Limits to Private Climate Change Mitigation

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Sustainable investing to mitigate climate change

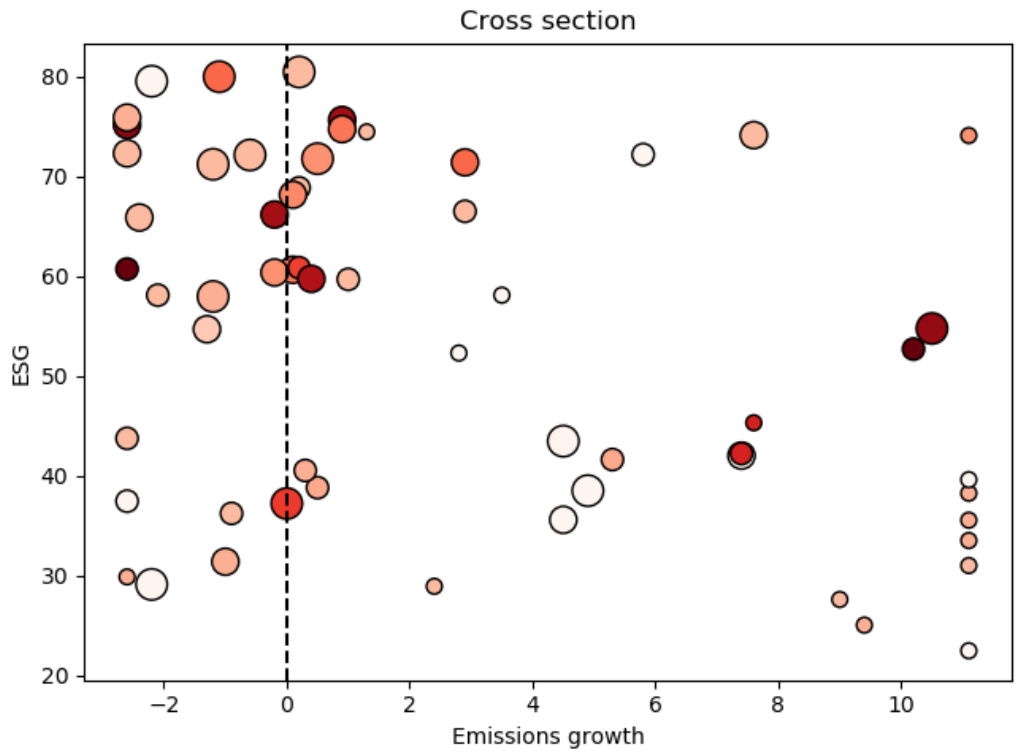
- Increasing urgency: *"Scientists tell us this decade, 2020 to 2030, must be the decade of action"* (John Kerry)
- 'First-best' policies like Pigouvian taxes face political constraints
- Many view sustainable investing as part of the way forward
  - *"[T]he creation of sustainable index investments has enabled a massive acceleration of capital towards companies better prepared to address climate risk"* (Larry Fink, 2021 letter to CEOs)
  - Sustainable funds in Europe accounted for 52 percent of net new flows in 2020 (Morningstar zeb ALFI 2021)
- Can sustainable investing (increasingly associated with 'ESG') meaningfully help mitigate climate change?

Can ESG investing shift production decisions?

- Sustainable investors could condition investment decisions on ESG scores, lowering cost of capital for 'good' firms
- For ESG investing to help, scores need to reflect changes in firms' contributions to climate change
- Approach motivated by high concentration of emissions
  - Just 96 'upstream' firms account for 70 percent of global stock of CO_2 emissions since 1850
  - We work with a panel of 52 firms with data on emissions and ESG accounting for a third of global emissions since 2002
  - We examine link between emissions and ESG scores for these firms

ESG scores unrelated to differences in emissions growth

Findings suggest limited scope for ESG investing to help



Literature

- Surveys on ESG investing: Matos (2020), Starks (2020), Cornell Damodaran (2020), IMF (2019)
- Empirical work drawing on firm-level emissions data
  - Data from US EPA: Naaraayanan Sachdeva Sharma (2020), Ivanov Kruttli Watugala (2020), Shive Forster (2020)
  - Voluntary disclosures to CDP: Ilhan Sautner Vilkov (2021), Bolton Kacperczyk (2020a, 2020b), Ioannou Li Serafeim (2016)
- Sustainable investing in theory: Oehmke Opp (2020), Green Roth (2021)
- Corporate governance: Berle (1930), Friedman (1970), Hart Zingales (2017), Broccardo Hart Zingales (2020), Zingales Kasperkevic Schechter (2020)

