

Concerns about Empirical Corporate Finance: Sustainability or Greenwashing Revisited

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Abstract

Inconsistent standards prevail in the evaluation of empirical corporate finance papers, leading to confusion in interpreting results. I demonstrate this point using an example: Duchin, Gao, and Xu (2025) propose that firms under environmental pressure (EP) via ESG ratings, pension fund ownership, or being headquartered in a Democrat county, for example, are more likely to divest polluting plants. They attribute this to “greenwashing” rather than sustainability. I show that reasonable adjustments to their specifications make the results inconclusive. Thus, their data do not allow one to infer that environmental pressures in fact cause divestiture.

Keywords: Factors, Risk Premia, Stock Returns

1. Introduction

I use a recent publication to raise concerns about evaluation standards for papers in the field of empirical corporate finance. Specifically, in a recent paper, Duchin, Gao, and Xu propose that if a firm receives an ESG rating or is otherwise the focus of environmental pressure to appear “green,” it is more likely to divest itself off a polluting plant. This result is interesting and provocative, as it indicates firms are indulging in “greenwashing” rather than meaningfully investing in technology that reduces adverse environmental impact. In this note, I propose that incorporating some intuitive methodological checks and control variables leads to an inconclusive result on the topic. Note that I am not questioning the issue of replication. As far as I can see, the results replicate correctly, and the code is well-done [1]. My piece is more about robustness to sensible variations in specification. Such concerns are particularly relevant given recent discussions regarding replication, robustness, and empirical standards in finance [2,3]. In the conclusion, I use my example to exposit the issues plaguing the evaluation of papers in empirical corporate finance.

2. The Basic Result

I go directly to the central result in Table III of Duchin, Gao, and Xu, which has two panels. Panel A models the binary outcome of divestiture of a polluting plant or not (coded as a 100/0 binary dependent variable), estimated via OLS, according to their code. The right-hand side has five metrics for environmental pressure. These are a dummy variable that equals one if the firm has an ESG rating, another indicator that equals one if the percentage of a firm’s shares held by pension funds is above the sample average, a dummy for whether the firm experiences an environmental risk incident according to the Reprisk database, a dummy indicator for whether the firm’s headquarters is located in a county which was carried by Democratic presidential candidate in the most recent election, and an index that averages the preceding indicators. The control variables are Q, a proxy for leverage, the level of cash holdings, and a measure of asset tangibility. Industry-year fixed effects are included. The environmental pressure variable is expected to be positive and significant [1].

In Panel B they interact the pressure index with the pollution level of the firm, measured as quantity of pollution, as well as pollution

divided by employee count (intensity). The interactive variable is expected to be positive and significant, indicating that more firm-level pollution increases the likelihood of divesting a polluting plant.

As expected, in their Table III, all nine coefficients across Panels A and B are positive and significant, lining up with their central hypothesis. I now propose that these findings are fragile.

3. Identification

As can be seen, the paper does not do a difference-in-differences, or adopt a regression discontinuity approach, using an identifying event and/or a cutoff boundary. For such reasons alone, the paper could be viewed unfavorably, as joint determination and reverse causality are serious concerns. These concerns are pervasive in observational corporate finance settings where causal identification is in-herently difficult and omitted-variable biases may contaminate inference [4,5].

As an example, firms that divest polluting plants are more likely to be held by pension funds (optics), and may be more likely to receive an ESG rating. Further, an omitted factor like size or other Compustat item like profits could be driving all of the variables—e.g., a profitable firm or a large firm is more likely to be held in

a pension fund, and is more likely to be able to divest a polluting plant without adverse operational consequence. Such concerns are familiar in empirical asset pricing and corporate finance, where firm characteristics often proxy for economically important but difficult-to-observe attributes [6,7].

This is not to say the authors have not executed the paper in good faith. However, when many papers are rejected for less than absolutely perfect identification and comprehensive fixed effects the issues I raise take on more importance. Remember, we are looking at something in the hydra-headed JF!

4. Some Checks on the Result

I now move on to my specific robustness checks. I first want to point out an ancillary issue. The replication code for Table III (jf replication.do) contains a line (#159): “winsor2 llog_total_release llog¬_total_release_emp , cuts(1 99) replace”

The paper and its internet appendix do not contain the phrases “winsor” or “winsorization.” Thus, the activity seems undisclosed, likely inadvertently. As far as I understand, it is incumbent on papers to disclose how they treat data, rather than have data treatment only be part of the code. However, I just want to mention this in passing, not dwell on it, except that all results below correspond to the winsorized data.

