

Counterproductive Sustainable Investing: The Impact Elasticity of Brown and Green Firms

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Based on research joint with Samuel Hartzmark (Boston College)

Sustainable investing in practice

Although there is significant heterogeneity across sustainable investing strategies...

The dominant strategy seeks a ***green transition***

- Reduce firm greenhouse gas emissions intensity
- While minimizing disruption to economic output

Simple implementation: Buy green (low-emissions) firms and divest/underweight brown (high emissions) firms

- Alternative strategies exist, such as engagement or targeted investments in green R&D, but represent a small % of the \$40 trillion invested in ESG/sustainability

Our critique is only about the dominant sustainable investing strategy in practice

Will sustainable investing achieve its green transition goal?

The mechanism: Sustainable investors hope to make firms more green by changing their cost of capital

- Direct capital toward green firms, lowering their cost of capital
- Direct capital away from brown firms, raising their cost of capital

What will happen if sustainable investing changes the cost of capital under the dominant strategy? Will it achieve its green transition goal?

Depends on *Impact Elasticity* $\equiv \frac{\Delta \text{ environmental impact}}{\Delta \text{ cost of capital}}$

of brown and green firms

A typical green firm

- Travelers Insurance
S&P 500 firm in insurance
- Emissions intensity:
1 ton per million revenue
- Cut emissions intensity
by ~40% (2019-21)
- Long term goals
 - Net-zero by 2030








A typical brown firm

- Martin Marietta Materials
S&P 500 firm in building materials
- Emissions intensity:
1,000 tons per million revenue
- Cut emissions intensity
by ~12% (2019-21)
- Long term goals: Modest, discusses
that moving to clean production is
costly up front



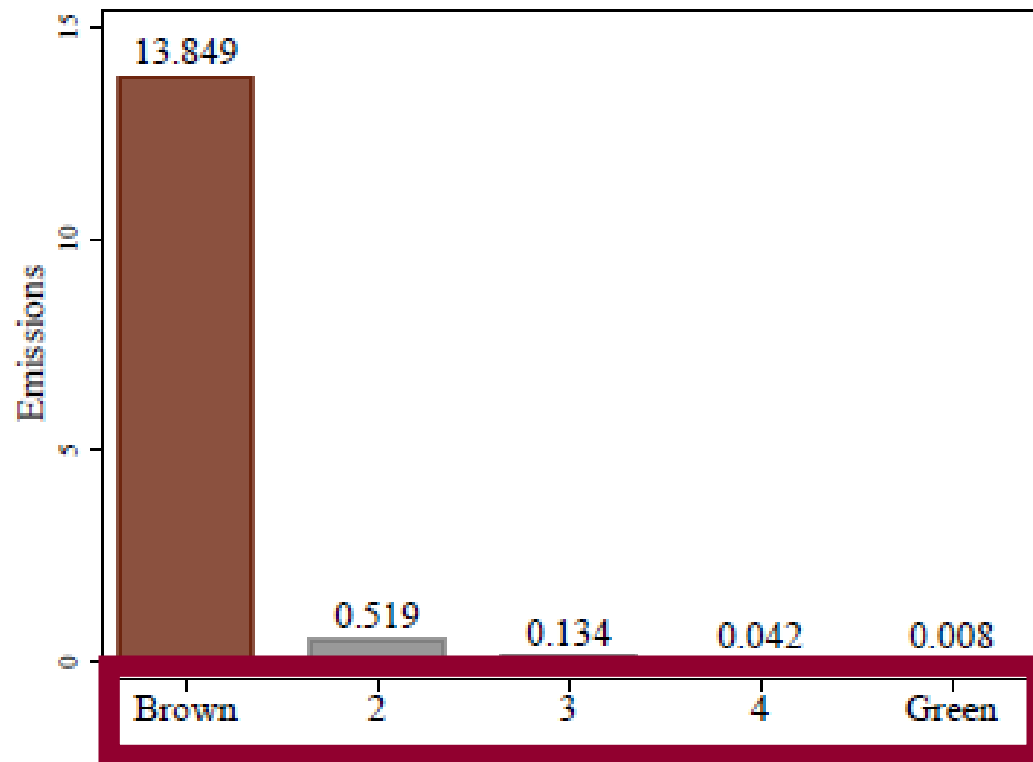
Dominant strategy: Buy and avoid

-  cannot get much more green or brown with cost of capital shifts
 - Decrease its cost of capital and invest more in what?
 - 100% reduction in emissions same as  cutting emissions by ~0.1%
 - No reason to think  could produce building materials at a lower emissions intensity or that it could meaningfully conduct green R&D
-  could become much more green or brown with cost of capital shifts
 - Cost of capital ↓: Invest in expensive green tech that pays off in the future
 - Cost of capital ↑: More short-termist, cut corners or double down on existing brown production to get cash now
 - Reversing recent reduction in emissions → increase ~30 times  level

