Who creates and who bears flow externalities in mutual funds?

DEUTSCHE BUNDESBANK
EUROSYSTEM

Daniel Fricke　　　**Stephan Jank**　　　**Hannes Wilke**

AFA Meeting 2023

January 7th, 2023

Flow externality

- Remaining investors bear flow externality in open-ended funds:
  - Daily redeemability. Large outflows ⇒ costly portfolio adjustments (commissions, bid-ask spreads, taxes ...).
  - Portfolio adjustments spread over longer period.

- Funds with large outflows underperform in next period (e.g., Chordia, 1996; Edelen, 1999; Chen et al., 2010).

Who creates and who bears flow externalities?

Contribution:

- Quarterly data on dynamic sectoral ownership structure of euro area mutual funds.

- Empirical framework to measure fund-level externality generated/received at the investor sector level.

Main findings: actively managed equity funds, 2013Q4:2020Q2

- Total flow externality in illiquid funds: −45 bps.

- Net externality generators: Investment funds.

- Net externality receivers: Households + insurers.

- Behavioral differences across investors (procyclicality, performance-sensitivity) in line with these patterns.

Related Literature

- **Strategic complementarities and fund fragility**
  Chordia (1996); Edelen (1999); Dickson et al. (2000); Chen et al. (2010); Goldstein et al. (2017); Capponi et al. (2020); Jin et al. (2021) Coval/Stafford (2007); Chernenko/Sunderam (2020); Falato et al. (2020); Giannetti/Jotikasthira (2022)

- **Contagion in economic and financial networks**
  Gai et al. (2011); Acemoglu et al. (2012); Elliott et al. (2014); Acemoglu et al. (2015); Fricke/Wilke (2020)

- **Investment horizons and financial markets**
  Miller/Rock (1985); Narayanan (1985); Stein (1989); Froot et al. (1992); Graham et al. (2005); Timmer (2018); Giannetti/Yu (2021)

Data and Descriptives
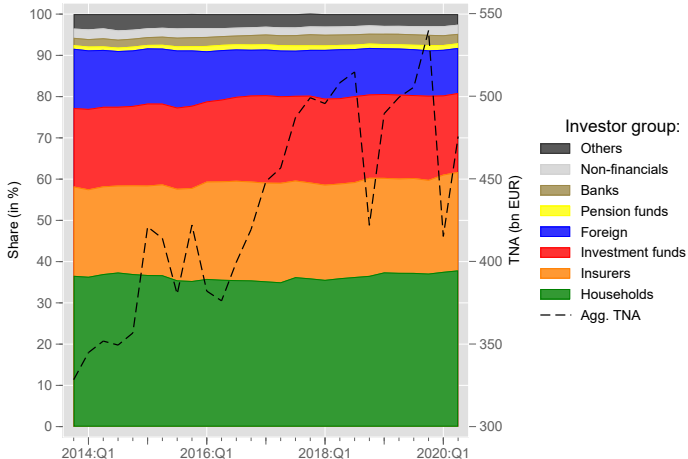
Data

Sources

- Morningstar: fund characteristics.
- Securities Holdings Statistics by Sector: fund ownership.

Sample construction

- Actively-managed equity mutual funds
- Domiciled and available for sale in euro area
- Subject to harmonized EU regulation (UCITS)
- Predominantly held by euro area investors (residual = *Foreign*)

