

The Big Three and Corporate Carbon Emissions Around the World

Online Appendices

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Appendix OA. Discussion on the Big Three's incentives to engage with portfolio firms

To the extent that a large proportion of the funds sponsored by the Big Three are passively managed, the incentives of the Big Three to engage with portfolio firms are called into question by criticisms to passive investors' role on corporate governance. Regarding the benefits from monitoring portfolio firms, these criticisms point out that passive funds are locked into their investments (e.g., they track indexes), which prevents them from exploiting informational advantages through trading, as well as from "voting with their feet" (i.e., exiting from underperforming companies). Regarding the costs of monitoring portfolio firms, critics claim that passive funds compete against other passive funds on cost, and that monitoring would introduce significant costs associated with research and engagement efforts. These commentators conclude that the combination of modest benefits and substantial costs results in weak incentives to monitor portfolio companies (e.g., Bebchuk and Hirst, 2019a).

However, other considerations suggest that the net benefit from monitoring could be greater than suggested by the previous criticisms. As explained by Fisch et al. (2020), considering the incentives of fund sponsors (i.e., the investment management companies that sponsor the fund families) results in new insights on the governance role of the Big Three.

First, the benefits for the Big Three from monitoring portfolio firms can be substantial. The reason is that fund sponsors do not only compete on fees, but also on returns. In particular, index funds do not only compete with funds tracking the same index; they also compete with other passive funds tracking different indexes (currently, there is a proliferation of indexes followed by funds, each yielding a different return). The Big Three also compete with active funds because a number of investors (for example, 401(k) plan participants) can easily shift their assets from one fund to another without paying significant transaction costs or taxes. As such, monitoring portfolio firms can help large index sponsors to attract and retain investors by boosting the returns of the investment choices offered by the sponsor. The benefits for the Big Three from monitoring portfolio firms are likely to be more pronounced in cross-cutting issues such as corporate governance or sustainability than on firm-specific issues. This is because a passive investor can identify practices that are likely to reduce the risk of underperformance with little firm-specific information, and the investment in identifying an improvement can be deployed across a broad range of portfolio companies.

Prior literature provides evidence consistent with this idea. Appel et al. (2016)'s results suggest that more passive ownership affects corporate governance positively when it comes to *low-cost* governance activities, such as consistently voting according to a predefined program at annual meetings or endorsing removal of poison pills and staggered boards. However, the results in Schmidt and Fahlenbrach (2017) suggest that more passive ownership affects corporate governance negatively and reduces shareholder value when it comes to *high-cost* governance activities, such as the monitoring of mergers and acquisitions, the choice of board members, or the accumulation of titles, which often happen outside of annual general meetings and which require continuous monitoring.

Second, the costs for the Big Three from monitoring portfolio firms can be reduced in several ways:

- i) To begin, these large investors can benefit from economies of scale, for example, by setting up a centralized governance or stewardship committee that conducts corporate governance research for all the funds in the family. These economies of scale are especially large when it comes to monitoring cross-cutting issues such as corporate governance or sustainability, as this type of monitoring requires less research in firm-specific characteristics and

circumstances. In particular, ensuring a minimum level of environmental performance can be done imposing a list of requirements to be met by all portfolio firms.

- ii) While the number of Big Three employees exclusively focused on stewardship might seem modest at the first sight, one should consider that these employees work in conjunction with thousands of fund managers around the world. For example, Blackrock's "Investment Stewardship" team is formed by 45 people (a number that has increased significantly over recent years), but this team counts with the feedback of over 2,000 investment professionals, each leading a team of several people (in total, Blackrock's headcount amounts to 14,900 people).¹ Importantly, the stewardship team can benefit from firm-specific feedback provided by managers of Blackrock's active funds (a significant proportion of the funds sponsored by the Big Three are actively managed).² To facilitate coordination, Blackrock has built a proprietary database, Aladdin® Research, where employees introduce the key points from any engagement with portfolio companies (Blackrock, 2020). Blackrock refers to this notion of cooperation on firm monitoring as "stewardship ecosystem" (Blackrock, 2020).
- iii) Finally, the large aggregate size of the Big Three gives them significant bargaining power in engagements with portfolio firms (they are likely pivotal voters), further reducing monitoring costs. Indeed, Bebchuk and Hirst (2019b) show that the Big Three have almost quadrupled their collective ownership stake in S&P 500 companies over the past two decades, that they have captured the overwhelming majority of the inflows into the asset management industry over the past decade, and that each of them now manages 5% or more of the shares in a vast number of public companies. Relatedly, Griffin (2020) shows that the Big Three combined own an average of 20.5% of outstanding shares for S&P 500 companies, and that these institutions are the single largest shareholder in 88% of those companies. Also according to Griffin (2020), the Big Three possess sufficient voting power to be pivotal in a number of environmental proposals.³

