Changing Investment Landscape: evidence of nonpecuniary motives of green investment

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Shu Tian
ADB

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Motivations and Research Questions

Motivations: A nascent stream of literature has investigated how investors' climate risk awareness affects their investment decisions, but with a focus on institutional investors (e.g., Krueger et al., 2020; Alok et al., 2020; Bolton and Kacperczyk, 2021; Ilhan et al., 2022).

Two recent studies with evidence about retail trading:

- Choi, Gao, and Jiang (2020 RFS): climate awareness increases following warmer than usual temperatures
  - carbon-intensive firms underperform in stock markets in such periods
  - retail investors (not institutional investors) sell carbon-intensive firms
- Choi, Gao, Jiang, and Zhang (2022): after the increase in climate awareness following local natural disasters
  - retail & institutional investors divest more from high-emission stocks
  - stock prices of high-emission firms fall

Two inter-related research questions:

(1) whether retail investors' increased **climate risk awareness** influence their **trading decisions** in financial markets, and

(2) whether such influence, if exists, result from **nonpecuniary** motives.

This study

utilizes detailed account-level trading data to directly examine the effect of climate risk awareness on retail trading. Specifically, we investigate:

(1) retail investors' tendency to tilt portfolios toward **greener assets**
- link their trading to their activeness in switching to **low-carbon lifestyles**

(2) the impact of shocks to investors' climate risk awareness
- natural disasters
- government's proposition of environmental goal (DCT: China's "Dual Carbon Targets", carbon peak by 2030, carbon neutrality in 2060)

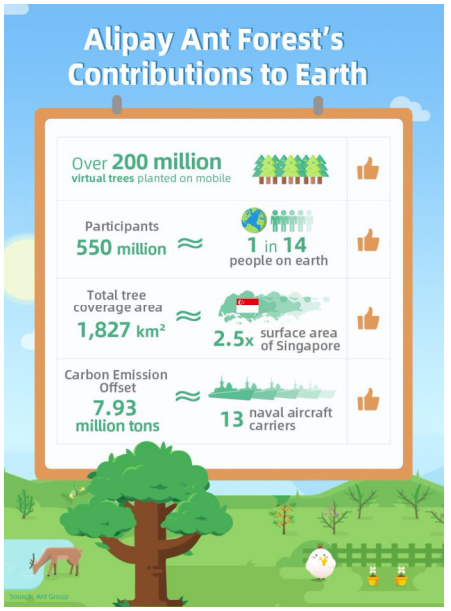
(3) the nature of trading motives: pecuniary vs. nonpecuniary

Special features:

- Large sample: 200,000 randomly selected retail traders from the pioneering mutual fund platform run by the Fintech giant, the Ant Group, in China
- Link trading of sample retail investors their activeness in switching to low-carbon lifestyles, measured by the "green points" they earn in the Ant Forest program run by the Ant Group

Background

- In 2016, the Ant Group launched Ant Forest in its Alipay app, where its users can earn green points for low-carbon lifestyle choices
- The green points can be used to grow **virtual trees in Alipay**, and the Ant will **match** by planting real trees, conserving a certain area of land for biodiversity conservation, or supporting poverty-stricken farmers
- In September 2019, the Ant Forest program won the UN Champions of the Earth award, the UN's highest environmental honor



Main findings and contributions

Using a sample comprised of 200,000 randomly selected retail traders from the pioneering mutual fund platform run by the Fintech giant, the Ant Group, in China, evidence shows:

- Retail investors with more Ant's "Green points" exhibit
  - stronger preference for **green mutual funds**, and
  - are more likely to sell **brown funds**
- The effect is stronger for investors located in areas that have recently experienced climate-risk related **natural disasters**
- The effect is stronger after **government's proposition of climate risk reduction goal**
- The effect cannot be explained by pecuniary motives.