$\Rightarrow$ **Final sample:** 2013Q4:2020Q2; 7,722 share classes; 2,597 funds

Motivation
000

Data and Descriptives
0000

Framework
000

Results
000000

Conclusion
0

Holdings by investor sector i

Motivation
ooo

Data and Descriptives
ooo●

Framework
ooo

Results
oooooo

Conclusion
o

Large outflow contribution by investor sector i

$$EuroFlows_{t,f,i} = \text{TNA}_{t,f,i} - \text{TNA}_{t-1,f,i} \times \left(1 + \text{Return}_{t,f,i}\right),$$
$$\text{with } \sum_i EuroFlows_{t,f,i} = EuroFlows_{t,f}.$$
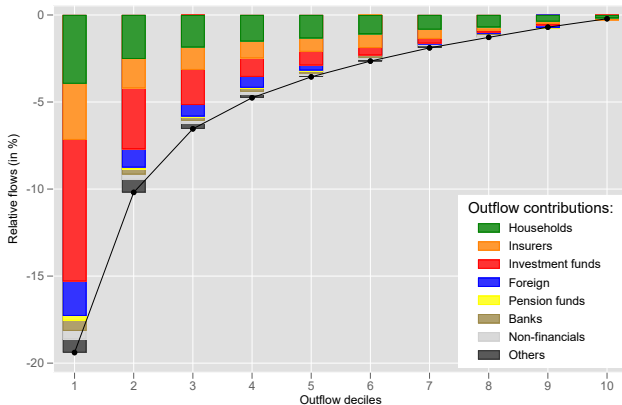
Extreme outflows are more (less) than proportionally driven by investment funds (households and insurers) ⌣

Framework

Who drives and who bears the flow externality?

- Direct measure of the total flow externality for funds with
  <u>large outflows in $t-1$</u>:

$$\widetilde{Alpha}_{t,f} = \text{Alpha}_{t,f} - \widehat{\text{Alpha}}_{t,f}$$

  with Alpha as benchmark-adjusted fund return and $\widehat{\text{Alpha}}$ as
  cond. expectation given four lags of fund performance 〜

- Average <u>total</u> within-fund externality due to outflows in $t-1$:

$$Externality = \frac{1}{n} \sum_{t,f} \widetilde{Alpha}_{t,f}$$

Decomposition by investor sector i

Externality *generated* is proportional to relative flow contribution:

$$Externality_i^{\text{generated}} = \frac{1}{n} \sum_{f,t} \left(\frac{\text{EuroFlows}_{t-1,f,i}}{\text{EuroFlows}_{t-1,f}} \right) \times \widehat{\text{Alpha}}_{t,f}$$

Externality *received* is proportional to relative TNA share:

$$Externality_i^{\text{received}} = \frac{1}{n} \sum_{f,t} \left(\frac{\text{TNA}_{t-1,f,i}}{\text{TNA}_{t-1,f}} \right) \times \widehat{\text{Alpha}}_{t,f}$$

$\rightarrow$ $\boxed{\text{Net externality}_i = Externality_i^{\text{received}} - Externality_i^{\text{generated}}}$
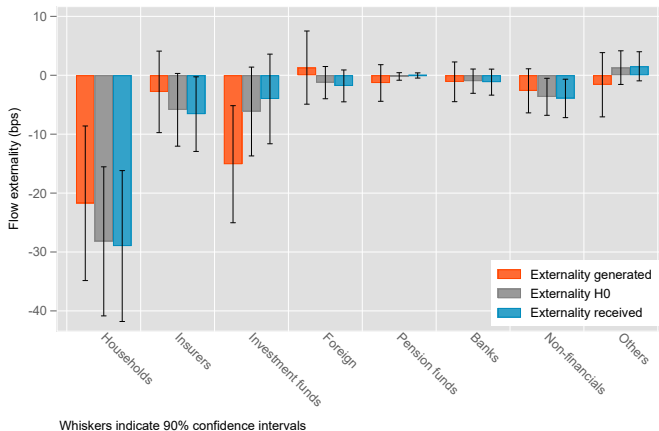
$$Externality = \sum_i Externality_i^{\text{generated}} = \sum_i Externality_i^{\text{received}}$$

$$\text{Null model: } Externality_i^{\text{H0}} = \frac{1}{n} \sum_{f,t} \left(\frac{\text{TNA}_{t-2,f,i}}{\text{TNA}_{t-2,f}} \right) \times \widehat{\text{Alpha}}_{t,f}$$

Results

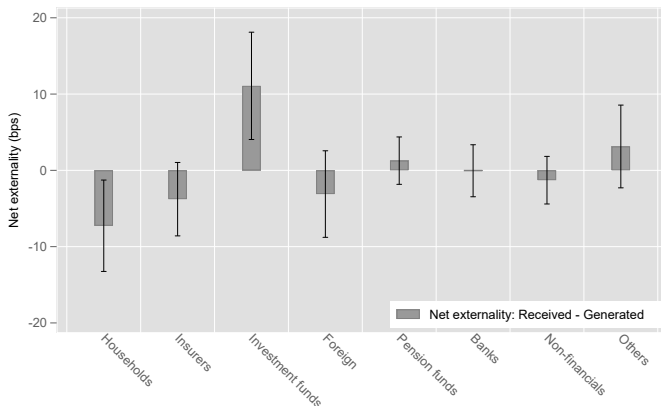# Results: Flow externality decomposition

Illiquid funds (top 25% small-/mid-cap holdings), Outflows(t-1) ≥ 10%:
Average total externality: -45 bps.