In support of the previous arguments, there is mounting anecdotal evidence that the Big Three are taking an active role in the economy. The reported number of engagements of these investors with portfolio firms is substantial and has increased dramatically in recent years.⁴ Beyond engagements with individual firms, they are also promoting economy-wide initiatives for board-shareholder engagement, they have been active in the regulatory process (for example, by commenting on and calling for change to the rules adopted by the SEC), and they have engaged with index providers in the composition of the indexes (for example, by requesting the exclusion of firms with practices not favored by the Big Three). In addition, the Big Three actively participate with various standard-setting organizations, and, in particular, with the SASB (Sustainability Accounting Standards Board).

¹ See <https://www.blackrock.com/corporate/literature/whitepaper/eng-blackrock-worldwide-leader-in-asset-and-risk-management.pdf>.

² For example, 27% of Blackrock's Assets Under Management (i.e., USD 2 trillion) is in actively managed funds (Blackrock, 2019), which makes BlackRock one of the largest active asset managers on the market.

³ See also the report "Climate in the boardroom: how asset manager voting shaped corporate climate action in 2019". Majority Action, September 2019.

⁴ While public engagements are not very common, private engagements appear to occur relatively often. For example, a recent survey by McCahery, Sautner, and Starks (2016) finds that 63% of very large institutional investors have engaged in direct discussions with management over the past five years, and 45% had private discussions with a company's board outside of management's presence. In their Investment Stewardship Annual Report of 2019, BlackRock said that they engaged with 1,458 companies that year. Moreover, with some companies, BlackRock engaged more than once, bringing the total number of engagements to 2,050. Out of these engagements, BlackRock met with 256 companies to discuss climate-related risks (BlackRock, 2018).

Appendix OB. Discussion on Big Three voting on shareholder proposals related to the environment

Historically, the Big Three have provided relatively little voting support to shareholder proposals related to climate issues. For example, in 2018, Vanguard voted for climate proposals 12% of the time, and BlackRock 10% of the times. In 2019, BlackRock supported 5 of the 36 climate-related shareholder proposals that came to a vote in the U.S. under Rule 14a-8. This relatively low support is sometimes interpreted as evidence that the Big Three are not active in the global effort to reduce corporate carbon emissions.⁵

Table OB.1 includes disclosures by the Big Three providing an explanation for their lack of support to some shareholder proposals related to climate issues. The argumentation can be summarized as follows:

- i) Shareholder proposals are relatively rare outside the U.S.
- ii) Many of the proposals related to climate issues are inappropriate or unnecessary.
- iii) The proposals that make sense are adopted in advance by companies. As a consequence, the sensible proposals are often withdrawn and end up not being included on the voting ballot. This is in line with the argument that voting could be a credible threat to discipline companies. A threat does not necessarily need to materialize to be effective (i.e., to induce certain behavior).⁶
- iv) Actively engaging with companies could be more effective than supporting shareholder proposals.
- v) Some of the Big Three have supported climate-related proposals in some well-known cases.⁷

The evidence in the academic literature provides some support for this argumentation. Prior research on shareholder voting raises concerns about the efficacy of this governance mechanism (e.g., Karpoff, Malatesta, and Walkling, 1996; Gillan and Starks, 2000). In a more recent survey of this literature, Ferri (2012) concludes that the effectiveness of shareholder proposals as a driver of change is unclear, among other things because they are non-binding for the target firm. In particular, Ertimur, Ferri, and Muslu (2011) find almost no support for proposals to link executive pay to social criteria. Regarding the expected effectiveness of the votes, Ertimur, Ferri, and Stubben (2010) report an implementation rate of 3% for proposals receiving between 30% and 50% of the votes cast, a support level that, historically, has been rarely achieved by climate-related proposals. That said, Ferri (2012) observes that the effectiveness of this type of activism has increased over time (although he also points out that whether this has resulted in value creation is still an open question).

Regarding the voting behavior of the Big Three, in their study of investor ideology based on voting behavior, Bolton, Li, Ravina, and Rosenthal (2020) classify the Big Three as “center-right”, but not as “far right” (these authors include support for environmental proposals among the types of behavior that suggest an ideology towards the “left”).

Finally, Matos (2020) points out that the Big Three could face political or business backlash if they become too involved in publicly opposing corporate management. This suggests that, rather than voting, private engagements could be the preferable activism strategy for the Big Three.

