
An EDHEC-Risk Institute Working Paper

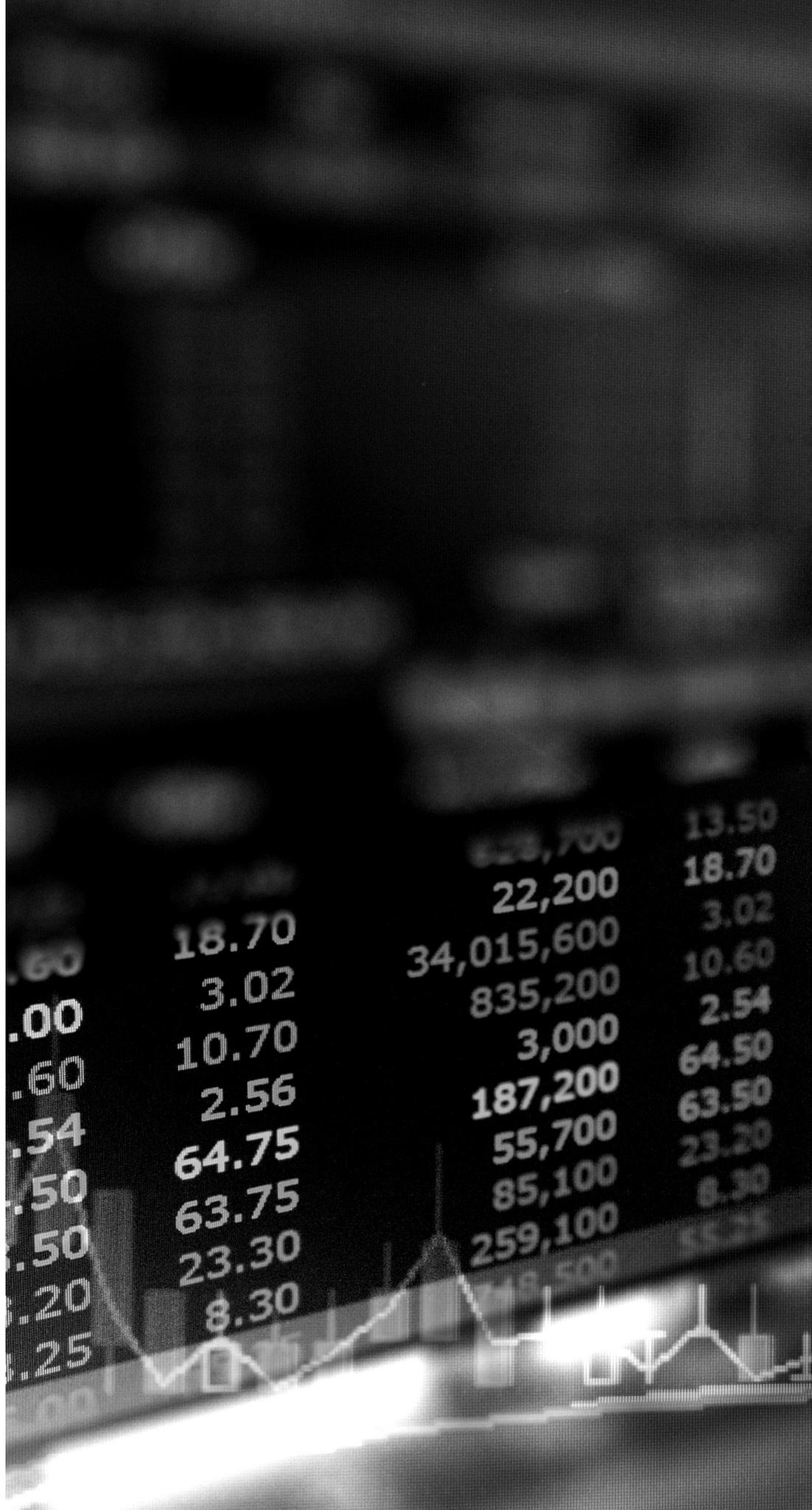
Institutional Investors and Corporate Carbon Footprint: Global Evidence

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ABSTRACT

Climate-aware institutional investors are assumed to affect the transition towards a low carbon economy by exercising their prerogatives as owners of global companies. Investors concerned with climate change can influence investee companies' carbon footprint by voting at shareholder meetings on climate-related issues and by actively engaging with executives and board members. We study to what extent institutional investors' ownership affected corporate carbon emissions in 68 countries for the period of 2007 to 2018. Results show that institutional investment on average does not appear to lead to a carbon footprint reduction. However, institutional investors are associated with a limited reduction of carbon footprint for the highest polluters in the sample. These results suggest that climate-driven responsible investors can complement but not substitute national and international climate policies.

