Investor Learning and Mutual Fund Performance

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Mutual Funds

- Mutual funds in the USA are investment vehicles that pool money from many investors to purchase a diversified portfolio of stocks, bonds, or other securities. They are managed by professional fund managers who allocate the fund's assets and attempt to produce capital gains or income for the fund's investors. The portfolio is structured and maintained to match the investment objectives stated in its prospectus. Here are some common types of mutual funds in the USA:
  - Stock (Equity) Funds: These funds invest primarily in stocks and are categorized based on the size of the companies they invest in (small, mid, or large-cap)
  - Bond (Fixed-Income) Funds: These funds invest in bonds and other debt instruments, and are often categorized by the type of bonds they invest in (such as government, municipal, or corporate bonds)
  - Index Funds: These funds aim to track the performance of a specific index, such as the S&P 500

Comparing to Hedge Funds or Closed-end funds

- Mutual funds have key differences from similar investment vehicles.
  - Mutual funds are open-ended, meaning they continuously issue and redeem shares based on investor demand. Highly regulated by the U.S. Securities and Exchange Commission (SEC). They must disclose their portfolios regularly. Available to all types of investors. Shares can be bought or sold at the end of each trading day at the fund's net asset value (NAV).
  - Hedge Funds are typically private investment partnerships with a fixed number of shares, not open to the general public. Employ short selling, leverage, derivatives, and arbitrage. Less regulated.These funds have higher fees and are less liquid.
  - Closed-end funds are publicly traded investment funds with a fixed number of shares. They do not redeem shares but are traded on stock exchanges.

Definitions

- In the context of mutual funds, the terms "flows," "returns," and "asset value" have specific meanings:
  - Mutual fund flows refer to the net movement of cash into and out of a mutual fund. This is calculated as the difference between the amounts of new capital coming into the fund (subscriptions) and the capital leaving the fund (redemptions). Fund flows are a significant indicator of investor sentiment and demand for the fund.
  - High net inflows indicate that more investors are buying into the fund, while net outflows suggest that investors are selling their holdings. This can impact the fund's asset size and, potentially, its performance, as the fund manager may need to buy or sell assets to accommodate these flows.
  - Mutual fund returns are the profits or losses made from investing in the fund. Returns are a key measure of a mutual fund's performance and are crucial for investors in assessing the effectiveness of the fund manager and the fund's investment strategy.

SEC EDGAR files

- EDGAR provides investor access to most public filings including those by mutual funds
  - U.S. Securities and Exchange Commission's EDGAR (Electronic Data Gathering, Analysis, and Retrieval system) is available to individuals and open to crawling (e.g., by "downloader" Python package). The most common documents are Prospectuses: These documents offer detailed information about a mutual fund, including investment objectives, strategies, risks, performance, distribution policy, fees, and expenses.
  - Annual and Semi-Annual Reports: These reports offer insights into the fund's performance over a certain period, including financial statements and a list of holdings.
  - Form N-PORT and N-CEN: Form N-PORT provides monthly portfolio holdings information for mutual funds. Form N-CEN is filed annually and provides census-type information.

Overview of the Question

- Does viewership of Mutual funds Government filings predict mutual fund flows? What is the effect on performance? Can we use cross-sectional equilibrium predictions?
- We clarify the predictions by modeling the fund information. We explore this question in two datasets from EDGAR system
- What characteristics attract viewership?
- Viewership and predictive power by filing age, type of the document, investor type

Model

We align with the notations used in Berk and Green. Their paper provides a framework for linking information-to-flows-to-performance.

Returns, denoted as R, are composed of α and ε_i, where R signifies the return prior to the deduction of any fees.

Here, α represents an inherent ability to achieve extraordinary returns. The term ε_i is introduced as a measure of the capability to infer fund characteristics from historical performance data.

Let ε_i to follow a normal distribution $N(0, \sigma_i^2)$. The precision of the information is quantified by $\omega_i = \frac{1}{\sigma_i^2}$. Assets under management q_i, define both the cost and fee structures of the fund.

Model Cont.

Cost structure and fund size are in equilibrium.