	Rated	Pension	Democratic	Env. Event	Pressure
		Holdings	HQ		Index
	(1)	(2)	(3)	(4)	(5)
Environmental Pressure	1.214***	0.720***	0.590**	1.897***	2.110***
	(0.303)	(0.269)	(0.278)	(0.506)	(0.593)
Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No
Firm Char	Yes	Yes	Yes	Yes	Yes
log(AT)	No	No	No	No	No
Observations	18,826	18,826	17,369	11,295	18,826
R ²	0.059	0.059	0.056	0.072	0.060
Panel B: Pollution Measure					

Table 1: Replication of Table III (OLS)

Next, in Table 1 of my note, I replicate their OLS results of Table III, which correspond exactly to the published version, so that is reassuring. I now move on to my new results. My first point is the role of firm size. Obviously, larger firms are more likely to be held by pension funds and more likely to be given an ESG rating. The table does not control for firm size. The importance of firm size as a fundamental determinant of economic and financial outcomes has long been recognized in the literature [6,7]

The table also does not control for firm fixed effects. Although it seems unduly harsh to penalize authors for not including more granular fixed effects than industry and time, plenty of papers are rejected for this reason. It seems reasonable to put publications through robustness checks for firm size and firm fixed effects.

Fixed-effects specifications are routinely employed to mitigate concerns regarding time-invariant omitted variables and unobserved heterogeneity [8].

In my Table 2, I include the logarithm of the firm’s total assets.2 I use book assets because one of the controls is Q, which already has market cap embedded. In Panel A, we find that the inclusion of size makes two of the five environmental pressure measures insignificant, and one of them (pension holdings) flips sign, contrary to the hypothesis. Note that the pressure index itself becomes insignificant. This table, if presented as is, would likely not find favor with reviewers at a so-called “A journal” even though it is an intuitive modification. Panel B indicates that the interaction of pressure index and pollution remains significant, although it is

debatable what the index means in light of Panel A, where it is not significant, and one of its components has the wrong sign.

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rejected for this reason. It seems reasonable to put publications through robustness checks for firm size and firm fixed effects. Fixed-effects specifications are routinely employed to mitigate concerns regarding time-invariant omitted variables and unobserved heterogeneity [8].

Panel A: Pressure Measure					
	Rated	Pension	Democratic	Env. Event	Pressure
		Holdings	HQ		Index
	(1)	(2)	(3)	(4)	(5)
Environmental Pressure	0.206 (0.290)	-0.437* (0.253)	0.380 (0.260)	1.065** (0.529)	0.105 (0.570)
Industry-Year FE	Yes	Yes	Yes	Yes	Yes Panel
Firm FE	No	No	No	No	No
Firm Char	Yes	Yes	Yes	Yes	Yes
log(AT)	Yes	Yes	Yes	Yes	Yes
Observations	18,826	18,826	17,369	11,295	18,826
R ²	0.067	0.067	0.064	0.075	0.067

B: Pollution Measure				
	Quantity	Quantity (Qtile)	Intensity	Intensity (Qtile)
	(1)	(2)	(3)	(4)
Pressure Index × Pollution	0.671*** (0.153)	2.532*** (0.608)	0.482** (0.230)	1.173** (0.591)
Pollution	-0.175** (0.078)	-0.592* (0.327)	-0.145 (0.119)	-0.353 (0.284)
Pressure Index	-3.368*** (1.243)	-3.396** (1.321)	1.334 (0.953)	0.167 (1.482)
Industry-Year FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No
Firm Char	Yes	Yes	Yes	Yes
log(AT)	Yes	Yes	Yes	Yes
Observations	12,084	12,084	11,742	11,742
R ²	0.079	0.080	0.078	0.078

Table 2: Table III + log(AT) (OLS)

In my Table 2, I include the logarithm of the firm's total assets. I use book assets because one of the controls is Q, which already has market cap embedded. In Panel A, we find that the inclusion of size makes two of the five environmental pressure measures insignificant, and one of them (pension holdings) flips sign, contrary to the hypothesis. Note that the pressure index itself becomes insignificant. This table, if presented as is, would likely not find favor with reviewers at a so-called "A journal" even though it is an intuitive modification. Panel B indicates that the interaction of pressure index and pollution remains significant, although it is debatable what the index means in light of Panel A, where it is not significant, and one of its components has the wrong sign.