⁵ See, for example, <https://www.cnbc.com/2019/10/13/blackrock-vanguard-found-religion-on-climate-doubts-are-growing.html>, <https://www.ft.com/content/8aade207-09bc-41a7-9f0a-24417882f1bc>.

⁶ Nonetheless, there are instances in which this threat has materialized. For example, at Exxon’s 2017 annual meeting BlackRock voted against the re-election of two board members in protest about a “non-engagement” policy. Also, after the Volkswagen’s emissions scandal, the Big Three voted against multiple members of the company’s supervisory board (including the Chair) and signed on to shareholder litigation against the company (Platt, 2020).

⁷ For example, BlackRock and Vanguard voted in 2017 to require Exxon Mobil to produce a climate change report.

Appendix OC. Russell Index construction after 2006

In 2007, to curb the number of stocks changing indexes, Russell adjusted the index switching rules by introducing a banding policy. The process of construction of the Russell 1000 and Russell 2000 Indexes after the initiation of this banding policy consists of six steps:⁸

- 1) Russell sorts Russell 3000E Index constituents by their end-of-May market cap in descending order (without adjusting by float).
- 2) Russell computes the total end of May market cap of Russell 3000E Index.
- 3) Russell computes the cumulative market capitalization for every firm in Russell 3000E as a sum of the market capitalizations of all stocks ranked above the particular firm.
- 4) Russell calculates percentiles for the Russell 3000E Index constituents as the ratio of their cumulative market cap to the total market cap of Russell 3000E.
- 5) Russell calculates the banding range around the 1,000 cutoff point by subtracting (adding) 2.5% from (to) the percentile of the cumulative market cap of the 1,000 cutoff point. To switch from Russell 1000 to Russell 2000 a stock has to fall below not only the 1,000 cutoff point, but also the lower threshold of the aforementioned banding range. Due to stock price fluctuations, the banding range is recomputed annually, leading to different ranks of the lower threshold for every year. In the 2007-2015 period, the ranks of the closest stock to the lower threshold of the banding range ranged between 1,180 and 1,243.
- 6) After constituents of Russell 1000 and Russell 2000 indexes are determined, Russell adjusts the number of security's shares to include only those shares available to the public. This process is referred to as free float adjustment.⁹ The purpose of this adjustment is to exclude from calculations the capitalization that is not available for purchase and is not part of the investable opportunity set. Russell computes the float adjusted market cap of individual stocks as of the end of June. This market cap is used to rank stocks within each index and determine the weights of individual stocks in the index.

⁸ See Russell U.S. Equity Indexes Construction and Methodology, v4.0, August 2019. p. 22-23. <https://research.ftserussell.com/products/downloads/Russell-US-indexes.pdf>

⁹ For the full list of free float adjustments, see FTSE Russell: Free Float Restrictions, v2.2, March 2020. p. 2-3. https://research.ftserussell.com/products/downloads/Free_Float_Restrictions.pdf

Appendix OD. Additional analyses

This appendix contains analyses addressing specific concerns about the inferences of the paper. These analyses are not included in the main body of the paper due to space limitations.

OD.1. Engagements of the Big Three with portfolio firms. Placebo test

As a placebo test of Table 3, we repeat the analysis in Table 3 replacing the dependent variables with similar variables defined based on engagements that are *not* related to environmental issues. For State Street, we define *Other_Engagement_StateStreet* as one if State Street engages with the firm about any issue other than Environmental/Social, and zero otherwise. For Vanguard, we define *Other_Engagement_Vanguard* as one if this institution engages with the firm about any issue other than “Oversight of strategy and risk” (which includes environmental issues), and zero otherwise. As shown in Table OD.1, the coefficient on $\text{Log}(CO_2)$ is no longer significant in this alternative test. That is, the level of carbon emissions fails to predict engagement on other issues.

OD.2. Alternative clustering of standard errors

In our main analyses, we cluster standard errors by firm and year. One possible concern is that clustering by year results in a small number of clusters (our sample has a relatively short time series), and thus in potential noise in the estimation of standard errors. To address this concern we check that the t-stats estimated clustering by firm and year do not vary significantly when we bootstrap them. As explained by prior literature (e.g., Cameron, Gelbach, and Miller, 2008; Petersen, 2009) bootstrapping is a common procedure to address the issue of having a small number of clusters. Table OD.2, Panel A, re-estimates the first two specifications in Table 4 using bootstrapped standard errors clustered by firm and year (we cannot conduct the bootstrap analysis in the third specification of Table 4 because the available 2-way-cluster+bootstrap algorithms do not allow the inclusion of firm fixed effects). To further corroborate that our inferences do not hinge on any particular way of estimating standard errors we repeat our tests using different clustering strategies. As shown in Table OD.2, Panel B, our inferences are unaffected.