We model the cost structure as $C(q_i)$, to ensure an internal solution through its convex properties. These properties are defined by the conditions: $C(q_i) > 0$, $C'(q_i) > 0$, and $C''(q_i) > 0$. Costs capture decreasing returns to scale in finding the investment opportunities.

Costs are assumed to be essential for generating returns. Furthermore, the fund manager is assumed to require a positive compensation, different from the costs above, denoted as $f(q_i) > 0$, for the management of the funds.

Model Cont.

1. The total payout to investors is denoted as $TP_{t+1} = q_t R_{t+1} - C(q_t, t) - q_t f$. Note that all terms depend, but are not homogenous in size.
2. The return to investors is defined as $r_{t+1} = \frac{TP_{t+1}}{q_t}$, which equates to $R_{t+1} - c(q_t)$. And as such, the cost to investors is expressed as $c(q_t) = \frac{C(q_t)}{q_t} + f$
3. We define priors and posterior means as follows: let the prior about the manager's alpha be $N[\phi_0, \frac{1}{\gamma}]$, with γ representing the precision of the investor's prior. Let ϕ_t denote the posterior given what investors learn, so we have $\phi_t = E(R_{t+1}|\mathcal{F}_t)$.

Model Cont.

1. In equilibrium, we require that $E_t(r_{t+1}|\mathcal{F}_t) = 0$. From this condition, after taking an expectation, we obtain $\phi_t = c(q_t) = \frac{C(q_t)}{q_t} + f$, implying that with a perfectly elastic supply of funds, the expected payoff precisely justifies the costs.
2. Bayesian sequential updating from ϕ_{t-1} to ϕ_t, with (a) normally distributed variables, (b) affine functions, and (c) a fixed true alpha, is given by $\phi_t = \frac{\gamma+(t-1)\omega}{\gamma+t\omega}\phi_{t-1} + \frac{\omega}{\gamma+t\omega}R_t$.

Model Cont.

1. The intuition for affine projections is $cov(S, V)/var(S)(S - Prior)$, so the fraction is $var(\alpha)/(var(\varepsilon) + var(\alpha)) = \omega/(\omega + \gamma)$, with precision over many periods $t\omega$
2. This yields $c(q_t) = c(q_{t-1}) + \frac{\omega}{\gamma + t\omega} r_t$ and this is the key result to be used further.
3. Using $\phi_t = c(q_t)$, $\phi_t = \phi_{t-1} + \frac{\omega}{\gamma + t\omega} r_t$

Model Cont.

1. Fund flows to performance relations are implicit in $c(q_t) - c(q_{t-1}) = \frac{\omega}{\gamma + t\omega} r_t$. It is monotone because $c'(q) = \frac{1}{q}[C'(q) - C(0)]$ is positive.
2. The excess realized return in the posterior is fixed by $r_{t+1} = R_{t+1} - c(q_t) = R_{t+1} - \phi_t$.

Model Cont.

1. The sensitivity of fund flows to the measure ω_i (learned signal precision) is implicitly defined by $c(q_t) = c(q_{t-1}) + \frac{\omega}{\gamma+t\omega} r_t$.
2. For $t = 1$, we have $\frac{\partial c_t}{\partial r_t} = \frac{\omega}{\gamma+\omega}$, so that $\frac{d}{d\omega}\left(\frac{\partial c_t}{\partial r_t}\right) = \frac{\gamma}{(\gamma+\omega)^2} > 0$, indicating that the sensitivity of fund flows to past performance (in equilibrium) increases with the ability to learn.
3. If the flow into the fund is expected to be irrationally higher, we have $q_t^* = q_t + \delta > q_t$. It follows that $c(q_t^*) - c(q_{t-1}) > \frac{\omega}{\gamma+t\omega} r_t$, leading to $E(R_{t+1} - c(q_t^*)|\mathcal{F}_t) = \phi_t - E(c(q_t^*)|\mathcal{F}_t) < 0$, suggesting that the next-period fund return is lower following abnormal net inflows.

