

Who creates and who bears flow externalities in mutual funds?



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Presentation

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Flow externality in mutual funds

- Open-ended mutual funds allow investors to redeem their shares on a daily basis.
- Negative externality for remaining fund investors:
 - Large outflows \Rightarrow costly portfolio adjustments (commissions, bid-ask spreads, price impact,...).
 - Fund managers spread adjustments over a longer period. \Rightarrow Remaining fund investors bear portfolio adjustment costs.
- Funds with large outflows underperform their peers in the next period (e.g., Edelen, 1999; Chen et al., 2010).



Who creates and who bears flow externalities?

Contribution:

- Novel dataset on the sectoral ownership structure of euro area mutual funds
- Empirical framework to measure the externality generated/received at the investor sector level

Main findings:

- Net externality generators: Investment funds.
- Net externality receivers: Households + insurers.
- Differences in fund share trading behavior across investors (procyclicality, performance-sensitivity) explain these findings.

Policy implications

⇒ **Financial stability issues:**

- New insights on within-fund spillover channels
- Negative side effects from activity of short-term oriented institutional investors ⇒ Investment funds' fund redemptions exert pressure on other financial intermediaries' fund returns

⇒ **Consumer-protection issues:**

- In particular less financially-sophisticated retail investors bear the flow externality.
- “Adding insult to injury”: Retail investors bear most of the externality **and** pay high fund management fees.

Data

Sources

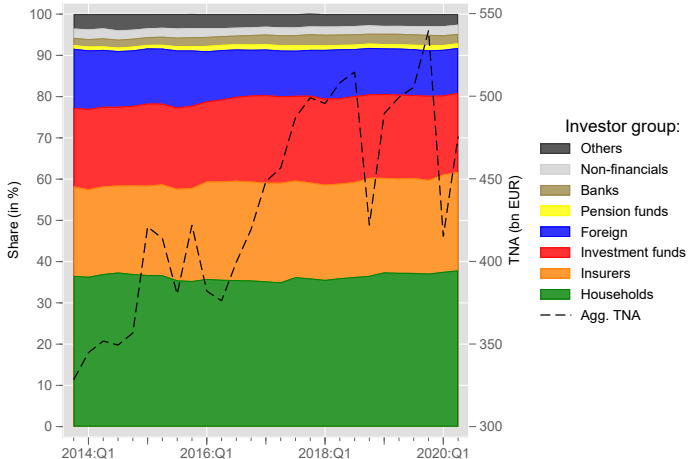
- Morningstar: fund characteristics.
- SHS-S: funds' ownership structure by sector.

Sample construction

- Actively-managed equity mutual funds
- Domiciled and available for sale in euro area
- Subject to harmonized EU regulatory framework (UCITS)
- Held (almost) entirely in euro area depots

⇒ **Final sample**: 27 quarters (2013:Q4–2020:Q2)
7,722 share classes (2,597 funds)

Holdings by investor sector



Sector specific flows

We decompose fund flows by sector based on the standard formula for implied fund flows (see e.g., Sirri and Tufano (1998)).

Euro flows by investor sector:

$$\text{EuroFlows}_{t,f,i} = \text{TNA}_{t,f,i} - \text{TNA}_{t-1,f,i} (1 + \text{Return}_{t,f}),$$

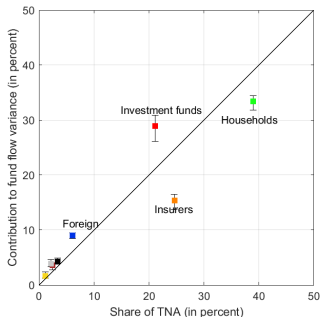
Relative flows by investor sector (% of total fund TNA):

$$\text{RelFlows}_{t,f,i}^a = \frac{\text{EuroFlows}_{t,f,i}}{\text{TNA}_{t-1,f}}.$$

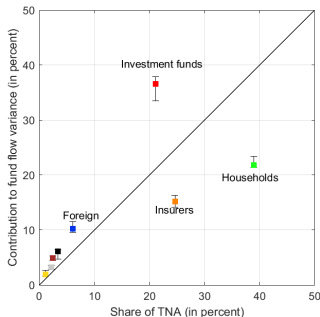
Relative flows by investor sector (% of sector i 's position in fund f):

$$\text{RelFlows}_{t,f,i}^b = \frac{\text{EuroFlows}_{t,f,i}}{\text{TNA}_{t-1,f,i}},$$