Whiskers indicate 90% confidence intervals

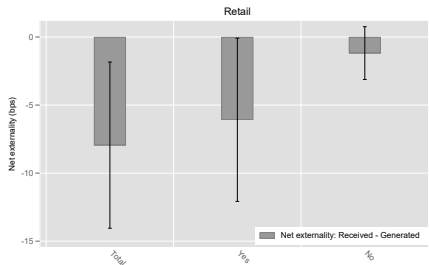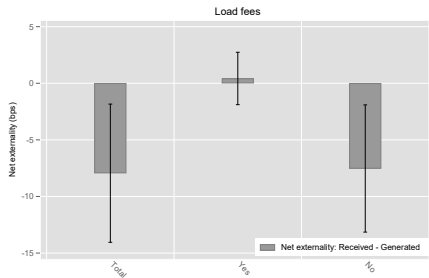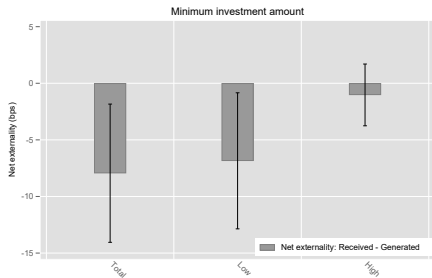# Results: Flow externality decomposition

Illiquid funds (top 25% small-/mid-cap holdings), Outflows(t-1) ≥ 10%:
Average total externality: -45 bps.

Whiskers indicate 90% confidence intervals

$$\text{Net externality} = Externality_i^{received} - Externality_i^{generated}$$

Results: A closer look at households (share-class char.)

Motivation
000

Data and Descriptives
0000

Framework
000

Results
000000

Conclusion
0

Additional Results/Robustness

- Network perspective Joint decomposition by generator/receiver confirms strong linkage from funds to households.

- Timing Total externality twice as large for contemp. outflows; net externality patterns similar. But: endogeneity concerns.

- No performance reversal Large outflows have a lasting one-off effect on fund NAVs. In line with trading-related costs.

- Excluding COVID-19 Total externality is smaller for pre-2020 data; net externality patterns similar.

- Different threshold Total externality varies with Outflow-threshold. Investment funds consistently net generators.

- Alternative performance measures Results very similar for CAPM-Alpha.

- Unexpected outflows Total externality is larger for large unexpected outflows; net externality patterns similar.

- Asymmetry No evidence of a positive inflow externality.

Behavioral Differences Across Sectors

Lastly, we ...

  (i) regress investor sector flows on market returns and the VIX,

 (ii) estimate the flow-performance relationship investor sectors,

(iii) take a closer look at COVID-19.

Compared to households/insurers, investment funds react stronger

  (i) to market downturns and increases in uncertainty ⌣

 (ii) on past fund performance (also within-fund) ⌣

(iii) during COVID-19 ⌣

Conclusion

- Novel framework to decompose fund flow externality.
  - Net externality generators: Investment funds.
  - Net externality receivers: Households + insurers.
  - Differences due to investment funds' stronger performance sensitivity and more procyclical trading.
- Financial stability concerns: detrimental effect of short-term investors' trading activity.
- Consumer-protection concerns: retail investors bear most of the flow externality (and pay highest fund fees).

- Outlook: other fund types, liquidity management tools, between-fund externality...

Who creates and who bears flow externalities in mutual funds?

DEUTSCHE BUNDESBANK
EUROSYSTEM

Daniel Fricke   **Stephan Jank**   **Hannes Wilke**

AFA Meeting 2023

January 7th, 2023

Disclaimer: The views expressed here are the authors' and do not necessarily represent the views of Deutsche Bundesbank or the Eurosystem.

