US Fixed Income Markets Have Several Large Players

Trillions of dollars, year-end 2020

$52.2

|	
12.8	Non-US investors (24.5%)
7.4	Monetary authority (14.2%)
5.8	Banking (11.1%)
5.7	Insurance (10.8%)
5.5	Mutual funds (10.5%)
4.3	Households (8.2%)
3.3	Money market funds (6.3%)
7.5	Other holders (14.4%)
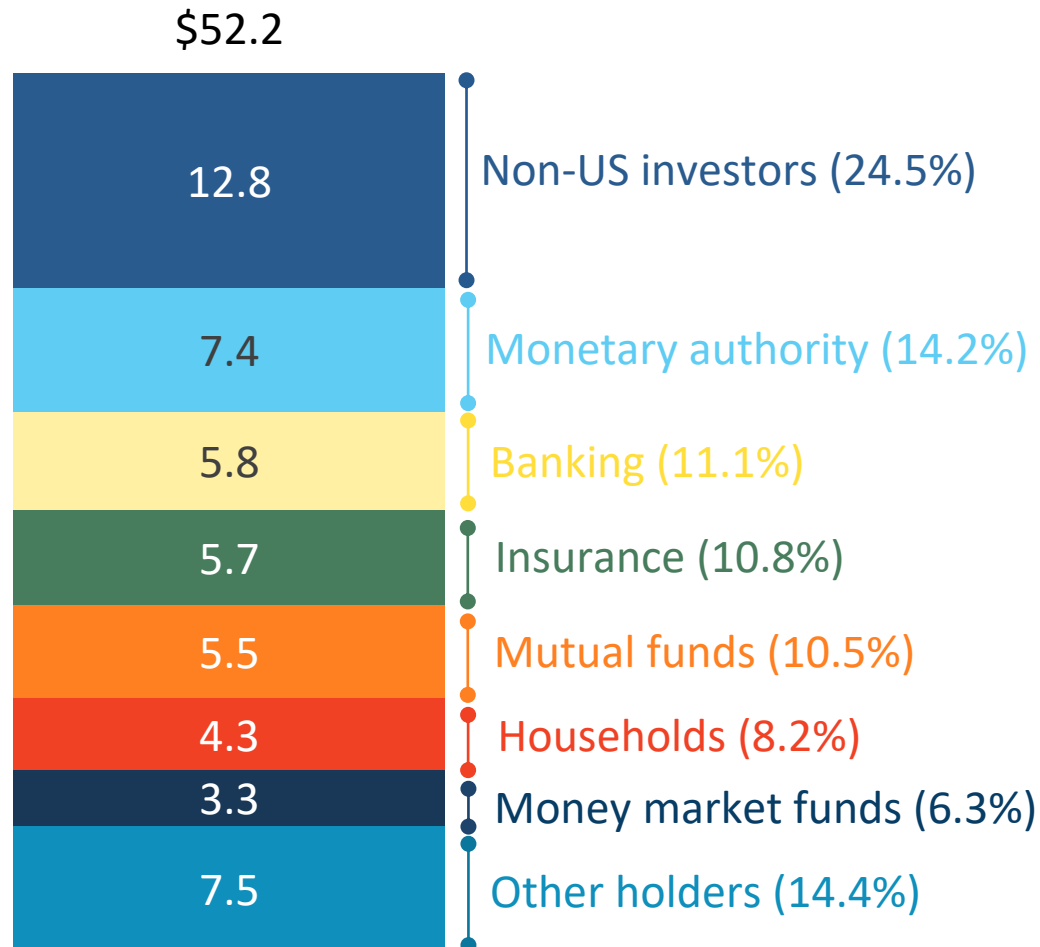
- Non-US investors have a major presence
- With ramped up balance sheet, Fed has become an important factor
- Banking, insurance, and mutual funds each hold about the same amount
- Direct holdings by households include separately managed accounts

Note: Market value of marketable Treasury securities, US agency securities (including MBS), US corporate bonds, foreign bonds held by US investors, and municipal securities

Source: Federal Reserve Board

Wide Swath of Trading in US Fixed Income Markets Is by Unknown Participants

Trillions of dollars, 2020

$195.2

13.0 — Mutual funds (6.6%)