Flow variance contribution by investor sector: Inflows vs. outflows

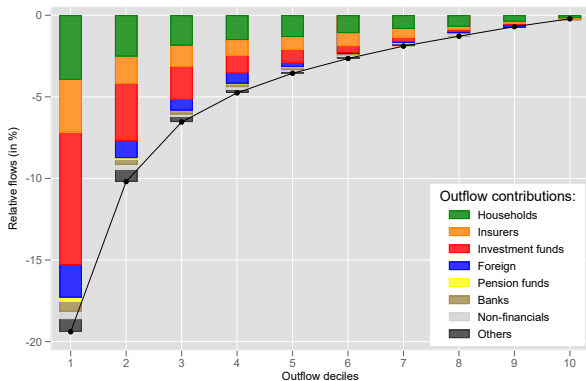


Left: Inflows



Right: Outflows.

Outflow contribution by investor sector across deciles



“Smoking gun”: In the Lowest flow decile over-proportional outflows by investment funds, under-proportional outflows by households and insurers.

Methodology

- Imbalances in flow contributions = imbalances in externality contributions?
⇒ Investor sectors need to have sufficient holdings overlap.
- Direct measure of the flow externality (**fund-quarter level**):
For the set of funds that experience large outflows ($\geq 10\%$) in $t - 1$, we track their performance in quarter t and compute the average flow externality (in bps):

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

with $\widetilde{Alpha}_{f,t}$ being the benchmark-adjusted return of fund f in quarter t beyond what is expected by past performance and expenses (i.e., the fund-level "damage" to remaining investors).

Externality decomposition by sector

Sector i 's externality contribution is proportional to its relative contribution to the Euro flows in $t-1$:

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

The externality *received* by investor sector i in fund f in quarter t is proportional to the sector's relative total net asset (TNA) share in $t-1$.

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

Externality decomposition by sector

Benchmark: Uniform flow behavior

$$Externality_i^{H0} = \frac{1}{n} \sum_{f,t} \left(\frac{TNA_{t-2,f,i}}{TNA_{t-2,f}} \right) \times \widetilde{Alpha}_{t,f}.$$

- All investor sectors redeem proportionally under the null.
- Contributions depend on TNA share *prior* to the occurrence of the large outflow.
- Relative TNA shares do not change!
- Investor sectors also absorb according to their TNA shares.

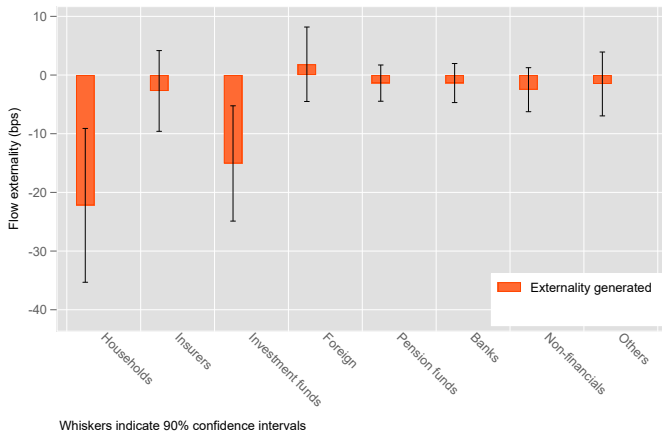
Flow externality decomposition

Illiquid funds (top 25% small-/mid-cap holdings), Outflows $\geq 10\%$:

Average total externality: -45 bps.

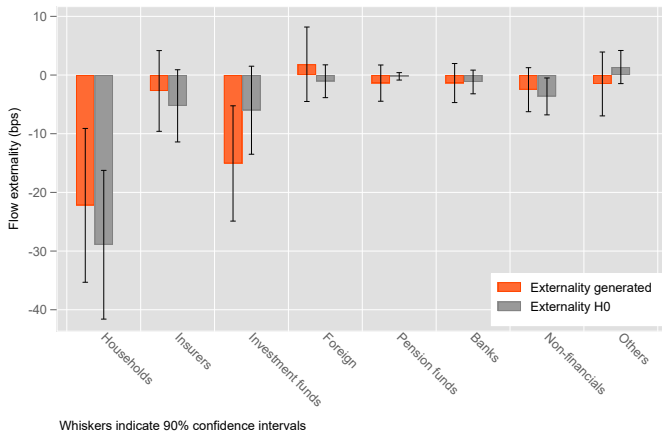
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Flow externality decomposition