Data/Regression Specification

- Primary Data: SEC server logs that count views of EDGAR filings
  - Two subsamples: 1/2003 - 6/2017, 6/2020 - 3/2023
  - Data structure: [IP, Time, Filing] $\rightarrow$ [Time, Filing]

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$$NetFlows_{i,t+1} = \alpha + \beta AVS_{i,t} + \gamma \mathbf{X}_{i,t} + \varepsilon_{i,t}$$

  - **X:** last month & year return, total assets, age, daily return volatility

Summary Statistics

Panel A: IP-Level Trends

	Count	Mean	SD	1%	50%	99%
Filings Viewed/Month	4,588,555	98.69	3625.08	1	1	784
Frequency of Activity	4,588,555	2.15	3.78	1	1	22

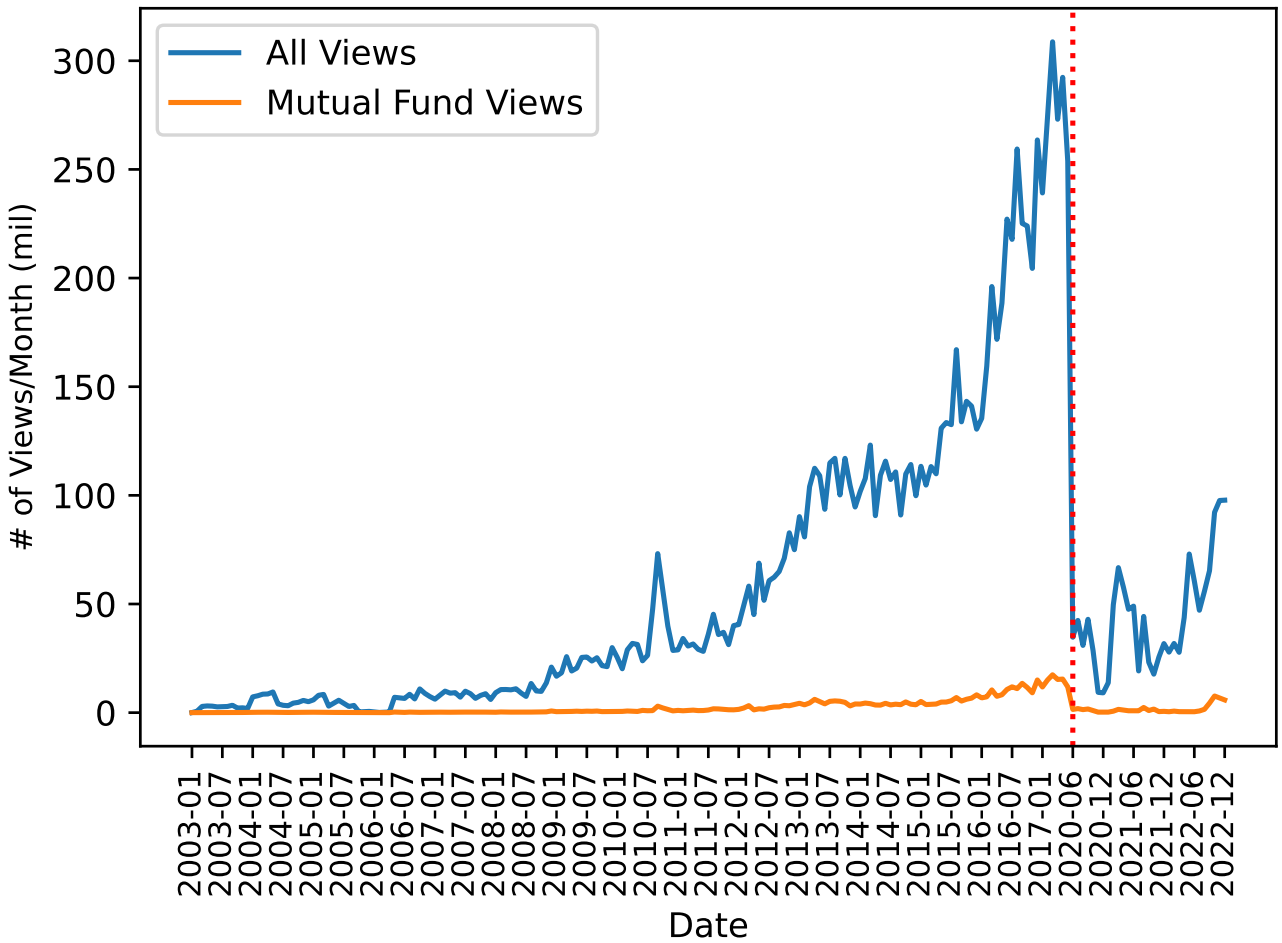
Panel B: Fund-Level Measures

	Count	Mean	SD	1%	50%	99%
Net Flows	279,846	1.251	4.165	-4.169	1.450	13.960
Annual Return	268,478	2.701	16.622	-45.543	6.850	55.645
log(Age)	276,438	4.70607	0.74254	1.79176	4.88925	5.70900
log(Total Assets)	276,438	6.73400	2.43012	0.33647	6.83926	11.99946
Daily Return Volatility	276,367	0.07495	0.03682	0.00051	0.07648	0.18048
Inflows	279,916	0.53537	0.49875	0	1	1
Abnormal View Share	268,797	0.00237	0.02137	-0.03625	-0.00019	0.05635

Large Funds

Rank	Fund Name	Total Net Assets ($M)	EDGAR View Share
1	Fidelity Phillips Street Trust	162,667.70	0.05%
2	Vanguard Index Funds	152,068.30	0.33%
3	J.P. Morgan Trust I	148,751.50	0.47%
4	AllSpring Funds Trust	148,692.10	0.60%
5	iShares Trust	147,626.20	0.85%
6	Goldman Sachs Trust	146,257.70	0.75%
7	Federated Hermes Money Market Obligations Trust	145,583.90	0.22%
8	PIMCO Funds	142,829.30	0.75%
9	J.P. Morgan Trust II	130,888.00	0.30%
10	Advanced Series Trust	130,509.90	0.26%

