg*	*Signatories_Hldg*	*CDP_Disclosure*
Food	3,773	438	0.24	0.09	0.43
Mining and Minerals	3,055	343	0.25	0.10	0.33
Oil and Petroleum Products	3,473	386	0.32	0.12	0.39
Textiles, Apparel & Footware	1,072	131	0.23	0.09	0.33
Consumer Durables	1,414	173	0.26	0.11	0.38
Chemicals	2,592	290	0.23	0.10	0.42
Drugs, Soap, Prfums, Tobacco	2,979	340	0.29	0.10	0.41
Construction and Construction Materials	5,489	596	0.21	0.11	0.35
Steel Works Etc	2,116	216	0.17	0.10	0.35
Fabricated Products	502	51	0.30	0.12	0.44
Machinery and Business Equipment	7,189	808	0.34	0.14	0.47
Automobiles	2,192	234	0.27	0.10	0.38
Transportation	4,377	448	0.26	0.11	0.42
Utilities	4,756	456	0.25	0.08	0.41
Retail Stores	3,870	436	0.33	0.12	0.40
Banks, Insurance and Other Financials	11,291	1,312	0.26	0.11	0.40
Other	16,481	1,989	0.32	0.12	0.39

Panel D. By country

Industry	*# Obs.*	*# firms*	*Inst_Hldg*	*Signatories_Hldg*	*CDP_Disclosure*
Argentina	91	11	0.17	0.02	0.21
Australia	2,672	326	0.14	0.08	0.44
Austria	380	39	0.18	0.12	0.59
Belgium	717	100	0.13	0.08	0.30
Brazil	1,351	165	0.19	0.11	0.57
Canada	3,420	362	0.42	0.13	0.47
Chile	388	50	0.07	0.03	0.21
China	4,260	591	0.10	0.03	0.10
Colombia	155	20	0.05	0.02	0.50
Czech Republic	96	12	0.13	0.06	0.21
Denmark	549	52	0.23	0.09	0.55
Egypt	194	19	0.07	0.03	0.03
Finland	639	60	0.28	0.14	0.74
France	3,440	378	0.18	0.10	0.37
Germany	3,321	346	0.20	0.12	0.47
Greece	138	17	0.17	0.23	0.33
Hong Kong	1,319	150	0.15	0.08	0.21
Hungary	155	21	0.10	0.04	0.19
India	3,881	400	0.13	0.05	0.19
Indonesia	904	114	0.08	0.04	0.05
Ireland	537	60	0.39	0.18	0.45
Israel	275	31	0.21	0.05	0.19
Italy	1,248	152	0.15	0.10	0.49
Japan	8,136	765	0.15	0.15	0.45
Luxembourg	27	7	0.05	0.03	0.00
Malaysia	749	85	0.08	0.04	0.13
Mexico	481	74	0.18	0.06	0.42
Morocco	58	7	0.01	0.00	0.00
Netherlands	880	125	0.32	0.16	0.51
New Zealand	649	68	0.10	0.05	0.41
Norway	795	89	0.23	0.18	0.51
Pakistan	356	35	0.06	0.01	0.01
Peru	164	19	0.16	0.04	0.09
Philippines	397	41	0.09	0.05	0.19
Poland	823	104	0.26	0.15	0.08
Portugal	394	42	0.10	0.08	0.50
Qatar	104	18	0.03	0.01	0.04
Russia	758	94	0.09	0.04	0.20
Saudi Arabia	136	31	0.01	0.01	0.04
Singapore	405	40	0.13	0.08	0.42
South Africa	1,227	124	0.19	0.08	0.69
South Korea	4,522	580	0.08	0.04	0.23
Spain	1,201	128	0.15	0.09	0.52
Sweden	1,137	139	0.36	0.16	0.66
Switzerland	1,675	180	0.24	0.12	0.53
Taiwan	2,034	204	0.13	0.07	0.31
Thailand	534	64	0.11	0.02	0.22
Turkey	1,267	164	0.07	0.04	0.38
U. A. Emirates	154	25	0.09	0.06	0.21
UK	5,568	638	0.37	0.20	0.58
USA	11,860	1,281	0.79	0.18	0.50

Table 3. Disclosure of Carbon Emissions and Holdings of CDP Signatories

This table presents an analysis of the determinants of firms' disclosure to the CDP. The dependent variable, *CDP_Disclosure*, is an indicator variable that equals one if a company submitted the CDP questionnaire, and zero otherwise. In Panel A, the experimental variable, *Signatories_Hldg,* is the fraction of the firm's equity owned by mutual funds that are currently CDP signatories. *OtherInst_Hldg* is the fraction of the firms' equity owned by funds managed by institutions that are not CDP signatories. In Panel B, the experimental variable, *I(Signatories_Hldg>5%),* is an indicator variable that equals one if CDP signatories own more than 5% of the firm's equity. The control variables are defined in Appendix A. Columns (1) – (4) report results corresponding to the full subsample of 76,621 firm-years from 2003 to 2020. Columns (5) – (8) report results corresponding to the subsample of 56,451 firm-years with non-missing carbon emissions data from Trucost. This subsample spans the period from 2006 to 2020. Independent variables are measured at the end of the prior year. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