Emissions and ESG data

- Firm-level CO_2 emissions from Climate Accountability Institute
  - Annual data based on production, not voluntary disclosures
  - Covers 96 companies: 67 oil and gas producers, 25 coal producers
  - Covers Scope 1 and 3 (downstream) emissions

- Many investors aim to incorporate **E**nvironmental, **S**ocial, **G**overnance considerations
  - We obtain ESG data from Refinitiv, a prominent provider
  - Less disagreement on E (Gibson Krueger Schmidt 2021) ▸ Providers
  - Large emitters have high ESG and E scores (E scores calculated within industry) ▸ Large emitters

- Combined panel of 52 firms in 20 countries covers a third of global emissions from 2002-17

ESG scores and emissions growth: regression approach

- Regressions assessing link between ESG scores and emissions growth at the firm-year level

$$\Delta \ \text{ln(Emissions)}_{i,t} = \alpha_i + \alpha_t + \beta \, \text{Score}_{i,t} + \gamma X_{i,t} + \epsilon_{i,t}$$

  - Firm and year fixed effects
  - Standard errors double clustered at firm and year level

- X_{it}: vector of firm (e.g. size, leverage, revenue) and country (e.g. real GDP growth, inflation) controls

- Emissions and controls winsorized at 5th and 95th percentiles

Scores do not capture contributions to climate change

	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)
Overall ESG Score	-1.1**	-0.5	-0.5
	(0.39)	(0.45)	(0.55)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.13	0.19	0.34
Firm-years	683	683	683
Firms	52	52	52
Countries	20	20	20

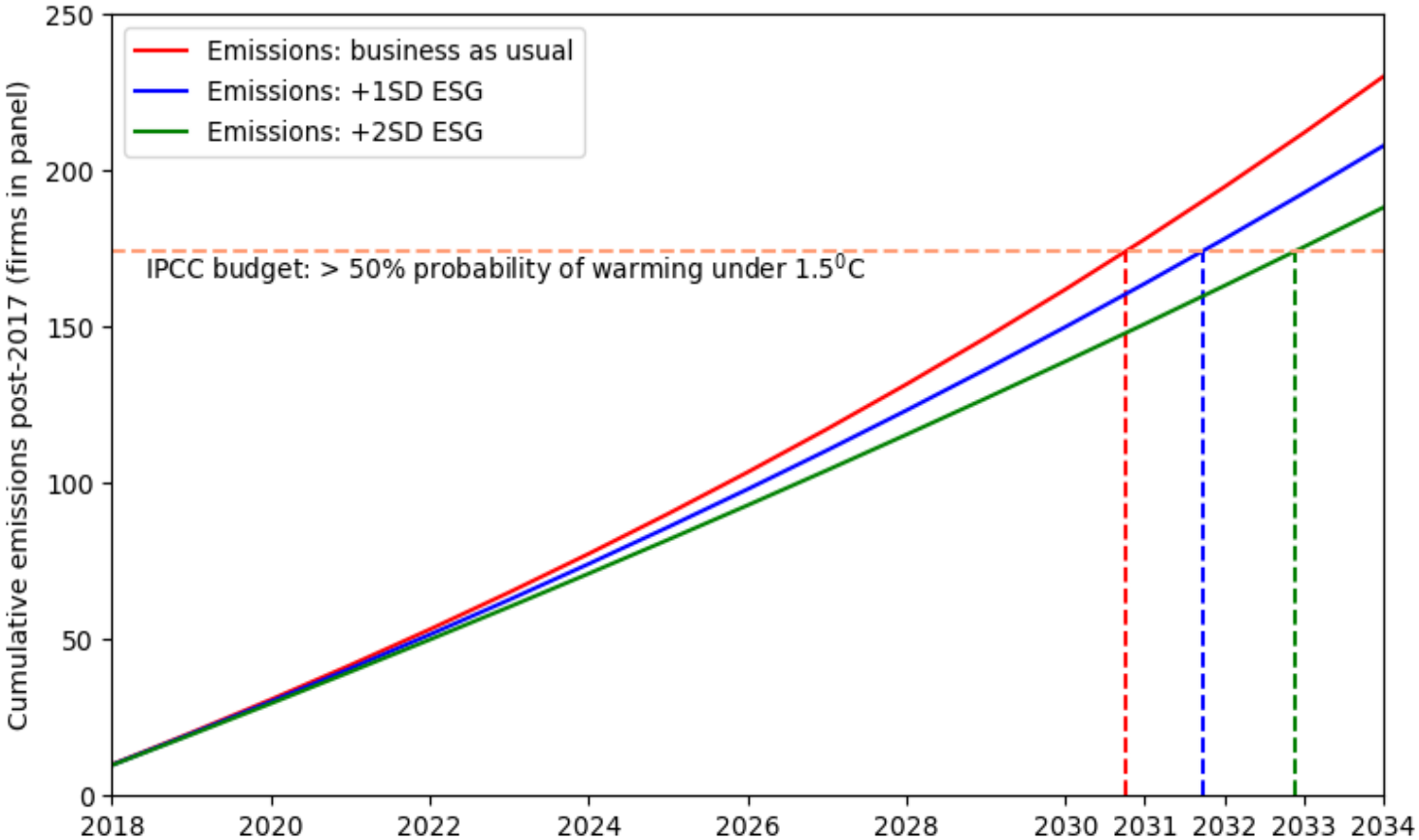
Note: ESG scores scaled to have unit variance; ln change in emissions multiplied by 100