OD.3. Alternative estimate of the Probability of Big Three Engagement

In Table 8 we measure the influence of each of the Big Three in a given firm by the probability that the institution engages with the firm (for each fund this probability is computed as in Table 3). To ensure that our inferences do not hinge on the specification and estimated parameters of the model of Table 3, we repeat the analysis using a simplified estimate of the probability of being engaged by the Big Three. In particular, we redefine *Big3_Target* as one if the firm is in the top quintile, quartile, and tercile of the distribution (respectively) in terms of both CO_2 emissions and Big Three ownership. As shown in Table OD.3, this alternative measurement choice results in identical inferences.

OD.4. Time variation in Big Three engagement. Robustness tests

To corroborate that our analysis does not hinge on our specific definition of the index measuring the degree of environmental commitment by each of the Big Three, we conduct the following additional robustness check on the tests in Table 9. First, we define continuous variables for the items 1, 4, and 6 (instead of constructing an indicator variable based on whether the values are higher than a given threshold). Second, we take the first principal component of these seven variables. In parallel to the previous analysis, we compute (for each fund) year-by-year changes in this metric and select the year of the maximum increase. These years are the same as in the previous analysis: 2017 for Blackrock, 2014 for State Street, and 2018 for Vanguard. Also, Table OD.4, Panel A, repeats the analysis in Table 9, Panel A, replacing *Blackrock_Commitment*, *StateStreet_Commitment*, and *Vanguard_Commitment* with the corresponding principal component computed as described above.

In Table 9 we measure the influence of each of the Big Three in a given firm by the probability that the institution engages with the firm (for each fund this probability is computed as in Table 3). For robustness, we repeat the analysis distinguishing between firms in the top quintile of both ownership by the corresponding Big Three institution and CO₂ emissions measured at the end of the previous year. We do so because the results in Table 3 suggest that firms with higher Big Three ownership and higher CO₂ emissions are more likely targeted by the Big Three. As shown in Table OD.4, Panel B, this alternative measurement choice results in identical inferences.

OD.5. Exploiting the reconstitution of the Russell 1000/2000. Placebo test

As placebo of the Russell 1000/2000 test, we repeat the analysis in Table 10 replacing *Big3_Hldg* with *NonBig3_Hldg*. To the extent that index investing is more prevalent among the Big Three than among other investment companies, this additional analysis is a placebo test. As shown in Table OD.5, we do not find that *NonBig3_Hldg* is significantly determined by the inclusion in the Russell 1000/2000 indexes. Consistently, in the second stage we do not find any significant association between the fitted value of *NonBig3_Hldg* and carbon emissions (the results are noisy due to the lack of association in the first stage). The outcome of this analysis suggests that the inclusion in the Russell 1000/2000 Indexes is not a generic instrument for institutional ownership, but rather an instrument for index investing, and thus –to the extent that most of the Big Three ownership is passive– a valid instrument for Big Three ownership.

References

- Appel, I., Gormley, T., Keim, D., 2016. Passive investors, not passive owners. *Journal of Financial Economics* 121, 111–141.
- Bebchuk, L. A., Hirst, S., 2019a. Index funds and the future of corporate governance: theory, evidence, and policy. *Columbia Law Review* 113, 2029–2146.
- Bebchuk, L. A., Hirst, S., 2019b. The specter of the giant three. *Boston University Law Review* 99, 721–741.

Ben-David, I., Franzoni, F., Moussawi, R., 2019. A note to “do ETFs increase volatility?”: An improved method to predict assignment of stocks into Russell indexes. *Journal of Finance (Replications and Corrigenda)* (web-only: <https://afajof.org/comments-and-rejoinders/>)

BlackRock, 2018. How BlackRock investment stewardship engages on climate risk. BlackRock Investment Institute.

BlackRock, 2019. 2019 annual report.

BlackRock, 2020. BlackRock investment stewardship. Protecting our clients assets for the long term. BlackRock Investment Institute.

Bolton, P., Li, T., Ravina, E., Rosenthal, H., 2020. Investor ideology. *Journal of Financial Economics* 137, 320–352.

Cameron, A. Gelbach, J., Miller, D., 2008. Bootstrap-based improvements for inference with clustered errors. *Review of Economics and Statistics* 90, 414–427.