182.2 — Others (93.4%)
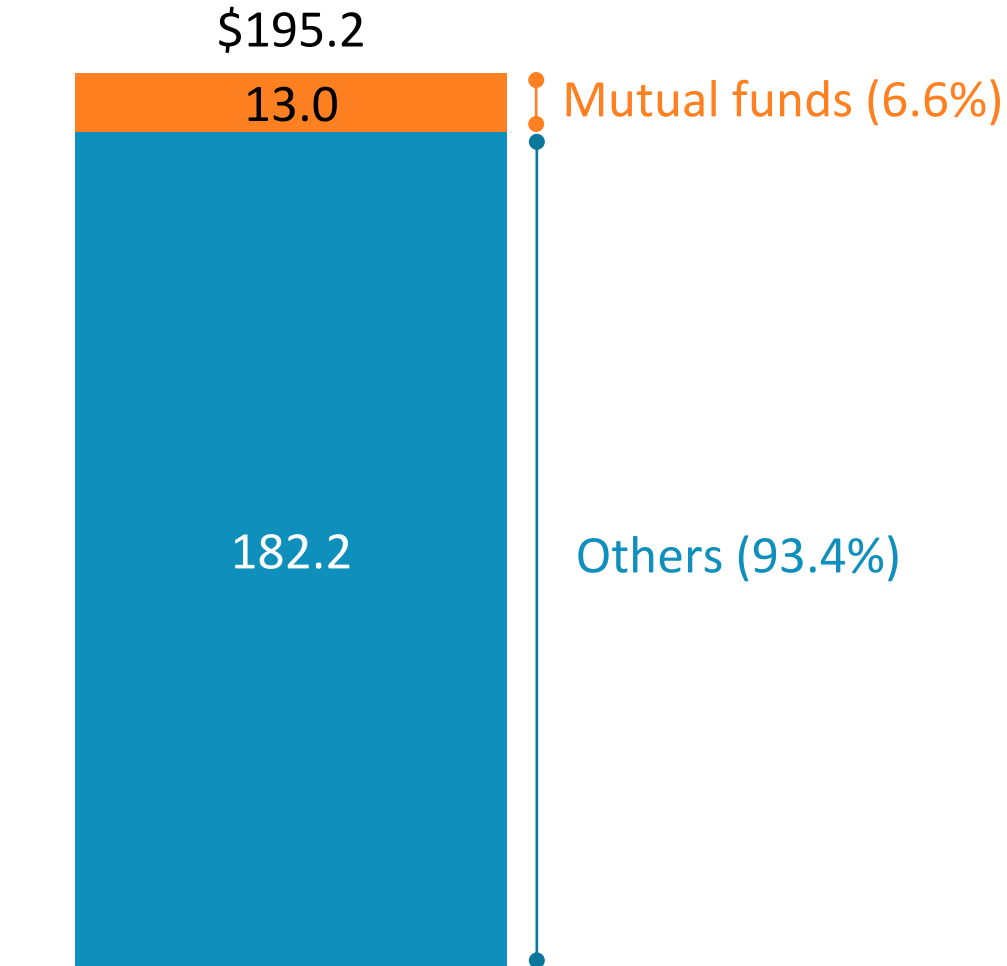
- Mutual funds account for a small share of trading in US fixed income markets

- Little is known about the other participants that comprise the bulk of trading

Note: Total trading volume of marketable Treasury securities (excluding T-bills), US agency securities (including MBS), US corporate bonds, and municipal securities

Source: Investment Company Institute and SIFMA

May 2022

Strategic Complementarity Among Investors with Overlapping Portfolios

Christof W. Stahel, PhD
Senior Economist
Research

Summary: First-mover Advantage and Systemic Risk

1. Regulators and academics: "Funds can be systemically risky because of a first-mover advantage"
   - Incentive for fund investors to <u>redeem ahead</u> of others because of a first-mover advantage

2. This research: "A more fundamental first-mover advantage drives all investor behavior"
   - If direct investors are expected to sell an asset and (temporarily) depress its value and reduce its market liquidity, a direct investor has an incentive to sell that asset <u>ahead</u> of them

3. Results: Laboratory setting direct investors in separately managed accounts
   - Direct investors with similar positions exhibit behavior <u>consistent with more fundamental incentive</u>
   - Investors in actively managed bond mutual funds exhibit a flow response to past underperformance that is <u>no different</u> than that of direct investors in matched separately managed account strategies

4. Main takeaways:
   - Regulation focusing only on funds is ineffective and inefficient - it fails to take into account this more fundamental driver for such behavior

First-mover Advantage at Fund Level

- Chen, Goldstein, and Jiang (2010) and Goldstein, Jiang, and Ng (2017)
  - Argue that bond funds are systemically risky

- Central to argument:
  - Redeeming investors receive NAV at redemption and draw on shared liquidity pool
  - Non-redeeming investors pay for the difference between NAV minus price of future asset sales and/or hold a fund with lower liquidity
  - "Strategic complementarity" at the fund level

- Because redeeming investors negatively affect remaining investors, ***the propensity for a fund investor to sell increases in the expectation that others will sell shares in the same fund***

- Manifests itself through a non-linear (kinked or concave) relationship between current flows and past performance ("flow-performance relationship")
  - Funds with less liquid assets have larger outflows after underperformance