Better E scores do not reflect lower emissions growth

	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)
Environment	0.3			
	(0.59)			
Emissions		0.5		
		(0.54)		
Resource Use			-0.1	
			(0.51)	
Env. Innovation				0.0
				(0.31)
Year fixed effects	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y
Country controls	Y	Y	Y	Y
R^2 (*within*)	0.34	0.34	0.34	0.34
Firm-years	683	683	683	683
Firms	52	52	52	52
Countries	20	20	20	20

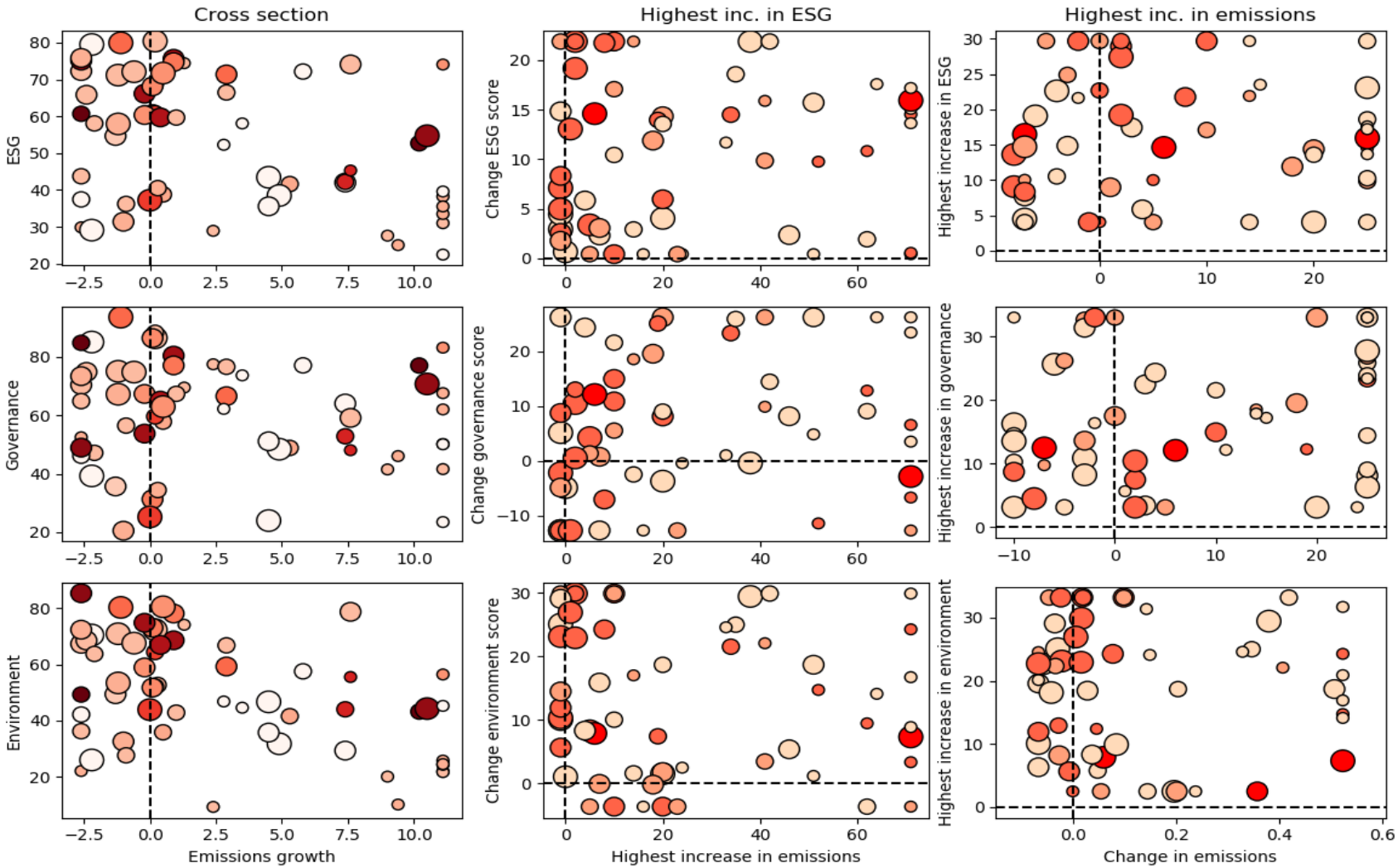
Note: ESG scores scaled to have unit variance; ln change in emissions multiplied by 100