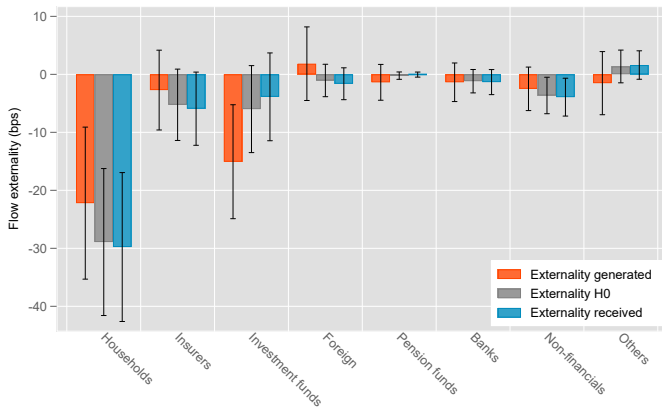
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Flow externality decomposition

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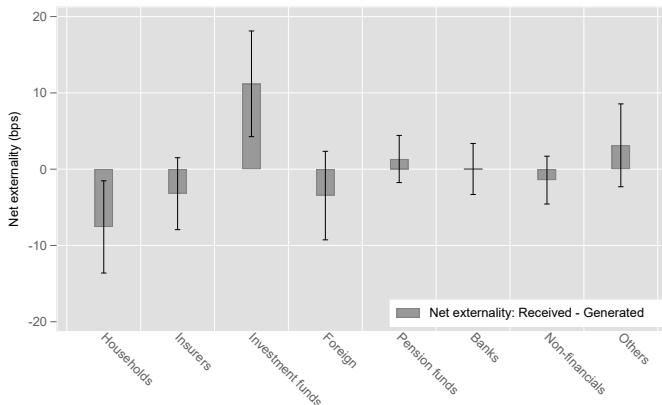
Average total externality: -45 bps.



Flow externality decomposition

Net externality = externality received - externality generated.

- Positive value: Net generator
- Negative value: Net receiver



Whiskers indicate 90% confidence intervals

The results so far

- Main findings:
 - Net **generators**: investment funds.
 - Net **receivers**: households, insurers.
- How do these investor sectors differ in their fund share trading behavior?

Portfolio turnover and investment procyclicality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Households	Insurers	Investment funds	Foreign	Pension funds	Banks	Non-financials	Others
Panel A: Sector turnover								
Turnover	2.91	3.40	6.63	7.87	6.44	8.40	6.80	7.67
$\Delta(j) - (1)$		0.49* (1.98)	3.72*** (13.17)	4.95*** (12.52)	3.53*** (5.89)	5.49*** (11.41)	3.89*** (6.97)	4.75*** (7.93)

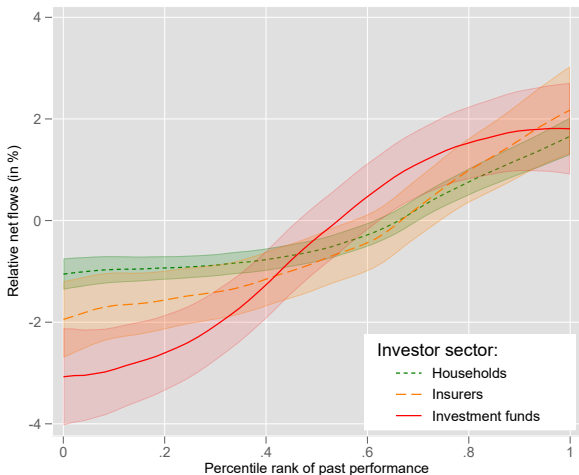
Turnover is defined as the minimum of a sectors' aggregate fund purchases or sales in a quarter, divided by average sector holdings during that period (in %).

Portfolio turnover and investment procyclicality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Households	Insurers	Investment funds	Foreign	Pension funds	Banks	Non-financials	Others
Panel B: Aggregate sector flows and the market								
Dependent variable: Aggregate sector flows (in percent of previous TNA)								
Market	0.08** (2.31)	0.02 (0.89)	0.18*** (4.38)	0.03 (0.48)	0.12 (1.04)	0.20* (1.79)	0.02 (0.28)	-0.06 (-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* (-2.02)	0.10* (1.73)	-0.05 (-0.76)	0.04 (0.32)	0.11 (0.99)	-0.06 (-0.89)	-0.14 (-1.51)
Panel C: Aggregate sector flows and the VIX								
Dependent variable: Aggregate sector flows (in percent of previous TNA)								
VIX	-0.04 (-0.49)	0.02 (0.64)	-0.16 (-1.38)	-0.01 (-0.09)	-0.33*** (-4.15)	-0.40*** (-3.36)	0.03 (0.45)	0.05 (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 (0.79)	-0.12** (-2.22)	0.03 (0.39)	-0.29*** (-4.26)	-0.36*** (-5.09)	0.07 (0.83)	0.08 (0.86)

