Carbon Home Bias

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TWO LEADING QUESTIONS:

1. How do institutional investors reallocate capital to support the energy transition?

2. How do they address carbon-transition risk in their portfolio strategies?

Climate Finance Context

Figure ES1: Global climate finance flows in 2021/2022

LANDSCAPE OF CLIMATE FINANCE IN 2021/2022

Global climate finance flows along their life cycle in 2021 and 2022. Values are averages of two years' data to smooth out fluctuations, in USD billions.

CLIMATE POLICY INITIATIVE

1.27 TRILLION USD ANNUAL AVERAGE

SOURCES AND INTERMEDIARIES
Which type of organizations are sources or intermediaries of capital for climate finance?
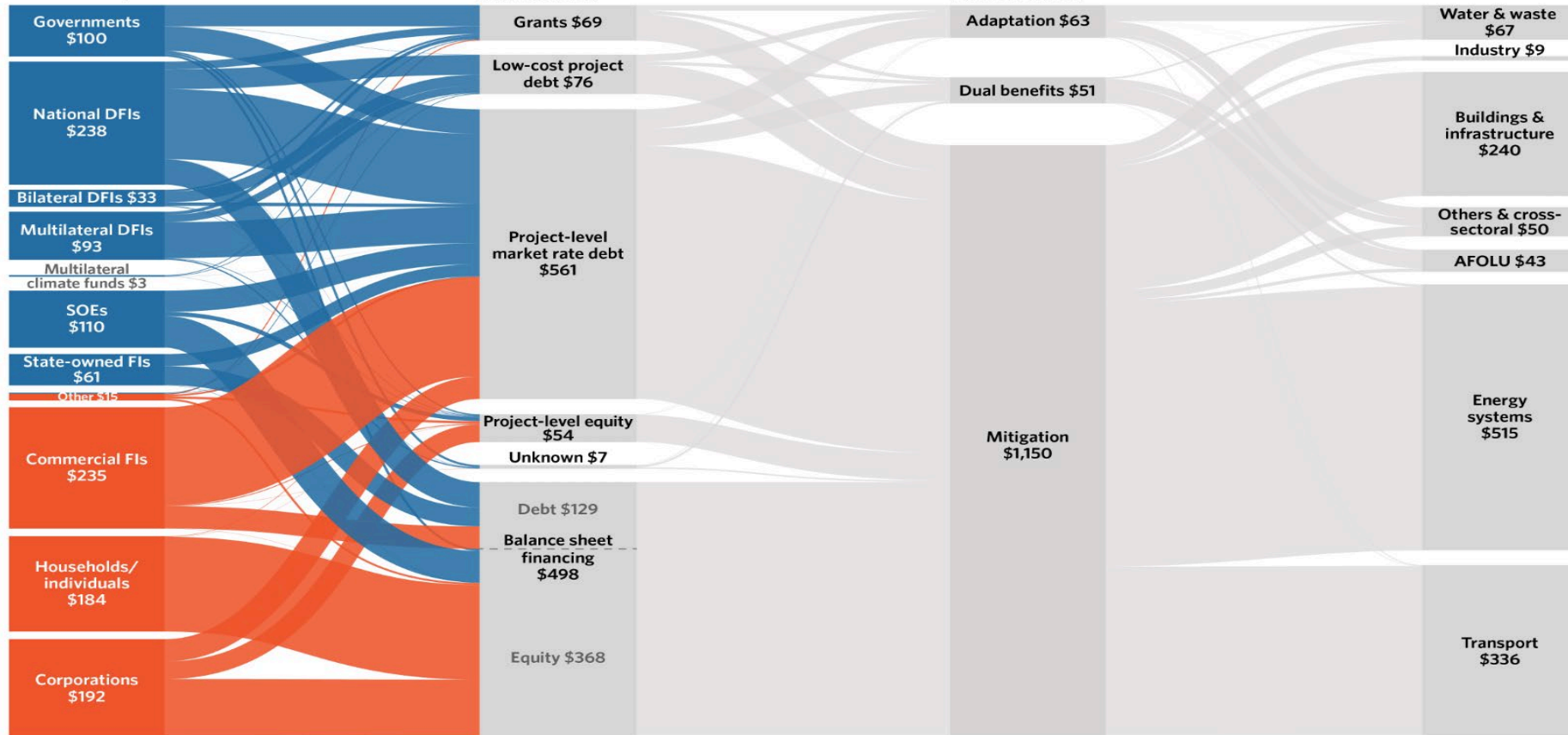
INSTRUMENTS
What mix of financial instruments is used?