Small magnitudes relative to scale of the problem



Note: Global carbon budget allocated proportionately to firms in panel

ESG scores and emissions growth: a visual assessment



Note: Largest increases are over four year periods

ESG scores reflect what firms say they do on climate

	Overall ESG Score	Environment
Attempt reduction in volatile organic compounds	0.56***	0.72***
	(0.12)	(0.11)
Recognize climate risks & opportunities	0.60***	0.52***
	(0.10)	(0.10)
Report environmental investments	0.41***	0.30**
	(0.11)	(0.12)
Report environmental partnerships	0.34***	0.37***
	(0.11)	(0.10)
Year fixed effects	Y	Y
Firm fixed effects	Y	Y
Firm controls	Y	Y
Country controls	Y	Y
R^2 (*within*)	0.89	0.88
Firm-years	683	683
Firms	52	52

Note: ESG scores scaled to have unit variance

Additional results and robustness

- ESG scores do not appear to improve over time ▸ Improvement over time
- Suggestive evidence that governance can help ▸ Governance
- Greater institutional ownership can help ▸ Ownership
- ESG scores are less informative for larger firms ▸ Firm size
- Robustness
  - Change in emissions intensity ▸ Emissions over revenue ▸ Emissions over assets
  - Emissions levels instead of growth ▸ Levels
  - Results with different timing ▸ Timing
  - Results without winsorizing ▸ Outliers