Ertimur Y., Ferri, F., Stubben, S., 2010. Board of Directors’ responsiveness to shareholders: Evidence from shareholder proposals. *Journal of Corporate Finance* 16(1), 53–72.

Ertimur Y., Ferri, F., Muslu, V., 2011. Shareholder activism and CEO pay. *Review of Financial Studies* 24(20), 535–592.

Ferri, F., 2012. Low-cost shareholder activism: A review of the evidence, invited chapter for the *Research Handbook on the Economics of Corporate Law*, ed. C.A. Hill and B.H. McDonnell (Edward Elgar Publishing).

Fisch, J., Hamdani, A., Davidoff Solomon, S., 2020. The new titans of Wall Street: A theoretical framework for passive investors. *University of Pennsylvania Law Review* 168, 17–72.

Gillan, S. L., Starks, L. T., 2000. Corporate governance proposals and shareholder activism: The role of institutional investors. *Journal of Financial Economics* 57, 275–305.

Griffin, C., 2020. Margins: Estimating the Influence of the Big Three on Shareholder Proposals. *SMU Law Review*, Forthcoming.

Karpoff, J. M., Malatesta, P. H., Walkling, R. A., 1996. Corporate governance and shareholder initiatives: empirical evidence. *Journal of Financial Economics* 42, 5–50.

Majority Action Report, 2019. “Climate in the boardroom: how asset manager voting shaped corporate climate action in 2019”.

Matos, P., “ESG and responsible institutional investing around the world: A critical review”. CFA Institute Research Foundation, 2020.

McCahery, J. A., Sautner, Z., Starks, L. T., 2016. Behind the scenes: the corporate governance preferences of institutional investors. *Journal of Finance* 71, 2905–2932.

Cameron, A. Gelbach, J., Miller, D., 2008. Bootstrap-based improvements for inference with clustered errors. *Review of Economics and Statistics* 90, 414–427.

Petersen, A., 2009. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies* 22, 435–480.

Platt, A., 2020. Index fund enforcement. *UC Davis Law Review* 53, 1453–1529.

Schmidt, C., Fahlenbrach, R., 2017. Do exogenous changes in passive institutional ownership affect corporate governance and firm value? *Journal of Financial Economics* 124, 285–306.

Table OB.1. Disclosures by the Big Three about voting on climate-related shareholder proposals

<p><i>“...not all markets employ shareholder proposals and not all shareholder proposals are drafted to elicit material, decision-useful information for investors. Specifically, of the 207 companies BlackRock engaged with globally on the topic of climate risk in 2019, only 40 companies globally received shareholder proposals related to climate risk, the majority of which were filed in the U.S. and EMEA, and predominantly targeted by the industrial and energy sectors.”</i></p> <p>Source: https://www.blackrock.com/corporate/literature/publication/blk-qtrly-commentary-2019-q2-amrs.pdf</p>
<p><i>“those proposals are often poorly constructed or conflate multiple issues, including ones that a company may not have the ability to act upon, and encourage inconsistent reporting that impedes comparability across different sectors and markets. In our view, given that shareholder proposals represent less than 2% of the ballot items in the U.S., there is disproportionate attention paid to them by commentators, many of whom make a simplistic assessment of an investor’s position on the issue raised by the proposal.”</i></p> <p>Source: https://www.blackrock.com/corporate/literature/publication/blk-qtrly-commentary-2019-q2-amrs.pdf</p>
<p><i>“BlackRock’s approach is to assess the company’s current disclosures and management of the issue that the shareholder proposal raises. Particularly in relation to proposals’ environmental and social (E&S) issues, we seek to understand how the issue might impact the company’s long-term business operations and potential to deliver sustainable financial returns. If we determine that the issue is material and don’t have a clear sense that it is being managed appropriately, we will engage the company to discuss its approach to the issue and how the board and management see the situation evolving over time. The importance of engagement is to explain to the company BlackRock’s views on the issue and provide feedback on the company’s approach from our perspective as a long-term investor on behalf of clients. In the past year, we engaged with over 1,400 individual companies on a wide range of ESG issues. In many cases, we have seen companies improve on ‘E’ and ‘S’, as well as ‘G’ (or governance), issues through engagement(s) over time. In a meaningful number of situations, shareholders who table proposals at companies determine that the company’s approach or planned actions are sufficient to address the issue and withdraw the proposal. Similarly, BlackRock may determine that there is no need to support a shareholder proposal that does go to a vote based on our assessment that management’s approach broadly addresses the issue.”</i></p> <p>Source: https://www.blackrock.com/corporate/literature/publication/blk-qtrly-commentary-2019-q2-amrs.pdf</p>
<p><i>“Blackrock assesses each management and shareholder proposal –through engagement and internal analysis –that comes to a vote. We vote to achieve the outcome that we believe is most aligned with our clients’ long-term economic interests. We have been surprised to see some asset managers have a perfect record of voting in favor of shareholder proposals, even when numerous proposals are not advantageous to shareholders or when the company is making demonstrable progress on an issue.”</i></p> <p>Source: https://www.blackrock.com/corporate/literature/publication/blk-qtrly-commentary-2019-q2-amrs.pdf</p>