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1. Introduction

While national governments pledged to reduce their greenhouse gas emissions under the Paris Agreement, delivering on those aims will require significant changes in the production and in the consumption of energy by the sources of these emissions, primarily companies. The financial system is growingly aware of the risks posed by climate change (Krueger et al., 2020) and, accordingly, many financial actors are making investments decisions to reduce their exposure to assets – primarily securities issued by companies – particularly sensitive to climate risks. Because public and private pension schemes, private equity funds, insurance companies, sovereign wealth funds, mutual funds and other institutional asset managers have a long-term investment horizon, the reduction of medium to long-term risks such as climate change is for them of paramount concern (Gibson et al., 2021; Krueger et al., 2020). Moreover, many of those institutional investors also have substantial direct and indirect exposure to sectors that are particularly exposed to climate risks, such as infrastructure and energy.

Initiatives to promote the integration of sustainability into investment decisions are gaining momentum. For example, the vast majority of global institutional investors have now signed the United Nations' Principle for Responsible Investments (UNPRI), committing to integrate ESG factors, including climate change, in their asset management operations. Disclosure of assets' exposure to climate risks is emerging as a new practice with the growing diffusion of dedicated reporting frameworks such as the Task Force on Climate-Related Financial Disclosures (TCFD). Financial regulators, including central banks, are looking into ways to embed climatic change risks in their supervision and financial stability mandates. In this context, to what extent institutional investors can actually affect investee companies on delivering towards the Paris Agreement goals is a pressing financial and policymaking question.

Active ownership by institutional investors encompasses both engaging with the management and boards of directors of investee companies and proxy voting on issues concerning governance and performance,

including those related to the environmental strategy (Dimson et al., 2015; 2019). The effectiveness of active ownership is receiving increasing attention in literature (Dyck et al., 2019; Broccardo et al., 2020). Active ownership approached vary widely across investors and geographies, but they usually involve mobilizing the public opinion and the media, in particular to bring attention to proxy votes on environmental-related issues at upcoming shareholders' meetings. Other active ownership initiatives are carried out behind the scenes and consist of discreet dialogues and interactions between investors and management and/or board directors.

Climate-focused active ownership engagements are conducted either independently or through collaborative endeavors (Dimson et al., 2019). Some dedicated platforms include the Carbon Disclosure Project (CDP) and major investor networks focused on climate change, such as the European Institutional Investors Group on Climate Change (IIGCC), the Asia Investor Group on Climate Change (AIGCC), the Australia/ New Zealand Investor Group on Climate Change (IGCC) and the Investor Network on Climate Risk (INCR). These collaborative engagements aim to encourage companies to disclose their climate change strategies (e.g. the CDP information requests), to set emission reduction targets and to take action on sector-specific issues such as gas flaring in the oil and gas sector. Examples of engagement objectives in this area include ensuring compensation policies are consistent with environmental targets, and requiring improved disclosure and target setting from companies on their carbon price assumptions.

Whether active engagement by climate-aware investors can actually affect investee companies' carbon footprint is an empirical question with relevant implications for climate policymaking. In particular, assessing the relationship between climate-aware investors and carbon footprint would shed light on the ability of finance to contribute to the transition towards a low carbon economy as a complement, or even as a substitute, of climate policymaking. Importantly, institutional investors own assets that are not currently or effectively covered by existing

national climate policies. Also, even in jurisdictions with a carbon taxation mechanism in place institutional investors are owners of businesses currently not included for instance in cap & trade frameworks. Therefore, climate-aware institutional investors can potentially complement or even substitutes, in many ways, the existing national and international carbon policies.