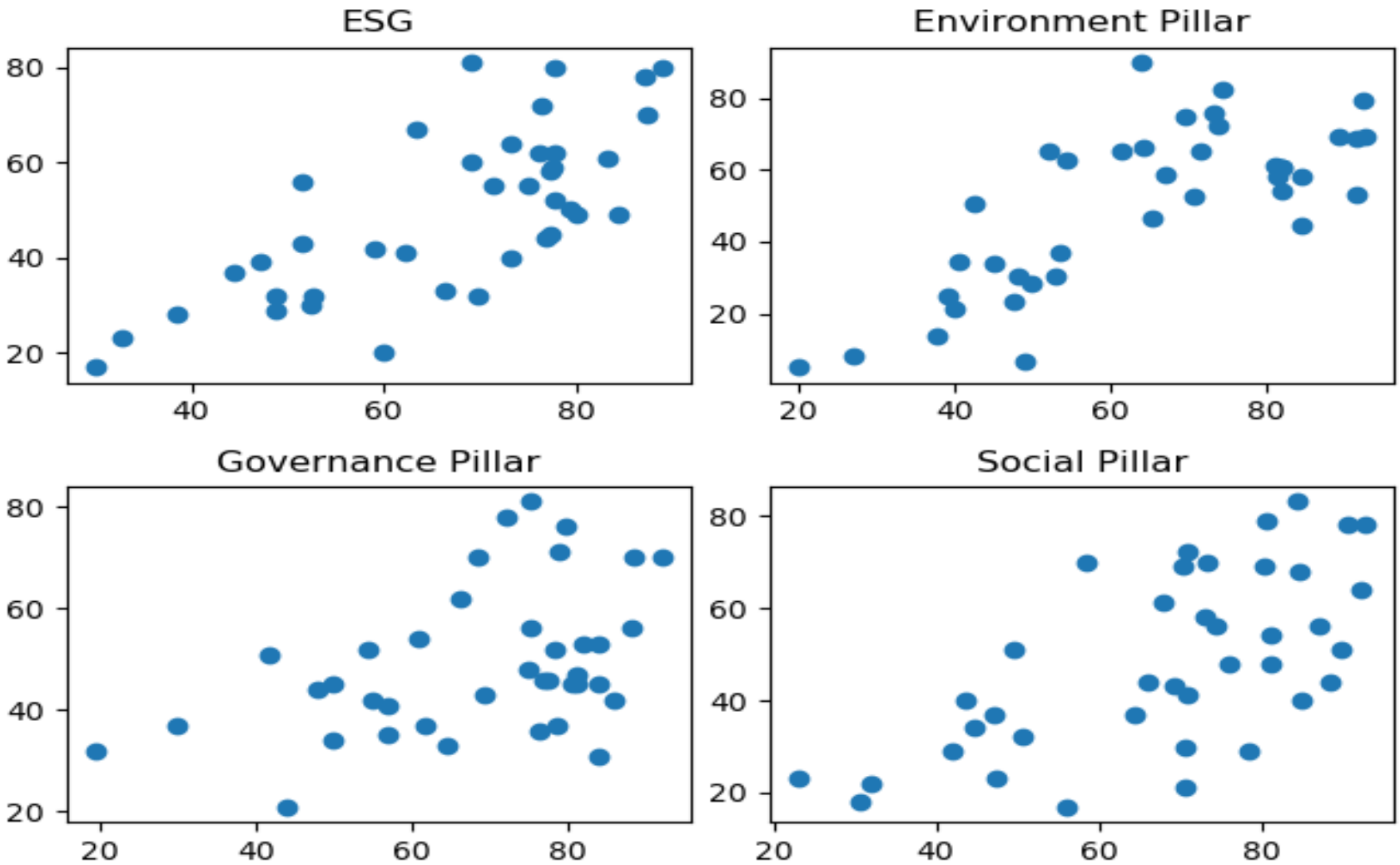
ESG investing: like a train on the wrong track

- Limited scope for sustainable investing conditioned (solely) on ESG to shift production incentives
  - Results could reflect issues with disclosure requirements, multidimensionality of ESG, scoring methodologies
  - Investors and policymakers (including central banks looking to manage carbon footprints) should use ESG with caution

- Approaches that could help shift the train in the right direction
  - Consistent standards and reporting requirements for all firms
  - Greater focus on measures that capture changes in firms' contributions to climate change
  - Continued efforts to build consensus for effective economy-wide policies like carbon pricing

