Flow-Driven ESG Returns

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What impact did ESG flows have on the realized returns to ESG investing?

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Naive approach...

1. Flows to labelled ESG funds: \$200 Billion
2. Price impact from CAPM calibration: ≈ 0.002

$$\text{ESG Impact} = \$200 \text{ Billion} \times 0.002 = \$0.4 \text{ Billion}$$

This paper...

1. New measure of total ESG flows by all investors: \$1.3 Trillion
2. Estimate willingness to substitute between ESG and other stocks from institutional portfolio holdings. Then derive ESG price impact: ≈ 0.4

$$\text{ESG Impact} = \$1.3 \text{ Trillion} \times 0.4 = \$520 \text{ Billion}$$

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Implications...

- **Impact investing has price impact**
  $1 flow from market portfolio to ESG portfolio increases aggregate value ESG stocks by $0.4
- **ESG returns driven by ESG flows**
  Under absence of price pressure from ESG flows, ESG funds would have not outperformed the market from 2016 to 2021
- **ESG flows affect cross-section of ESG stocks**
  The ESG stocks that received higher flows had higher returns in the cross-section. Impact of flows stronger when stocks held by inelastic/passive investors

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Background and Related Literature

1. Drastic growth of the environmental, social and governance (ESG) investment industry in recent years
2. ESG funds had higher realized returns than market in recent years: Investors seem to be *"doing well by doing good"*
3. Wedge between *realized* and *expected* returns due to shifts in ESG preferences (Pastor, Taylor & Stambaugh, 2022)
4. But, for every buyer there is a seller. High willingness to substitute implies small impact (Berk & Binsbergen, 2022)
5. However, holdings data suggest low willingness to substitute between stocks (Koijen and Yogo, 2019)

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Data and Variable Definitions

1. **Accounting and Stock Market Data:** CRSP & Compustat
   - Price of stock n at quarter t denoted $P_{t,n}$
   - Shares outstanding normalized to 1
2. **Institutional Holdings Data:** Thompson s34 & s12 file
   - $Q^i_{t,n}$ denotes shares held by fund i
   - $w^i_{t,n} = Q^i_{t,n} P_{t,n} / AUM^i_t$ is portfolio weight
3. **Mutual Fund Flows:** CRSP Mutual Fund Database
4. **Sustainability Characteristics**:
   - Revealed preferences measure from ESG funds' holdings
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Measuring ESG tastes

- Identify 382 ESG mutual funds by matching fund names with a list of sustainability key words
  (Vanguard FTSE Social Fund, iShares ESG ETF, Calvert Impact Fund)
- Compute portfolio weight held by all ESG funds w_n^{ESG} by aggregating their holdings

Year	# Funds	Avg. # Stocks	Total AUM ($ Billion)	% Indexed AUM	Active Share
2012	88	226	25.02	0.16	0.69
2015	101	223	36.80	0.24	0.68
2018	199	195	63.19	0.22	0.63
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1. Define ESG stocks as $\tau_n^{ESG} > 0$
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*Note: This measures **perceived ESG** which may not be equal to **true ESG***