We study to what extent institutional investors' ownership affected corporate carbon emissions in 68 countries for the period of 2007 to 2018. Results show that institutional investment on average does not appear to lead to a carbon footprint reduction. However, institutional investors are associated with a limited reduction of carbon footprint for the highest polluters in the sample. Thus, responsible investors can help the decarbonization of investors but are unlikely to play a major role in the low carbon transition unless their active ownership becomes more effective.

The paper is structured as follows. Section 2 presents a literature review and develops the research hypotheses. Section 3 describes the applied methods and sample used for the analysis. Section 4 presents the results of the empirical analysis. Section 5 discusses the interpretation of the findings and concludes.

2. Literature Review and Hypothesis



Carbon emissions are increasingly material to the financial performance of companies and investors (Bolton and Kacperczyk, 2021). Institutional investors may be motivated by a mix of financial and/or social motives to reduce their portfolios' carbon exposure (Boermans and Galema, 2019). Investors have therefore two possible strategies in promoting socially desirable outcomes in companies (Broccardo et al., 2020): exit (divestment) and voice (engagement). In this paper we study the role of institutional investors who report to (UNPRI) engaging on climate issues with investee companies. We are therefore able to provide a quantification of the "active ownership" effect on corporate carbon footprint by climate-aware institutional investors.

The tools used to achieve such goal are carbon targets, scenario analysis, enhanced disclosure. Typically, active ownership by institutional investors encompasses both engaging with the managers of investee companies and proxy voting on issues concerning the environmental and sustainability strategy (Dyck et al., 2019). Active ownership approaches vary widely across investors and geographies, but they usually involve mobilizing the public opinion and the media, in particular to bring attention to proxy votes on environmental-related issues at upcoming shareholders' meetings. Other active ownership initiatives are carried out behind the scenes and consist of discreet dialogues and interactions between investors and management and/or board directors (Dimson et al., 2020).

According to Celik & Isaksson (2013) the definition "institutional investor" constitutes a wide range of investors who are commonly characterised as a legal entity, but are heterogeneous in their "business models", which constitutes many features such as their investment horizon, their purpose, beneficiaries and investment strategy.

Starks et al. (2017) state that investor horizon is a main determinant of investors' CSR preference. CSR investments are merely costs on the short term that yield returns in the long term (Graves & Waddock, 1994; Starks et al., 2017) and therefore short-term investors tend to position themselves opposite to long-term

investors in CSR investment decision-making processes (Cox et al., 2008).

Another main determinant of investors' CSR preference is investors' feeling of "psychological ownership" (McNulty & Nordberg, 2016). Psychological ownership reflects an "emotional investment" that creates "a feeling of possessiveness" and long-term commitment with the investee. Contrary to psychological ownership stands "legal ownership", which reflects a legal right based and purely financial relationship with the investee (McNulty & Nordberg, 2016).

Psychological ownership is fundamental to other images of ownership such as universal ownership (McNulty & Nordberg, 2016). Universal owners (typically public pension funds and insurance companies) hold large diversified portfolios that practically represent a stake in the global economy, which implies that portfolio constituents absorb each other's external costs (Kiernan, 2007). Moreover, universal owners' investment decisions also need to reflect long-term non-financial interest of their constituents. Such investors are generally more exposed to stakeholder pressures (i.e. regulatory pressure, responsibilities to beneficiaries) (Cox et al., 2008). As such, the universal owner takes "investment approach agitated for change at investee companies but with larger social and economic purposes in mind" (McNulty & Nordberg, 2016). Others believe that institutional investors' preferences only serve the maximization of short-term profits (Porter, 1992). In practice, the institutional investor community contains both types of investors. Investors can apply a variety of direct and in-direct strategies to improve their ESG footprint. Indirect strategies include for example thematic investments and negative and positive screening. Negative (positive) screening involves the exclusion (inclusion) of particular investments based on a set of ESG criteria. Thematic investments refer to portfolio specialization in a particular ESG topic (e.g. sustainable energy) (OECD, 2017). Shareholder engagement is a primary reason why investors use ESG information (Amel-Zedah & Serafeim, 2012). In principle, all equity investors are expected to engage with their investee, which compromises the monitoring of the firm, gathering new information and

spreading this information throughout the market, thereby using the rights attached to their equity ownership. This provides for the optimal functioning of capital markets and resource utilization across the economy (Celik & Isaksson, 2013). However, such ownership engagement introduces costs and benefits that not all investors are equally willing to get involved with.