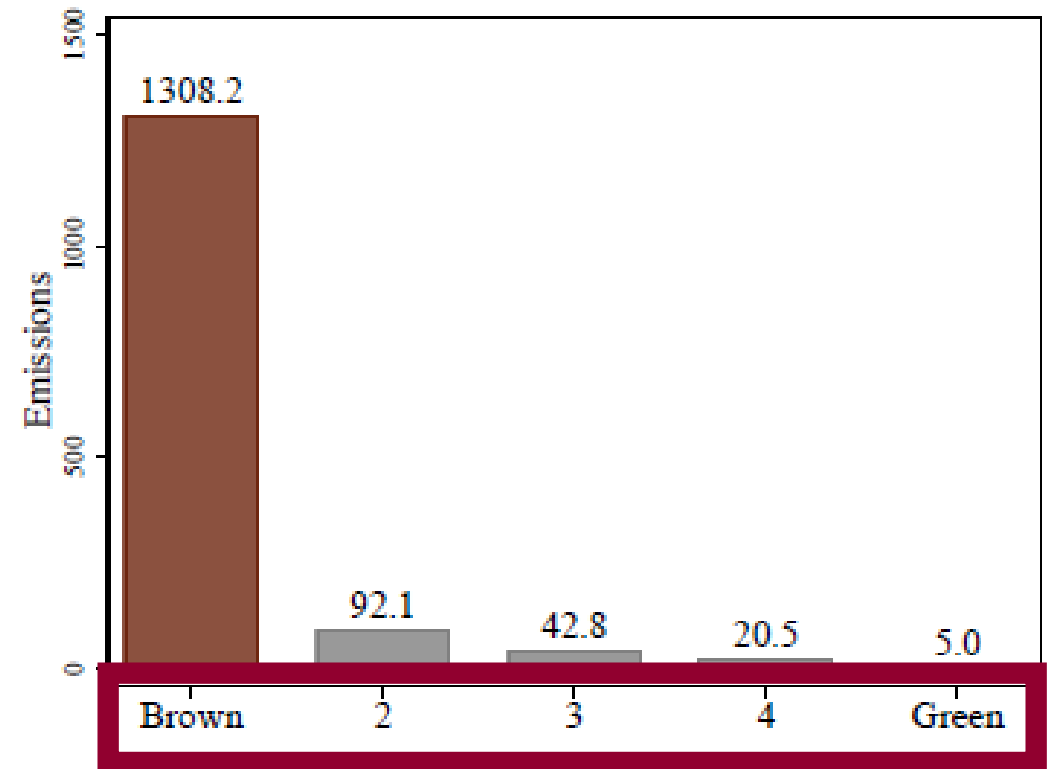
Emissions

Brown: Quintile 1, Neutral: Quintiles 2-4, Green: Quintile 5

(a) Total emissions



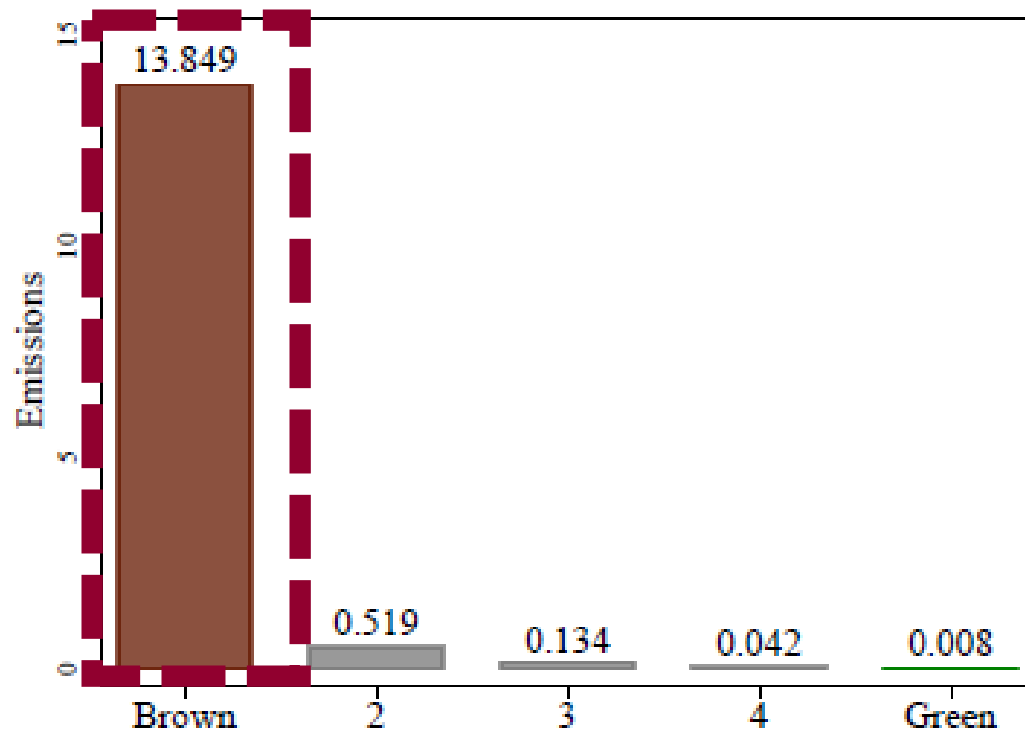
(b) Emissions intensity (emissions/revenue)