Table OD.1. Engagements of the Big Three with portfolio firms. Placebo test

This table presents a placebo test of Table 3 using engagements by State Street and Vanguard that are not on environmental issues. *Other_Engagement_StateStreet* is an indicator variable that equals one if State Street engages with the firm about any issue other than Environmental/Social, and zero otherwise. *Other_Engagement_Vanguard* is an indicator variable that equals one if Vanguard engages with the firm about any issue other than “Oversight of strategy and risk” (which includes environmental issues), and zero otherwise. Engagement data is from year 2018 due to limitations in data availability. The independent variables are measured at the end of the prior year. *Log(CO₂)* is the logarithm of the firm’s total carbon emissions. *StateStreet_Hldg* (*Vanguard_Hldg*) is State Street’s (Vanguard’s) holding in the firm, namely the fraction of the firm’s equity held by State Street (Vanguard). The rest of the variables are defined in Appendix A. *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tail) respectively. Intercepts are omitted.

	Dependent Variable:					
	<i>Other_Engagement_StateStreet</i>			<i>Other_Engagement_Vanguard</i>		
	<i>Logit</i>	<i>OLS</i>	<i>OLS</i>	<i>Logit</i>	<i>OLS</i>	<i>OLS</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Log(CO₂)</i>	0.002 (0.055)	-0.002 (-0.843)	0.002 (0.373)	-0.110 (-0.875)	-0.001 (-1.368)	-0.000 (-0.047)
<i>StateStreet_Hldg</i>	126.626*** (19.494)	17.117*** (27.640)	11.929*** (13.540)			
<i>Vanguard_Hldg</i>				18.184*** (3.375)	0.156*** (3.362)	-0.122 (-1.330)
<i>MSCI_Constituent</i>	1.473** (8.185)	0.112*** (8.181)	0.144*** (10.169)	0.079 (0.152)	0.000 (0.088)	0.002 (0.473)
<i>Controls:</i>						
<i>Size</i>	0.153** (2.560)	0.004 (0.856)	0.003 (0.577)	0.359** (2.208)	0.003* (1.944)	0.002 (1.154)
<i>Log(BM)</i>	-0.309*** (-3.664)	-0.024*** (-3.664)	-0.008 (-1.108)	-0.274 (-1.206)	-0.003 (-1.522)	-0.001 (-0.319)
<i>ROA</i>	0.314 (0.294)	-0.014 (-0.210)	0.027 (0.417)	-4.925*** (-2.633)	-0.046** (-2.513)	-0.047** (-2.446)
<i>Leverage</i>	0.627 (1.523)	0.065** (2.079)	0.033 (1.059)	0.514 (0.447)	0.002 (0.194)	0.003 (0.351)
<i>PPE</i>	-0.905*** (-3.298)	-0.073*** (-3.530)	-0.064*** (-2.673)	-1.338 (-1.383)	-0.008 (-1.244)	-0.002 (-0.320)
<i>Country FE</i>	NO	NO	YES	NO	NO	YES
<i>Industry FE</i>	NO	NO	YES	NO	NO	YES
Pseudo R ² /R ²	0.37	0.31	0.35	0.11	0.01	0.03
# Obs.	3,286	3,286	3,286	3,323	3,323	3,323

Table OD.2. Clustering of standard errors. Robustness

This table repeats the tests in Table 4 using alternative options for clustering standard errors. In Panel A, standard errors are bootstrapped using 1,000 iterations. In Panel B, standard errors are double-clustered at country and industry levels (column 1), triple clustered at country, industry and year levels (column 2), and clustered at firm level (column 3). *t*-statistics are in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% level (two-tail) respectively. Intercepts are omitted.