We now move on to my next robustness check. Obviously, estimating a system with a binary dependent via OLS leads to meaningless predictions which may not be bounded in between the dependent range. The R² from these regressions also has

little meaning, since the fit is not linear. Finally, the errors from these regressions are clearly not homoskedastic. For this reason, empirical researchers frequently supplement linear probability models with nonlinear estimators such as logit or probit models that explicitly account for the binary nature of the dependent variable [9,10]. Yet, the paper does indeed use OLS on a dependent binary and reports R², with the only accounting for error being "clustered by firm."

Instead I account for the binary dependent by performing a maximum likelihood logit estimation, which is less objectionable. At the very least, this should be a valuable supplement to an OLS estimation for a binary dependent. Note that the logit estimation cannot estimate likelihoods for units that do not change over time, and hence the sample size shrinks. It is not clear these units contribute meaningfully to the phenomenon in question, and it is debatable whether they should be used, but be that as it may.

Panel A: Pressure Measure					
	Rated	Pension	Democratic	Env. Event	Pressure
		Holdings	HQ		Index
	(1)	(2)	(3)	(4)	(5)
Environmental Pressure	0.890***	0.252	-0.216	0.877	1.582**
	(0.342)	(0.235)	(0.572)	(0.601)	(0.619)
Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Firm Char	Yes	Yes	Yes	Yes	Yes
log(AT)	Yes	Yes	Yes	Yes	Yes
Observations	18,745	18,745	17,290	11,243	18,745
R^2	0.162	0.162	0.168	0.189	0.162

Panel B: Pollution Measure				
	Quantity	Quantity (Qtile)	Intensity	Intensity (Qtile)
	(1)	(2)	(3)	(4)
Pressure Index × Pollution	0.361**	1.282**	0.205	0.413
	(0.151)	(0.587)	(0.275)	(0.587)
Pollution	0.103	0.455	0.165	0.179
	(0.090)	(0.404)	(0.166)	(0.350)
Pressure Index	-1.348	-1.145	1.506	1.210
	(1.506)	(1.500)	(1.343)	(1.759)
Industry-Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Firm Char	Yes	Yes	Yes	Yes
log(AT)	Yes	Yes	Yes	Yes
Observations	11,978	11,978	11,641	11,641
R^2	0.185	0.185	0.187	0.187

Table 3: Table III + Firm FE + log(AT) (OLS)

Panel A: Pressure Measure					
	Rated	Pension	Democratic	Env. Event	Pressure
		Holdings	HQ		Index
	(1)	(2)	(3)	(4)	(5)
Environmental Pressure	0.743***	0.431***	0.340**	0.903***	1.132***
	(0.135)	(0.116)	(0.136)	(0.183)	(0.193)
Industry-Year FE (groups)	Yes	Yes	Yes	Yes	Yes
Firm FE (groups)	No	No	No	No	No
Year FE	—	—	—	—	—
Firm Char	Yes	Yes	Yes	Yes	Yes
log(AT)	No	No	No	No	No
Observations	10,073	10,073	9,063	5,088	10,073

Panel B: Pollution Measure

	Quantity	Quantity (Qtile)	Intensity	Intensity (Qtile)
	(1)	(2)	(3)	(4)
Pressure Index × Pollution	0.155*	0.314	0.053	0.107
	(0.081)	(0.263)	(0.109)	(0.246)
Pollution	0.079	0.355*	0.030	0.078
	(0.057)	(0.188)	(0.079)	(0.182)
Pressure Index	0.224	1.152	2.365***	2.296***
	(1.001)	(0.875)	(0.541)	(0.738)
Industry-Year FE (groups)	Yes	Yes	Yes	Yes
Firm FE (groups)	No	No	No	No
Year FE	—	—	—	—
Firm Char	Yes	Yes	Yes	Yes
log(AT)	No	No	No	No
Observations	6,271	6,271	6,085	6,085

Table 4: Logit Analog of Table III (Industry-Year FE)

The logit results appear in Table 4. Here, although the Panel A results all line up nicely, there is virtually no evidence in Panel B that firm-level pollution contributes to increased likelihood of a polluting plant's divestiture. Specifically, three of the four pollution measures fail in the interaction of pressure with pollution, and the fourth is barely significant.