Panel A. Continuous variable

	Dependent Variable: *CDP_Disclosure*							
	All sample observations				Observations with non-missing Trucost data			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Signatories_Hldg	0.47***	0.41***	0.38***	0.27***	0.40***	0.36***	0.35***	0.26***
	(15.16)	(14.31)	(12.90)	(8.45)	(11.70)	(11.00)	(10.69)	(6.64)
OtherInst_Hldg	0.20***	0.13***	0.14***	0.13***	0.18***	0.13***	0.12***	0.13***
	(6.60)	(4.47)	(4.78)	(4.04)	(5.43)	(3.87)	(3.54)	(3.11)
Size	0.11***	0.14***	0.14***	0.06***	0.11***	0.15***	0.15***	0.07***
	(58.02)	(63.30)	(63.86)	(10.67)	(42.97)	(42.53)	(42.53)	(8.50)
Log(BM)	–0.05***	–0.04***	–0.05***	–0.01***	–0.05***	–0.04***	–0.05***	–0.01***
	(–15.16)	(–12.88)	(–14.08)	(–4.41)	(–12.53)	(–10.21)	(–10.97)	(–3.09)
ROA	0.26***	0.13***	0.13***	0.13***	0.30***	0.23***	0.23***	0.16***
	(9.91)	(5.12)	(5.14)	(5.39)	(8.59)	(6.34)	(6.41)	(5.08)
Leverage	–0.11***	–0.12***	–0.13***	–0.04*	–0.12***	–0.13***	–0.12***	–0.04
	(–6.04)	(–6.66)	(–6.76)	(–1.89)	(–5.39)	(–5.56)	(–5.34)	(–1.42)
Tangibility	0.11***	0.00	–0.00	–0.00	–0.00	0.01	0.01	0.00
	(7.62)	(0.10)	(–0.07)	(–0.04)	(–0.13)	(0.59)	(0.37)	(0.11)
Dividends	0.01***	0.01***	0.01***	–0.00	0.02***	0.01***	0.01***	–0.00
	(3.99)	(3.66)	(3.76)	(–1.06)	(4.14)	(4.13)	(4.17)	(–0.96)
Return	–0.01*	–0.00	–0.02***	–0.01***	–0.01**	–0.01*	–0.02***	–0.01***
	(–1.87)	(–0.74)	(–5.93)	(–4.84)	(–2.39)	(–1.95)	(–6.35)	(–4.19)
Log(CO2)					0.02***	0.00	–0.00	–0.00
					(13.68)	(0.43)	(–0.07)	(–0.49)
Country FE	YES	YES	YES	n.a.	YES	YES	YES	n.a.
Industry FE	NO	YES	YES	n.a.	NO	YES	YES	n.a.
Year FE	NO	NO	YES	YES	NO	NO	YES	YES
Firm FE	NO	NO	NO	YES	NO	NO	NO	YES
R^2	0.28	0.32	0.33	0.65	0.29	0.32	0.33	0.67
# Obs.	76,621	76,621	76,621	76,089	56,451	56,451	56,451	55,999

Table 3. Disclosure of Carbon Emissions and Holdings of CDP Signatories (cont'ed)

Panel B. Indicator for significant holdings

	Dependent Variable: *CDP_Disclosure*							
	All sample observations				Observations with non-missing Trucost data			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I(Signatories_Hldg>5%)	0.14***	0.12***	0.11***	0.04***	0.12***	0.10***	0.10***	0.03***
	(19.96)	(17.47)	(15.54)	(6.39)	(14.40)	(12.50)	(12.25)	(3.66)
OtherInst_Hldg	0.14***	0.08***	0.09***	0.05*	0.12***	0.08**	0.07**	0.03
	(4.72)	(2.72)	(3.07)	(1.73)	(3.77)	(2.36)	(2.03)	(0.90)
Size	0.11***	0.13***	0.14***	0.07***	0.10***	0.15***	0.15***	0.08***
	(56.26)	(61.34)	(61.65)	(11.40)	(41.85)	(41.52)	(41.51)	(9.03)
Log(BM)	–0.05***	–0.04***	–0.04***	–0.02***	–0.05***	–0.04***	–0.04***	–0.02***
	(–14.66)	(–12.56)	(–13.77)	(–4.95)	(–12.19)	(–10.07)	(–10.83)	(–3.65)
ROA	0.23***	0.12***	0.12***	0.13***	0.28***	0.21***	0.21***	0.17***
	(9.03)	(4.56)	(4.64)	(5.71)	(7.91)	(5.93)	(6.00)	(5.31)
Leverage	–0.10***	–0.11***	–0.11***	–0.05**	–0.11***	–0.11***	–0.11***	–0.05*
	(–5.23)	(–5.80)	(–5.94)	(–2.11)	(–4.72)	(–4.85)	(–4.63)	(–1.72)
Tangibility	0.10***	0.00	–0.00	0.01	–0.01	0.01	0.01	0.01
	(7.53)	(0.10)	(–0.12)	(0.25)	(–0.33)	(0.53)	(0.30)	(0.33)
Dividends	0.01***	0.01***	0.01***	–0.00	0.01***	0.01***	0.01***	–0.00
	(3.23)	(3.05)	(3.23)	(–1.15)	(3.58)	(3.71)	(3.75)	(–0.99)
Return	–0.00	–0.00	–0.02***	–0.01***	–0.01**	–0.01*	–0.02***	–0.01***
	(–1.37)	(–0.43)	(–5.70)	(–4.86)	(–2.07)	(–1.78)	(–6.11)	(–4.22)
Log(CO2)					0.02***	0.00	–0.00	–0.00
					(13.73)	(0.51)	(–0.00)	(–0.54)
Country FE	YES	YES	YES	n.a.	YES	YES	YES	n.a.
Industry FE	NO	YES	YES	n.a.	NO	YES	YES	n.a.
Year FE	NO	NO	YES	YES	NO	NO	YES	YES
Firm FE	NO	NO	NO	YES	NO	NO	NO	YES
R^2	0.29	0.32	0.33	0.65	0.29	0.32	0.33	0.67
# Obs.	76,621	76,621	76,621	76,089	56,451	56,451	56,451	55,999