Contribution

- The first study to examine how retail investors' environmental awareness affects their trading decisions using account-level data
  - **Environmental awareness is carried over into trading decisions**
- Validates the channel based on the innovate data of individuals' low-carbon related activities
- Shows that the effect is, at least partially, driven by investors' non-pecuniary motives
- Shows the effect of governmental environmental commitment

Data and Measurements

- Sample Period: 2019.10-2021.09, monthly frequent data

- Individual-level mutual fund trading data: 200,000 randomly selected retail investors from the Ant Group:

  -Retail trading: Net purchase of fund *j* by investor *i* in month t (*NetBuyi,j,t*)

$$NetBuy_{i,j,t} = (BV_{i,j,t} - SV_{i,j,t})/(BV_{i,j,t} + SV_{i,j,t})$$

  -Fund greenness: environmental performance ("E" score of funds in Wind)

- Individual-level climate risk awareness proxy from the Ant Forest program:

Green point of investor *i* in month *t*: $Greenpoint_{i,t}$

Summary statistics

Variables	No.Obs.	Mean	Std	Min	25pct	median	75pct	Max
NetBuy	3298576	25.00	66.00	-100.00	0.00	0.00	1.00	100.00
GreenPoints	3298576	7.18	1.77	0.00	6.89	7.72	8.21	11.62
ESG	3298576	6.35	0.44	2.31	6.15	6.45	6.63	8.30
E	3298576	2.77	0.87	0.00	2.15	2.68	3.31	8.15
S	3298576	0.45	0.85	0.36	4.08	4.66	5.10	9.32
G	3298576	6.73	0.47	1.45	6.50	6.75	7.01	8.94
Disaster	3298576	0.14	0.35	0.00	0.00	0.00	0.00	1.00
Female	3298576	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Age	3298576	34.04	9.51	18.00	27.00	32.00	39.00	85.00

Empirical results – Baseline tests

	(1) $NetBuy_{i,j,t}$	(2) $NetBuy_{i,j,t}$	(3) $NetBuy_{i,j,t}$
$GreenPoints_{i,t} * E_{j,t-1}$	0.05**		
	(2.40)		
$GreenPoints_{i,t} * E\text{-}highP80_{j,t-1}$		0.14**	
		(2.49)	
$GreenPoints_{i,t} * E\text{-}lowP20_{j,t-1}$			-0.15***
			(-3.50)
Investor*Month fixed effects	YES	YES	YES
Fund*Month fixed effects	YES	YES	YES
Adj. R2	0.3127	0.3127	0.3127
No. of Obs.	3298576	3298576	3298576

Empirical results – Placebo tests

	(1) $NetBuy_{i,j,t}$	(2) $NetBuy_{i,j,t}$	(3) $NetBuy_{i,j,t}$	(4) $NetBuy_{i,j,t}$
$GreenPoints_{i,t}*ESG_{j,t-1}$	0.03			
	(0.65)			
$GreenPoints_{i,t}* E_{j,t-1}$		0.05**		
		(2.40)		
$GreenPoints_{i,t}* S_{j,t-1}$			-0.01	
			(-0.46)	
$GreenPoints_{i,t}* G_{j,t-1}$				0.03
				(0.81)
Investor*Month fixed effects	YES	YES	YES	YES
Fund*Month fixed effects	YES	YES	YES	YES
Adj. R2	0.3127	0.3127	0.3127	0.3127
No. of Obs.	3298576	3298576	3298576	3298576

Empirical results: Address Endogeneity

IV1: City-level number of metro line stations scaled by population

IV2: City-level kms of metro line scaled by population

Panel A: 1st stage

	(1) $Greenpoint_{i,t}$	(2) $Greenpoint_{i,t}$
$Stations_{i,t}$	0.37***	
	(6.90)	
$Kms_{i,t}$		0.13***
		(3.13)
Fund*Month fixed effects	YES	YES
Month fixed effects	YES	YES
Investor fixed effects	YES	YES
Adj. R2	0.6827	0.6827
No. of Obs.	3298576	3298576