Traditionally, the "actions taken by shareholders with the explicit intention of influencing corporations' policies and practices", which some refer to as "active ownership" (McNulty & Nordberg, 2016), address issues that exclusively are of interest to shareholders, such as issues relating to takeovers and business strategies (Dimson et al., 2015). Active ownership, however, is a multi-used term in literature that refers to different concepts of ownership engagement. Dimson et al. (2015) define active ownership more narrow as a form shareholder engagement that addresses ESG issues in the interest of a broader set of stakeholders. For the purpose of clarity, the remainder of this paper refers to Dimson's definition as responsible ownership.

McNulty & Nordberg (2016) distinguish between two sorts of voice. The first is expressed through private dialogue and relationship building. The other expression of voice is based on a public-formal actions and the use of shareholder rights. Dyck et al. (2017) state that shareholder engagements relating to firm's ES performance occur likely in the form private dialogue. David et al. (2007) provide contradictory evidence and explain: "activism can trigger managers to engage in political activities to safeguard their discretion, potentially diverting resources and reducing CSR." However, over recent years, responsible ownership has strongly emerged, which has proven successful (Dimson et al., 2015). Further, research shows that foreign long-term IO improves corporate governance structures around the globe (Aggarwal et al., 2011; Bena, Ferreira, Matos & Pires, 2017), and IO tends to positively affect CSR (Cox et al., 2004; Cox et al., 2008; Dimson et al., 2015; Dyck et al., 2021; Keckses et al., 2016; Neubaum & Zahra, 2006; Uchida & Motta, 2015).

Summarizing, carbon emissions become increasingly material to financial performance. Shareholders may be motivated by a mix of financial and/or social motives to reduce their portfolios' carbon exposure. This paper investigates whether institutional ownership (IO) affects firm's carbon footprint. Scholars assume that IO volume is a proxy for the salience level of investors and thus their potential to evoke corporate changes (Neubaum & Zahra, 2006). This paper follows that assumption to quantify the independent variable of interest. The two main metrics to assess firms' climate footprint are alternatively the carbon intensity (the ratio of emissions over sales) and total emissions. Therefore, using those two specifications the studied hypothesis is articulated as follows:

Hyp.1a: Institutional ownership is negatively associated with firms' carbon-intensity

Hyp.1b: Institutional ownership is negatively associated with firms' carbon-emissions.

3. Data and Methodology



To what extent the commitment to address climate of such large segment of the global institutional money can help deliver on the Paris Agreement targets is an underexplored empirical question. We first explore what actions and tools investors undertake to factor climate considerations in their operations. We obtained the portion of the 2018 survey to the signatories of the United Nations' Principle for Responsible Investments (UNPRI) reporting their dealings with climate change risks and opportunities. The survey respondents have a cumulated Assets under Management (AuM) of about 71 trillion USD, considering that according to some estimate the global AuM of such investors is about 79 trillion USD globally, the survey can be considered fairly representative (about 90% of the world total). Table 1 shows that investors accounting for 26% of the AuM seek their investee companies to reduce carbon footprint, such percentage is therefore expressing the quantity of AuM that is reported to be mobilized in active ownership operations. Moreover, Table 1 also shows that investors are actively managing their holdings' exposure to climate change risks by using various tools such as carbon footprinting, scenario testing, and enhanced disclosure on emission risks.

We explore what determines the adoption of climate-related activities and operating tools by the investors reporting to UNPRI. Table 1 shows the results of a logistic regression where the dependent variable is equal to 1 if the investor reports having adopted the activity/tool and equal to 0 otherwise.

The independent variables are: 1) the dummy "Asset Owner" which is equal to 1 if the investor reporting to UNPRI is an asset owner, equal to 0 otherwise; 2) the "Reporting years" which expresses the total number of years the investor has reported to UNPRI; 3) and the "AuM" captures the dollar value of the total assets managed or owned by investors reporting to UN PRI. We also include controls for the region where the investor is headquartered.