Table 4. 2SLS Estimation

This table reports estimates from an instrumental variable (IV) 2SLS analysis exploiting the composition of the MSCI ACWI index to instrument ownership by CDP signatories. Panel A includes all sample observations. Panel B restricts the analysis to firms in the vicinity of the bottom of the index. *MSCI*, the instrument, equals one if stock *I* is a member of the MSCI ACWI Index in year *t*, and zero otherwise; $\widehat{Signatories_Hldg}$ is the fitted value of *Signatories_Hldg* from the first stage estimation. The experimental variable, *Signatories_Hldg*, is the fraction of the firm's equity owned by institutional investors that were CDP signatories in year *t*. The dependent variable, *CDP_Disclosure*, is and indicator variable that equals one if the firm submitted CDP questionnaire in year t, and zero otherwise. The rest of the variables are defined in Appendix A. Independent variables are measured at the end of the prior year. The sample spans from 2003 to 2020, and includes 76,621 firm-year observations. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

Panel A. Full sample

	First Stage		Second Stage	
	Dep. var.: *Signatories_Hldg*		Dep. var.: *CDP_Disclosure*	
	(1)	(2)	(3)	(4)
MSCI	0.02***	0.01***		
	(6.48)	(4.32)		
$\widehat{Signatories_Hldg}$			8.25***	1.96*
			(6.26)	(1.87)
OtherInst_Hldg	–0.02*	–0.31***	0.31***	0.65**
	(–1.92)	(–21.53)	(2.80)	(2.01)
Size	0.01***	0.03***	0.03*	0.01
	(13.02)	(13.04)	(1.83)	(0.17)
Log(BM)	–0.01***	–0.01***	0.01	0.01
	(–5.10)	(–9.01)	(0.70)	(0.42)
ROA	0.03***	0.05***	–0.09	0.04
	(2.66)	(6.76)	(–0.96)	(0.68)
Leverage	0.01**	–0.06***	–0.21***	0.06
	(2.43)	(–8.30)	(–4.10)	(0.84)
Tangibility	–0.01*	0.02**	0.08*	–0.03
	(–1.95)	(2.19)	(1.69)	(–0.95)
Dividends	–0.00***	–0.00	0.03***	–0.00
	(–3.54)	(–0.92)	(4.36)	(–0.75)
Return	–0.00***	–0.00***	0.01	–0.01**
	(–3.69)	(–3.09)	(1.09)	(–2.22)
Country FE	YES	n.a.	YES	n.a.
Industry FE	YES	n.a.	YES	n.a.
Year FE	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES
Kleibergen-Paap F-stat.	41.9	18.6	-	-
R^2	0.29	0.78	-2.99	-0.10
# Obs.	76,621	76,089	76,621	76,089

Table 4. 2SLS Estimation (cont'ed)

Panel B. Firms around the threshold

	First Stage		Second Stage	
	Dep. var.: *Signatories_Hldg*		Dep. var.: *CDP_Disclosure*	
	(1)	(2)	(3)	(4)
MSCI	0.03***	0.02***		
	(8.96)	(5.51)		
$\widehat{Signatories_Hldg}$			3.45***	1.77*
			(6.22)	(1.75)
OtherInst_Hldg	–0.06***	–0.43***	0.27***	0.76*
	(–3.31)	(–14.14)	(2.93)	(1.71)
Size	0.01**	0.01**	0.09***	0.04
	(2.33)	(2.10)	(6.39)	(1.35)
Log(BM)	–0.00	–0.02***	–0.01	–0.00
	(–0.47)	(–6.16)	(–0.68)	(–0.20)
ROA	0.07***	0.05***	–0.14	0.08
	(3.20)	(2.88)	(–1.37)	(0.79)
Leverage	0.04***	–0.01	–0.14**	0.03
	(3.55)	(–0.42)	(–2.39)	(0.34)
Tangibility	–0.01	0.02	0.03	–0.03
	(–1.45)	(0.94)	(0.68)	(–0.39)
Dividends	–0.01***	–0.00	0.04***	–0.01
	(–4.55)	(–1.57)	(3.61)	(–1.25)
Return	–0.00	–0.00	–0.01	–0.01
	(–0.91)	(–1.18)	(–0.79)	(–1.07)
Country FE	YES	n.a.	YES	n.a.
Industry FE	YES	n.a.	YES	n.a.
Year FE	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES
Kleibergen-Paap F-stat.	80.3	30.3	-	-
R^2	0.36	0.86	-0.40	-0.06
# Obs.	11,052	9,898	11,052	9,898