Appendix

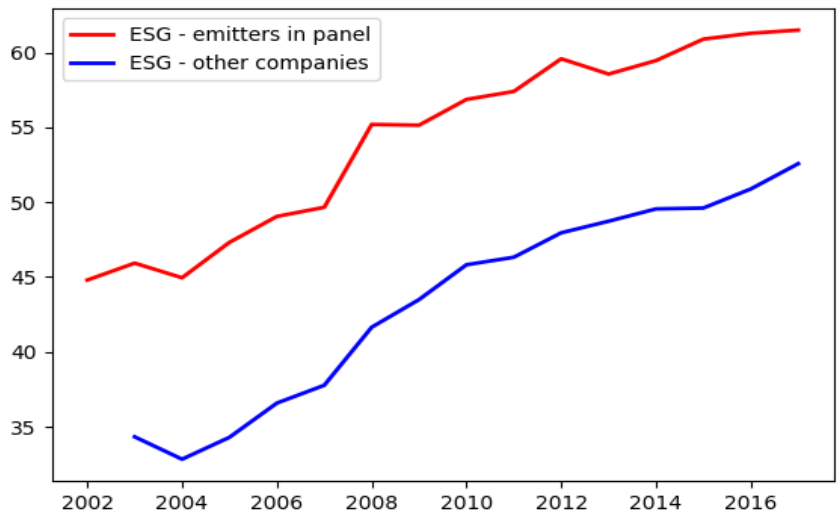
ESG providers disagree less about E

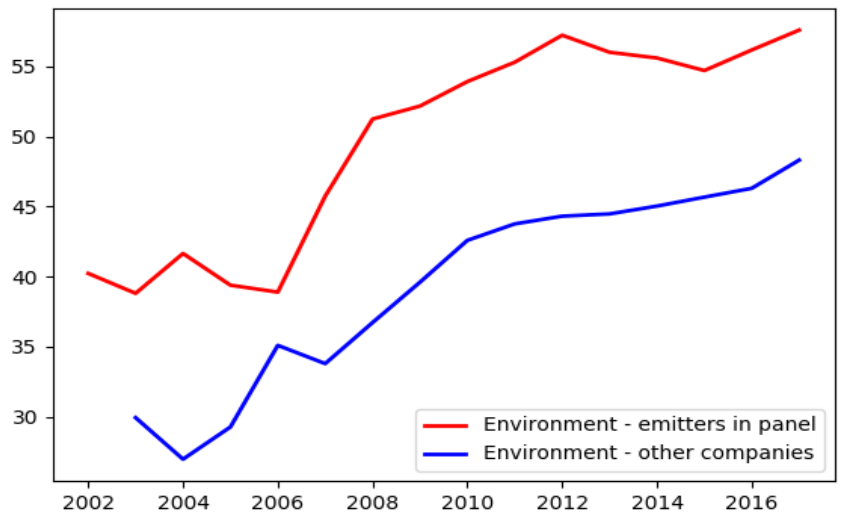


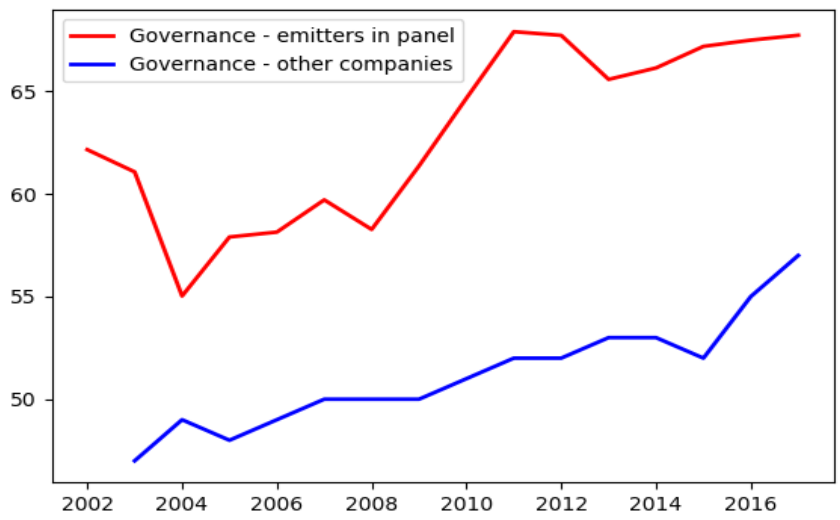
Note: Scores from Refinitiv shown on horizontal axis, and scores from S&P shown on vertical axis. Based on averages for a sample of 35 firms between 2013 and 2017