Flow-performance relationship by investor sector

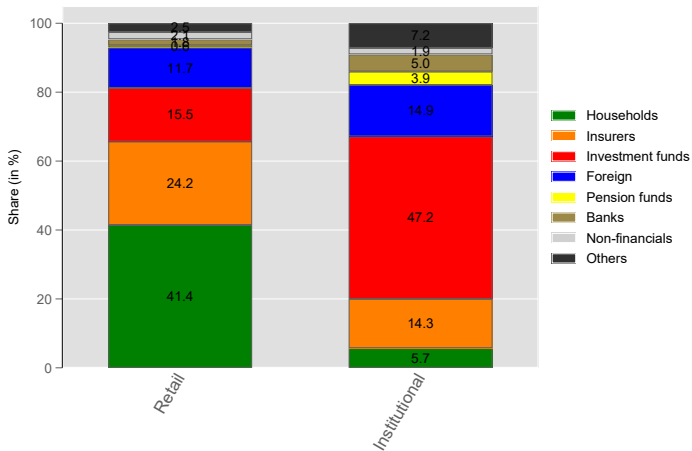
$$\text{RelFlows}_{t,f,i}^b = f(\text{AlphaRank}_{t-1,f}) + bX_{t-1,f} + \mu_t + \epsilon_{t,f,i},$$



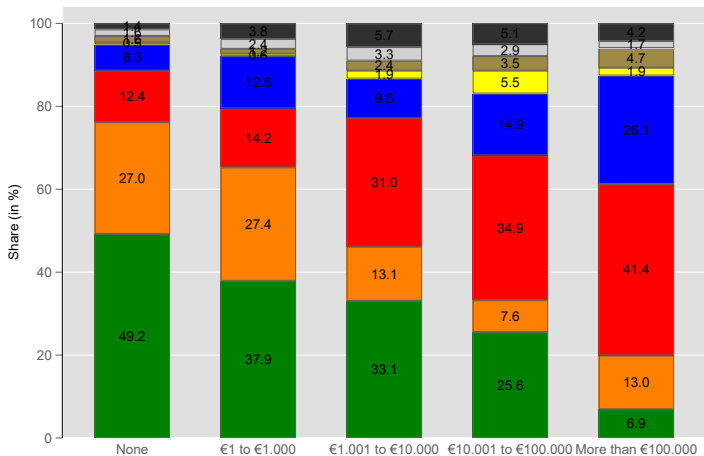
Conclusions

- Empirical framework to decompose fund flow externality.
 - Net **generators**: investment funds.
 - Net **receivers**: households, insurers.
- Differences due to investment funds' stronger performance sensitivity and more pro-cyclical trading.
- Financial stability concerns due to fund share trading activity of short-term investors.
- Consumer-protection concerns: Retail investors bear most of the flow externality **and** pay higher fund fees.