Table 5. Additions to the MSCI ACWI

This table reports estimates from difference-in-differences regressions of ownership by CDP signatories and carbon emissions disclosure around the time a stock is added to MSCI ACWI Index. The treated group consist of 638 firms added to the MSCI ACWI during the period (2006-2018). For every treated firm a control firm is selected among non-treated firms from the same industry and year using propensity scores. The covariates used to construct propensity scores are listed in Panel A. For every treatment and control observation sample includes 5-year period around the treatment year (-2; +2). The dependent variables are institutional ownership by CDP signatories (*Signatories_Hldg*) and carbon emission disclosure (*CDP_Disclosure*). *Treatment* is an indicator variable that equals one if a firm is added to the MSCI ACWI Index, and zero otherwise. *Post* is an indicator variable that equals one in the year a firm is added to the MSCI ACWI Index and thereafter, and zero otherwise. Panel A presents descriptive statistics and tests of covariate balance between the treated and control groups. Panel B presents difference-in-differences estimates around the index additions. The rest of the variables are defined in Appendix A. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

Panel A. Descriptive statistics

	Mean values		Difference	
Variable	*Treatment*	*Control*	*t*-stat.	*p*-value
Inst_Hldg	0.29	0.31	–1.45	0.147
Size	8.66	8.79	–1.38	0.167
Log(BM)	–0.91	–0.97	1.05	0.293
ROA	0.06	0.07	–0.84	0.399
Leverage	0.26	0.26	0.15	0.884
Tangibility	0.29	0.29	0.39	0.694
Dividends	0.40	0.43	–0.75	0.451
Return	0.36	0.30	1.69	0.092

Panel B. Signatories' holdings and CO2 disclosure: difference-in-differences estimates

	Dependent variable:	
Variable	*Signatories_Hldg*	*CDP_Disclosure*
	(1)	(2)
*Treatment*Post*	0.01***	0.06***
	(3.42)	(3.48)
Year FE	YES	YES
Firm FE	YES	YES
R^2	0.85	0.75
# Obs.	6,208	6,270

Table 6. Disclosure and Subsequent CO2 Emissions

This table presents estimations of the effect of carbon disclosure on the components of total carbon emissions. The dependent variables are the logarithm of the firm's direct CO_2 emissions (Scope 1 CO_2), the logarithm of the emissions due to purchased electricity (Scope 2 CO_2), and the logarithm of the firm's other supply chain emissions (Scope 3 CO_2). The experimental variable, *CDP_Disclosure*, is an indicator variable that equals one if the company submits CDP questionnaire in that year, and zero otherwise. The control variables are defined in Appendix A. The table reports results corresponding to the subsample of firm-years from 2003 to 2019 with non-missing carbon emissions data from Trucost. Independent variables are measured at the end of the prior year. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent variable: Log[CO_2 (t+s)]					
	Scope 1 CO_2		Scope 2 CO_2		Scope 3 CO_2	
	s=1	s=2	s=1	s=2	s=1	s=2
	(1)	(2)	(3)	(4)	(5)	(6)
CDP_Disclosure	–0.08***	–0.10***	–0.02	–0.04**	–0.01	–0.02**
	(–4.89)	(–6.14)	(–1.00)	(–2.45)	(–0.91)	(–2.14)
Inst_Hldg	0.10	0.08	–0.06	–0.03	0.21***	0.19***
	(1.23)	(0.91)	(–0.72)	(–0.39)	(4.70)	(3.87)
Size	0.53***	0.41***	0.53***	0.40***	0.57***	0.43***
	(24.53)	(21.04)	(28.58)	(22.19)	(37.39)	(32.24)
Log(BM)	–0.06***	–0.06***	–0.08***	–0.07***	–0.10***	–0.09***
	(–4.68)	(–4.85)	(–6.13)	(–5.75)	(–12.35)	(–11.04)
ROA	0.55***	0.44***	0.70***	0.67***	0.67***	0.61***
	(5.51)	(4.44)	(7.09)	(6.91)	(10.02)	(8.86)
Leverage	–0.04	–0.06	–0.17**	–0.11	–0.19***	–0.14***
	(–0.51)	(–0.79)	(–2.26)	(–1.47)	(–4.25)	(–2.94)
Tangibility	0.54***	0.37***	0.12	–0.03	0.36***	0.21***
	(3.58)	(2.66)	(1.02)	(–0.25)	(4.39)	(2.85)
Dividends	0.00	0.01	0.00	0.01	0.01	0.01*
	(0.67)	(1.15)	(0.56)	(1.38)	(1.65)	(1.77)
Return	0.04***	0.04***	0.05***	0.05***	0.06***	0.06***
	(5.25)	(6.04)	(8.35)	(8.06)	(10.83)	(10.81)
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
R^2	0.95	0.95	0.91	0.91	0.97	0.97
# Obs.	65,038	63,044	65,048	63,057	65,094	63,103

Table 7. First-time Disclosers

This table reports estimates an analysis of carbon emissions around the time a firm starts systematically disclosing its carbon emissions. Panel A shows pre-treatment means of the treated and control groups and a test of the difference in mean between treated and control groups. The treated group consists of 1,117 firms that started disclosing carbon emissions for the first time during the period (2007-2018). For every treated firm a control firm is selected among non-treated firms from the same industry and year using propensity scores. Covariates used to construct propensity scores are listed in Panel A. For every treatment and control observation sample includes 5-year period around the treatment year (–2; +2). The dependent variable is logarithm of the firm's direct CO_2 emissions (Scope 1 CO_2). *Treatment* is an indicator variable that equals one if a firm started systematically disclosing its carbon emissions for the first time during the period 2007-2018, and zero otherwise. *Post* is an indicator variable that equals one in the year after the first CDP questionnaire is filed and thereafter, and zero otherwise. The rest of the variables are defined in Appendix A. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