Fund characteristics by investor sector ⮐

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Households	Insurers	Investment funds	Foreign	Pension funds	Banks	Non-financials	Others
Institutional share class	0.02	0.09	0.33	0.17	0.51	0.31	0.13	0.32
		0.07***	0.31***	0.15***	0.49***	0.29***	0.11***	0.30***
		(7.06)	(12.59)	(43.07)	(36.81)	(9.28)	(9.09)	(10.94)
Load fees	0.85	0.92	0.75	0.78	0.64	0.71	0.79	0.77
		0.07***	-0.10***	-0.06***	-0.21***	-0.14***	-0.06***	-0.08***
		(7.00)	(-3.95)	(-7.81)	(-6.15)	(-4.47)	(-3.46)	(-7.40)
log(Minimum investment)	10.87	12.92	14.18	14.57	13.38	14.14	12.66	13.41
		2.05***	3.31***	3.70***	2.51***	3.28***	1.80***	2.55***
		(12.26)	(25.49)	(9.05)	(6.97)	(18.60)	(9.13)	(27.97)
Expense ratio (%, p.a.)	1.64	1.53	1.25	1.46	1.19	1.43	1.60	1.33
		-0.10***	-0.39***	-0.18***	-0.45***	-0.21***	-0.04**	-0.31***
		(-9.97)	(-13.80)	(-19.71)	(-28.11)	(-3.63)	(-2.42)	(-7.42)
log(Fund TNA)	7.98	7.42	6.93	7.28	6.83	7.53	7.40	7.02
		-0.56***	-1.05***	-0.70***	-1.15***	-0.46***	-0.58***	-0.96***
		(-9.07)	(-9.80)	(-7.62)	(-15.51)	(-11.82)	(-6.53)	(-9.33)
Age (years)	22.59	22.59	14.46	18.01	14.98	15.38	16.40	15.04
		0.00	-8.13***	-4.59***	-7.61***	-7.22***	-6.19***	-7.55***
		(-0.01)	(-13.26)	(-5.89)	(-8.53)	(-8.73)	(-18.74)	(-9.50)
Share of small/mid-cap stocks	22.49	25.93	29.20	30.26	24.37	29.47	30.52	31.15
		3.44***	6.72***	7.78***	1.88*	6.99***	8.04***	8.67***
		(9.15)	(49.73)	(10.90)	(1.92)	(16.60)	(10.02)	(21.40)

Expense ratios across different sectors ⌐

|	Dependent variable: *Expense ratio*			
	(1) OLS	(2) OLS	(3) WLS	(4) WLS
Insurers	-0.089***	-0.040***	-0.099**	-0.043***
	(-9.26)	(-7.90)	(-2.30)	(-3.41)
Investment funds	-0.319***	-0.214***	-0.512***	-0.271***
	(-22.56)	(-22.10)	(-11.85)	(-11.96)
Foreign	-0.163***	-0.129***	-0.306***	-0.275***
	(-17.56)	(-15.73)	(-5.58)	(-9.94)
Pension funds	-0.509***	-0.227***	-0.630***	-0.302***
	(-18.42)	(-12.70)	(-10.51)	(-7.15)
Banks	-0.088***	-0.043***	-0.314***	-0.170***
	(-8.03)	(-8.01)	(-4.06)	(-5.19)
Non-financials	-0.012*	-0.018***	-0.046	-0.046***
	(-1.95)	(-5.89)	(-1.22)	(-3.12)
Others	-0.047***	-0.040***	-0.346***	-0.137***
	(-5.64)	(-9.37)	(-4.03)	(-6.74)
Households (Constant)	1.864***	1.827***	1.696***	1.620***
	(140.28)	(562.52)	(59.33)	(183.41)
R^2	0.03	0.89	0.10	0.90
Within R^2		0.08		0.17
Obs.	253,338	252,889	253,338	252,889
Fund-quarter FE	No	Yes	No	Yes

