Are Green Funds for Real?

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Research Questions

Do mutual funds make investment decisions based on the environmental content of earnings conference calls?

Should they? Can mutual funds better decarbonize their portfolio by investing on environmental talk?

In a nutshell

Using an **unsupervised machine learning algo**, we extract the percentage of each **earning conference call** dedicated to talking about the climate transition, and then look at how **green mutual funds** respond to it. We find that:

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2. Green funds select stocks based on whether they communicate about the climate transition.
   - Firms that start talking about the climate transition do not initially have higher levels of green ownership than matched firms.
   - However, their green ownership **grows twice as much**.

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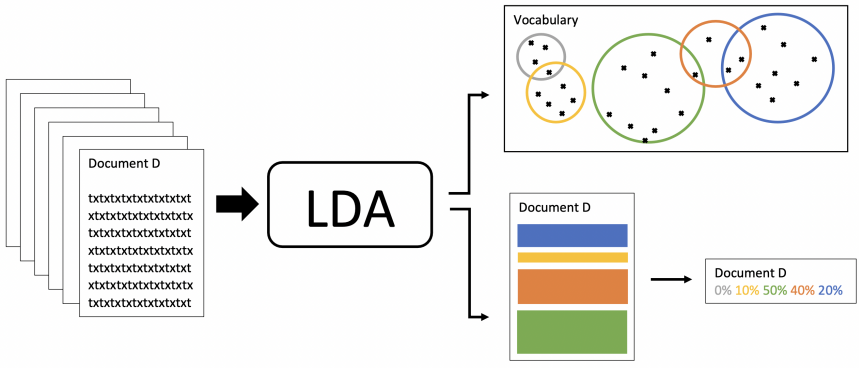
   - However, their green ownership **grows twice as much**.

3. Firms that talk about climate transition increment their emissions by 3.4%, almost half of the market's 6.7%.

Latent Dirichlet Allocation (LDA)

- LDA is a natural language processing tool designed to uncover the hidden thematic structure behind a corpus of documents.
  - A document is represented by a probability distribution over K topics.
  - A topic is characterized by a probability distribution over V terms.



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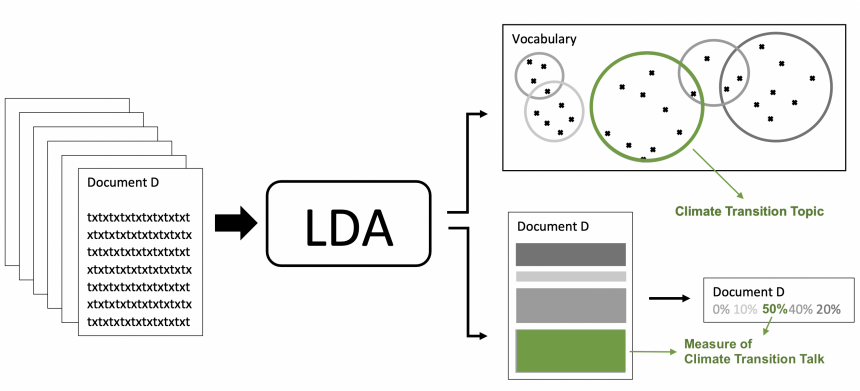


Examples

Why LDA?

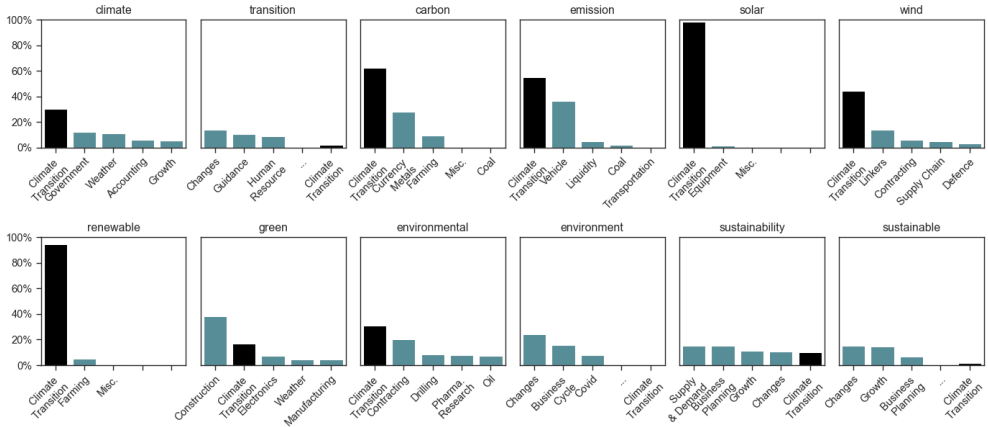
- LDA is a **dimensionality-reduction** technique.
  - Topics are easy to interpret.
  - Documents are easy to classify.