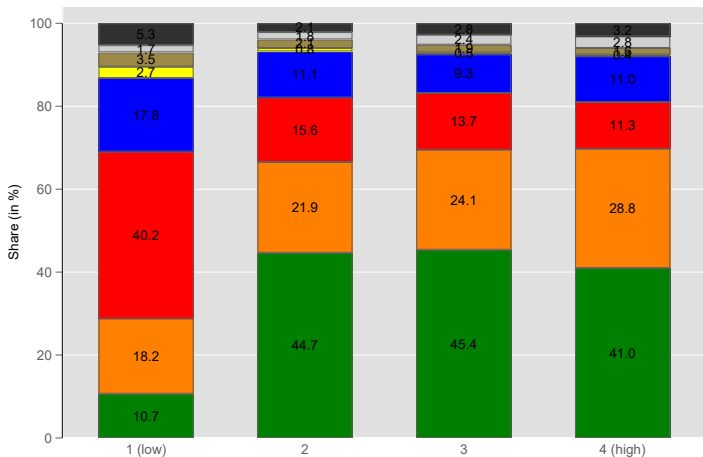
Breakdown by share class type



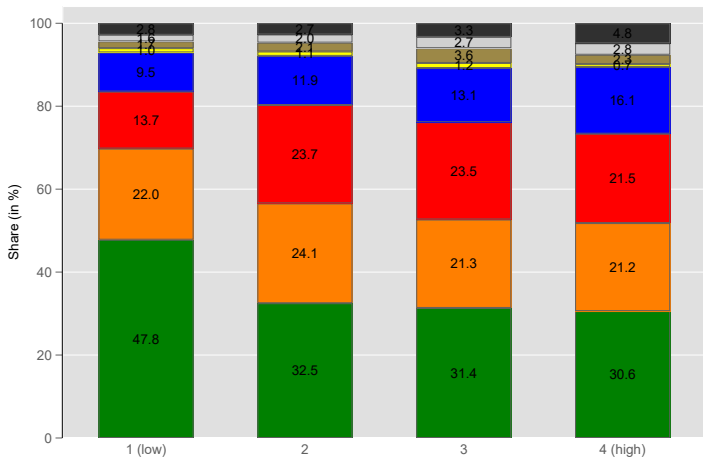
Breakdown by minimum investment required



Breakdown by expense ratio



Breakdown by ratio of small-to-mid-cap holdings



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

Expense ratios by different sectors: Within fund analysis 

	Dependent variable: <i>Expense ratio</i>			
	(1) OLS	(2) OLS	(3) WLS	(4) WLS
Insurers	-0.089*** (-9.26)	-0.040*** (-7.90)	-0.099** (-2.30)	-0.043*** (-3.41)
Investment funds	-0.319*** (-22.56)	-0.214*** (-22.10)	-0.512*** (-11.85)	-0.271*** (-11.96)
Foreign	-0.163*** (-17.56)	-0.129*** (-15.73)	-0.306*** (-5.58)	-0.275*** (-9.94)
Pension funds	-0.509*** (-18.42)	-0.227*** (-12.70)	-0.630*** (-10.51)	-0.302*** (-7.15)
Banks	-0.088*** (-8.03)	-0.043*** (-8.01)	-0.314*** (-4.06)	-0.170*** (-5.19)
Non-financials	-0.012* (-1.95)	-0.018*** (-5.89)	-0.046 (-1.22)	-0.046*** (-3.12)
Others	-0.047*** (-5.64)	-0.040*** (-9.37)	-0.346*** (-4.03)	-0.137*** (-6.74)
Households (Constant)	1.864*** (140.28)	1.827*** (562.52)	1.696*** (59.33)	1.620*** (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

Methodology

Time structure:

t-2: Investor sectors hold fund shares before large outflow

→ Large outflow!

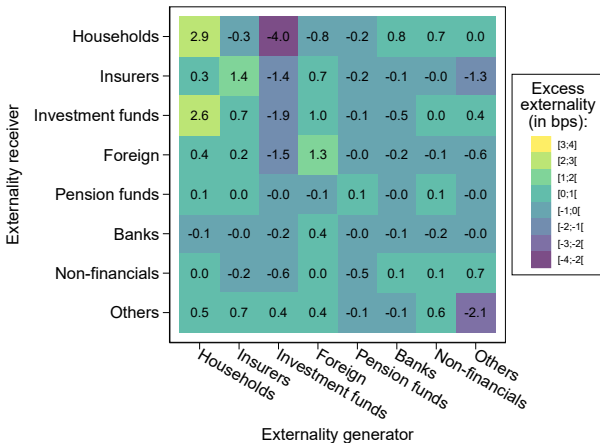
t-1: Investor sectors hold fund shares after large outflow

→ fund generates return after large outflow

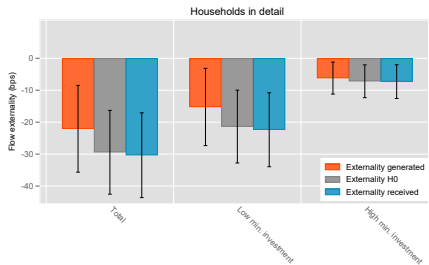
t: Sectors remaining in the fund realize fund return

Network perspective: Excess flow externality

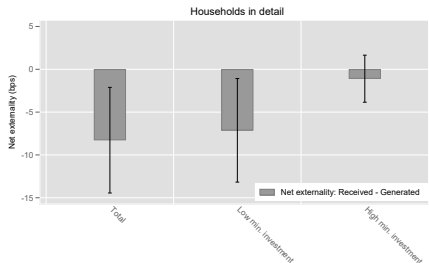
$$\text{Excess Externality}_{i \rightarrow j} = \text{Externality}_{i \rightarrow j} - \text{Externality}_{i \rightarrow j}^{\text{H0}}$$