Panel A. Descriptive statistics

	Mean values		Difference	
Variable	*Treatment*	*Control*	*t*-stat.	*p*-value
Inst_Hldg	0.34	0.37	-2.10	0.036
Size	8.39	8.36	0.67	0.504
Log(BM)	-0.83	-0.83	0.07	0.942
ROA	0.06	0.06	-1.20	0.229
Leverage	0.25	0.24	1.26	0.207
Tangibility	0.30	0.30	0.21	0.836
Dividends	0.39	0.34	1.93	0.053
Return	0.17	0.24	-2.76	0.006

Panel B. CO_2 emissions

	Dep. Var: Log[CO_2 (t)]	
Indep. variables:	(1)	(2)
*Treatment*Post*	–0.09**	–0.09***
	(–2.44)	(–3.74)
Treatment	0.05	
	(0.72)	
Inst_Hldg	–0.11	0.15
	(–0.42)	(0.85)
Size	0.97***	0.56***
	(25.69)	(11.63)
Log(BM)	–0.00	–0.06***
	(–0.05)	(–2.93)
ROA	1.23***	0.86***
	(3.28)	(4.66)
Leverage	0.26	–0.12
	(1.29)	(–0.69)
Tangibility	1.62***	0.68**
	(6.67)	(2.26)
Dividends	–0.05	–0.01
	(–1.40)	(–0.85)
Return	0.04	0.03**
	(1.48)	(2.33)

Country FE	YES	n.a.
Industry FE	YES	n.a.
Year FE	YES	YES
Firm FE	NO	YES
R-squared	0.72	0.96
Observations	9,515	9,514

Table 8. Signatory Investors' Exclusive Access to CDP data

This table presents estimations of the effect of carbon disclosure on direct CO_2 emissions. The dependent variable is the logarithm of the firm's direct CO_2 emissions (Scope 1 CO_2). The experimental variable *CDP_Disclosure* is an indicator variable that equals one if a company submitted CDP questionnaire in year t, and zero otherwise. Columns (1)-(2) report results restricting the analysis to cases in which only CDP signatories have access to the CDP data (i.e., we exclude firms whose CDP questionnaire can be accessed by the general public). Columns (3)-(4) introduces the additional restriction that CDP signatories own more than 5% of shares in the firm. Columns (5)-(6) introduces the additional restriction that the CDP signatories are also PRI signatories. Independent variables are measured at the end of the prior year. The control variables are defined in Appendix A. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent variable: log[CO_2 (t+s)]					
	Only Signatories have access		*Only Signatories have access Signatories own > 5%*		*Only Signatories have access Signatories of both CDP and PRI own > 5%*	
	s=1	s=2	s=1	s=2	s=1	s=2
	(1)	(2)	(3)	(4)	(5)	(6)
CDP_Disclosure	–0.06***	–0.07***	–0.07***	–0.10***	–0.09***	–0.12***
	(–3.18)	(–4.15)	(–3.50)	(–4.47)	(–4.02)	(–4.96)
Controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
R^2	0.95	0.95	0.95	0.94	0.95	0.94
# Obs.	50,146	49,700	47,812	47,359	46,461	46,018

Table 9. Engagement

This table analyzes whether the Big Three use CDP information in their engagements with portfolio companies. Panel A presents an analysis of the determinants of carbon emissions disclosure to CDP. The dependent variable *CDP_Disclosure* is an indicator variable that equals one if a company submitted CDP questionnaire, and zero otherwise. *Big3_Hldg* is the fraction of the firm's equity owned by BlackRock, Vanguard, and State Street; *I(Big3_Hldg>5%)* is an indicator variable that equals one if BlackRock, Vanguard, and State Street own more than 5% of the firm's equity. The control variables are as in Table 3. Panel B presents an analysis of the determinants of engagements of the Big Three with individual firms in their portfolios. Columns (1), (2), and (3) focus on engagements by BlackRock, State Street, and Vanguard, respectively. The dependent variables equal one if the corresponding institution engages with the firm, and zero otherwise. *Top_Emitter*, is an indicator variable that equals one if a company is in top quartile by the amount of CO_2 emissions in its industry. The rest of the variables are defined in Appendix A. Independent variables are measured at the end of the prior year. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

Panel A. Big Three ownership and disclosure

	Dependent Variable: *CDP_Disclosure*			
	(1)	(2)	(3)	(4)
Big3_Hldg	1.03***		0.95***	
	(7.43)		(7.04)	
I(Big3_Hldg>5%)		0.11***		0.03***
		(11.40)		(3.74)
Controls	YES	YES	YES	YES
Country FE	YES	YES	n.a.	n.a.
Industry FE	YES	YES	n.a.	n.a.
Year FE	YES	YES	YES	YES
Firm FE	NO	NO	YES	YES
R^2	0.33	0.32	0.65	0.65
# Obs.	76,621	76,621	76,089	76,089

Panel B. Disclosure and Big Three engagement

	Dependent variable:		
	Engagement by Black Rock (1)	*Engagement by State Street* (2)	*Engagement by Vanguard* (3)
*CDP_Disclosure*Top_Emitter*	0.05***	0.04***	0.04***
	(4.81)	(8.50)	(4.27)
CDP_Disclosure	0.05***	0.00	0.01
	(5.70)	(0.66)	(0.79)
BlackRock_Hldg	3.70***		
	(20.04)		
StateStreet_Hldg		4.00***	
		(17.63)	
Vanguard_Hldg			0.80***
			(5.05)
Top_Emitter	–0.02***	–0.01***	–0.01
	(–2.75)	(–3.33)	(–0.91)
Size	0.07***	0.03***	0.04***
	(29.65)	(26.67)	(21.27)