Table 2 shows that the size and the seniority in reporting consistently show a positive and statistically significant relationship with the likelihood of investors adopting climate-related activities and operating tools. While the cumulated experience in UNPRI reporting points towards the existence of early strong commitment in responsible investments, the size seems to points towards the existence of economies of scale as only the larger investors might have sufficient organizational and financial resources to create and run active ownership operations.

Table 1: Activities and tools used by institutional investors reporting to UN PRI in 2018

This table shows the amount of Assets under Management (AuM) of the institutional investors reporting to UN PRI. Data is from the UN PRI Survey 2018.

Panel A: Activities undertaken by investors to respond to climate change risk

	Setting carbon reduction targets for portfolio	Established climate change sensitive asset allocation strategy	Targeted low carbon/ climate resilient investments	Reduce portfolio exposure to emissions intensive holdings	Used emissions data or analysis to inform investment decisions	Sought climate change integration by companies
	4.71	6.96	17.79	15.67	18.46	18.51
AuM/Total AuM	7%	10%	25%	22%	26%	26%

Panel B: Tools used by investors to manage emission risks

	Carbon footprinting	Scenario testing	Disclosure on emission risk	Target setting for emission risk reduction	Encourage internal/ external portfolio managers to monitor emission risks	Emissions risks monitoring/reporting are formalized into contracts when appointing managers
AuM (USD Trillion)	18.03	6.92	9.21	11.27	16.72	4.67
AuM/Total AuM	26%	10%	13%	16%	24%	7%

1 - Boston Consulting Group, *Global Asset Management* 2018.

Table 2: Determinants of institutional investors' climate actions

This table shows the determinants of the adoption of climate risk-related activities and operating tools. Asset Owner is a dummy variable equal to 1 if the investor reporting to UNPRI is an asset owner, equal to 0 otherwise. Reporting years expresses the total number of years the investor has reported to UNPRI. Assets under Management (AuM) captures the dollar value of the total assets managed or owned by investors reporting to UN PRI. Data is from the UN PRI Survey 2018.

Panel A: Activities undertaken by investors to respond to climate change risk

	Setting carbon reduction targets for portfolio	Established climate change sensitive asset allocation strategy	Targeted low carbon/ climate resilient investments	Reduce portfolio exposure to emissions intensive holdings	Used emissions data or analysis to inform investment decisions	Sought climate change integration by companies
Asset Owner	-0.100 (0.398)	-0.164 (0.439)	0.311 (0.263)	-0.006 (0.291)	-0.160 (0.266)	0.081 (0.262)
Reporting years	0.250 (0.078)***	0.316 (0.085)***	0.209 (0.047)***	0.190 (0.051)***	0.238 (0.046)***	0.256 (0.048)***
AuM (Log)	0.263 (0.089)***	0.255 (0.093)***	0.195 (0.054)***	0.208 (0.059)***	0.210 (0.052)***	0.241 (0.053)***
Constant	-21.383 (691.045)	-22.655 (1128.792)	-5.584 (1.744)***	-20.395 (955.173)	-19.208 (446.968)	-20.756 (634.250)
Region Control	YES	YES	YES	YES	YES	YES
Observations	1059	1004	1044	1044	1082	1082
Chi-square	48.46***	41.25***	66.18***	51.28***	75.02***	97.5***
Pseudo R ²	0.161	0.157	0.114	0.100	0.120	0.157

Panel B: Tools used by investors to manage emission risks

	Carbon footprinting	Scenario testing	Disclosure on emission risk	Target setting for emission risk reduction	Encourage internal/ external portfolio managers to monitor emission risks	Emissions risks monitoring/reporting are formalized into contracts when appointing managers
Asset Owner	0.088 (0.249)	0.540 (0.384)	0.075 (0.342)	0.188 (0.422)	0.044 (0.274)	0.525 (0.639)
Reporting years	0.230 (0.044)***	0.145 (0.071)**	0.339 (0.070)***	0.182 (0.076)**	0.201 (0.048)***	0.220 (0.133)*
AuM (Log)	0.197 (0.050)***	0.339 (0.089)***	0.217 (0.074)***	0.299 (0.092)***	0.238 (0.056)***	0.514 (0.177)***
Constant	-18.598 (384.900)	-21.969 (550.673)	-20.445 (529.517)	-23.090 (1345.624)	-6.741 (1.774)***	-17.957 (4.243)***
Region Control	YES	YES	YES	YES	YES	YES
Observations	1082	1042	1044	1004	1082	650
Chi-square	79.72***	35.29***	66.07***	28.74***	74.24***	23.88***
Pseudo R ²	0.121	0.121	0.172	0.109	0.129	0.214