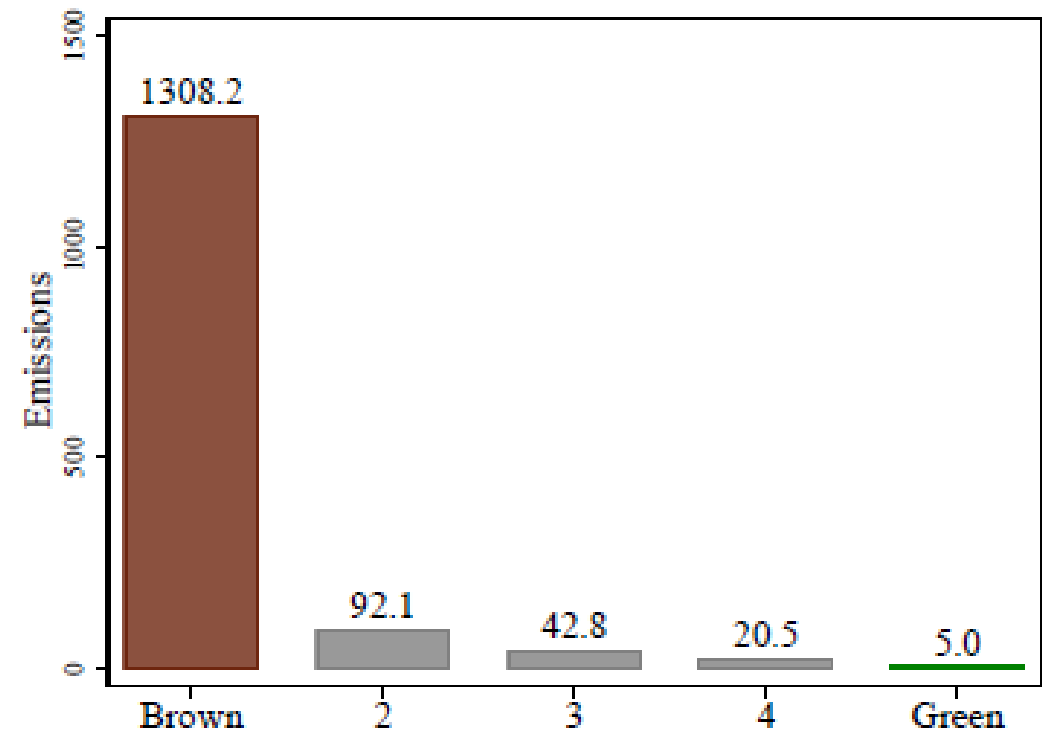
Emissions

Brown firms have ~1,700 times the total emissions of green firms

(a) Total emissions



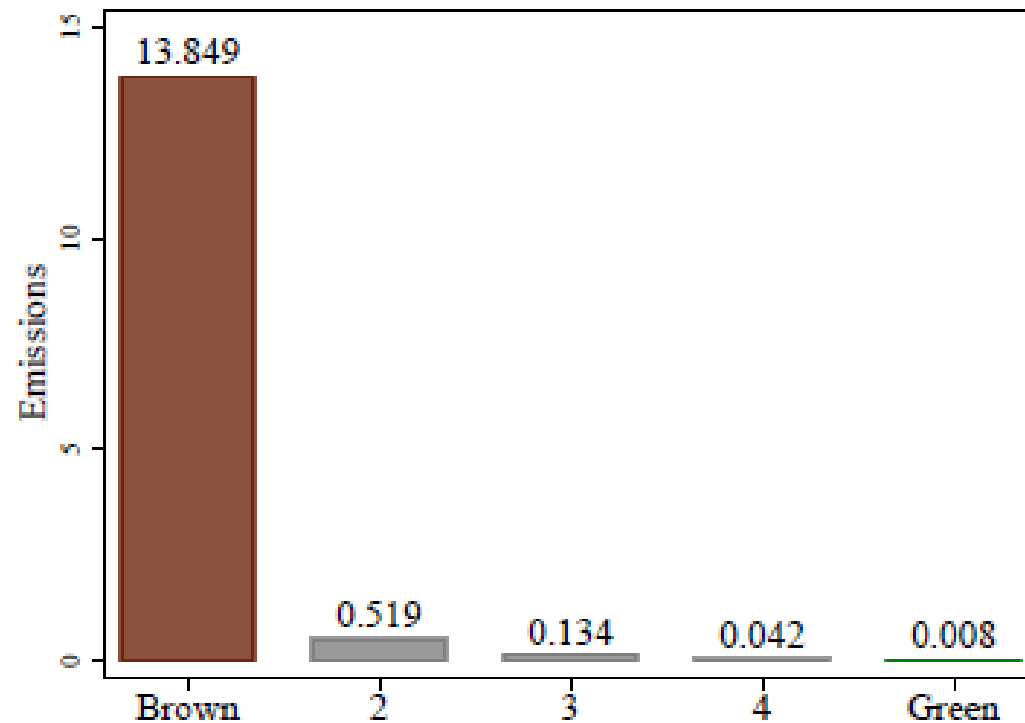