USES
What types of activities are financed?

SECTORS
What is the finance used for?

| Sources and Intermediaries	Instruments	Uses	Sectors
Governments $100	Grants $69	Adaptation $63	Water & waste $67
National DFIs $238	Low-cost project debt $76	Dual benefits $51	Industry $9
Bilateral DFIs $33	Project-level market rate debt $561	Mitigation $1,150	Buildings & infrastructure $240
Multilateral DFIs $93	Project-level equity $54		Others & cross-sectoral $50
Multilateral climate funds $3	Unknown $7		AFOLU $43
SOEs $110	Debt $129		Energy systems $515
State-owned FIs $61	Balance sheet financing $498		Transport $336
Other $15	Equity $368		
Commercial FIs $235			
Households/individuals $184			
Corporations $192			

Public **Private**

"Other" public sources include export credit agencies and unknown public funds
"Other" private sources include institutional investors, funds, and unknown
"AFOLU" stands for agriculture, forestry, other land use, and fisheries. "Others & cross-sectoral" includes $6bn unknown

Source: Climate Policy Initiative
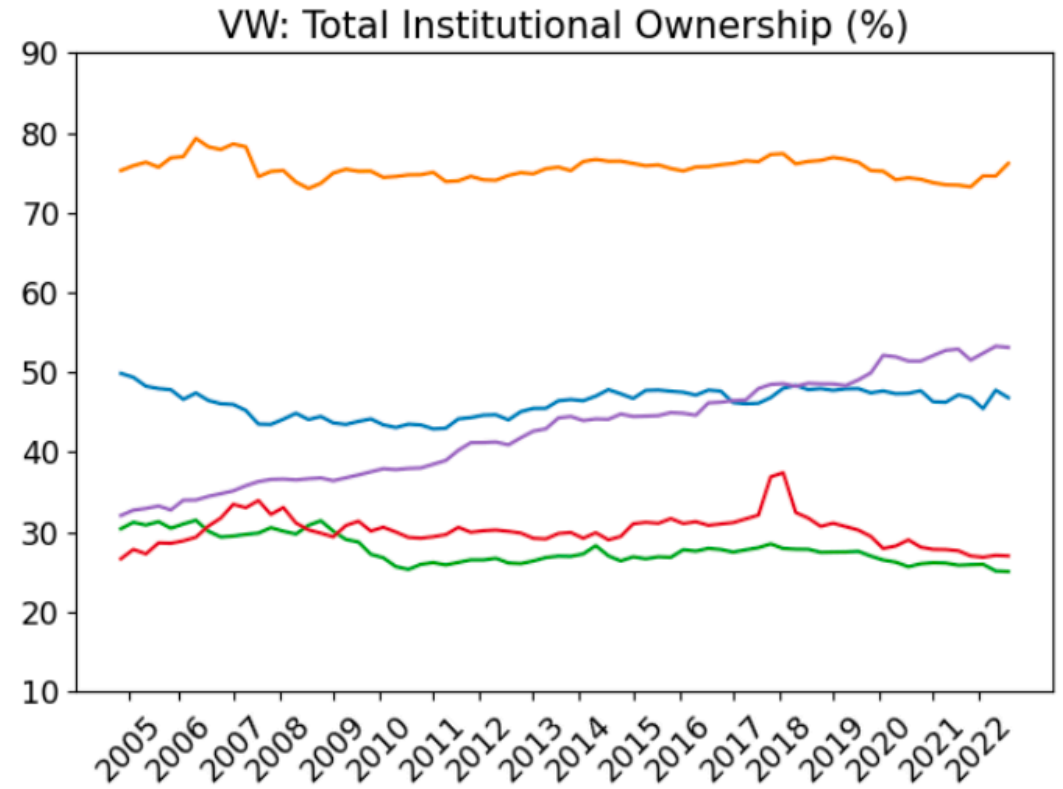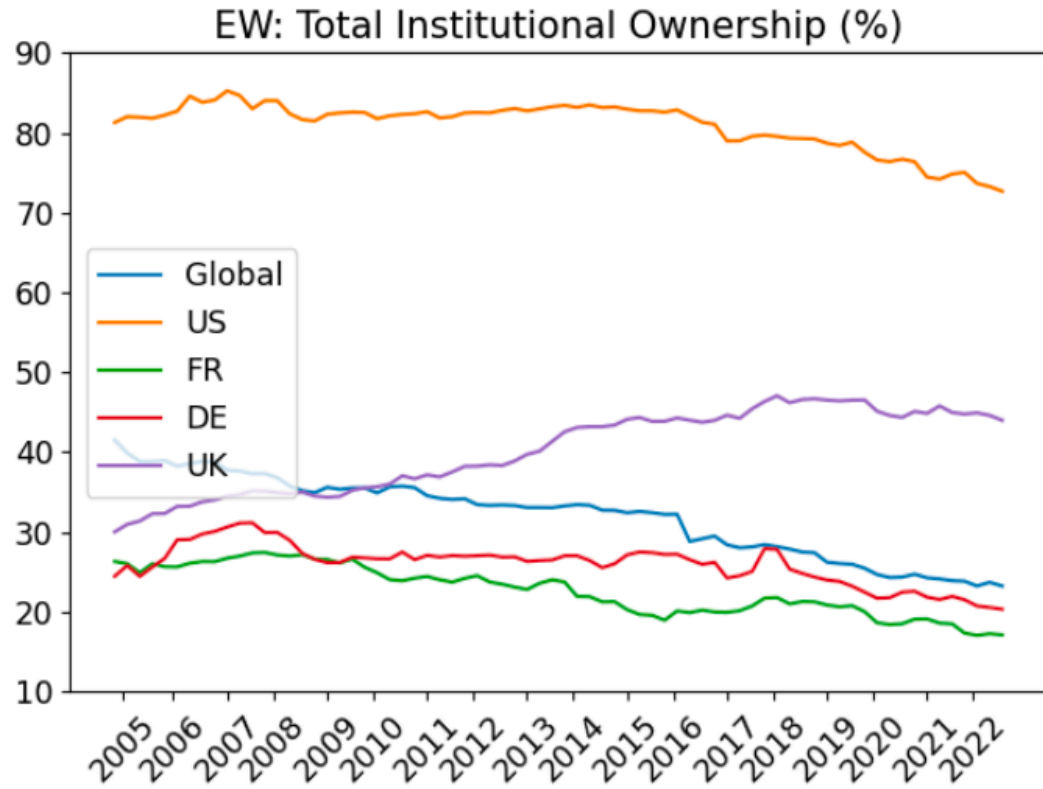
Investment Approaches