Baseline Result Goldstein et al (JFE 2017)

Corporate Bond Funds
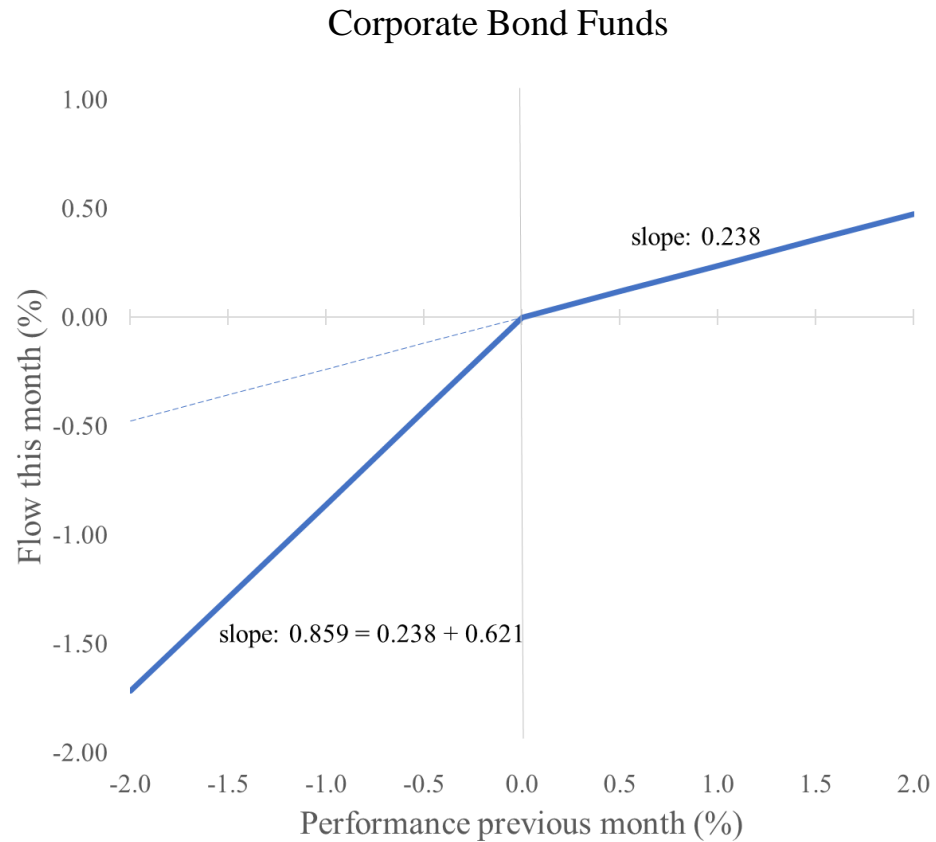
$$\text{Flow}_{i,t} = \beta_1 \text{Performance}_{i,-1} + \beta_2 \text{Performance}_{i,-1} \times \text{I}(\text{Performance}_{i,-1} < 0)$$
$$+ \beta_3 \text{I}(\text{Performance}_{i,-1} < 0) + \gamma \text{Controls}_{i,t} + \alpha + \eta_{i,t}$$

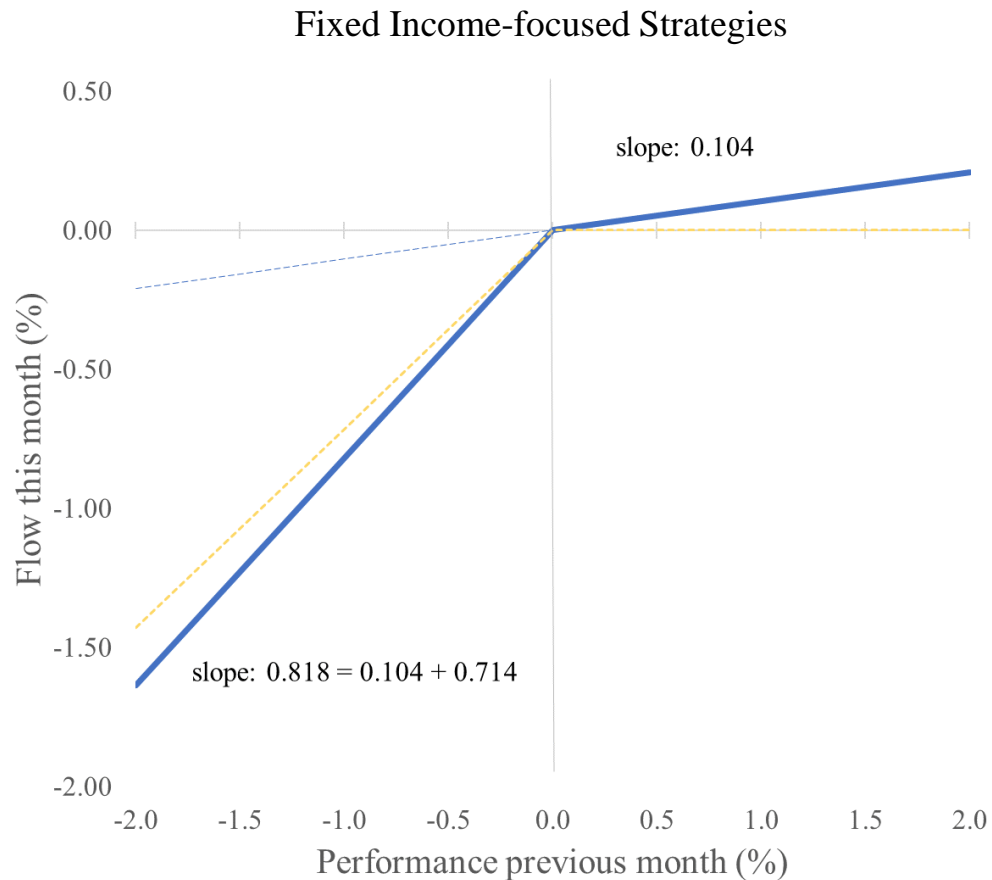| GJN (2017) Table 2 Flow-performance regressions	
Actively managed corporate bond funds	
	Flows
Performance	**0.238**
Performance × (Performance < 0)	**0.621**