(b) Emissions intensity (emissions/revenue)



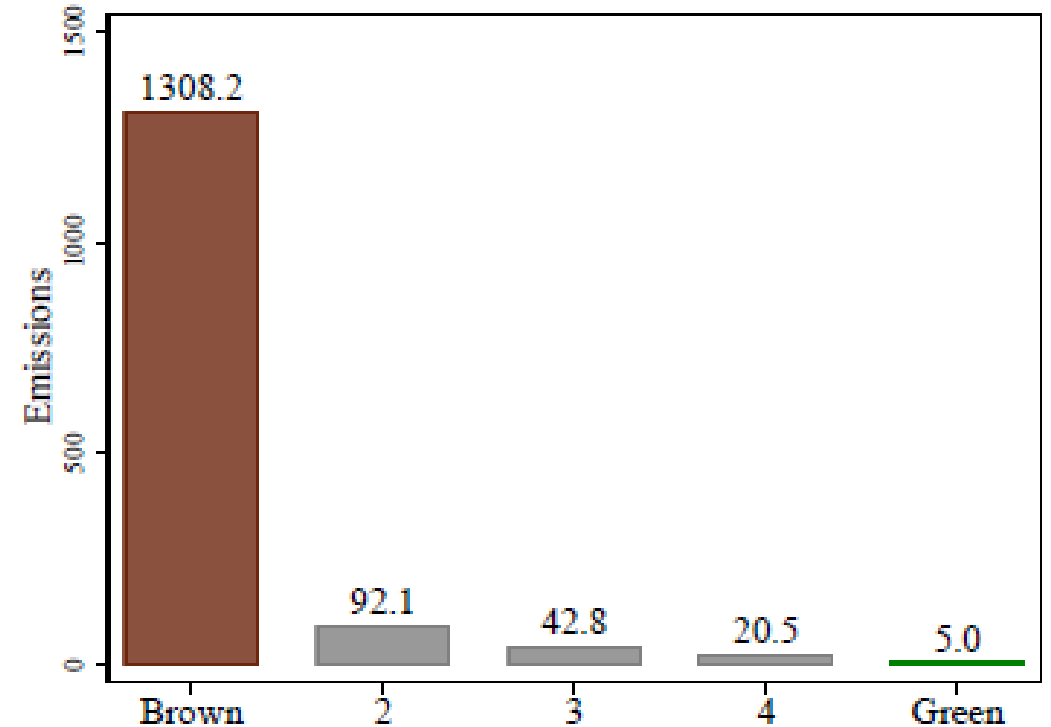
Emissions

Is this just due to differences in firm size?