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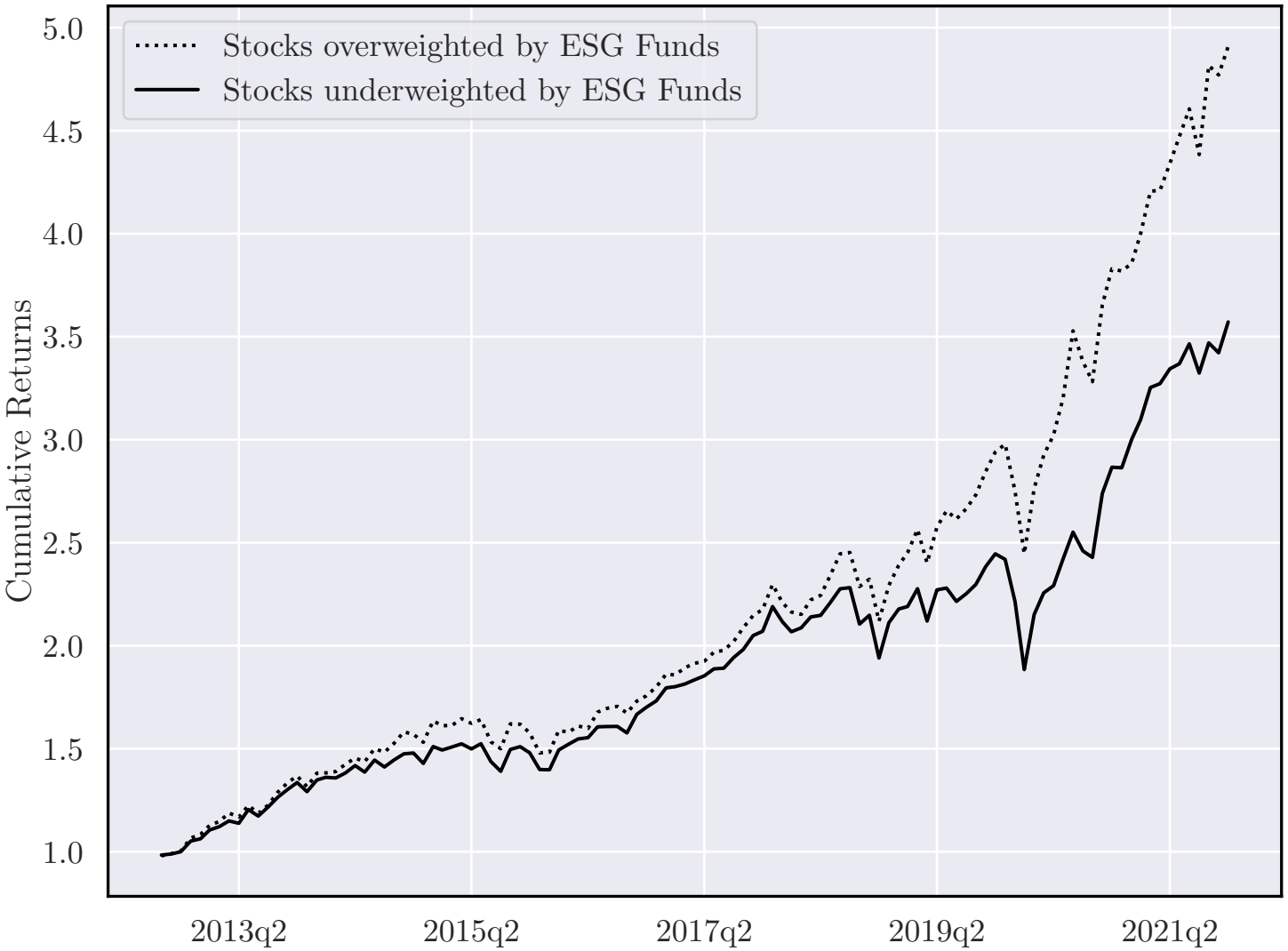
ESG stocks versus non-ESG stocks



A New Measure of Flows into Managed Portfolios

- Compute portfolio share of each investor i at quarter t by projecting weights onto managed portfolios S

$$w_n = \sum_{s=1}^{S} \beta^s w_n^s + a_n$$

  where S includes includes ESG, market, industry and different style portfolios (value, growth etc.)
- Institution i's dollars in ESG portfolio

$$A_{i,t}^{ESG} = \beta_{i,t}^{ESG} * AUM_{i,t}$$

- Total flow into ESG portfolio by summing changes in ESG-assets across all institutions (accounting for ESG return)