Log(BM)	–0.02***	–0.01***	–0.02***
	(–7.62)	(–9.56)	(–7.89)
ROA	–0.04	0.01	–0.02
	(–1.06)	(0.53)	(–0.58)
Leverage	–0.08***	–0.05***	–0.06***
	(–5.10)	(–6.34)	(–4.37)
Tangibility	–0.02	0.00	0.00
	(–1.32)	(0.37)	(0.14)
Dividends	–0.00	0.00	0.01*
	(–0.37)	(0.84)	(1.76)
Return	–0.01	0.00*	–0.01
	(–0.79)	(1.68)	(–0.97)
Country FE	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
R^2	0.26	0.14	0.22
# Obs.	17,118	36,479	11,128

Table 10. Divestment: Firm-level data

This table analyzes whether CDP signatories use CDP information in their investment decisions. The dependent variable, *Signatories_Hldg*, is the fraction of the firm's equity owned by CDP signatories. *CDP_Disclosure* is an indicator variable that equals one if a company answered the CDP questionnaire in year t, and zero otherwise. *Top_Emitter* is an indicator variable that equals one if a company is in top quartile by the amount of CO_2 emissions in its industry, and zero otherwise. The control variables are defined in Appendix A. Columns (1)-(2) report results restricting the analysis to cases in which only CDP signatories have access to the CDP data (i.e., we exclude firms whose CDP questionnaire can be accessed by the general public). Columns (3)-(4) introduces the additional restriction that CDP signatories own more than 5% of shares in the firm. Columns (5)-(6) introduces the additional restriction that the CDP signatories are also PRI signatories. Independent variables are measured at the end of the prior year. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent variable: *Signatories_Hldg* (*t*+*s*)					
	Only Signatories have access		*Only Signatories have access Signatories own > 5%*		*Only Signatories have access Signatories of both CDP and PRI own > 5%*	
	s=0	s=1	s=0	s=1	s=0	s=1
	(1)	(2)	(3)	(4)	(5)	(6)
*CDP_Disclosure*Top_Emitter*	–0.005	–0.005	–0.007*	–0.007	–0.009**	–0.009*
	(–1.56)	(–1.46)	(–1.81)	(–1.48)	(–2.01)	(–1.76)
CDP_Disclosure	0.010***	0.008***	0.018***	0.014***	0.023***	0.018***
	(4.69)	(3.65)	(6.888)	(5.14)	(7.92)	(5.94)
Top_Emitter	0.004*	0.005*	0.005*	0.005*	0.005*	0.005*
	(1.69)	(1.84)	(1.703)	(1.84)	(1.71)	(1.87)
Size	0.034***	0.028***	0.035***	0.029***	0.035***	0.029***
	(11.08)	(9.11)	(11.113)	(9.15)	(11.05)	(9.11)
Log(BM)	–0.010***	–0.011***	–0.010***	–0.011***	–0.009***	–0.011***
	(–5.19)	(–5.88)	(–5.025)	(–5.74)	(–4.76)	(–5.50)
ROA	0.065***	0.073***	0.063***	0.073***	0.064***	0.073***
	(5.89)	(6.18)	(5.683)	(6.07)	(5.66)	(6.10)
Leverage	–0.050***	–0.037***	–0.050***	–0.037***	–0.051***	–0.039***
	(–5.57)	(–3.65)	(–5.485)	(–3.62)	(–5.49)	(–3.72)
Tangibility	0.018*	0.023**	0.017*	0.023**	0.017	0.023**
	(1.86)	(2.20)	(1.738)	(2.04)	(1.64)	(2.02)
Dividends	0.001	0.000	0.001	0.001	0.001	0.000
	(1.55)	(0.65)	(1.549)	(0.73)	(1.40)	(0.46)
Return	0.005***	0.006***	0.005***	0.006***	0.005***	0.006***
	(5.39)	(6.97)	(5.202)	(6.67)	(5.07)	(6.59)

Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
R^2	0.77	0.77	0.77	0.77	0.77	0.77
# Obs.	47,264	42,551	44,968	40,342	43,596	38,984

Table 11. Divestment: Fund-level data

This table presents estimations of the effect of carbon disclosure on the holdings of institutional investors at the fund-firm-year level. The dependent variable Δ*_Fund_Ownership* is the fractional change in the number of firm's shares owned by a particular institutional investor. *CDP_Disclosure* is an indicator variable that equals one if a company submitted CDP questionnaire in year t, and zero otherwise. *Top_Emitter* is an indicator variable that equals one if a company is in top quartile by the amount of CO_2 emissions in its industry, and zero otherwise. The control variables are defined in Appendix A. The sample consists of portfolio companies of institutional investors that either do not file CDP questionnaire or file and restrict access to the questionnaire to CDP signatories. Column (1) reports results corresponding to the subsample of funds that are CDP signatories that have access to restricted CDP disclosure. Column (2) reports results corresponding to the subsample of funds that are not CDP signatories. Independent variables are measured at the end of the prior year. Standard errors are clustered at the fund-year level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent Variable: Δ*_Fund_Ownership*	
	CDP signatories	*Other funds*
	(1)	(2)
*CDP_Disclosure*Top_Emitter*	–0.011***	–0.002
	(–4.81)	(–0.70)
CDP_Disclosure	–0.002	–0.012***
	(–1.32)	(–6.27)
Top_Emitter	0.001	0.003*
	(0.47)	(1.68)
Size	–0.007***	0.001
	(–3.49)	(0.37)
Log(BM)	–0.012***	–0.010***
	(–8.26)	(–6.65)
ROA	–0.116***	–0.074***
	(-11.05)	(–6.29)
Leverage	0.092***	0.056***
	(13.23)	(7.75)
Tangibility	–0.025***	0.011
	(–3.04)	(1.19)
Dividends	–0.003***	–0.000
	(–4.08)	(–0.21)
Return	–0.001	–0.039***
	(–0.42)	(–21.57)
Firm FE	YES	YES
Fund-Year FE	YES	YES
R^2	0.33	0.33
# Obs.	8,330,637	8,002,992

Why do Institutional Investors Request Information on CO2 Emissions?