(a) Total emissions



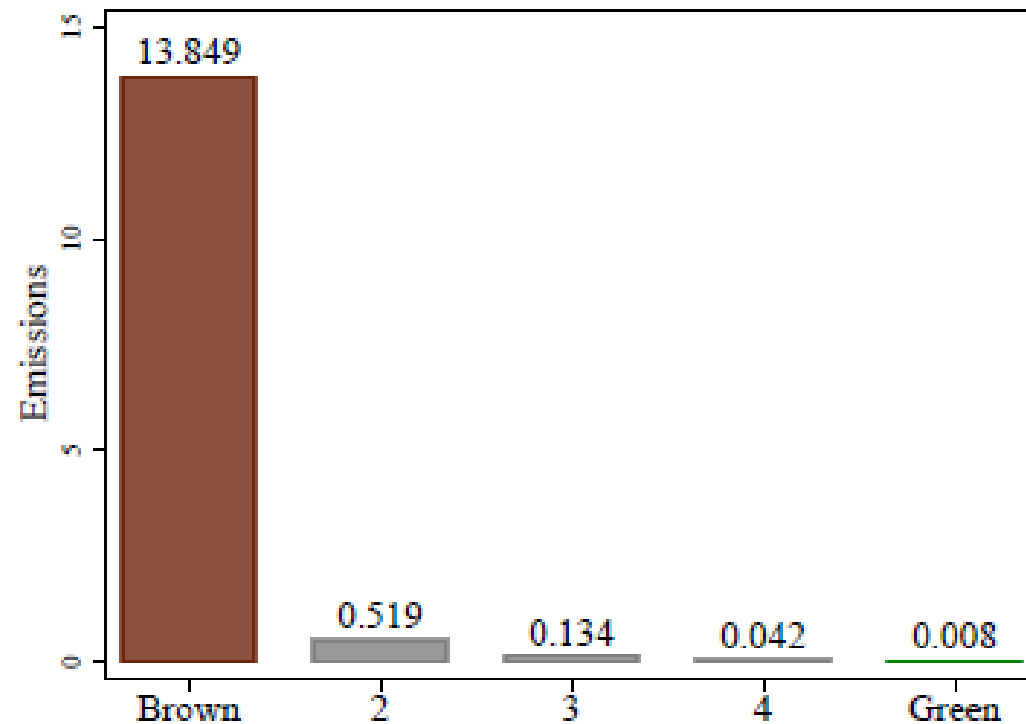
(b) Emissions intensity (emissions/revenue)