A closer look at households



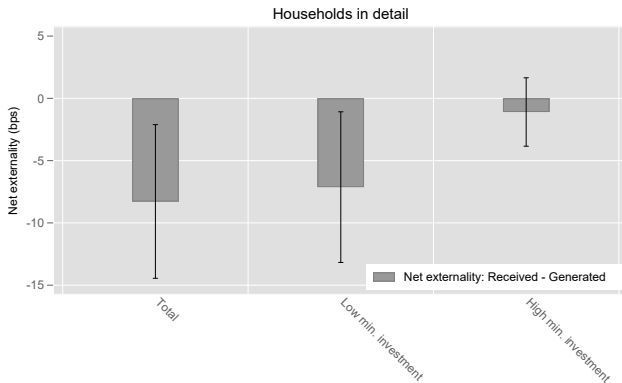
Whiskers indicate 90% confidence intervals



A closer look at households

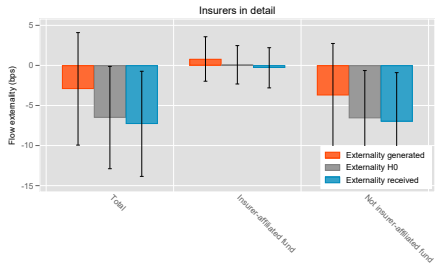
A high minimum investment amount acts as an **entry barrier** for less wealthy (i.e., less-financially sophisticated) households.

Cutoff: 10.000 EUR minimum investment amount

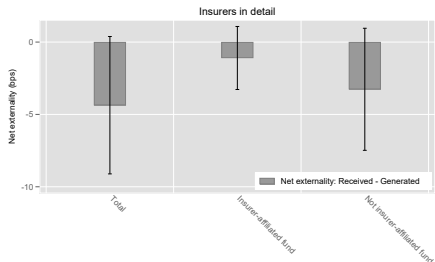


Whiskers indicate 90% confidence intervals

A closer look at insurers



Whiskers indicate 90% confidence intervals



Whiskers indicate 90% confidence intervals

FPR - Regressions (Linear)

	(1)	(2)
Linear specification		
	Dependent variable: RelFlows _{t,f,i} ^b	
Alpha rank	4.51*** (8.01)	–
Alpha rank × Investment funds	4.97*** (3.96)	5.25*** (3.39)
Alpha rank × Insurance companies	3.11*** (3.07)	3.91*** (3.17)
Alpha rank × Pension funds	-1.67 (-0.59)	0.47 (0.13)
Alpha rank × Banks	1.73 (0.27)	-0.28 (-0.04)
Alpha rank × Non-financials	2.42*** (2.84)	2.92*** (3.04)
Alpha rank × Foreign	-2.56 (-0.69)	-1.93 (-0.52)
Alpha rank × Others	7.50*** (4.14)	7.07*** (3.75)
Fund-level controls	Yes	–
Time fixed effects	Yes	–
Fund×time fixed effects	No	Yes
R ²	1.401	19.57
Within R ²	1.34	1.17
Obs.	181.392	181.122

FPR - Regressions (Piecewise-linear)