Online Appendices

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Table OA1. Alternative Fixed Effects Structures (Table 3)

This table assesses the sensitivity of the results in Table 3 (i.e., the association between ownership by CDP signatories and carbon emissions disclosure) to alternative fixed-effect structures. Except for the fixed effects, the rest of the specification is as in Table 3. T-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent Variable: *CDP_Disclosure*				
	(1)	(2)	(3)	(4)	(5)
Signatories_Hldg	0.35***	0.26***	0.27***	0.26***	0.28***
	(10.57)	(8.38)	(8.44)	(7.90)	(8.49)
OtherInst_Hldg	0.16***	0.15***	0.15***	0.14***	0.18***
	(4.76)	(4.57)	(4.53)	(4.43)	(5.09)
Size		0.06***	0.06***	0.06***	0.06***
		(10.81)	(10.68)	(6.54)	(9.28)
Log(BM)		–0.01***	–0.01***	–0.01***	–0.01***
		(–3.85)	(–4.25)	(–3.94)	(–3.19)
ROA		0.09***	0.14***	0.12***	0.08***
		(3.90)	(5.84)	(5.19)	(3.33)
Leverage		–0.06**	–0.05**	–0.05**	–0.06**
		(–2.46)	(–2.07)	(–2.06)	(–2.50)
Tangibility		0.01	0.01	0.00	0.05*
		(0.35)	(0.24)	(0.11)	(1.81)
Dividends		–0.00	–0.00	–0.00	0.00
		(–0.04)	(–1.06)	(–1.23)	(0.21)
Return		–0.01***	–0.01***	–0.01***	–0.01***
		(–4.86)	(–5.09)	(–5.19)	(–4.94)
Firm FE	YES	YES	YES	YES	YES
Year FE	YES	NO	NO	NO	NO
Country-Year FE	NO	YES	NO	NO	NO
Industry-Year FE	NO	NO	YES	NO	NO
Size Decile-Year FE	NO	NO	NO	YES	NO
Country-Industry-Year FE	NO	NO	NO	NO	YES
R^2	0.65	0.67	0.65	0.65	0.72
# Obs.	76,089	76,045	76,080	76,087	72,074

Table OA2. Alternative Clustering of Standard Errors

This table assesses the sensitivity of the results in Table 3 (i.e., the association between ownership by CDP signatories and carbon emissions disclosure) to alternative clustering options. In column 1 standard errors are double clustered at the country and industry level. In column 2 standard errors are triple clustered at the country, industry and year level. In column 3 standard errors are double clustered at the firm and year level. The empirical specification is as in Table 3. t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent Variable: *CDP_Disclosure*		
Clustering:	Country, industry	Country, industry, year	Firm, year
	(1)	(2)	(3)
Signatories_Hldg	0.27***	0.27***	0.27***
	(4.28)	(4.20)	(6.92)
OtherInst_Hldg	0.13*	0.13*	0.13***
	(1.96)	(2.05)	(4.12)
Size	0.06***	0.06***	0.06***
	(6.23)	(6.18)	(9.19)
Log(BM)	–0.01***	–0.01**	–0.01***
	(–2.71)	(–2.70)	(–3.71)
ROA	0.13***	0.13***	0.13***
	(5.40)	(5.15)	(4.76)
Leverage	–0.04	–0.04	–0.04*
	(–1.22)	(–1.26)	(–1.87)
Tangibility	–0.00	–0.00	–0.00
	(–0.04)	(–0.04)	(–0.04)
Dividends	–0.00	–0.00	–0.00
	(–1.10)	(–1.09)	(–1.02)
Return	–0.01***	–0.01**	–0.01**
	(–3.82)	(–2.60)	(–2.25)
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
R^2	0.65	0.65	0.65
# Obs.	76,089	76,089	76,089

Table OA3. Alternative Econometric Model: Logistic Regression

This table assesses the sensitivity of the results in Table 3 (i.e., the association between ownership by CDP signatories and carbon emissions disclosure) to using a logistic regression (instead of OLS). The variable definitions are as in Table 3. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent Variable: *CDP_Disclosure*	
	(1)	(2)
Signatories_Hldg	3.85***	3.94***
	(51.86)	(44.68)
OtherInst_Hldg	0.14***	0.08*
	(3.78)	(1.83)
Size	0.49***	0.44***
	(89.52)	(63.88)
Log(BM)	–0.21***	–0.22***
	(–21.41)	(–18.79)
ROA	1.89***	1.51***
	(15.75)	(10.61)
Leverage	–0.54***	–0.63***
	(–10.72)	(–10.79)
Tangibility	0.35***	–0.01
	(10.09)	(–0.30)
Dividends	0.09***	0.10***
	(6.85)	(6.43)
Return	–0.03*	–0.03
	(–1.81)	(–1.38)
Log(CO2)		0.09***
		(21.48)
Pseudo R^2	0.15	0.14
# Obs.	76,621	56,452