- Two main channels through which institutions can affect corporates:

  ‣ Portfolio tilting / divestment

  ‣ Engagement

- Early studies (largely U.S.-based) find that both channels operate at the same time (Gibson et al., 2022; Krueger, Sautner, and Starks, 2020)

- Institutional investor choices are influenced by internal and external (stakeholder) pressure

  ‣ Mandates; political pressure; climate awareness/familiarity

- **This paper**: Focus on portfolio choices of domestic vs. foreign institutions

  ‣ Differential treatment of stocks with similar CO_2 emissions

- **Do institutional portfolios reflect cross-sectional variation in carbon emissions?**
  - ‣ Is there evidence of portfolio tilting/divestment?
  - ‣ Emission level/intensity screens

- **Do institutional investors exhibit home bias in their emission tilts?**

- **What mechanisms can explain tilting and divestment decisions?**

Carbon Home Bias: Possible Narratives

- Carbon footprint as a pure risk characteristic: => location *per se* should not matter

- Heterogeneous climate policy impacts: => should apply similarly to domestic and foreign stocks

- Familiarity-based investing: => Applies to local vs. foreign stocks (but not with different emissions)

- Investment salience: => Proximity of natural disasters & overweighting (should underweight local companies more)

- Political alignment and investor ideology: => Investors align themselves with companies of similar types. Familiarity + anti-woke stance may produce home bias if there are enough investors of that type

- **Catering to clienteles with different preferences + business links**

Data

Data Sets

- A large sample of global institutional equity portfolios matched with firm-level data on corporate characteristics and carbon emissions

- Firm-level data on GHG emissions from S&P Global Trucost
  - Scope 1, scope 2, and scope 3 (upstream and downstream) carbon emissions
    - Scope 1 greenhouse gas (GHG) emissions occur from sources that are controlled or owned by a firm
    - Scope 2 and scope 3 are indirect and are related to energy consumption and supply chain
  - We separate scope 1+2 and scope 3 carbon emissions

Our Sample

- **Quarterly frequency:** portfolio and firm level

- Period: 2005-2022

- **11,788** unique institutions and **15,515** unique firms from **48** MSCI ACWI countries

- We require an institution to hold **at least 10 stocks**, of which at least one must be foreign and one domestic

- Institutions (holding companies) with a portfolio allocation greater than 50% to a single stock in a given quarter are excluded

Measures of Portfolio Exposures

- **Intensive margin**: LOG(PF Share), the share invested in each firm
  - PF Share sums to 100 for each institution in each time period