Ownership structure, conditional on outflows ⟲
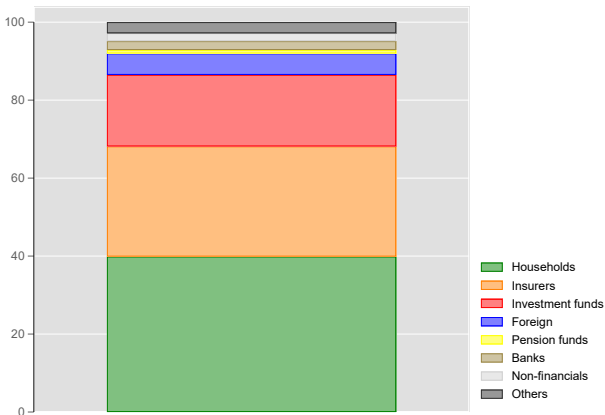
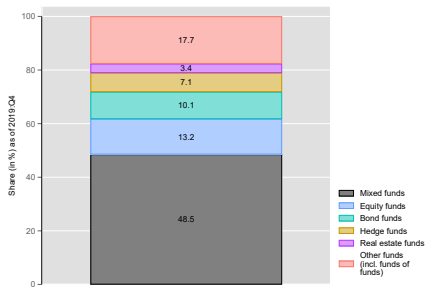# Flow variance contribution by investor sector ⌣
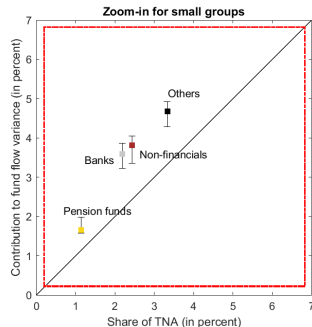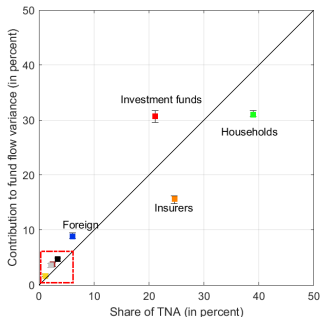
H0 of uniform flow behavior: flow contributions prop. to relative sector size ⇒ All sectors would lie on the main diagonal.

Investment funds in SHS are institutional-dominated ⌐
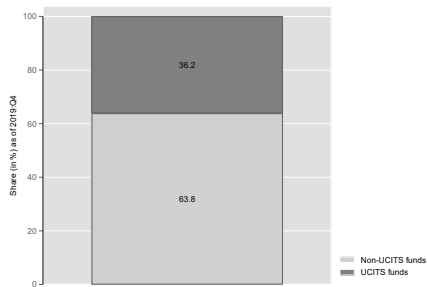
Total fund holdings: 2.33 trillion Euros (2019:Q4).
HH-share (non-)UCITS funds: 20% (11%).
Institutional share: $64\% \times 0.89 + 36\% \times 0.8 = 86\%$.

$\widehat{Alpha}$ Regression ⌣

Dep. var.: Alpha$_{t,f}$		
	(1)	(2)
Alpha$_{t-1}$	0.09***	0.09***
	(9.40)	(8.98)
Alpha$_{t-2}$	0.04***	0.04***
	(4.65)	(4.23)
Alpha$_{t-3}$	0.14***	0.13***
	(17.69)	(17.07)
Alpha$_{t-4}$	0.01*	0.01
	(1.66)	(1.20)
Illiquid$_{t-1}$	0.00***	0.00***
	(3.87)	(4.79)
log(TNA$_{t-1}$)		0.00***
		(5.53)
Expense Ratio$_{t-1}$		-0.00***
		(-3.98)
Constant	-0.01***	-0.02***
	(-17.03)	(-9.26)
Time FEs	Yes	Yes
R^2	.1284	.1304
Obs.	29817	29817

Network view: externality from i to j ⌄

$$Externality_{i \to j} = \frac{1}{n} \sum_{f,t} \left(\frac{\text{EuroFlows}_{t-1,f,i}}{\text{EuroFlows}_{t-1,f}} \right) \times \left(\frac{\text{TNA}_{t-1,f,j}}{\text{TNA}_{t-1,f}} \right) \times \widehat{\text{Alpha}}_{t,f}.$$
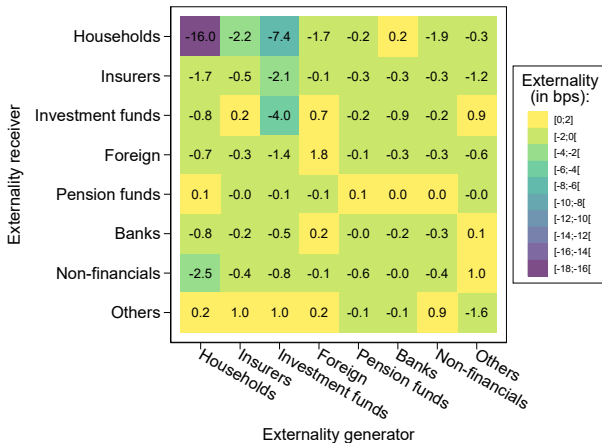
Flow externality decomposition: contemp. outflows