- LDA is an **unsupervised** machine learning algorithm.
  - It is agnostic.
  - The topics is not predefined but inferred directly from the data.

- LDA better **captures human discourse**.
  - Words can belong to multiple topics.
  - Each word has a relative importance within each topic.

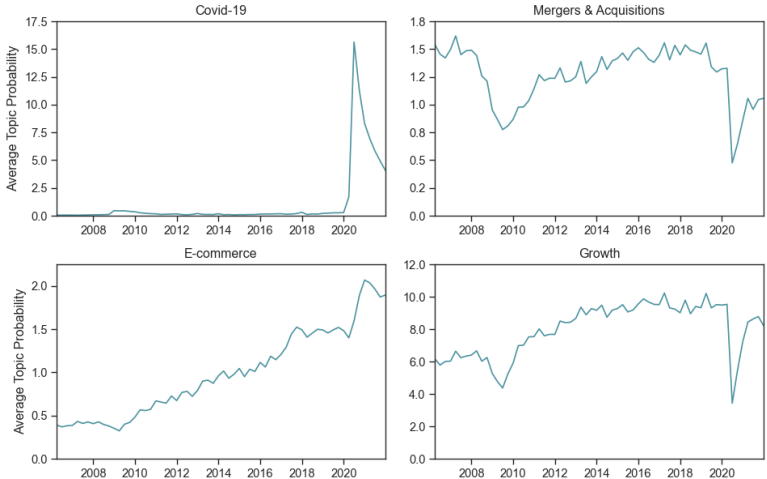
$\rightarrow$ **Note that we manually labeled the climate transition topic.**

Climate-Themed Words and the Climate Transition Topic



Summary by Industry

Other Topics in LDA



Identifying Green Funds

Fund Name	Universe	Geo. Focus	Objective
Fidelity Funds American Growth	Mutual Fund	USA	The fund aims to achieve long-term capital growth, principally through a focused portfolio invested in companies having their head office or exercising a predominant part of their activity in the US. A minimum of 50% of the funds net assets will be invested in securities deemed to maintain sustainable characteristics. Environmental characteristics include but are not limited to climate change mitigation and adaptation, water and waste management, biodiversity, while social characteristics include but are not limited to product safety, supply chain, health and safety and human rights.

Funds Summary Statistics

Fund Ownership and Climate Transition Talk

Do green mutual funds exhibit preferences for firms that express themselves about the climate transition?

$$FO_{it} = \beta_0 + \beta_1 CTT_{it} + \beta_2 \text{E-Score}_{it} + \beta_3 X_{it} + \gamma_{s_i t} + \varepsilon_{it}, \quad (1)$$

- FO : Aggregate fund ownership in percentage point (FO^G, FO^{NG}, FO^{Total})
- CTT : Climate transition talk as measured during the latest call
- E-Score : Refinitiv's environment score
- X : Financial control variables
- γ : Industry-quarter fixed effects

Fund Ownership and Climate Transition Talk

	(1) FO^G	(2) FO^G	(3) FO^{Total}	(4) FO^{NG}	(5) FO^G	(6) FO^G	(7) FO^G	(8) FO^G
CTT	0.1116***	0.1127***	-0.2274	-0.3819**			0.1117***	0.1087***
	(9.3927)	(6.4104)	(-1.4292)	(-2.3568)			(4.7726)	(6.1636)
I^{CT}					0.2806***			
					(4.7716)			
CTT^{Pres}						0.0581***		
						(5.2349)		
CTT^{QA}						0.0602***		
						(4.0472)		
E-Score		0.0806***	-1.3966***	-1.4967***	0.0850***	0.0802***	0.0519***	0.1598***
		(4.9576)	(-5.0938)	(-5.5390)	(4.9558)	(4.9340)	(3.3585)	(6.0101)
Time Period	2006-2021	2006-2021	2006-2021	2006-2021	2006-2021	2006-2021	2006-2018	2019-2021
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	102,621	49,014	49,014	49,014	49,014	49,014	31,570	17,444
No. Firms	3,957	2,222	2,222	2,222	2,222	2,222	1,859	1,902
Adj. R-Squared	0.2053	0.1915	0.1768	0.1713	0.1638	0.1918	0.1243	0.2450

The average firm that talks about climate transition has a 17% higher percentage of green ownership (i.e., 44 basis points vs 0.26% of the sample mean green ownership).