To study the actual effect of institutional ownership of climate-aware investors on the climate footprint of invested companies, we obtain firms' annual carbon emissions data from Thomson Reuters ASSET4. Specifically, data are obtained from all constituent firms of the full ASSET4 universe list for the period 2007 to 2018. This timespan covers all available ASSET4 data and was chosen to maximize the dataset, anticipating that carbon emission data is relatively unavailable. Thomson Reuters reports

scope 1 and 2 carbon emission data in their disclosed form under variable code ENERDP023. In case a firm does not disclose such emission data, Thomson Reuters estimates the CO2 emissions according to various models, reported under variable ENERDP123. This study complements disclosed emission data with Thomson Reuters' estimates to maximize the number of observations. This yields an initial sample of 7373 firms. Data on firms' institutional shareholdings is from Orbis. Table 3 displays the descriptive statistics.

Table 3: Descriptive statistics

This table shows full sample descriptive statistics. The first column reports number of data points for each variable. The second and third columns report the value range. The fourth column reports median values; the fifth column reports mean values and the last column reports the standard deviation. Primary variables are from Thomson Reuters ASSET4; Worldscope; Orbis. Secondary variables are derived from Primary variables. CIs is carbon-sales intensity. Leverage is calculated as Debt/Assets. Tobin's Q is calculated as (Market Cap + Debt) / Assets. Tangibility is calculated as PPE/Assets. Carbon Intensity is calculated as Carbon Emissions/Sales.

	N	Min	Max	Median	Mean	St. Dev.
Sales (\$000)	76530	-	514 000 000	1 392 410	6 351 806	18 800 000
Assets (\$000)	76231	-	4 030 000 000	2 777 190	25 000 000	143 000 000
Debt (\$000)	76119	-	3 390 000 000	571 887	6 095 393	47 300 000
PPE (\$000)	74737	-	272 000 000	450 561	2 907 410	9 605 622
Carbon Emissions (Tonnes)	46477	0	34 500 000 000	98 071	3 950 130	225 000 000
Institutional Ownership (%)	84312	0	100	12.3	17.3	17.5
IOc (%)	84312	0	100	28.66	36.85	31.72
Leverage	76103	0	0.91	0.21	0.24	0.2
Tobin's Q	72421	0.1	3.013	1.04	1.29	0.83
Tangibility	74722	0	0.94	0.19	0.28	0.27
Carbon Intensity	46001	0.0005	329.03	0.039	0.7	8.99

This study adopts an OLS regression model with lagged values for the dependent variable. The regression equation is the following:

$$CF_{it} = \alpha + \beta IO_{it-1} + \gamma' Y_{it-1} + \Lambda + \varepsilon_{it}$$

where CF_{it} is the carbon footprint (measured alternatively as emissions of CO₂ or as the ratio of emissions of CO₂ and revenues) of company i at time t , IO_{it-1} is the institutional ownerships of company i at time $t-1$, and Y_{it-1} represents a collection of control variables for firm i at time $t-1$. Λ includes time, country, and industry fixed effects.

4. Results



We investigate whether institutional ownership impacts the carbon footprint (in terms of both emissions and carbon intensity) of investee companies. Table 4 reports the simplest models estimated using the lagged log of Emission (column 1) and the log of carbon intensity (column 2). The interpretation of the coefficients should be intended as an impact on the percentage of emissions.

First of all, the table shows that institutional ownership coefficient has the hypothesized sign. However, considering the emissions volume there is no statistically significant effect. On the contrary, focusing on carbon intensity we observe the carbon intensity decreases by 0.1% for each 1% increase in ownership by institutional investors. Therefore, for one standard deviation in institutional ownership the carbon intensity decreases by -1,75% annually.