Illiquid funds (top 25% small-/mid-cap holdings), Outflows(t) ≥ 10%:
Average total externality: -96 bps.

Outflow(t)

Whiskers indicate 90% confidence intervals
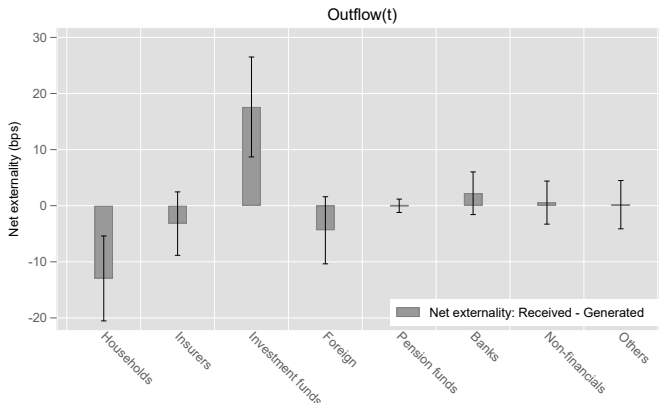
$$\text{Net externality} = \textit{Externality}_i^{\text{received}} - \textit{Externality}_i^{\text{generated}}$$

Alpha over different forward horizons ⌣

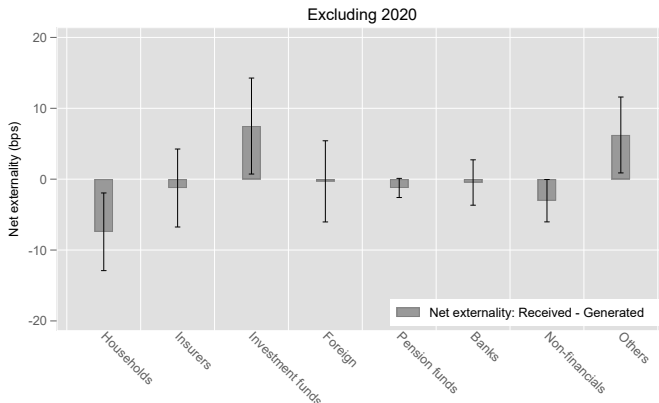Illiquid funds (top 25% small-/mid-cap holdings), Outflows(t-1) ≥ 10%:

	(1)	(2)	(3)	(4)
	Dep. var.: Alpha$_{f,t+\tau}$ (in %)			
	$\tau = 0$	$\tau = 1$	$\tau = 2$	$\tau = 3$
Outflows$_{t-1}$	0.06	0.07	-0.09	-0.10
	(0.92)	(0.98)	(-1.31)	(-1.32)
Outflows$_{t-1}$ × Illiquid fund$_{t-1}$	-0.57***	0.11	-0.05	0.18
	(-3.27)	(0.57)	(-0.25)	(0.81)
Illiquid fund$_{t-1}$	0.29***	0.31***	0.44***	0.37***
	(5.72)	(5.38)	(7.40)	(5.59)
Alpha$_{t-1}$	0.08***	0.07***	0.15***	0.04***
	(8.76)	(6.91)	(19.03)	(4.77)
Alpha$_{t-2}$	0.04***	0.14***	0.04***	-0.01
	(4.02)	(17.66)	(4.39)	(-1.58)
Alpha$_{t-3}$	0.13***	0.04***	-0.01	-0.06***
	(16.93)	(4.43)	(-0.60)	(-6.28)
Alpha$_{t-4}$	0.01	-0.03***	-0.09***	-0.00
	(1.13)	(-2.90)	(-9.51)	(-0.14)
log(TNA$_{t-1}$)	0.07***	0.07***	0.06***	0.06***
	(5.58)	(5.30)	(4.60)	(3.63)
Expense ratio $_{t-1}$	-0.12***	-0.13***	-0.18***	-0.26***
	(-3.96)	(-3.99)	(-4.78)	(-6.69)
Constant	-2.33***	-0.84***	0.09	-0.28
	(-9.28)	(-3.07)	(0.30)	(-0.87)
Time fixed effects	Yes	Yes	Yes	Yes
R^2	.1319	.1287	.1356	.117
Obs.	29,799	27,077	24,623	22,643