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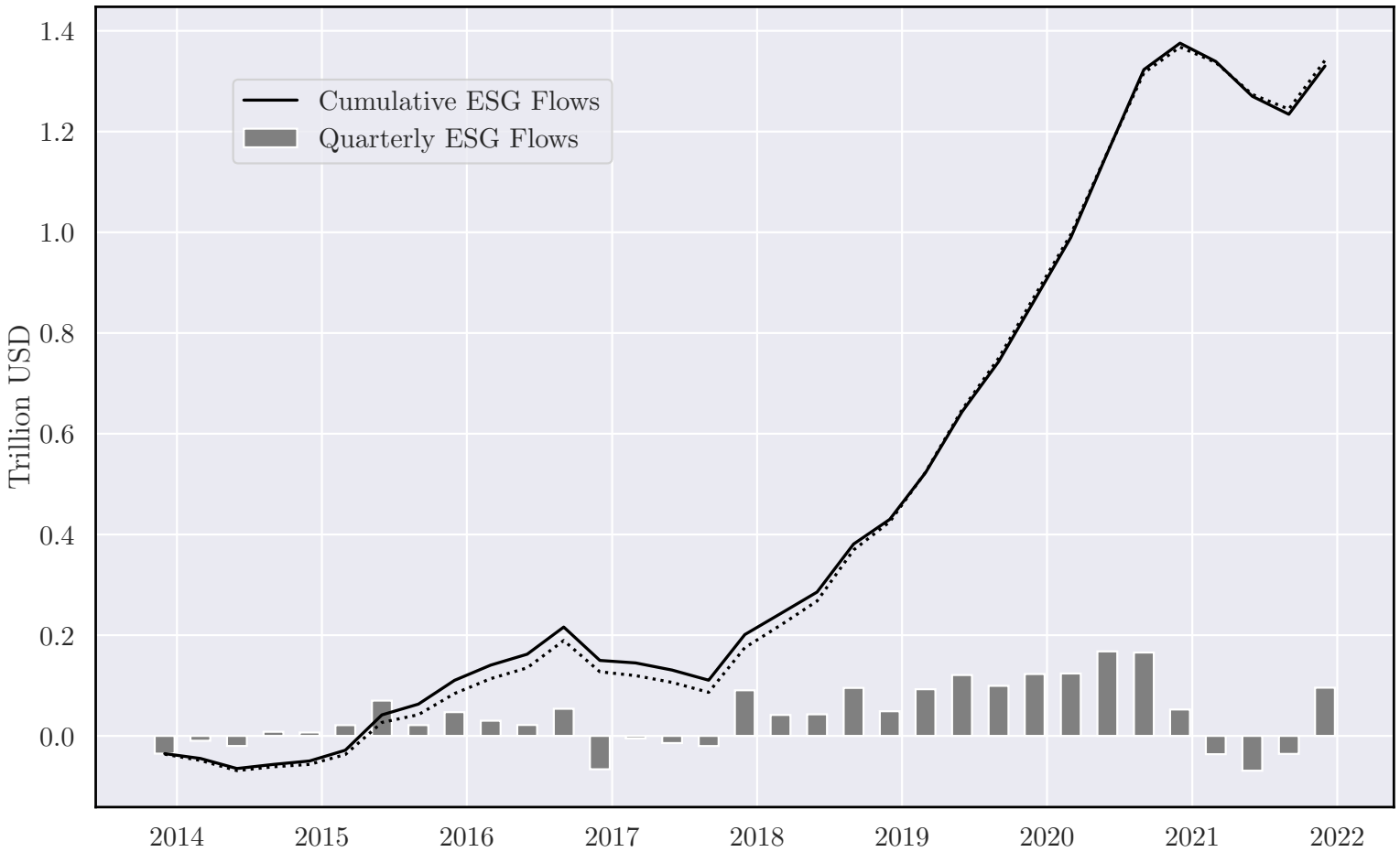

- ESG flow from labelled ESG mutual funds: \$200 Billion
- ESG flow from all 13F institutions: \$1.3 Trillion

Identifying the causal link between ESG flows and returns

Why not directly regress ESG returns onto ESG flows?

$$\text{ESG-Return}_t = \mathcal{M} * \text{ESG-Flow}_t + \epsilon_t$$

- ESG returns and flows driven by many variables (ESG regulation, climate news etc.)
- Reversed causality: Flows chasing returns

Can we identify $\mathcal{M}$ from holdings data?