At a more granular level, Table 5 illustrates the difference between the bottom and top quarter

of the distribution of the emissions and carbon intensity. Results suggest that in the bottom quartile of the distribution the institutional ownership makes no difference, the coefficient is indeed not significantly different from zero. If we observe the quartile of "heavy polluters", it is possible to see that the coefficient is negative and significant for both the dependent variables which are used in this piece of research. For what concerns the emissions, the coefficient (- 0.006) suggests that for each 1% increase in institutional ownership there is a decrease of CO2 of 0.6%. Considering one standard deviation increase in ownership we have a robust decrease of approximately 10.5% in emissions. When carbon intensity is considered, the effect is smaller in magnitude but still statistically significant; an increase of 1% in institutional ownership determines a carbon intensity reduction of 0.4% (one standard deviation increase in institutional ownership leads to a -12.7% in carbon intensity).

Table 4: Regression results: emissions and carbon intensity

Variables are transformed as indicated to improve data distributional properties. Regression estimates include robust standard errors, clustered at country-level. Data are from Thomson Reuters ASSET4; Worldscope & Orbis. Significance levels reported in superscript: *** is significant at 1%; ** is significant at 5%; * is significant at 10%.

	Log Emissions	Log Carbon Intensity
	(1)	(2)
	Coeff./se	Coeff./se
Institutional Ownership	-0.000 (0.001)	-0.001*** (0.001)
Sales	0.637*** (0.010)	
Tobin's Q	-0.011 (0.007)	-0.036*** (0.007)
Asset Tangibility	2.701*** (0.040)	2.740*** (0.041)
Asset Size	0.283*** (0.014)	-0.034*** (0.010)
Leverage	-0.004 (0.008)	-0.003 (0.008)
Earnings	-0.014* (0.008)	-0.017** (0.008)
Constant	-1.781 (26010.334)	-2.978 (21492.527)
Observations	22114	22137
R-sq	0.745	0.592
Country	YES	YES
Year	YES	YES
Industry	YES	YES

Table 5: Regression results: emissions and carbon intensity by quartile

Variables are transformed as indicated to improve data distributional properties. Regression estimates include robust standard errors, clustered at country-level. Data are from Thomson Reuters ASSET4; Worldscope Et Orbis. Significance levels reported in superscript: a is significant at 1%; b is significant at 5%; c is significant at 10%.

	Top 25% Emitters	Bottom 75% Emitters	Top 25% Emitters	Bottom 75% Emitters
	Log Emissions Coeff./se	Log Emissions Coeff./se	Log Carbon Intensity Coeff./se	Log Carbon Intensity Coeff./se
Instit. Ownership	-0.006*** (0.002)	-0.000 (0.001)	-0.004*** (0.001)	0.000 (0.000)
Sales	0.220*** (0.042)	0.533*** (0.020)		
Tobin's Q	-0.054 (0.039)	-0.003 (0.016)	0.050*** (0.011)	-0.031*** (0.006)
Asset Tangibility	1.427*** (0.144)	2.628*** (0.082)	0.182** (0.073)	2.316*** (0.037)
Asset Size	0.315*** (0.048)	0.388*** (0.029)	0.006 (0.017)	-0.051*** (0.009)
Leverage	-0.020 (0.039)	0.031 (0.031)	0.121*** (0.035)	0.004 (0.006)
Earnings	0.037* (0.020)	-0.021 (0.017)	-0.011 (0.013)	-0.019*** (0.007)
Constant	3.940*** (1.018)	0.195 (1.303)	-0.365 (0.749)	-1.689** (0.736)
Observations	5369	16880	5309	16828
R-sq	0.493	0.548	0.282	0.445
Country	YES	YES	YES	YES
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES

5. Conclusions

This study attempts to measure what impact climate-aware institutional shareholders have on firms' carbon footprint. Thereby, this paper responds to a request from Louche et al. (2016) to assess the impact of (low-carbon) investment practices on climate change. This study analyses panel data of 6392 firms from 68 countries from the period between 2007 and 2018 on the impact of shareholders on their investees' carbon-sales intensity. Across full sample, we find that institutional shareholders do not reduce in a meaningful way their investees' carbon footprint but they contribute to the carbon emission reduction for the most polluting companies. However, even for the highest emitting companies in our sample the reduction of carbon footprint has a limited magnitude.

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- Le Sourd, V. and L. Martellini. The EDHEC European ETF and Smart Beta and Factor Investing Survey 2019 (August).
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