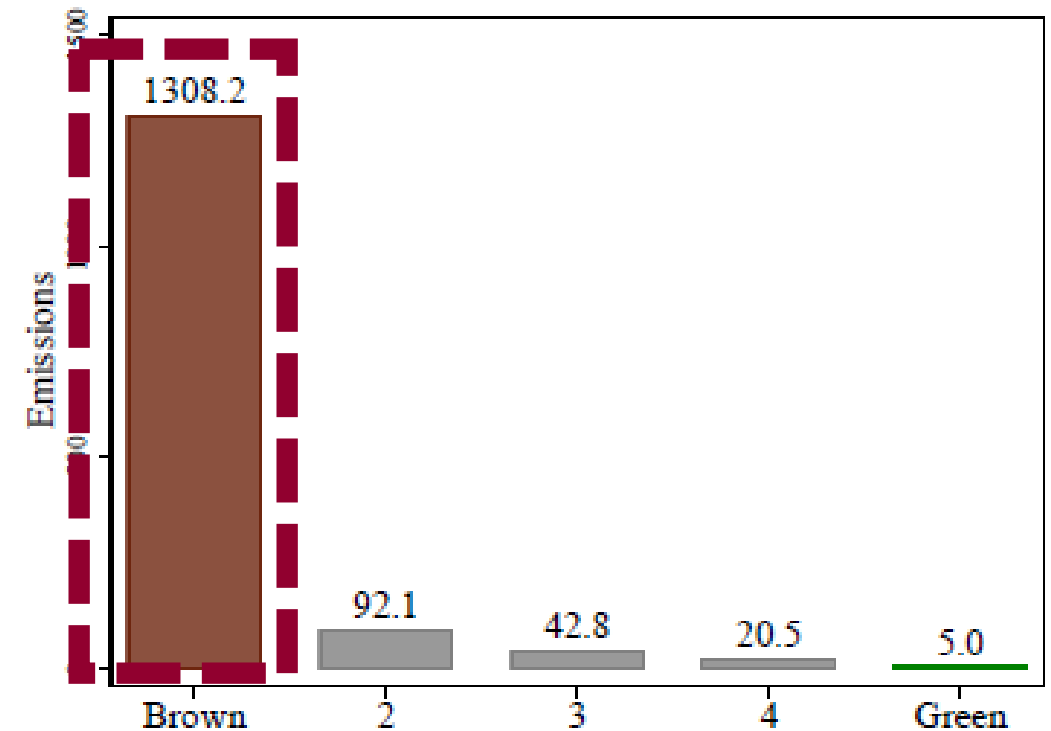
Emissions

No, brown firms have 261 times the emissions intensity of green firms

(a) Total emissions



(b) Emissions intensity (emissions/revenue)



Measuring the impact elasticity

$$\textit{Impact Elasticity} \equiv \frac{\Delta \text{ environmental impact}}{\Delta \text{ cost of capital}}$$

- Examine how firm emissions intensity responds to shocks to their cost of capital using data across 3000 firms over the past 20 years
 - Exogenous shocks to cost of capital using variation in dividend demand
 - Financial distress shocks to highly leveraged firms
- **Green** firm impact elasticity ≈ 0
- **Brown** firm impact elasticity < 0
pollute more per unit output when cost of capital \uparrow

Detailed estimates available: <https://sites.google.com/site/kellyshue/>

Why do brown and green firms have different impact elasticities?

Brown firms can choose between two types of projects

1. Continue brown production, cut corners on abatement (cash now)
2. New green production (higher up-front cost, backloaded cash flows)

↑ cost of capital = ↑ discount rate: Short term cash flows look more attractive, favoring Option 1 → negative impact elasticity

Contradiction: Sustainable investors want brown firms to care more about the future, but raising their discount rates makes brown firms care less about the future

Green firms operate in a line of business (e.g. insurance) where they cannot generate large environmental externalities regardless of which investments are chosen

Additional incentive effects?

Indirect incentive effects? What if brown firms choose to become more green to access a lower cost of capital or higher share price from sustainable investors in the future?

- Promising in theory!
- Using data on the aggregated holdings of sustainable investing funds, we show that sustainable investors have offered very weak financial incentives
 - They reward already green firms for large %, but environmentally meaningless reductions in emissions



Europe's Climate Leaders 2022

Company	Country	Sector	Reduction of core emissions intensity (Scope 1 and 2) YoY 2015-20 [1]	Core emissions intensity (GHGs in tonnes per €mn revenue) [2]	Core emissions in tonnes (CO2 equivalent) [2]	Total reduction of core emissions 2015-20 [3]	Scope 3 emissions reported? [4]	CDP rating [5]	Participation in Science Based Targets initiative (SBTi) [6]
Logitech International	Switzerland	Technology & Electronics	46.8%	0.4	1,889	88.9%	yes	-	Committed
CAP	Italy	Energy & Utilities	45.2%	14.2	3,365	95.1%	yes	-	-
ICA Gruppen	Sweden	Retail & Ecommerce	42.4%	1.5	19,394	92.1%	yes	Not scored (F)	Targets set, well below 2°C
Rosenberger	Germany	Technology & Electronics	42.3%	0.4	554	89.6%	no	-	-
Vaisala	Finland	Technology & Electronics	41.3%	1.1	431	91.7%	yes	B	-
SEGRO	UK	Property	39.5%	7.2	3,489	86.0%	yes	B	Targets set, 1.5°C
Sopra Steria	France	Consulting & Professional Services	39.4%	1.1	4,842	72.9%	yes	A	Targets set, 1.5°C



Focus on % reductions is a proportional thinking error (Kahneman 1981, Shue and Townsend 2021)

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Exclusion criteria is at the company level