Flow externality decomposition: excluding COVID-19 ⬤

Illiquid funds (top 25% small-/mid-cap holdings), Outflows(t-1) ≥ 10%:
Average total externality: -26 bps.

Excluding 2020

Net externality (bps)

Households Insurers Investment funds Foreign Pension funds Banks Non-financials Others

Net externality: Received - Generated

Whiskers indicate 90% confidence intervals

$$\text{Net externality} = Externality_i^{received} - Externality_i^{generated}$$

Flow externality decomposition: Higher threshold ⟲

Illiquid funds (top 25% small-/mid-cap holdings), Outflows(t-1) ≥ 20%:
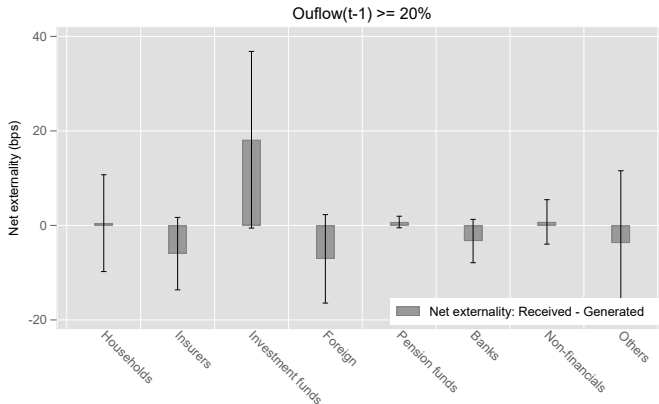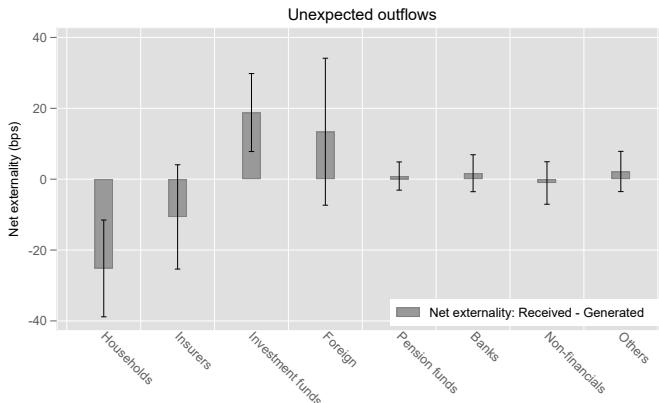Average total externality: -64 bps.

Whiskers indicate 90% confidence intervals

$$\text{Net externality} = \textit{Externality}_i^{\text{received}} - \textit{Externality}_i^{\text{generated}}$$

Flow externality decomposition: unexpected outflows ⌣

Illiquid funds (top 25% small-/mid-cap holdings), Outflows^{U}(t-1) ≥ 10%:
Average total externality: -54 bps.

Whiskers indicate 90% confidence intervals

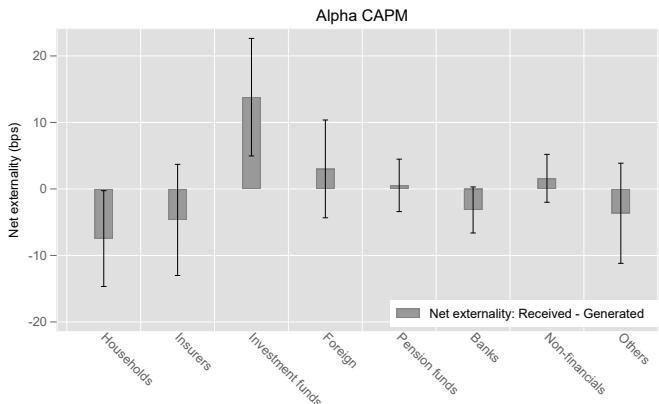$$\text{Net externality} = \textit{Externality}_i^{\text{received}} - \textit{Externality}_i^{\text{generated}}$$

Flow externality decomposition: Alpha CAPM ⌣

Illiquid funds (top 25% small-/mid-cap holdings), Outflows(t-1) ≥ 10%:
Average total externality: -46 bps.