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A Model of Demand-Shocks and Prices

- Investor i chooses an optimal portfolio Q^i across N stocks
- Price-Elasticity of Demand $\zeta^i \in \mathbb{R}^{N \times N}$:

$$\zeta^i = -\frac{\text{Change in Demand (\%)}}{\text{Change in Price (\%)}} = -\frac{\Delta Q^i / Q^i}{\Delta P / P}$$

1. Stock-Specific Elasticity: ζ^i_n.
   Shell goes up by 1%, how much Shell stock does Blackrock sell?
2. Cross-Elasticity: ζ^i_{mn}.
   Shell goes up by 1%, how much Exxon stock does Blackrock sell?
3. Aggregate Elasticity Matrix: ζ
   The ownership-weighted sum of investor-specific elasticities

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   The ownership-weighted sum of investor-specific elasticities

A Model of Demand-Shocks and Prices

- Investor i chooses an optimal portfolio Q^i across N stocks
- Price-Elasticity of Demand $\zeta^i \in \mathbb{R}^{N \times N}$:

$$\zeta^i = -\frac{\text{Change in Demand (\%)}}{\text{Change in Price (\%)}} = -\frac{\Delta Q^i / Q^i}{\Delta P / P}$$

1. Stock-Specific Elasticity: ζ^i_n.
   Shell goes up by 1%, how much Shell stock does Blackrock sell?
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- Now assume a dollar flow to the ESG portfolio w^{ESG} resulting in a demand shock F_t^{ESG}
- In equilibrium prices have to change in order to induce investors to accommodate the flow
- It can be shown that this leads to a *realized* ESG return

$$\text{ESG-Return}_t = \mathcal{M} * F_t^{ESG}$$

where $\mathcal{M} = (\sum_i Q^i \zeta^i)^{-1}$ is inverse of the aggregate price elasticity of demand

- Flow-driven ESG return depends on investors' willingness to substitute between stocks ζ^i

How to identify elasticities from holdings data?

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Estimating elasticities from trades (van der Beck, 2022)

- Use 13F filings to construct quarterly institutional trades from changes in shares held $Q^i_{t,n}$

$$\Delta q^i_{t,n} = \log Q^i_{t,n} - \log Q^i_{t-1,n}$$

Example: If Blackrock holds 100 shares of Apple in 2010 Q1 and 105 shares in 2010 Q2 then $\Delta q \approx 5\%$

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Identification

- Prices and quantities are jointly determined in equilibrium: Need instrument (exogenous variation) for prices to identify elasticities!

- Intuition: To identify elasticity of investor i, use exogenous demand shocks by other investors $j \neq i$

- 3 Sources of Exogenous Demand Shocks by *some* investors
  1. Flow-driven trades by Mutual Funds
  2. ESG Index Inclusions
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Estimating Elasticities for all Investors

- Construct trades Δq_t^i for all 13F investors from 2010 to 2020 (household sector holds remaining shares)

Estimation

Pool investors by institutional type and estimate elasticity via 2SLS

1. First Stage: *Construct exogenous shocks to prices*

$$\Delta p_{t,n} = \beta * \text{Demand Shock}_{t,n}^{-i} + \textit{Controls} + \varepsilon_{t,n}^{i}$$

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Estimated Demand Coefficients