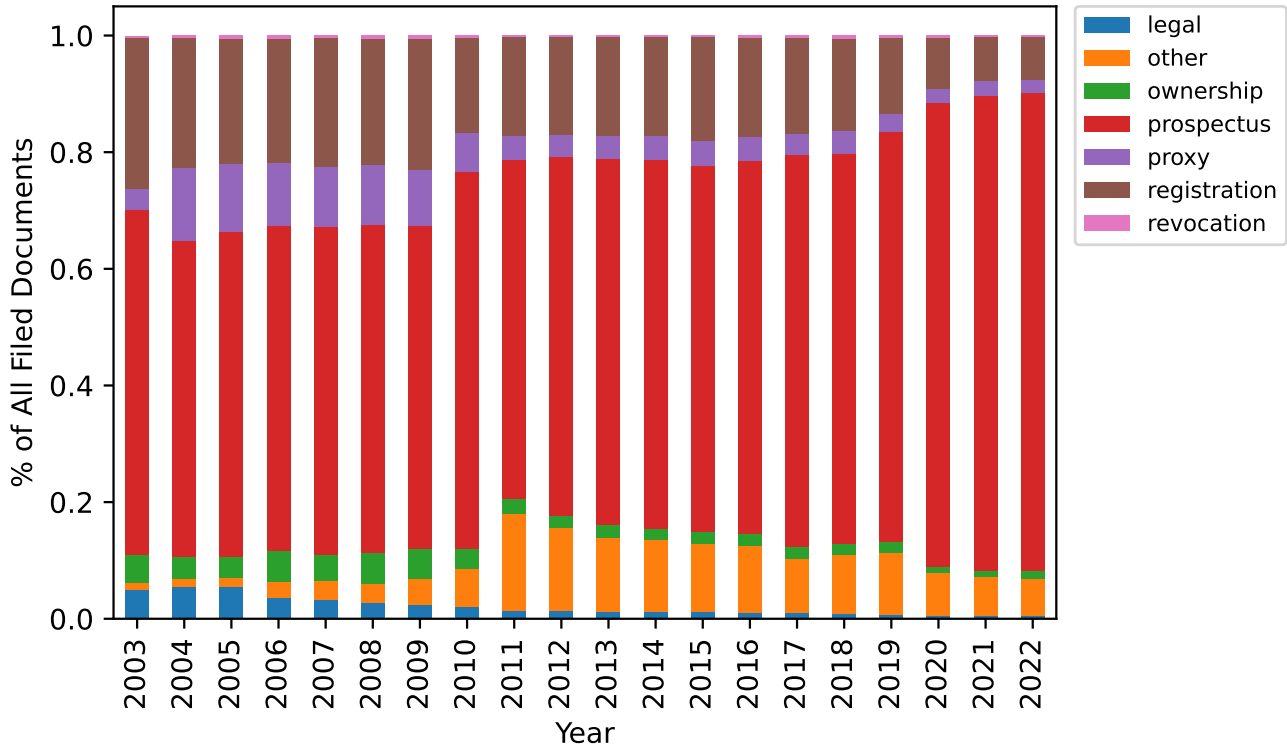
Mutual Fund Viewership Over Time



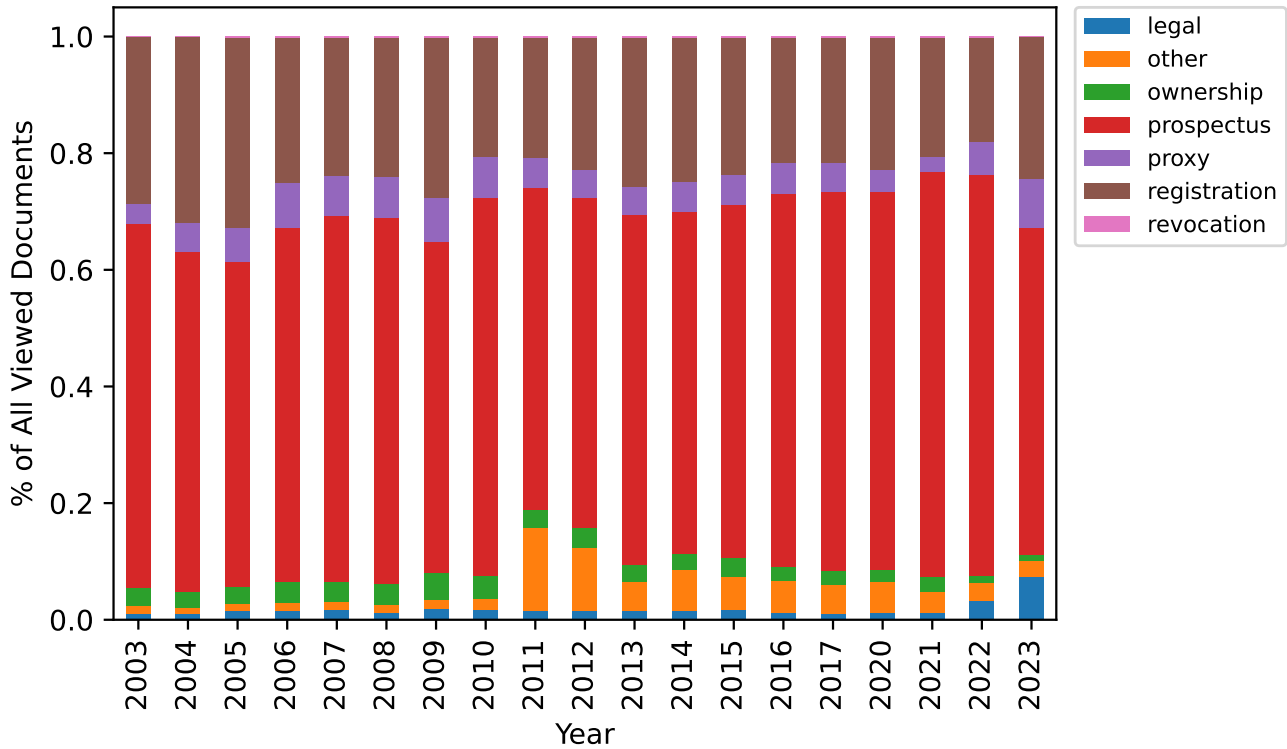
Classes Examples

	Category	List
A	Prospectus: Summary information about fund performance, distributions, portfolio holdings, or other fund attributes.	10-D 10-D/A 10-K 10-K/A 10-Q 10-Q/A 424B1 424B2 424B3 424B4 424B5 424B8 424I 425 497 497AD 497H2 497J 497K 497K1 497K2 497K3A 497K3B 8-K 8-K/A ARS D D/A FWP N-30D N-30D/A N-CSR N-CSR/A N-CSRS N-CSRS/A NPORT-EX NPORT-EX/A NPORT-P NPORT-P/A N-Q N-Q/A NSAR-A NSAR-A/A NSAR-AT NSAR-AT/A NSAR-B NSAR-B/A NSAR-BT NSAR-BT/A NSAR-U NSAR-U/A
B	Reports: Disclosures about external block ownership, as well as insider holdings.	11-K 11-K/A 13FCONP.....

Filings By Class



Views By Class



What predicts AVS?

Dep. Var: AVS	(1)	(2)	(3)
Last Month Return	0.0027		0.0029*
	(1.70)		(1.87)
Last Year Return	0.0089		0.0053
	(1.51)		(0.91)
log(Total Assets)		0.0127***	0.0129***
		(17.51)	(17.76)
Daily Return Volatility		-0.0014**	-0.0020***
		(-2.35)	(-3.22)
log(Age)		-0.0062***	-0.0071***
		(-8.85)	(-8.92)
Constant	-0.0208***	-0.0201***	-0.0205***
	(-29.53)	(-33.93)	(-32.29)
N	256,900	267,464	256,900
R-Squared	0.0201	0.0199	0.0213