Alpha CAPM

Whiskers indicate 90% confidence intervals

$$\text{Net externality} = Externality_i^{received} - Externality_i^{generated}$$

No positive externality from large inflows ⊖

	(1)	(2)	(3)	(4)
		Dependent variable		
		Alpha$_{f,t}$ (in %)		
Outflows$_{t-1}$	-0.08	0.06		
	(-1.26)	(0.92)		
Outflows$_{t-1}$ × Illiquid fund$_{t-1}$		-0.57***		
		(-3.27)		
Inflows$_{t-1}$			0.07	0.03
			(1.09)	(0.53)
Inflows$_{t-1}$ × Illiquid fund$_{t-1}$				0.10
				(0.64)
Illiquid fund$_{t-1}$		0.29***		0.23***
		(5.72)		(4.37)
Controls	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
R^2	.1303	.1319	.1303	.1314
Obs.	29,799	29,799	29,799	29,799

Behavioral Differences Across Sectors: Procyclicality ⏎

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Households	Insurers	Investment funds	Foreign	Pension funds	Banks	Non-financials	Others

Panel A: Aggregate sector flows and the market

Dependent variable: Aggregate sector flows (in percent of previous TNA)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Market	0.08**	0.02	0.18***	0.03	0.12	0.20*	0.02	-0.06
	(2.31)	(0.89)	(4.38)	(0.48)	(1.04)	(1.79)	(0.28)	(-0.69)
R^2	23.0	1.1	46.4	0.7	5.1	11.7	0.1	1.1
$\Delta(j) - (1)$	–	-0.06*	0.10*	-0.05	0.04	0.11	-0.06	-0.14
		(-2.02)	(1.73)	(-0.76)	(0.32)	(0.99)	(-0.89)	(-1.51)

Panel B: Aggregate sector flows and the VIX

Dependent variable: Aggregate sector flows (in percent of previous TNA)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VIX	-0.04	0.02	-0.16	-0.01	-0.33***	-0.40***	0.03	0.05
	(-0.49)	(0.64)	(-1.38)	(-0.09)	(-4.15)	(-3.36)	(0.45)	(0.41)
R^2	2.2	0.4	17.6	0.0	20.3	24.4	0.2	0.3
$\Delta(j) - (1)$	–	0.05	-0.12**	0.03	-0.29***	-0.36***	0.07	0.08
		(0.79)	(-2.22)	(0.39)	(-4.26)	(-5.09)	(0.83)	(0.86)

Behavioral Differences Across Sectors: FPR ⌣

$$\text{RelFlows}_{t,f,i}^{b} = f(\text{AlphaRank}_{t-1,f}) + b \times X_{t-1,f} + \mu_t + \epsilon_{t,f,i},$$
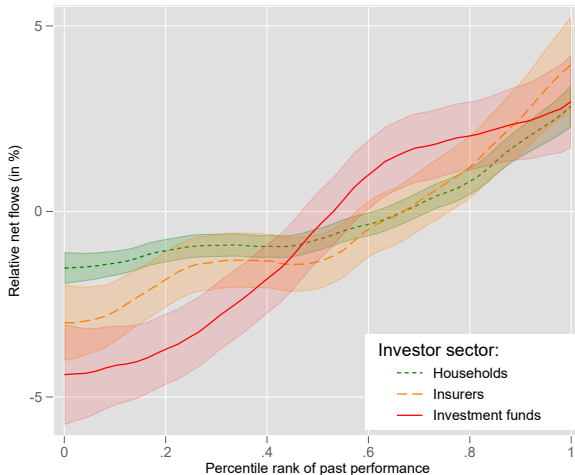
Outflows during the COVID-19 stress episode