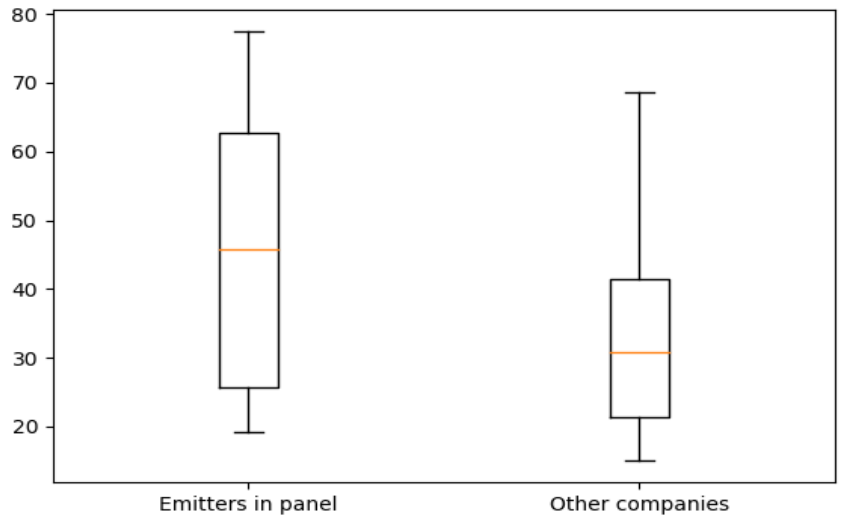
Data

Large emitters have higher ESG and Environment scores



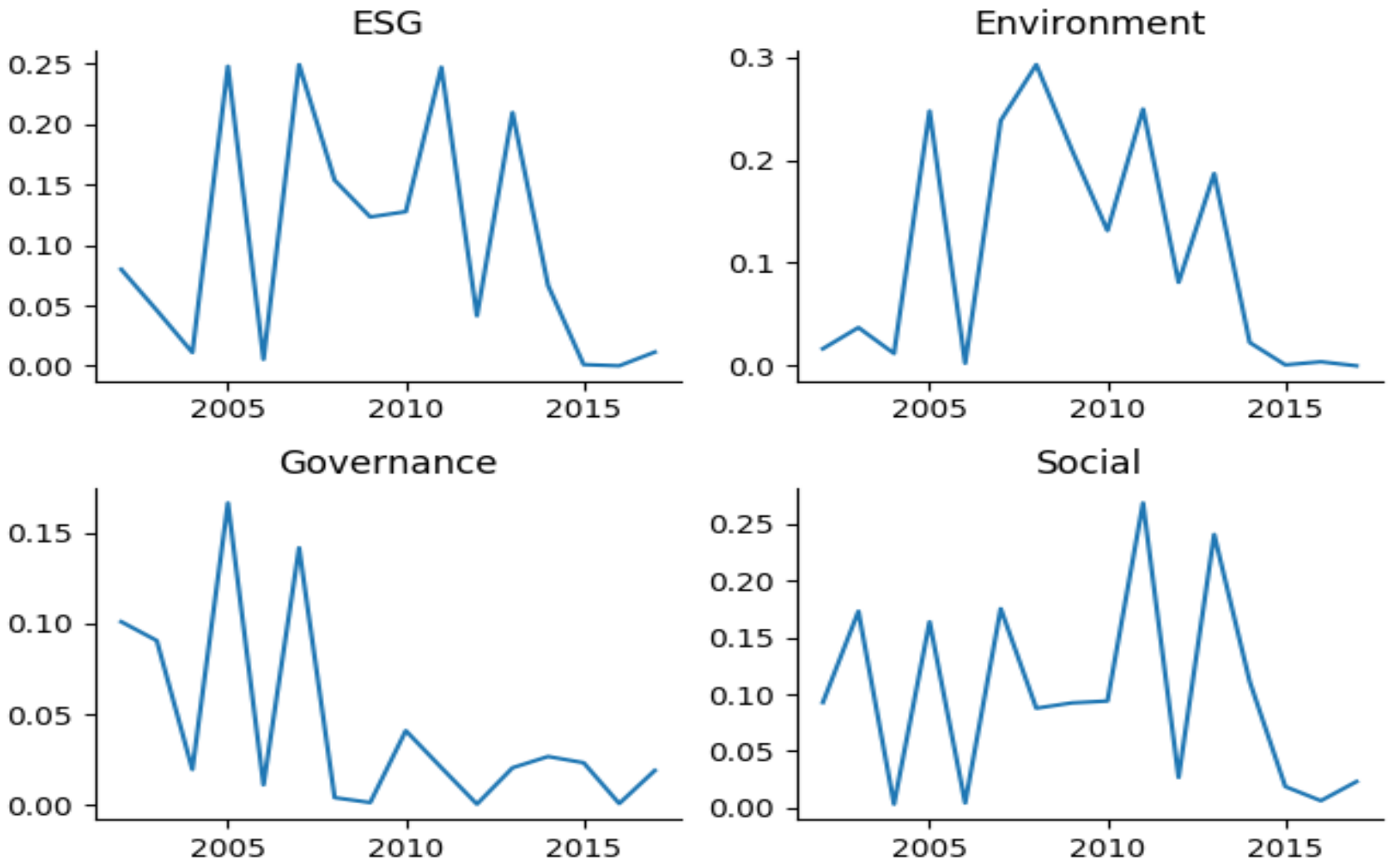






▸ Data

ESG scores do not appear to improve over time



Note: Figure shows R^2 from within-year univariate regressions

Robustness

Suggestive evidence that better governance might help

	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)
Governance	-0.8*			
	(0.44)			
Management		-0.7*		
		(0.39)		
CSR Strategy			-0.5	
			(0.37)	
Shareholders				-0.2
				(0.45)
Year fixed effects	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y
Firm controls	Y	Y	Y	Y
Country controls	Y	Y	Y	Y
R^2 (*within*)	0.35	0.35	0.34	0.34
Firm-years	683	683	683	683
Firms	52	52	52	52
Countries	20	20	20	20