	ζ^i Identified from Trades $\Delta q_{t,n}$	ζ^i in Koijen and Yogo (2019)
Pooled All	1.054 (0.033)	0.282 (0.001)
Pooled by Type		
Mutual Funds		
High Active Share	3.198 (0.305)	0.744 (0.004)
Medium Active Share	2.660 (0.298)	0.477 (0.004)
Low Active Share	1.296 (0.092)	-0.142 (0.003)
Banks	1.292 (0.118)	0.238 (0.002)
Pension funds	0.838 (0.081)	0.322 (0.002)
Insurance companies	0.387 (0.168)	0.321 (0.003)
Households	0.724 (0.244)	0.530 (0.009)

ESG Elasticities and Cross-Elasticities

- Take elasticity of each investor and compute ownership-weighted average for each stock
- Buying \$1 of average ESG stock increases prices by $\mathcal{M}_{ESG} = \$1.11$
- What happens to other ESG and non-ESG stocks?

		Cross-Multipliers ($\times 10^4$)	
	$\mathcal{M}_{\text{ESG}}$	$\mathcal{M}_{\text{ESG,ESG}}$	$\mathcal{M}_{NonESG,ESG}$
Mean	1.11	-0.86	-1.40
10th Pctl.	1.01	-2.30	-3.23
Median	1.09	-0.05	-0.12
90th Pctl.	1.25	0.43	0.36

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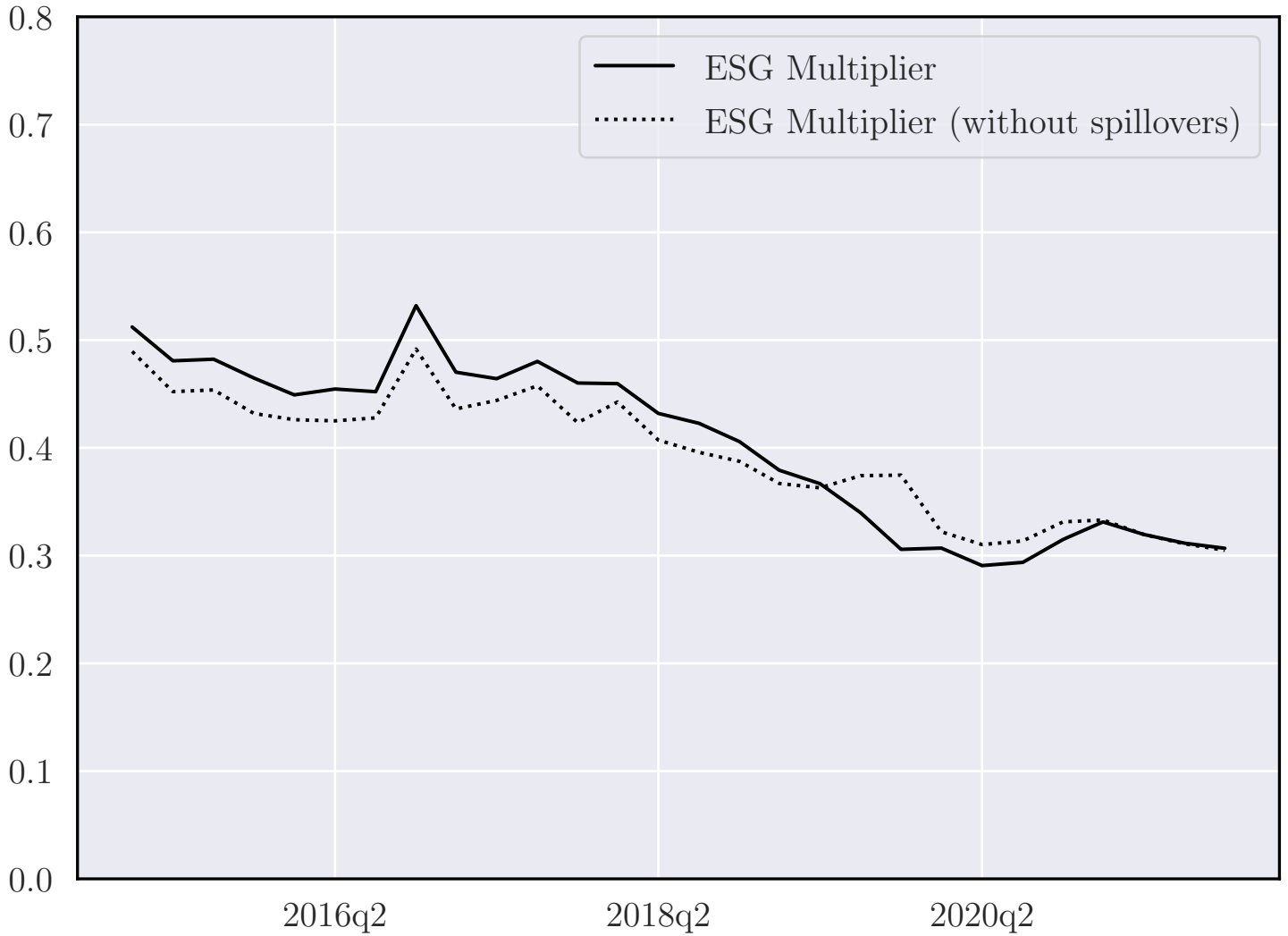
ESG Flow Multiplier