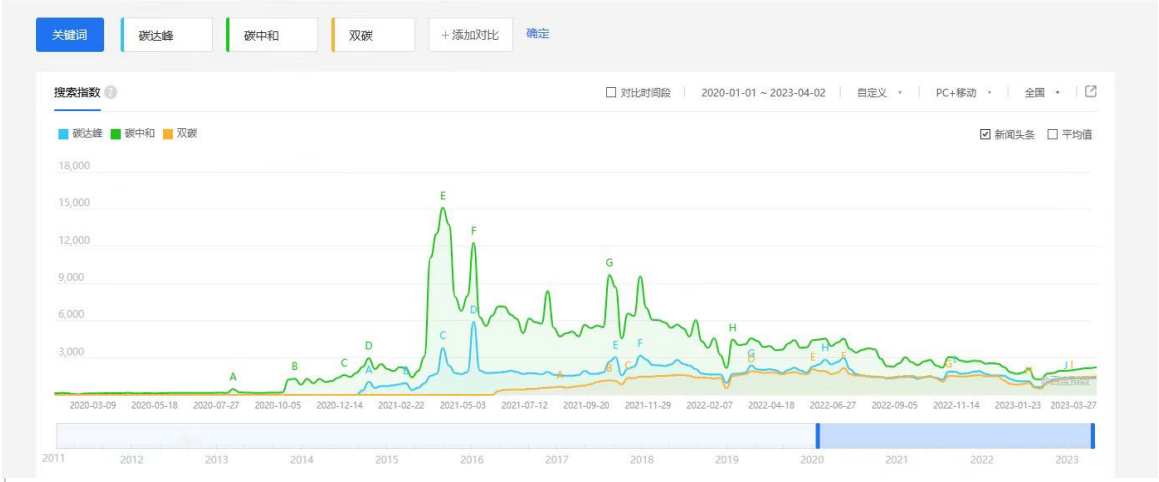
Panel B: 2nd stage

	Stations			*Kms*		
	(1) $NetBuy_{i,j,t}$	(2) $NetBuy_{i,j,t}$	(3) $NetBuy_{i,j,t}$	(4) $NetBuy_{i,j,t}$	(5) $NetBuy_{i,j,t}$	(6) $NetBuy_{i,j,t}$
$GreenPoints_{i,t}*E_{j,t-1}$	4.91***			13.35***		
	(3.76)			(3.13)		
$GreenPoints_{i,t}*E\text{-}highP80_{j,t-1}$		9.36***			19.99*	
		(2.68)			(1.76)	
$GreenPoints_{i,t}*E\text{-}lowP20_{j,t-1}$			-5.39**			-15.02*
			(-2.12)			(-1.80)
Investor*Month fixed effects	YES	YES	YES	YES	YES	YES
Fund*Month fixed effects	YES	YES	YES	YES	YES	YES
Adj. R2	0.3127	0.3127	0.3127	0.3127	0.3127	0.3127
No. of Obs.	3298576	3298576	3298576	3298576	3298576	3298576

Awareness – The effect of climate related disasters

	(1) $Greenpoint_{i,t}$	(2) $Greenpoint_{i,t}$	(3) $Greenpoint_{i,t}$
$Disaster_{i,t*}\ GreenPoints_{i,t}*E_{j,t-1}$	0.11*		
	(1.83)		
$GreenPoints_{i,t}*E_{j,t-1}$	0.03		
	(1.51)		
$Disaster_{i,t}*E_{j,t-1}$	-0.87*		
	(-1.91)		
$Disaster_{i,t*}\ GreenPoints_{i,t}*\ E\text{-}highP80_{j,t-1}$		0.29*	
		(1.76)	
$GreenPoints_{i,t}*\ E\text{-}highP80_{j,t-1}$		0.10*	
		(1.66)	
$Disaster_{i,t}*\ E\text{-}highP80_{j,t-1}$		-2.30*	
		(-1.89)	
$Disaster_{i,t*}\ GreenPoints_{i,t}*\ E\text{-}lowP20_{j,t-1}$			-0.19*
			(-1.65)
$GreenPoints_{i,t}*\ E\text{-}lowP20_{j,t-1}$			-0.12***
			(-2.58)
$Disaster_{i,t}*\ E\text{-}lowP20_{j,t-1}$			1.55*
			(1.80)
Fund*Month fixed effects	YES	YES	YES
Investor*Month fixed effects	YES	YES	YES
Adj. R2	0.3127	0.3127	0.3127
No. of Obs.	3298576	3298576	3298576