- **Extensive margin**: OWN, a binary indicator equal to 100 if a firm is owned by an institution at time t, or 0 if it is no longer owned but used to be owned within the last 3 years (the **investment universe**)
  - Follows Koijen-Yogo (2019)

Empirical Specifications

Baseline Empirical Models

- OLS with standard errors double-clustered at firm, or institution and year-quarter levels

- **Baseline model 1 (firm-level)**:

$$\text{IO}_{f,t} = b_0 + b_1 Emissions_{f,t} + \Omega Controls_{f,t} + \Gamma_{c*t} + \Gamma_{j*t} + e_{f,t}$$

- **Baseline model 2 (institution-firm-level)**:

$$\text{Log(PF Share)}_{i,f,t} = b_0 + b_1 Emissions_{f,t} + b_2 FOR_{i,f,t} * Emissions_{f,t} + $$
$$+ \Omega Controls_{f,t} + \Gamma_{i*t} + e_{i,f,t}$$

Findings I:

GHG Emissions and Portfolio Choice

Carbon Emissions and Investor Ownership (IO): Firm-Level Evidence

DEP. VAR.: IO	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
S12INT	-0.117***		-0.0213					
	(0.0153)		(0.0200)					
S3INT		-0.320***		-0.231**				
		(0.0628)		(0.0928)				
LOGS12TOT					-0.465***		-0.107	
					(0.0736)		(0.0803)	
LOGS3TOT						-0.157*		-0.0410
						(0.0894)		(0.112)
Country*Yr/Qtr FE	X	X	X	X	X	X	X	X
Industry*Yr/Qtr FE			X	X			X	X
Observations	411398	411398	411398	411398	411398	411398	411398	411398
R2	0.811	0.811	0.820	0.820	0.811	0.811	0.820	0.820

Carbon Emissions and Foreign/Domestic IO: Firll-level Evidence

Panel B: Domestic ownership								
IO_DOM	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
S12INT	-0.0488***		0.00399					
	(0.0115)		(0.0144)					
S3INT		-0.0809*		0.168**				
		(0.0462)		(0.0643)				
LOGS12TOT					-0.0361		0.168***	
					(0.0506)		(0.0574)	
LOGS3TOT						0.200***		0.351***
						(0.0622)		(0.0782)
Controls	X	X	X	X	X	X	X	X
Country*Yr/Qtr FE	X	X	X	X	X	X	X	X
Industry*Yr/Qtr FE			X	X			X	X
Observations	411398	411398	411398	411398	411398	411398	411398	411398
R2	0.877	0.877	0.881	0.881	0.877	0.877	0.881	0.882

Panel C: Foreign ownership								
IO_FOR	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
S12INT	-0.0682***		-0.0253*					
	(0.00938)		(0.0147)					
S3INT		-0.239***		-0.399***				
		(0.0411)		(0.0656)				
LOGS12TOT					-0.429***		-0.275***	
					(0.0484)		(0.0563)	
LOGS3TOT						-0.357***		-0.392***
						(0.0587)		(0.0768)
Controls	X	X	X	X	X	X	X	X
Country*Yr/Qtr FE	X	X	X	X	X	X	X	X
Industry*Yr/Qtr FE			X	X			X	X
Observations	411398	411398	411398	411398	411398	411398	411398	411398
R2	0.437	0.436	0.458	0.459	0.439	0.437	0.458	0.459

Investor-Level Evidence: Intensive Margin (**Tilting**)

Panel A: Intensity

LOG(PF SHARE)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
S12INT	-0.00117*	0.00205***		-0.000394				
	(0.000588)	(0.000470)		(0.000551)				
FOR*S12INT	-0.00454***	-0.00480***	-0.000938	-0.000406				
	(0.00113)	(0.000754)	(0.000796)	(0.000639)				
S3INT					0.0143***	0.0143***		0.00789**
					(0.00254)	(0.00156)		(0.00382)
FOR*S3INT					-0.0236***	-0.0205***	-0.0139***	0.00865
					(0.00394)	(0.00274)	(0.00251)	(0.00615)
Controls	X				X	X	X	X
Yr/Qtr FE	X				X			
Inst*Yr/Qtr FE						X	X	X
Firm*Yr/Qtr FE							X	
Inst*Firm FE								X
Observations	73926898				73926898	73926898	73922723	73162109
R2	0.354				0.354	0.653	0.674	0.875
Within R2	0.333				0.333	0.272	0.0718	0.114

Institutional investors tend to be more exposed to domestic stocks with higher carbon footprints