By how much does $1 ESG flow raise the value of all ESG stocks?



Impact Investing at the Fund Level

	Deviation from S&P500 (Active Share)	Impact of 1$ into fund *i* onto... ESG Stocks	Fossil Fuel Stocks	Sin Stocks
TIAA-CREF Social Choice Fund	0.48	0.98	0.12	-0.02
Calvert Social Investment Fund	0.72	2.71	-0.11	-0.09
Vanguard FTSE Social Index Fund	0.36	0.43	-0.09	-0.10
iShares MSCI ESG ETF	0.39	0.54	0.17	0.05

1. Many ESG funds do not deviate from market
2. ESG funds differ strongly in their impact
3. New impact-criterion to distinguish ESG funds

Counterfactual ESG Returns in Absence of ESG Flows

	Return	α (CAPM)	α (CH4 + Green)
True Returns: Empirically Observed			
Return (%)	2.01	2.40	1.51
t-statistic	(2.91)	(3.47)	(2.01)
Counterfactual Returns: In Absence of Total ESG Flows			
Return (%)	0.04	0.57	-0.30
t-statistic	(0.05)	(0.77)	(-0.38)

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Flows and the Cross-Section of ESG Returns

- Compute inflow into individual ESG stocks Δd_n (using fund flows and lagged portfolio weights)
- Model implies that flow-driven return is

$$\Delta p_n^{Flow} = \mathcal{M}_n \Delta d_n$$

- Simple cross-sectional regression over subset of ESG stocks using cumulative returns from 2016-2021