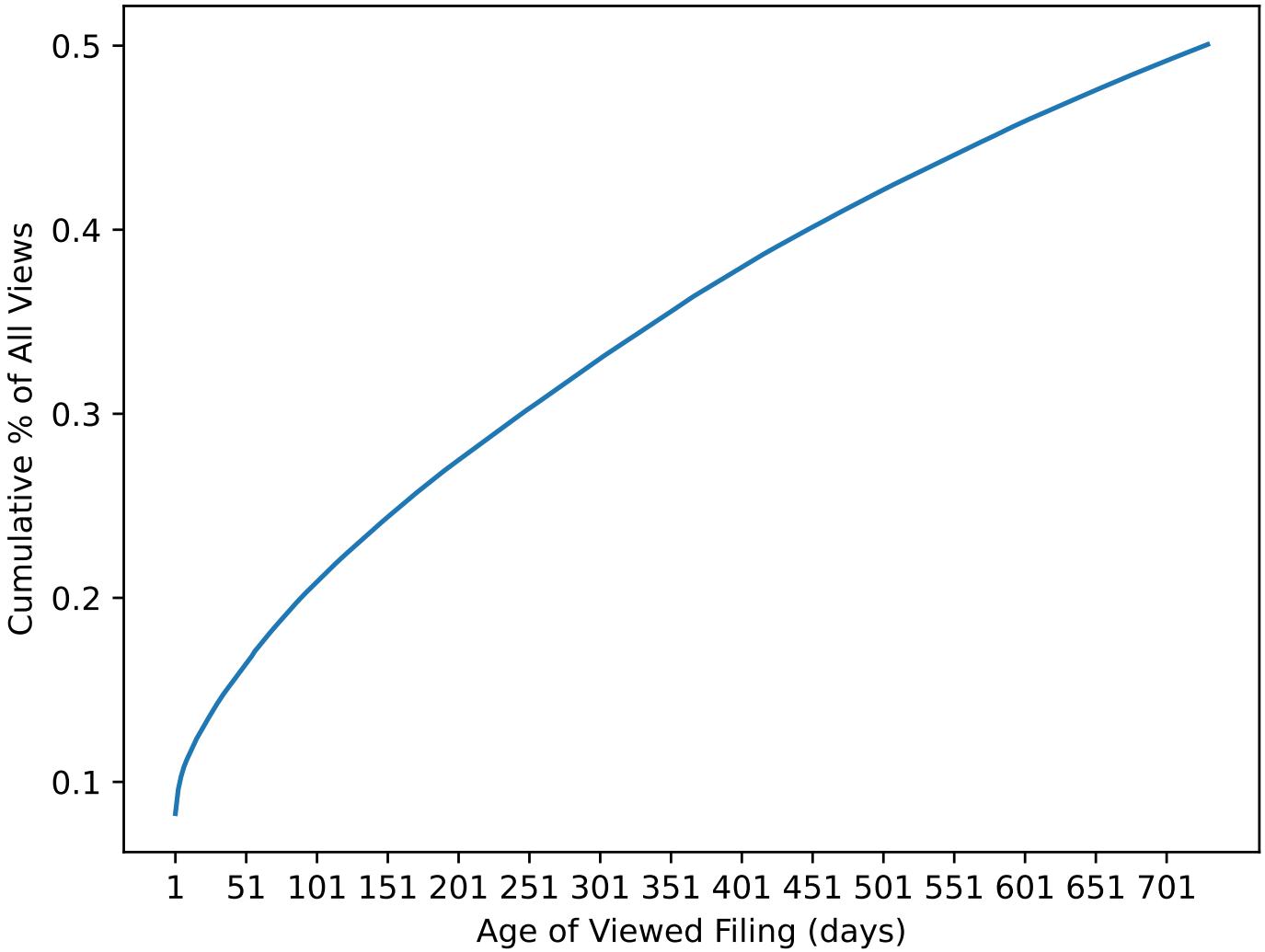
Results: Predicting Flows

Dep. Var: Net Flows	**(1)**	**(2)**	**(3)**	**(4)**
Abnormal View Share	0.3064***	0.2652***	0.2268***	0.2113***
	(12.21)	(10.90)	(9.87)	(9.24)
Last Month Return		0.1107		0.1609***
		(1.88)		(2.88)
Last Year Return		2.9912***		2.9480***
		(18.12)		(18.93)
log(Total Assets)			0.4097***	0.3866***
			(16.15)	(15.53)
Daily Return Volatility			-0.2759***	-0.2708***
			(-9.31)	(-9.93)
log(Age)			-1.3163***	-1.1216***
			(-41.49)	(-32.47)
Constant	1.2665***	1.0042***	1.2677***	1.0918***
	(36.88)	(31.01)	(47.21)	(40.07)
N	268,158	257,552	268,089	257,552
R-Squared	0.0230	0.0313	0.1077	0.0857

Results: Predicting Performance

Dep. Var: Return	**(1)**	**(2)**	**(3)**	**(4)**
Abnormal View Share	-0.0072***	-0.0056***	-0.0065***	-0.0050***
	(-3.93)	(-2.99)	(-3.55)	(-2.72)
Last Month Return		0.0404***		0.0410***
		(7.37)		(7.78)
Last Year Return		0.0741***		0.0390***
		(9.47)		(4.85)
log(Total Assets)			0.0019	0.0016
			(1.39)	(1.27)
Daily Return Volatility			0.0485***	0.0476***
			(33.17)	(35.44)
log(Age)			0.0116***	0.0092***
			(8.99)	(6.96)