Awareness– The effect of Dual Carbon Goal



	(1)
	$NetBuy_{i,j,t}$
$GreenPoints_{i,t}*E_{j,t-1}*Post_{202103}$	0.12***
	(2.84)
$GreenPoints_{i,t}*E_{j,t-1}$	0.01
	(0.37)
Investor*Month fixed effects	YES
Fund*Month fixed effects	YES
Adj. R2	0.3127
No. of Obs.	3298576

Non-pecuniary motives– Financial performance

	(1) $Profit\text{-}1month_{i,j,t}$	(2) $Profit\text{-}3month_{i,j,t}$	(3) $Profit\text{-}6month_{i,j,t}$	(4) $Profit\text{-}12month_{i,j,t}$
$GreenPoints_{i,t}*E_{j,t-1}$	0.98	2.29	1.81	6.06
	(0.27)	(0.34)	(0.18)	(0.47)
Investor*Month fixed effects	YES	YES	YES	YES
Fund*Month fixed effects	YES	YES	YES	YES
Adj. R2	0.0727	0.1075	0.0589	0.0671
No. of Obs.	3298576	3298576	3298576	3298576

Additional results – Cross-sectional variation

	(1) $NetBuy_{i,j,t}$	(2) $NetBuy_{i,j,t}$	(3) $NetBuy_{i,j,t}$	(4) $NetBuy_{i,j,t}$
$GreenPoints_{i,t}*E_{j,t-1}*Female_{i,t}$	-0.03			
	(-0.61)			
$E_{j,t-1}*Female_{i,t}$	0.03			
	(0.09)			
$GreenPoints_{i,t}*E_{j,t-1}*Elder_{i,t}$		0.10**		
		(2.15)		
$E_{j,t-1}*Elder_{i,t}$		-0.33		
		(-0.98)		
$GreenPoints_{i,t}*E_{j,t-1}*HighSpend_{i,t}$			0.10**	
			(2.15)	
$E_{j,t-1}*HighSpend_{i,t}$			-0.71**	
			(-2.01)	
$GreenPoints_{i,t}*E_{j,t-1}*GreenPilot_{i,t}$				0.10**
				(2.31)
$E_{j,t-1}*GreenPilot_{i,t}$				-0.72**
				(-2.35)
$GreenPoints_{i,t}*E_{j,t-1}$	0.06**	-0.01	0.02	0.02
	(2.00)	(-0.30)	(0.98)	(0.61)
Investor*Month fixed effects	YES	YES	YES	YES
Fund*Month fixed effects	YES	YES	YES	YES
Adj. R2	0.3127	0.3127	0.3127	0.3127
No. of Obs.	3298576	3298576	3298576	3298576

Conclusion and Key Messages

- Retail investors exhibit stronger climate risk awareness (with more Ant's green points) are more likely to purchase funds with better environmental performance.
- This investment decisions are more pronounced
  - after investors' local city experienced climate related natural disasters
  - after government's proposition of dual carbon goals
- This **investment behavior is likely to be driven by investors' moral/ethical obligations for the environment rather than financial motives.**
- *Policy makers, especially central banks, can leverage this investment behavior to promote more green investment and greening the financial sector*.