Table OA4. Alternative Fixed Effects Structures (Table 6)

This table assesses the sensitivity of the results in Table 6 (i.e., the association between CDP disclosure and subsequent carbon emissions) to alternative fixed-effect structures. Except for the fixed effects, the rest of the specification is as in Table 3. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent variable: Log[CO_2 (t+s)]			
	Scope 1 CO_2		Scope 1 CO_2	
	s=1	s=2	s=1	s=2
	(1)	(2)	(3)	(4)
CDP_Disclosure	–0.06***	–0.07***	–0.07***	–0.09***
	(–3.71)	(–4.48)	(–4.54)	(–5.95)
Inst_Hldg	0.29***	0.22**	0.16**	0.13
	(3.33)	(2.56)	(2.00)	(1.61)
Size	0.51***	0.39***	0.53***	0.41***
	(21.43)	(17.72)	(23.91)	(20.22)
Log(BM)	–0.06***	–0.06***	–0.07***	–0.07***
	(–4.49)	(–4.25)	(–5.26)	(–5.06)
ROA	0.55***	0.45***	0.61***	0.53***
	(5.53)	(4.50)	(6.33)	(5.42)
Leverage	–0.06	–0.08	–0.06	–0.08
	(–0.87)	(–1.11)	(–0.82)	(–1.06)
Tangibility	0.58***	0.42***	0.51***	0.35**
	(3.91)	(3.03)	(3.28)	(2.47)
Dividends	0.00	0.01	0.01	0.01*
	(0.33)	(1.11)	(1.35)	(1.65)
Return	0.05***	0.05***	0.04***	0.04***
	(6.26)	(6.99)	(5.07)	(5.89)
Firm FE	YES	YES	YES	YES
Country-Year FE	YES	YES	NO	NO
Industry-Year FE	NO	NO	YES	YES
R^2	0.95	0.95	0.95	0.95
# Obs.	65,020	63,027	65,034	63,041

Table OA5. First-time Disclosure: Pre-Trend Test

This table reports estimates an analysis of carbon emissions around the time a firm starts systematically disclosing its carbon emissions. The treated group consists of 1,117 firms that started disclosing carbon emissions for the first time during the period (2007 - 2018). For every treated firm a control firm is selected among non-treated firms from the same industry and year using propensity scores. For every treatment and control observation sample includes 5-year period around the treatment year (-2; +2). The dependent variable is logarithm of the firm's direct CO_2 emissions (Scope 1 CO_2). *Treatment t-2* is an indicator variable that equals one for the firm from treated group two years before the first CDP questionnaire is filed, and zero otherwise. The rest of the treatment indicators are defined similarly. The rest of the variables are defined in Appendix A. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dep. Var: Log[CO_2 (t)]	
Indep. variables:	(1)	(2)
Treatment t-2	0.12	–0.01
	(1.71)	(–0.14)
Treatment t-1	0.09	–0.03
	(1.34)	(–0.49)
Treatment t	–0.02	–0.11*
	(–0.39)	(–2.10)
Treatment t+1	–0.07	–0.16**
	(–0.92)	(–2.72)
Treatment t+2	–0.12	–0.22***
	(–1.58)	(–3.22)
Controls	YES	YES
Country FE	YES	n.a.
Industry FE	YES	n.a.
Year FE	YES	YES
Firm FE	NO	YES
R-squared	0.72	0.96
Observations	9,515	9,514

Table OA6. Engagements: Treating the Big Three as a Group

This table presents an analysis of the determinants of engagements of the Big Three with individual firms treating the Big Three as a group. The dependent variable, *Big3_Engagement*, is and indicator variable that equals one if BlackRock, State Street, or Vanguard engages with the firm about environmental issues, and zero otherwise. *Top_Emitter* is an indicator variable that equals one if a company is in top quartile by the amount of CO_2 emissions in its industry. *CDP_Disclosure* is an indicator variable that equals one if a company submitted CDP questionnaire, and zero otherwise. The rest of the variables are defined in Appendix A. The sample consists of investment portfolios of Big Three institutions during the years with available engagement data. The set of portfolio companies is limited to firms that either do not file CDP questionnaire or file and restrict access to the questionnaire to CDP signatories. Independent variables are measured at the end of the prior year. Standard errors are clustered at the firm level. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent Variable: *Big3_Engagement*	
	(1)	(2)
*CDP_Disclosure*Top_Emitter*	0.02***	0.02***
	(2.89)	(2.90)
CDP_Disclosure	0.01***	0.01***
	(3.27)	(3.25)
Top_Emitter	0.00	0.00
	(1.47)	(1.47)
Size	0.02***	0.02***
	(14.11)	(14.07)
Log(BM)	–0.02***	–0.02***
	(–10.27)	(–10.23)
ROA	–0.02	–0.02
	(–1.51)	(–1.55)
Leverage	–0.04***	–0.04***
	(–5.17)	(–5.16)
Tangibility	0.03***	0.03***
	(5.78)	(5.78)
Dividends	–0.00***	–0.00***
	(–3.04)	(–2.95)
Return	0.00	0.00
	(0.95)	(1.08)
Year FE	YES	NO
Fund FE	YES	NO
Fund-Year FE	NO	YES
R^2	0.03	0.05
# Obs.	52,287	52,287