Constant	0.0177***	0.0156***	0.0181***	0.0166***
	(10.78)	(10.71)	(14.79)	(15.22)
N	260,955	250,770	260,892	250,770
R-Squared	0.5311	0.5426	0.5436	0.5484

Viewership by Horizon



Results: AVS by Filing Age

	Filing Age:				
Dep. Var: Net Flows	**<1 mo**	**1-3 mos**	**3-6 mos**	**6-12 mos**	**>12 mo**
Abnormal View Share	0.2125***	0.8951***	0.6158***	0.8071***	0.2085***
	(8.49)	(8.63)	(7.68)	(8.53)	(5.62)
Last Month Return	0.1371***	0.1187**	0.2275***	0.1462***	0.2234***
	(3.49)	(2.40)	(5.36)	(2.95)	(6.06)
Last Year Return	2.8271***	2.5711***	2.8236***	2.6360***	2.6680***
	(17.37)	(14.36)	(17.69)	(14.31)	(18.21)
log(Total Assets)	0.3908***	0.4287***	0.3794***	0.4183***	0.3840***
	(14.64)	(14.04)	(14.39)	(-13.30)	(16.25)
Daily Return Volatility	-0.2780***	-0.2643***	-0.2723***	-0.2587***	-0.2520***
	(-9.41)	(-7.87)	(-9.47)	(-7.54)	(-9.55)
log(Age)	-1.2127***	-1.2678***	-1.1766***	-1.2604***	-1.0145***
	(-30.86)	(-28.85)	(-30.47)	(-28.13)	(-30.45)
Constant	1.1891***	1.2381***	1.1539***	1.2673***	0.9793***
	(40.71)	(37.01)	(40.14)	(-36.30)	(38.39)
N	198,322	134,660	207,205	128,590	221,407
R-Squared	0.0883	0.0916	0.0885	0.0903	0.0909