LOG(PF SHARE)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LOGS12TOT	0.0178***	0.0171***		0.0000463				
	(0.00315)	(0.00206)		(0.00261)				
FOR*LOGS12TOT	-0.0500***	-0.0298***	-0.0145***	-0.0183***				
	(0.00450)	(0.00288)	(0.00329)	(0.00370)				
LOGS3TOT					0.0342***	0.0211***		0.0120***
					(0.00386)	(0.00285)		(0.00417)
FOR*LOGS3TOT					-0.0517***	-0.0311***	-0.0204***	-0.00653
					(0.00546)	(0.00375)	(0.00579)	(0.00609)
Controls	X	X	X	X	X	X	X	X
Yr/Qtr FE	X				X			
Inst*Yr/Qtr FE		X	X	X		X	X	X
Firm*Yr/Qtr FE			X				X	
Inst*Firm FE				X				X
Observations	73926898	73926898	73922723	73162109	73926898	73926898	73922723	73162109
R2	0.354	0.653	0.674	0.875	0.354	0.653	0.674	0.875
Within R2	0.334	0.272	0.0718	0.114	0.334	0.272	0.0718	0.114

Investor-Level Evidence: Extensive Margin (**Divestment**)

whether investor i holds a position in firm j

	Panel A. Intensity							
OWN	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
S12INT	0.0284***	0.0245***		-0.130***				
	(0.0101)	(0.00572)		(0.0139)				
FOR*S12INT	-0.0400***	-0.0819***	-0.0533***	0.0206				
	(0.0127)	(0.00907)	(0.00946)	(0.0151)				
S3INT					0.0134	-0.0330		-0.434***
					(0.0370)	(0.0259)		(0.120)
FOR*S3INT					-0.0853**	-0.149***	-0.245***	0.567***
					(0.0425)	(0.0312)	(0.0282)	(0.159)
Controls	X	X	X	X	X	X	X	X
Yr/Qtr FE	X				X			
Inst*Yr/Qtr FE		X	X	X		X	X	X
Firm*Yr/Qtr FE			X				X	
Inst*Firm FE				X				X
Observations	105157448	105157448	105155532	104931587	105157448	105157448	105155532	104931587
R2	0.0269	0.269	0.302	0.518	0.0269	0.269	0.302	0.518
Within R2	0.0242	0.0632	0.0118	0.0282	0.0242	0.0632	0.0118	0.0282

	Panel B. Levels							
OWN	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LOGS12TOT	-0.388***	-0.253***		-1.160***				
	(0.0662)	(0.0436)		(0.0843)				
FOR*LOGS12TOT	-0.110**	-0.365***	-0.609***	0.0897				
	(0.0521)	(0.0404)	(0.0458)	(0.0877)				
LOGS3TOT					-0.697***	-0.503***		-1.080***
					(0.0809)	(0.0551)		(0.135)
FOR*LOGS3TOT					-0.254***	-0.397***	-0.812***	-0.423**
					(0.0762)	(0.0517)	(0.0611)	(0.175)
Controls	X	X	X	X	X	X	X	X
Yr/Qtr FE	X				X			
Inst*Yr/Qtr FE		X	X	X		X	X	X
Firm*Yr/Qtr FE			X				X	
Inst*Firm FE				X				X
Observations	105157448	105157448	105155532	104931587	105157448	105157448	105155532	104931587
R2	0.0272	0.269	0.302	0.518	0.0275	0.270	0.302	0.518
Within R2	0.0244	0.0635	0.0119	0.0283	0.0247	0.0637	0.0119	0.0283

Findings II:

What is the Mechanism?

A List of Possible Explanations

- Strong evidence of carbon home bias in global institutional portfolios

- Possible explanations:
  - Regional bias
  - Political connections
  - Business connections
  - Policy shift
  - Political environment
  - Salience

Summary: Main Results and Contribution to the Literature

1. **Tilting & Divestment**: We find evidence that institutional investors tend to reduce their exposure to companies with higher emissions (both levels and intensities)

2. **Carbon Home Bias**: The effect is significantly stronger for foreign companies and goes beyond the regular home bias effect

3. **US Big 3 Tilting**: The effect is stronger for larger institutions and institutions domiciled in North America, especially at the intensive margin

4. **Post Paris**: The effect gets stronger post Paris Climate Agreement

5. **External Pressures**: The results are consistent with the view that institutions are subject to external pressures and internalize these pressures by **tilting abroad**

6. **Emerging Markets:** Carbon home bias adversely affects cost of capital and price informativeness in EMEs

THANK YOU FOR LISTENING