Find out if you're invested in 200 of the largest owners of carbon reserves

Shrinking brown firms and a green transition

The dominant strategy causes brown firms to increase emissions *per unit output*

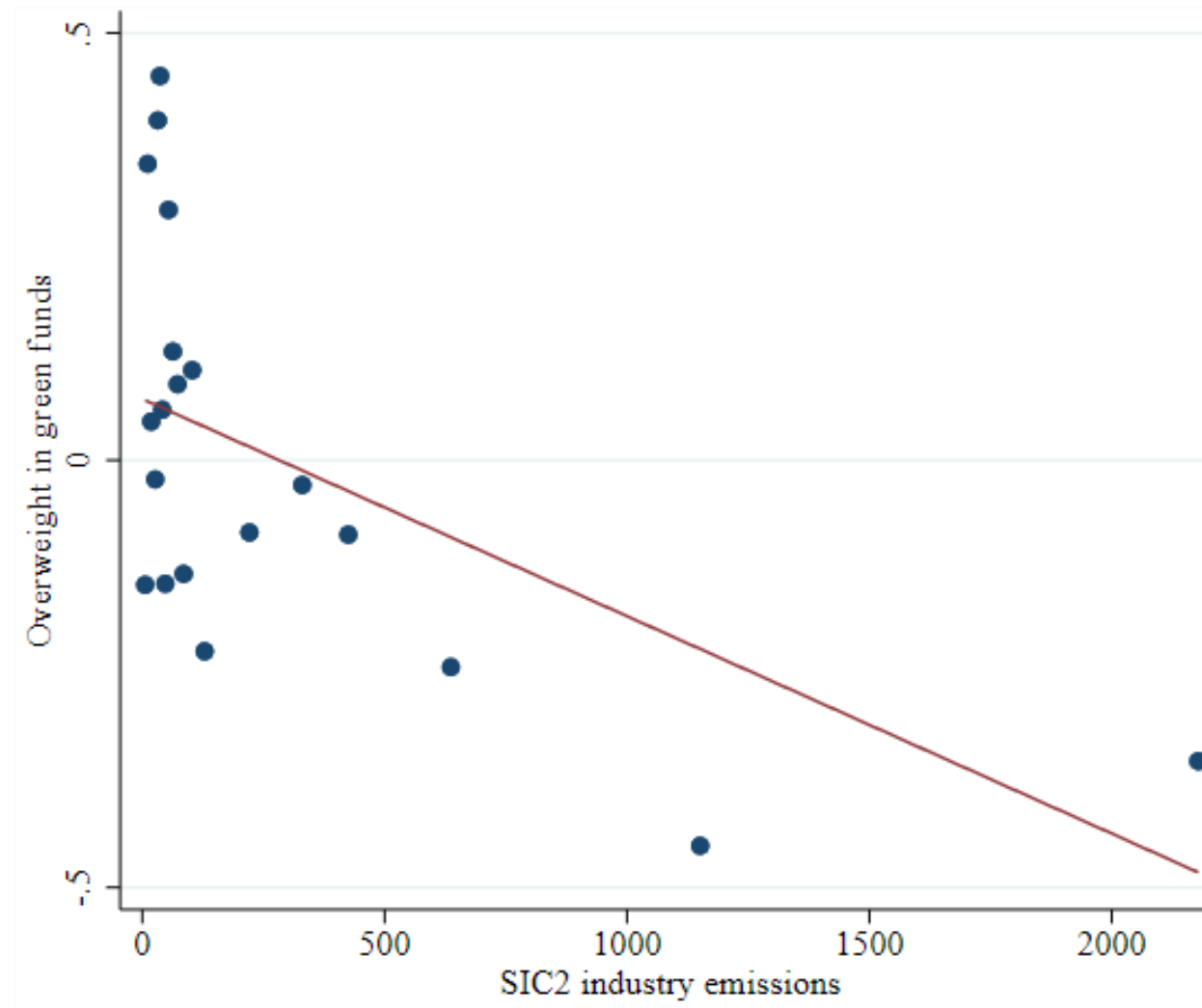
- But a large increase in financing costs will kill firms and reduce absolute emissions

Problem: Hard to substitute from agriculture, energy, transportation, and building materials (brown) to insurance, health care and financial services (green)