Viewership by Document Class

	Filing Category					
Dep. Var: Net Flows	**Legal Disclosure**	**Ownership**	**Prospectus**	**Proxy Statement**	**Registration**	**Revocation**
Abnormal View Share	0.3539***	0.3266***	0.0531	0.0926*	0.0499	1.2279***
	(5.91)	(4.02)	(1.40)	(1.76)	(1.13)	(10.72)
Last Month Return	0.1450***	-0.0638	-0.0161	-0.0640	-0.0228	-0.0192
	(4.65)	(-1.12)	(-0.38)	(-1.16)	(-0.40)	(-0.26)
Last Year Return	2.8488***	2.8112***	3.1074***	3.0209***	3.1168***	2.3379***
	(19.43)	(12.49)	(21.19)	(20.23)	(21.37)	(8.37)
log(Total Assets)	0.3670***	0.5305***	0.4615***	0.4804***	0.4777***	0.3999***
	(14.38)	(15.07)	(19.13)	(19.57)	(19.74)	(8.98)
Daily Return Volatility	-0.2559***	-0.3037***	-0.2955***	-0.3185***	-0.3106***	-0.2581***
	(-9.59)	(-8.06)	(-11.49)	(-11.85)	(-11.91)	(-4.68)
log(Age)	-1.1358***	-1.3369***	-1.2041***	-1.2194***	-1.2253***	-1.4010***
	(-30.94)	(-25.00)	(-34.22)	(-33.54)	(-34.77)	(-20.07)
Constant	1.1261***	1.1313***	1.0558***	1.0959***	1.0616***	1.4013***
	(40.16)	(28.45)	(40.85)	(40.34)	(40.65)	(25.62)
N	187,752	90,805	260,902	230,296	261,405	52,235
R-Squared	0.0959	0.1111	0.0970	0.1013	0.0991	0.1107

Results: AVS by Flow Direction

	Outflows			Inflows		
Dep. Var: Net Flows	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Abnormal View Share	0.0157	0.0072	0.0055	0.2429***	0.2470***	0.2331***
	(1.54)	(0.74)	(0.55)	(7.79)	(8.39)	(7.81)
Last Month Return	0.2037***		0.2088***	-0.3622***		-0.2530***
	(17.76)		(18.65)	(-4.72)		(-3.49)
Last Year Return	0.7631***		0.5849***	1.3780***		1.7867***
	(11.53)		(9.16)	(6.82)		(9.67)
log(Total Assets)		0.1863***	0.1884***		-0.1652***	-0.1390***
		(12.03)	(12.25)		(-4.17)	(-3.55)
Daily Return Volatility		0.2154***	0.2233***		-0.4539***	-0.3730***
		(11.16)	(11.57)		(-8.94)	(-7.49)
log(Age)		0.0655***	0.1139***		-1.1773***	-0.9690***
		(4.02)	(6.47)		(-32.64)	(-23.53)
Constant	-1.5476***	-1.5475***	-1.5650***	3.4240***	3.5092***	3.3495***
	(-97.51)	(-103.38)	(-104.81)	(72.18)	(88.24)	(81.73)
N	121,336	121,336	121,336	136,216	136,216	136,216
R-Squared	0.0498	0.0863	0.0986	0.0302	0.1150	0.0798

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- AVS predicts flows positively and affects subsequent fund performance negatively.
- Attention-performance relation is stronger in earlier sample
- Recent documents/forms are more popular
  - Predictive power of AVS varies with filing age