Next, I add size, or log(assets), to the logit specification, and the results appear in Table 5. The pressure index is not significant in Panel A. More relevant, none of the interaction effects

(pressure×pollution) are significant in Panel B. Thus, based on the logit specification with firm size included, there is no evidence that firms with environmental pressures are more likely to divest polluting plants, nor is there evidence that polluting firms are more likely to do so.

Hence, the central phenomenon of the paper is not robustly evident in econometrically reasonable (even desirable) modifications to their procedure.

Panel A: Pressure Measure

	Rated	Pension	Democratic	Env. Event	Pressure
		Holdings	HQ		Index
	(1)	(2)	(3)	(4)	(5)
Environmental Pressure	0.377***	-0.086	0.175	0.397**	0.283
	(0.134)	(0.123)	(0.140)	(0.196)	(0.192)
Industry-Year FE (groups)	Yes	Yes	Yes	Yes	Yes
Firm FE (groups)	No	No	No	No	No
Year FE	—	—	—	—	—
Firm Char	Yes	Yes	Yes	Yes	Yes
log(AT)	Yes	Yes	Yes	Yes	Yes
Observations	10,073	10,073	9,063	5,088	10,073

Panel B: Pollution Measure

	Quantity	Quantity (Qtile)	Intensity	Intensity (Qtile)
	(1)	(2)	(3)	(4)
Pressure Index × Pollution	0.113	0.240	0.018	0.033
	(0.079)	(0.261)	(0.110)	(0.247)
Pollution	0.051	0.250	0.022	0.050
	(0.055)	(0.187)	(0.080)	(0.182)
Pressure Index	0.208	0.779	1.476***	1.468**
	(0.960)	(0.872)	(0.555)	(0.746)
Industry-Year FE (groups)	Yes	Yes	Yes	Yes
Firm FE (groups)	No	No	No	No
Year FE	—	—	—	—
Firm Char	Yes	Yes	Yes	Yes
log(AT)	Yes	Yes	Yes	Yes
Observations	6,271	6,271	6,085	6,085

Table 5: Logit + log(AT) (Industry-Year FE)

5. Conclusion

As we can see, I find that although the results of Duchin, Gao, and Xu survive in a few specifications, they are not consistently robust to intuitive robustness checks. Overall, no conclusion is possible that firms under environmental pressure are more likely to spin off polluting plants. In terms of execution, Table III of the paper, which contains the central result, does not include firm fixed effects, and does not include size as a control. Further, it estimates a binary dependent equation with OLS, without a robustness check that accounts for the nature of the dependent. The table also does not account for clearly heteroskedastic errors induced by the binary dependent. The aim of my paper is to account for these issues. I also point out the necessity of full disclosure concerning data treatment, rather than having others dig into the code to find such treatment, as winsorization in the code is not disclosed in the paper. However, I do not raise issues with the accuracy of the code, which fully replicates the results, as far as I can see.

Note that there are rarely settings in financial economics that allow clean identification, and requiring DiD or RDD in every paper seems unreasonable. This requirement would seem to preclude

many interesting phenomena from appearing in the literature. Further, demanding, in effect, a separate intercept for every firm (firm fixed effects) would seem to be unduly harsh and soak up many phenomena of interest. This may be the reason the authors were not required to incorporate these matters, but I am sure most of us know at least one case in which lack of treatment of these issues was used to reject the paper.

I do want to take this opportunity to state that the field of empirical corporate finance seems extremely murky to me. I have read many

reports and many papers, and the problem is that features like identification, fixed effects, error clustering, data treatment, and estimation methods vary dramatically across papers. More broadly, concerns regarding empirical reliability, specification sensitivity, and reproducibility have received increasing attention throughout financial economics [2,11]. Referees' diktats to incorporate such features (or rejection recommendations for lack thereof) also exhibit considerable cross-sectional variation with little to no editorial intervention. No systematic or consistent picture appears, whether we consider "top journals" or other.

I am confident that everyone involved means well, and people are doing the most constructive job they can. But what bothers me about this situation is that scholars seem rather bemused with the varying standards being applied across papers. Some papers appear to be allowed journal access with more variations from norms imposed on others. These aspects can lead to a loss of morale, a loss of standards, and a lack of trust. Hence, this is a call to be fair and reasonable when evaluating finance papers. Also, editors have a crucial role in ensuring justice, because only they see the entire flow of papers.

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