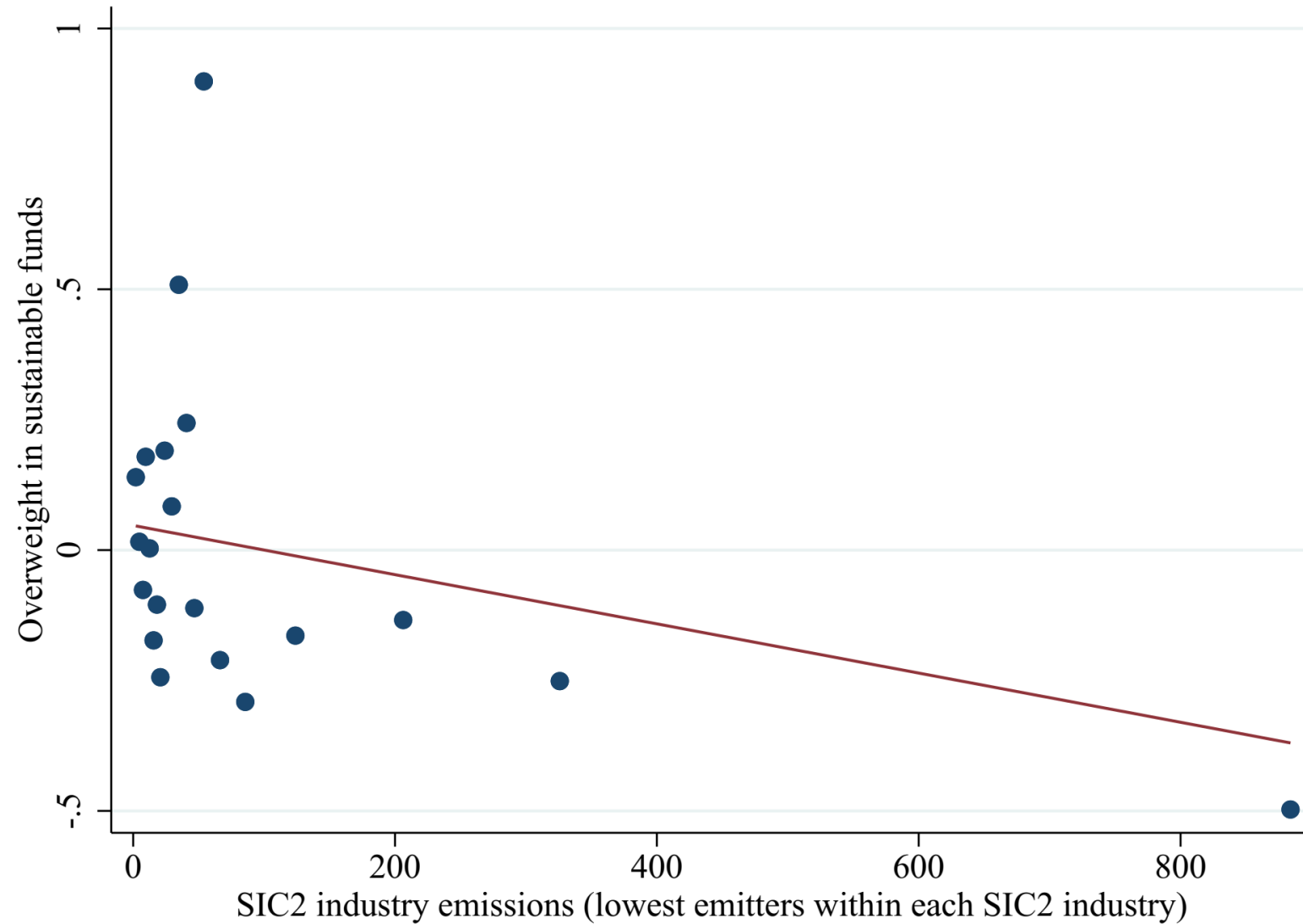
Example goal: Decrease emissions intensity and still feed people

- Invest in relatively green or transitioning (in levels, not %) agriculture firms
- Relatively green agriculture is still brown compared to insurance firms
- Should not underweight agriculture as a whole
- Reality: Sustainable investors underweight entire agriculture industry ~80%
- Some funds “sector-adjust” but agriculture and drugstores are in the same sector

Green fund allocations by SIC2 industry



Using only the greenest 20% of firms within each SIC2



Conclusion

Dominant sustainable investing strategy may be counterproductive

- Brown firms becomes more brown, green firms cannot become more green
- Sustainable investors mistakenly reward green firms for large % reductions in emissions

Not a critique of all sustainable investing strategies

- Dominant strategy seems motivated by naïve desire to reward good and punish bad firms
- Investor flows and engagement should target brown firms
- Portfolios should overweight (or not underweight) brown industries, and reward the relatively green or transitioning firms within brown industries

What about investors who just want to hedge carbon transition risk?

- Demand higher returns for risky brown firms → Brown becomes more brown
- Mitigating ESG risk in your portfolio will not encourage firms to transition to green

Has sustainable investing changed the cost of capital?

- **No, offsetting flows:** Teoh et al. (1999), Berk and van Binsbergen (2021)
- **Yes, by 1-3%+ :** Chava (2014), van der Beck (2021), Kacperczyk and Pedro (2022), Pastor et al. (2022), Green and Vallee (2022), Gormsen et al. (2023)

Regardless, with \$40 trillion invested and growing, important to know what would happen if sustainable investing succeeds in changing the cost of capital

Suppose you could push a button to change brown firms' cost of capital: Do you want the cost of capital to go up?