▸ Robustness

Institutional ownership can help

	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)
Overall ESG Score	0.1	0.5	-0.3
	(0.51)	(0.91)	(0.80)
Inst ownership	0.9***	0.6*	0.1
	(0.26)	(0.34)	(0.45)
Overall ESG Score $\times$ Inst ownership	-0.2***	-0.1	-0.0
	(0.04)	(0.07)	(0.06)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.18	0.24	0.35
Firm-years	567	567	567
Firms	50	50	50
Countries	20	20	20

▸ Robustness

Relationship weaker for larger firms

	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)
Overall ESG Score	-10.4**	-9.1*	-5.0
	(3.77)	(4.29)	(4.59)
Log Lag Assets	-0.5	-1.7	-1.0
	(1.58)	(1.79)	(1.66)
Overall ESG Score $\times$ Log Lag Assets	0.4**	0.3*	0.2
	(0.14)	(0.17)	(0.18)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.16	0.22	0.36
Firm-years	602	602	602
Firms	52	52	52
Countries	20	20	20

▶ Robustness

Weak relationship with emissions intensity growth

Emissions scaled by revenue

	$\Delta(Em/Revenue)$	$\Delta(Em/Revenue)$	$\Delta(Em/Revenue)$
Overall ESG Score	0.0	0.0	0.3
	(0.51)	(0.85)	(1.19)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.51	0.53	0.55
Firm-years	683	683	683
Firms	52	52	52
Countries	20	20	20

▸ Robustness

Weak relationship with emissions scaled by assets

	$\Delta(Em/Assets)$	$\Delta(Em/Assets)$	$\Delta(Em/Assets)$
Overall ESG Score	-0.3 (0.48)	-0.7 (0.45)	-1.4 (1.05)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.24	0.27	0.33
Firm-years	683	683	683
Firms	52	52	52
Countries	20	20	20

▸ Robustness

Weak relationship with levels of emissions

	ln(Emissions)	ln(Emissions)	ln(Emissions)
Overall ESG Score	0.20**	0.11	0.03
	(0.08)	(0.08)	(0.04)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.44	0.75	0.95
Firm-years	683	683	683
Firms	52	52	52
Countries	20	20	20

▸ Robustness

Timing does not drive results

	Δ ln(Emissions)$_{t+1}$	Δ ln(Emissions)$_{t+1}$	Δ ln(Emissions)$_{t+1}$
Overall ESG Score	-1.1**	-0.4	-0.0
	(0.39)	(0.41)	(0.50)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.12	0.19	0.34
Firm-years	683	683	683
Firms	52	52	52
Countries	20	20	20

Timing does not drive results

	Δ ln(Emissions)$_{t+2}$	Δ ln(Emissions)$_{t+2}$	Δ ln(Emissions)$_{t+2}$
Overall ESG Score	-1.2***	-0.8*	-0.6
	(0.32)	(0.38)	(0.47)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.14	0.19	0.32
Firm-years	631	631	631
Firms	52	52	52
Countries	20	20	20

Timing does not drive results

	$\Delta\ ln(Emissions)_{t-1}$	$\Delta\ ln(Emissions)_{t-1}$	$\Delta\ ln(Emissions)_{t-1}$
Overall ESG Score	-1.1** (0.39)	-0.6 (0.45)	-0.4 (0.50)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.10	0.16	0.33
Firm-years	682	682	682
Firms	52	52	52
Countries	20	20	20

Timing does not drive results

	$\Delta\ ln(Emissions)_{t-2}$	$\Delta\ ln(Emissions)_{t-2}$	$\Delta\ ln(Emissions)_{t-2}$
Overall ESG Score	-1.0*	-0.1	0.7
	(0.55)	(0.67)	(0.98)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.06	0.11	0.22
Firm-years	681	681	681
Firms	52	52	52
Countries	20	20	20

▸ Robustness

Results hold without winsorizing

	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)	Δ *ln*(*Emissions*)
Overall ESG Score	-1.3*	-0.6	-0.6
	(0.59)	(0.53)	(0.90)
Year fixed effects	Y	Y	Y
Country fixed effects	N	Y	N
Firm fixed effects	N	N	Y
Firm controls	Y	Y	Y
Country controls	Y	Y	Y
R^2 (*within*)	0.08	0.15	0.26
Firm-years	683	683	683
Firms	52	52	52
Countries	20	20	20

▸ Robustness