Panel A. Bootstrapped 2-way cluster standard errors

	Dep. Var.: $\text{Log}(CO_2)$	
	(1)	(2)
<i>Big3_Hldg</i>	-3.44*** (-5.83)	-1.69** (-2.31)
<i>NonBig3_Hldg</i>	-0.04 (-0.25)	-0.12 (-0.77)
<i>Controls</i>	YES	YES
<i>Country FE</i>	YES	YES
<i>Industry FE</i>	YES	YES
<i>Year FE</i>	NO	YES
R ²	0.75	0.75
# Obs.	19,224	19,224

Panel B. Alternative clustering strategies

	Dependent Variable: $\text{Log}(CO_2)$		
	(1)	(2)	(3)
<i>Big3_Hldg</i>	-1.00** (-2.47)	-1.00** (-2.65)	-1.00*** (-2.96)
<i>NonBig3_Hldg</i>	-0.07 (-0.74)	-0.07 (-0.70)	-0.07 (-0.89)
<i>Controls</i>	YES	YES	YES
<i>Year FE</i>	YES	YES	YES
<i>Firm FE</i>	YES	YES	YES
<i>Clustered by</i>	Country and Industry	Country, Industry, and Year	Firm
R ²	0.98	0.98	0.98
# Obs.	19,134	19,134	19,134

Table OD.3. Alternative estimate of the Probability of Big Three Engagement

This table repeats the analysis in Table 8 using an alternative estimate of the probability of being targeted by the Big Three. The dependent variable is the logarithm of CO_2 (i.e., the firm's total GHG emissions measured in equivalents of metric tons of CO_2). *Big3_Hldg* is the fraction of the firm's equity owned by mutual funds sponsored by BlackRock, Vanguard, or State Street. *NonBig3_Hldg* is the fraction of the firms' equity owned by funds managed by institutions other than BlackRock, Vanguard, and State Street. *Big3_Target2* equals one if both *Big3_Hldg* and CO_2 (measured over the prior year) are in the top X-percentile of their sample distributions, and zero otherwise. In column (1), (2), and (3) X-percentile is, respectively: quintile, quartile, and tercile. The rest of the specification is as in Table 8. *t*-statistics are in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% level (two-tail) respectively. Intercepts are omitted.

	Dependent Variable: $\text{Log}(CO_2)$		
	<i>Top Quintile</i> (1)	<i>Top Quartile</i> (2)	<i>Top Tercile</i> (3)
<i>Big3_Hldg*Big3_Target2</i>	-1.39*** (-2.59)	-1.52*** (-3.05)	-1.27*** (-2.95)
<i>Big3_Hldg</i>	-0.45 (-1.25)	-0.32 (-0.93)	-0.32 (-0.93)
<i>NonBig3_Hldg</i>	-0.45 (-1.25)	-0.10 (-0.99)	-0.09 (-0.99)
<i>Controls</i>	YES	YES	YES
<i>Year FE</i>	YES	YES	YES
<i>Firm FE</i>	YES	YES	YES
R^2	0.98	0.98	0.98
# Obs.	19,134	19,134	19,134

Table OD.4. Time variation in Big Three engagement. Robustness tests.

This table explores the sensitivity of the results of Table 9 to the way of measuring the key independent variables. In Panel A, *Blackrock_Commitment2*, *StateStreet_Commitment2*, *Vanguard_Commitment2* are measured taking the principal components of the 7 items in Appendix C. The rest of the specification is as in Table 9, Panel A. In Panel B, *Blackrock_Target2*, *StateStreet_Target2*, *Vanguard_Target2* are measured as indicator variables that equal one if both the ownership by the corresponding Big Three institution and CO₂ emissions (measured over the prior year) are in the top quintile of their respective distributions. The rest of the specification is as in Table 9, Panel A. *t*-statistics are in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% level (two-tail) respectively. Intercepts are omitted.

Panel A. Alternative measure of Big Three commitment

	Dependent Variable: $\text{Log}(CO_2)$		
	(1)	(2)	(3)
<i>Blackrock_Target*Blackrock_Commitment2</i>	-0.03*** (-4.40)		
<i>StateStreet_Target*StateStreet_Commitment2</i>		-0.03*** (-4.22)	
<i>Vanguard_Target*Vanguard_Commitment2</i>			-0.02*** (-4.93)
<i>Controls</i>	YES	YES	YES
<i>Year FE</i>	YES	YES	YES
<i>Firm FE</i>	YES	YES	YES
R ²	0.98	0.98	0.98
# Obs.	19,134	19,134	19,134

Panel B. Alternative measure of the probability of being targeted by the Big Three

	Dependent Variable: $\text{Log}(CO_2)$		
	(1)	(2)	(3)
<i>Blackrock_Target2*Blackrock_Commitment</i>	-0.04*** (-3.92)		
<i>StateStreet_Target2*StateStreet_Commitment</i>		-0.05*** (-5.03)	
<i>Vanguard_Target2*Vanguard_Commitment</i>			-0.04** (-2.04)
<i>Controls</i>	YES	YES	YES
<i>Year FE</i>	YES	YES	YES
<i>Firm FE</i>	YES	YES	YES
R ²	0.98	0.98	0.98
# Obs.	19,134	19,134	19,134

Table OD.5. Exploiting the reconstitution of the Russell 1000/2000. Placebo test.