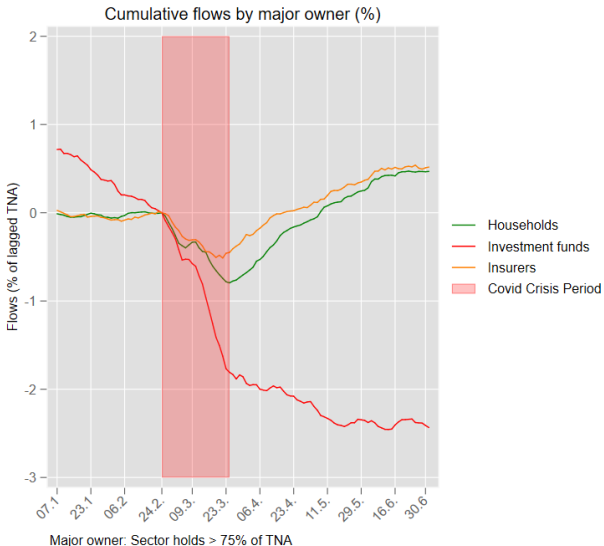
	(1)	(2)		
Piecewise-linear specification				
	Dependent variable: RelFlows ^b _{t,f,i}			
Alpha rank low	1.32	(1.30)	-	
Alpha rank high	6.33***	(3.44)		
Alpha rank low × Investment funds	7.82***	(2.85)	8.20**	(2.33)
Alpha rank high × Investment funds	-5.71	(-1.17)	-5.42	(-0.90)
Alpha rank low × Insurance companies	0.65	(0.32)	-1.02	(-0.39)
Alpha rank high × Insurance companies	4.66	(1.21)	9.60**	(2.01)
Alpha rank low × Pension funds	5.68	(0.77)	12.22	(1.34)
Alpha rank high × Pension funds	-13.78	(-1.10)	-20.65	(-1.36)
Alpha rank low × Banks	-1.05	(-0.07)	-6.33	(-0.43)
Alpha rank high × Banks	5.15	(0.20)	11.67	(0.45)
Alpha rank low × Non-financials	-0.33	(-0.18)	0.99	(0.46)
Alpha rank high × Non-financials	5.39	(1.57)	3.81	(0.95)
Alpha rank low × Foreign	1.55	(0.18)	0.64	(0.07)
Alpha rank high × Foreign	-8.21	(-0.52)	-5.10	(-0.33)
Alpha rank low × Other	0.75	(0.20)	0.34	(0.09)
Alpha rank high × Other	13.12*	(1.94)	13.17*	(1.87)
Fund-level controls	Yes		-	
Time fixed effects	Yes		-	
Fund×time fixed effects	No		Yes	
R ²		1.1	19.57	
Within R ²		1.35	1.17	
Obs.		181.392	181.122	

Fund flow externality decomposition - excluding 2020

Illiquid funds (top 25% small-/mid-cap holdings), Outflows $\geq 10\%$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total	Households	Insurers	Investment funds	Foreign	Pension funds	Banks
Externality ^{out}	-25.93	-6.97 (-1.15)	-4.64 (-1.03)	-12.18** (-2.08)	0.67 (0.17)	1.01 (1.20)	-0.55 (-0.27)
Externality ⁱⁿ	-25.93	-14.34** (-2.12)	-5.33 (-1.40)	-4.39 (-1.11)	-0.33 (-0.19)	-0.23 (-0.78)	-1.07 (-0.91)
Externality ^{H0}	-25.93	-13.55** (-2.07)	-5.08 (-1.37)	-5.43 (-1.32)	-0.04 (-0.02)	0.00 (0.01)	-0.86 (-0.75)
Externality ⁱⁿ - Externality ^{out}	0.00	-7.37** (-2.21)	-0.68 (-0.21)	7.78* (1.92)	-1.00 (-0.29)	-1.24 (-1.51)	-0.52 (-0.27)
Externality ^{out} - Externality ^{H0}	0.00	6.58** (2.36)	0.43 (0.16)	-6.75** (-2.00)	0.72 (0.24)	1.00 (1.47)	0.31 (0.19)
Externality ⁱⁿ - Externality ^{H0}	0.00	-0.79 (-1.33)	-0.25 (-0.46)	1.04 (1.41)	-0.28 (-0.55)	-0.23* (-1.67)	-0.21 (-0.73)
Obs.	624						

Outflows during the COVID-19 stress episode

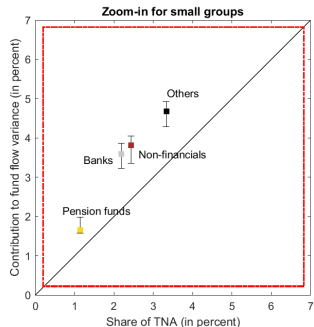
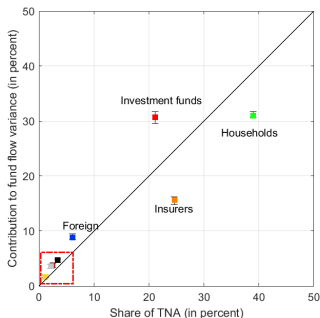


COVID-19 - Flow regressions

Market crash period (24th February - March 23, 2020)