Chicken-Egg problem? We look at the first time they talk!

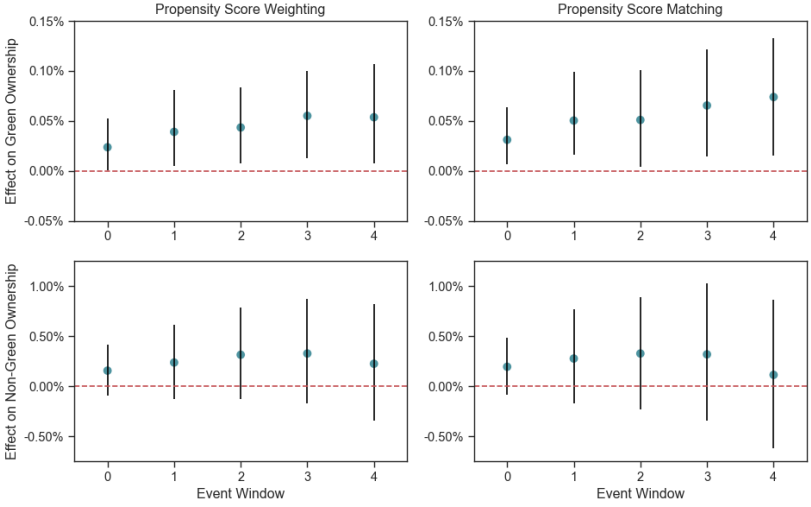
First instances of climate transition talk: We focus on 401 "events" during which a firm discusses the climate transition for the first time.

Matching techniques: We build our control group following Imai, Kim, and Wang (2019).

- Step 1: Exact match on time period and industry, and must not talk about the climate transition in the past and next 2 years.
- Step 2: Propensity scores using environmental and financial covariates.

Difference-in-Difference Estimators

parallel trend



One-Year Percentage Change in Carbon Emissions, ΔCE

	All	CI Top 75%	CI Bottom 25%	Bottom-Top
All	6.69%***	8.04%***	2.56%***	-5.48%***
	(4.38)	(4.54)	(1.91)	(-3.37)
No Talk	7.38%***	8.67%***	1.73%	-6.94%**
	(3.95)	(4.24)	(0.85)	(-2.88)
Talk	3.44%***	3.29%***	3.20%**	-0.09%
	(3.51)	(3.11)	(2.64)	(-0.07)
Talk-No Talk	-3.95%***	-5.38%**	1.46%	
	(-2.01)	(-2.21)	(0.65)	

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Green funds and firms expressing clear environmental objectives do not systematically engage in greenwashing.

Our findings highlight the *need* to **regulate and standardize firms' disclosure**, in the spirit of the United Nations Task Force on Climate-Related Financial Disclosures.

Going forward, firms might be tempted to abuse this communication channel to attract investors and reduce their cost of capital (Pástor et al., 2021) .

Thank You

References I

Imai, Kosuke, In Song Kim, and Erik H Wang, 2019, Matching methods for causal inference with time-series cross-sectional data, *American Journal of Political Science* .

Pástor, L'uboš, Robert F Stambaugh, and Lucian A Taylor, 2021, Sustainable investing in equilibrium, *Journal of Financial Economics* 142, 550–571.

Firms Summary Statistics

	Count	Mean	STD	25%	50%	75%	95%
CTT	113,805	0.42	1.70	0.00	0.00	0.00	2.65
FO^C	138,397	25.50	13.66	14.82	25.70	35.42	47.80
FO^G	138,397	0.26	0.57	0.00	0.05	0.25	1.18
Control Variables							
E-Score	55,226	24.49	27.21	0.00	13.48	44.68	78.47
Ln Size	138,379	6.82	1.85	5.51	6.76	8.04	10.02
Tobin's Q	131,252	1.02	0.88	0.42	0.93	1.52	2.63
Profitability	138,257	-0.01	0.07	-0.01	0.01	0.02	0.05
Leverage	133,222	0.34	0.35	0.03	0.28	0.52	0.97
Tangibility	138,140	0.20	0.19	0.06	0.13	0.27	0.63
Investments	138,160	0.01	0.01	0.00	0.01	0.01	0.03
EPS Surprise	119,397	-0.17	4.69	-0.13	0.07	0.36	2.32