This table reports estimates from an instrumental variable (IV) 2SLS analysis exploiting the reconstitution of the Russell 1000/2000 indexes. The results correspond to the estimation of the following model:

$$\text{First stage (Panel A): } Non_Big3_Hldg_{it} = \alpha + \beta * Russell2000_{it} + \sum \lambda_n * (\ln(Mktcap_{it}))^n + v * \ln(Float_{it}) + \phi_1 * Band_{it} + \phi_2 * Russell2000_{it-1} + \phi_3 * Band_{it} * Russell2000_{it-1} + \tau_t + \delta_i + \varepsilon_{it} \quad (1)$$

$$\text{Second stage (Panel B): } Log(CO_2)_{it+1} = \alpha + \beta * Non_Big3_Hldg_{it} + \sum \lambda_n * (\ln(Mktcap_{it}))^n + v * \ln(Float_{it}) + \phi_1 * Band_{it} + \phi_2 * Russell2000_{it-1} + \phi_3 * Band_{it} * Russell2000_{it-1} + \tau_t + \delta_i + \varepsilon_{it} \quad (2)$$

$Russell2000_{it}$, the instrument, equals one if stock i is assigned to the Russell 2000 Index in year t , and zero otherwise; $Mktcap_{it}$ is the market capitalization of stock i as of the end of May of year t following Ben-David et al.'s (2019) methodology; $Float_{it}$ is the float-adjusted market capitalization of stock i as of the end of June of year t used by Russell to determine firm-specific index weights. $Band_{it}$ equals one if the firm's end-of-May market capitalization is within the banding interval (see Appendix C), and zero otherwise; $Russell2000_{it-1}$ equals one if the firm is in Russell2000 in the previous year, and zero otherwise. $Non_Big3_Hldg_{it}$ is the fitted value of Non_Big3_Hldg from the first stage estimation. Specifications include polynomial controls of order 1, 2 and 3. Results are based on a sample formed by bandwidths of 500, 400, and 300 firms around the threshold between Russell 1000 and Russell 2000 in the years 2005-2018. Standard errors are clustered at the firm level. t -statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Intercepts are omitted.

Panel A. First stage

	Dep. Var.: $Non_Big3_Hldg_t$								
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
$Russell2000_t$	-0.01 (-1.31)	-0.01 (-0.94)	-0.01 (-1.03)	-0.00 (-0.85)	-0.01 (-0.90)	-0.01 (-1.03)	-0.00 (-0.67)	-0.01 (-0.92)	-0.01 (-1.03)
$Polynomial\ order,\ N$	1	1	1	2	2	2	3	3	3
$Bandwidth$	500	400	300	500	400	300	500	400	300
$Float\ control$	YES	YES	YES	YES	YES	YES	YES	YES	YES
$Firm\ FE$	YES	YES	YES	YES	YES	YES	YES	YES	YES
$Year\ FE$	YES	YES	YES	YES	YES	YES	YES	YES	YES
$Kleibergen-Paap\ F-stat.$	1.705	0.880	1.062	0.715	0.817	1.056	0.446	0.838	1.056
R^2	0.90	0.90	0.91	0.90	0.90	0.91	0.90	0.90	0.91
# Obs.	5,164	3,993	2,918	5,164	3,993	2,918	5,164	3,993	2,918

Table OD.5. Exploiting the reconstitution of the Russell 1000/2000. Placebo test (cont'ed)

Panel B. Second stage

	Dep. Var.: $\text{Log}(CO_2)_{t+1}$								
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
$\widehat{Non_Big3_Hdlg}_t$	6.57	8.58	5.69	11.89	9.46	5.65	12.91	8.80	5.66
	(1.01)	(0.90)	(1.00)	(0.78)	(0.88)	(0.99)	(0.65)	(0.89)	(0.99)
<i>Polynomial order, N</i>	1	1	1	2	2	2	3	3	3
<i>Bandwidth</i>	500	400	300	500	400	300	500	400	300
<i>Float control</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Firm FE</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Year FE</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES
R^2	0.93	0.90	0.95	0.84	0.88	0.95	0.81	0.90	0.95
# Obs.	5,164	3,993	2,918	5,164	3,993	2,918	5,164	3,993	2,918