$$\Delta p_n = \beta \Delta p_n^{Flow} + Controls + \epsilon_n$$

1. If β significantly positive: Flows matter for cross-section
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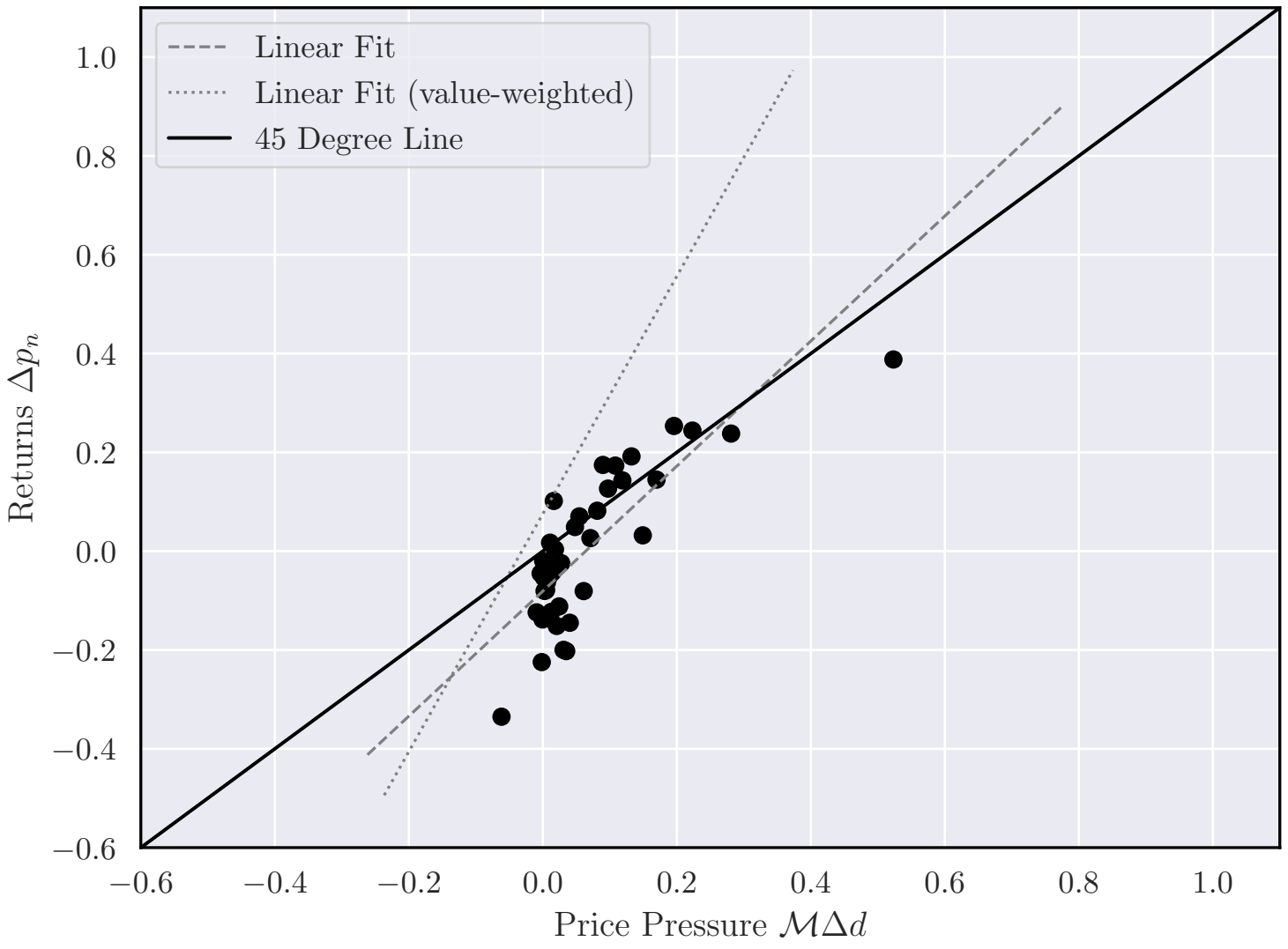

Impact of flows is larger for more inelastic stocks!

- Approximate flow-driven impact: $\text{Impact}_n = \frac{\Delta p_n}{\Delta d_n}$
- Regress Impact_n on $\mathcal{M}_n$ in the cross-section

	Price Impact $\Delta p_n / \Delta d_n$
const	1.809
	(1.418)
$\mathcal{M}_n$	2.813***
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Log ME	-0.211***
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- Stocks included in FTSE 4Good Index are strict subset of FTSE USA Index (Berk and Binsbergen, 2022)
- Regress Quarterly Returns onto Index Inclusion Dummy $I_{n,t}^{4G}$

	Realized Returns	
$I_{n,t}^{4G}$	0.009	0.001
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$I_{n,t}^{4G} \times I(\text{Tracked by ESG Funds})$		0.068**
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Observations	125263	125263

- Index additions have 6.8% return and 7.9% higher mutual fund ownership: Multiplier $\frac{6.8}{7.9} = 0.87$

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What are the real effects on companies' investment?

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