back

Example of Climate Transition Talk

Firm	Industry Name	CTT	Text Sample
FuelCell Energy	Capital Goods	28.47%	We're also working hard to implement our strategy for affordable distributed hydrogen and infrastructure to reduce emissions from the transportation sector, a significant source of CO2 and NOx globally. [...] Automakers, truck and bus manufacturers and industrial lift manufacturers have all indicated that fuel cells will have a role in cleaning up the transportation emissions issue we face globally
Tesla	Automobiles & Components	10.46%	The energy teams have made great progress in both our solar and energy storage businesses. [...] Tesla's mission from the beginning has been to accelerate the advent of sustainable energy. That means sustainable energy generation and sustainable energy consumption in the form of vehicles, electric vehicles.
Metabilix	Pharma., Biotech. & Life Science	2.28%	Our evaluation and testing has revolved around five areas,the physical properties of Mirel, its biodegradability, low carbon footprint, high renewable carbon content and FDA food contact approval. [...] Mirel actually has a negative CO2 footprint. [...] Because Mirel is made from corn and utilizes renewable energy in its production, the environmental benefits are significant.

back

Climate Transition Talk by Industry - back

Industry	# Firms	$\frac{\sum I_{it}^{CT}}{\#Obs}$	CTT	CTT^{Pres}	CTT^{QA}
All	4,446	0.14	0.84	1.02	0.63
Energy	290	0.21	0.82	1.13	0.61
Materials	202	0.22	0.64	0.87	0.53
Capital Goods	411	0.34	1.71	2.04	1.33
Com. & Prof. Services	168	0.18	0.70	0.82	0.56
Transportation	76	0.11	0.24	0.38	0.19
Auto. & Components	45	0.23	0.72	0.86	0.59
Consumer Durables & Apparel	169	0.03	0.04	0.08	0.05
Consumer Services	183	0.03	0.05	0.07	0.05
Retailing	229	0.02	0.03	0.06	0.03
Food & Staples Retailing	38	0.08	0.26	0.40	0.24
Food, Beverage & Tobacco	104	0.05	0.11	0.19	0.08
Household & Personal Products	40	0.10	0.21	0.24	0.21
Health Care Equipment & Services	456	0.03	0.09	0.11	0.09
Pharma., Biotech. & Life Sciences	613	0.02	0.04	0.06	0.04
Software & Services	548	0.04	0.19	0.24	0.15
Techn. Hardware & Equipment	327	0.12	0.48	0.60	0.38
Semiconductors & Equipment	162	0.19	0.69	1.00	0.45
Telecom. Services	65	0.06	0.19	0.25	0.16
Media & Entertainment	181	0.03	0.05	0.08	0.05
Real Estate	40	0.11	0.52	0.64	0.40

- CTT : the percentage of the call spent discussing the climate transition
- I^{CT} : 1 if the call discusses the climate transition and 0 otherwise
- CTT^{Pres} : the percentage of the presentation spent discussing the climate transition
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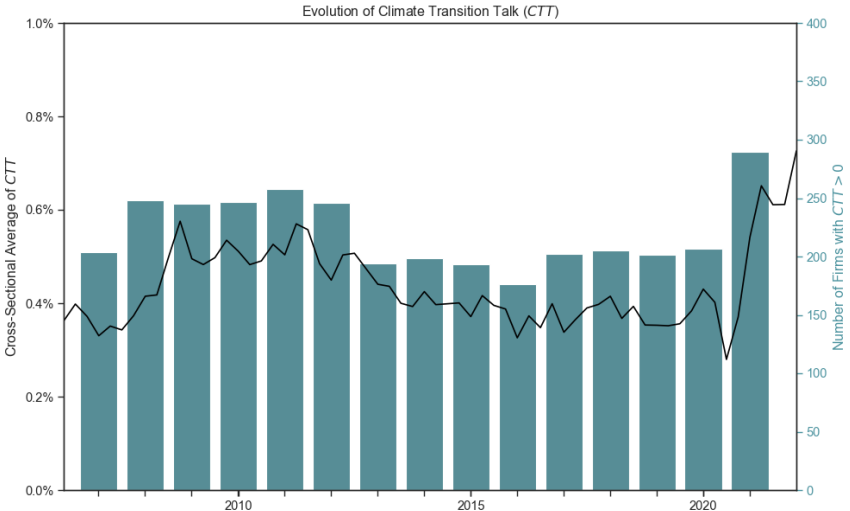
Climate Transition Talk in the Time Series