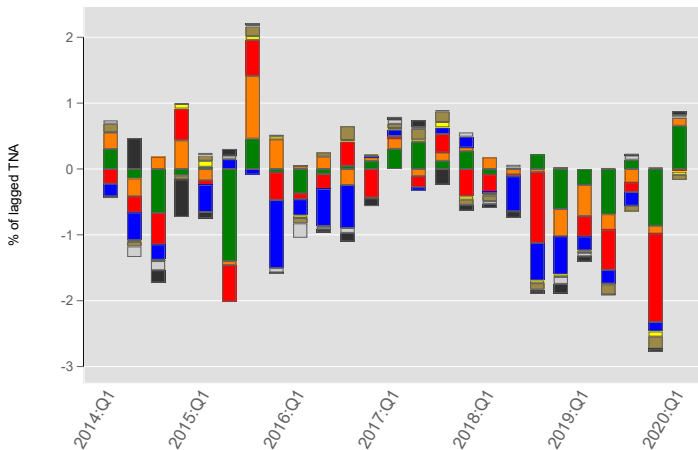
Horizon $H =$	1 day	2 days	3 days	4 days	5 days	10 days	20 days	40 days	60 days
Dependent variable: $CumRelFlows_{s,f,H}$									
Panel A: OLS									
Investment Funds	-0.02 (-1.34)	-0.09*** (-2.75)	-0.09* (-1.74)	-0.09 (-1.47)	-0.10 (-1.22)	-0.41*** (-2.60)	-1.48*** (-3.89)	-2.23*** (-5.34)	-2.82*** (-5.67)
Insurers	-0.02 (-1.29)	0.01 (0.22)	0.06 (1.39)	0.04 (0.79)	0.05 (0.74)	-0.02 (-0.17)	0.23 (0.93)	0.15 (0.40)	0.15 (0.33)
Constant	0.01 (0.92)	-0.03** (-2.15)	-0.11*** (-4.42)	-0.17*** (-4.89)	-0.25*** (-5.45)	-0.33*** (-4.72)	-0.79*** (-5.04)	-0.32 (-1.53)	-0.03 (-0.09)
R^2	0.00	0.01	0.01	0.00	0.00	0.01	0.03	0.03	0.04
Within R^2	0.00	0.01	0.01	0.00	0.00	0.01	0.03	0.03	0.04
# share classes	1,627	1,624	1,623	1,618	1,616	1,611	1,594	1,563	1,537
# Funds	1,010	1,009	1,009	1,007	1,006	1,006	1,001	990	981
Panel B: Fund fixed effects									
Investment Funds	-0.05 (-1.11)	-0.18*** (-2.60)	-0.27*** (-2.72)	-0.30** (-2.38)	-0.46*** (-3.19)	-1.13*** (-4.03)	-2.49*** (-3.38)	-3.26*** (-4.74)	-3.54*** (-4.94)
Insurers	-0.11 (-1.61)	-0.28* (-1.81)	-0.37** (-2.10)	-0.52** (-2.26)	-0.66** (-2.31)	-0.96* (-1.71)	-2.07* (-1.76)	-1.74 (-1.08)	-1.51 (-0.85)
Constant	0.03** (2.00)	0.04 (1.29)	0.00 (0.07)	-0.05 (-0.97)	-0.07 (-1.25)	-0.01 (-0.11)	-0.34 (-1.29)	0.07 (0.27)	0.24 (0.81)
R^2	0.07	0.16	0.22	0.19	0.21	0.28	0.42	0.54	0.58
Within R^2	0.00	0.01	0.02	0.02	0.02	0.03	0.04	0.04	0.05
# share classes	971	969	968	965	963	956	940	910	895
# Funds	354	354	354	354	353	351	347	337	332

Flow variance contribution by investor sector: All flows



Under the null hypothesis of uniform flow behavior:
 Flow contributions only depend on relative size of sector
 ⇒ All sectors would lie on the main diagonal.

Flows by investor sector (percent of lagged TNA)



Related literature

- **Fund fragility and structural vulnerabilities**

Edelen (1999); Coval and Stafford (2007); Chen et al. (2010); Goldstein et al. (2017); Capponi et al. (2020); Chernenko and Sunderam (2020); Falato et al. (2020); Fricke and Wilke (2020); Jin et al. (2021).

- **Contagion in economic and financial networks**

Acemoglu et al. (2012); Elliott et al. (2014); Acemoglu et al. (2015).

- **Investment horizons and financial markets**

Froot et al. (1992); Graham et al. (2005); Timmer (2018); Gianetti and Yu (2021).

Network perspective: from sector i to sector j

$$Externality_{i \rightarrow j} = \frac{1}{n} \sum_{f,t} \left(\frac{\text{EuroFlows}_{t-1,f,i}}{\text{EuroFlows}_{t-1,f}} \right) \times \left(\frac{\text{TNA}_{t-1,f,j}}{\text{TNA}_{t-1,f}} \right) \times \overline{\text{Alpha}}_{t,f}$$