Other Topics

Funds Summary Statistics - back

	Count	Mean	STD	25%	50%	75%
Green Funds	955					
Total Net Assets (m$)		440.09	920.67	48.03	142.93	411.08
Number of Holdings		81.97	143.50	18.00	31.00	68.00
Fund Flows		0.16	0.64	-0.03	0.01	0.10
Annual Returns		0.13	0.31	-0.03	0.12	0.28
Carbon Footprint (t/m$ invested)		77.09	75.00	33.33	57.08	91.64
Carbon Intensity (t/m$ of revenue)		114.38	95.66	60.24	95.44	128.99
Yearly Change in Carbon Footprint		0.57	7.45	-1.48	0.36	2.31
Yearly Change in Carbon Intensity		0.81	9.56	-2.26	0.64	3.52
Non-Green Funds	8,009					
Total Net Assets (m$)		1,187.98	3,131.56	52.60	210.50	816.59
Number of Holdings		112.22	202.58	24.00	44.00	93.00
Fund Flows		0.10	0.53	-0.04	0.00	0.07
Annual Returns		0.13	0.34	-0.05	0.11	0.29
Carbon Footprint (t/m$ invested)		80.92	80.45	29.56	60.03	99.80
Carbon Intensity (t/m$ of revenue)		110.39	99.25	51.43	93.50	129.21
Yearly Change in Carbon Footprint		0.93	7.76	-1.29	0.45	2.68
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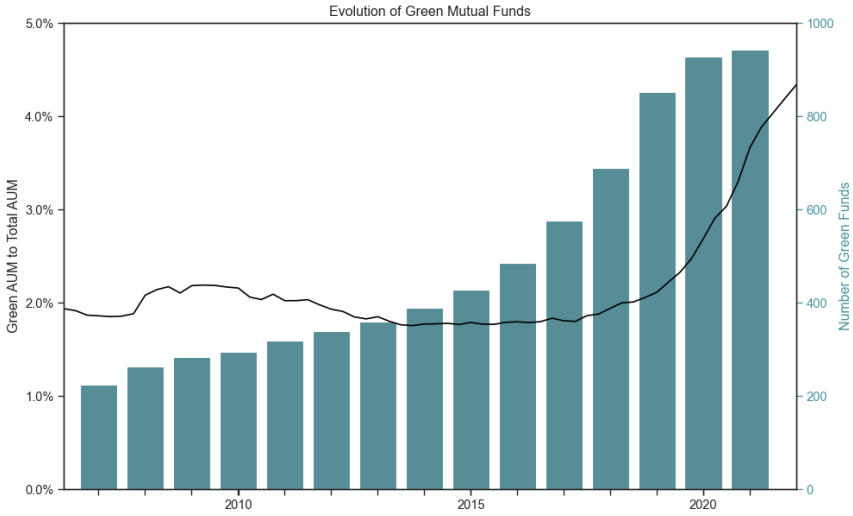

Fund Ownership around First Climate Transition Talks

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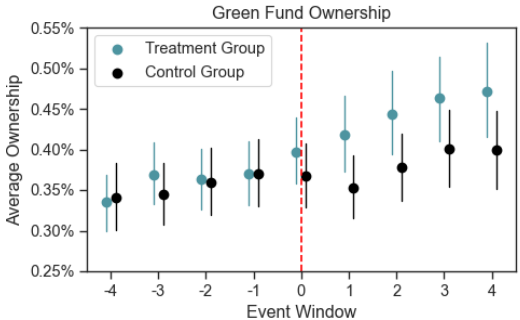

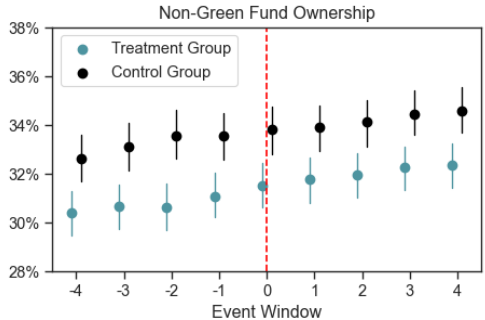

Difference-in-Difference estimator:

$$\hat{\delta}(F) = \frac{1}{\sum_{i=1}^{N}\sum_{t=0}^{T} D_{it}} \sum_{i=1}^{N}\sum_{t=0}^{T} D_{it} \left\{ (FO_{i,t+F} - FO_{i,t-1}) - \sum_{i'} w_{it}^{i'} \left(FO_{i',t+F} - FO_{i',t-1}\right) \right\}$$