First-mover Advantage at Asset Market Level

- Central to the argument:
  - Limited, finite market liquidity means investors selling an asset can temporarily depress its value and reduce its liquidity
  - Non-selling investors hold an asset with depressed value and with lower liquidity
  - "Strategic complementarity" at the asset market level

- Reality: Archegos Capital April 2021 - Large investors attempt exiting before others

- Because selling investors negatively affect non-selling investors, *the propensity for direct investor to sell increases in the expectation that other investors will sell the same assets*

- Implies a similar flow/sales-performance relationship among direct investors holding the same asset

- More fundamental explanation for observing a concave flow-performance relationship
  - Assets in less liquid markets should be affected more likely

Investors Holding Same Assets

- Analyze behavior of direct investors holding same positions

- Laboratory Setting: Investors in Separately Managed Accounts (SMA)
  - Investors in a given strategy hold same positions: overlapping portfolios
  - Direct investors who own assets in their accounts
  - Own decision to invest/divest in/from strategy
  - **Shared limited asset market liquidity…**
    … but no NAV redemption/sales and no shared liquidity pool

- Morningstar monthly data from 2000 to 2021
  - Equity-focused strategies ($6.3 trillion TNA, 2020)
  - Fixed income-focused strategies ($3.8 trillion TNA, 2020)

- Additional data
  - FINRA Trade Reporting and Compliance Engine (TRACE)
  - Chicago Board Options Exchange
  - Federal Reserve Bank of St. Louis

Baseline Result for SMA Investors in Same Strategy

Fixed Income-focused Strategies

slope: 0.104

slope: 0.818 = 0.104 + 0.714

Flow this month (%)

Performance previous month (%)

$$\text{Flow}_{S,t} = \beta_1 \text{Performance}_{S,-1} + \beta_2 \text{Performance}_{S,-1} \times \text{I}(\text{Performance}_{S,-1} < 0)$$
$$+ \beta_3 \text{I}(\text{Performance}_{S,-1} < 0) + \gamma \text{Controls}_{S,t} + \alpha + \eta_{S,t}$$

Table 2 Flow-performance regressions	
Fixed Income-focused Strategies	
	Flows
Performance	0.104
Performance × (Performance < 0)	**0.714**

Baseline Result for SMA Investors in Same Strategy

$$\text{Flow}_{S,t} = \beta_1 \text{Performance}_{S,-1} + \beta_2 \text{Performance}_{S,-1} \times I(\text{Performance}_{S,-1} < 0)$$

$$+ \beta_3 I(\text{Performance}_{S,-1} < 0) + \gamma \text{Controls}_{S,t} + \alpha + \eta_{S,t}$$

	Equity Focused			Fixed Income Focused		
	$\text{Alpha}_{S,-1}$	$\text{Alpha}_{S,-1}$	$\text{Excess Return}_{S,-1}$	$\text{Alpha}_{S,-1}$	$\text{Alpha}_{S,-1}$	$\text{Excess Return}_{S,-1}$
$\text{Performance}_{S,-1}$	0.3329***	0.3272***	0.0073	0.1044	0.1304	−0.1150***
	(0.0594)	(0.0540)	(0.0083)	(0.1564)	(0.1431)	(0.0347)
$\text{Performance}_{S,-1} \times I(\text{Performance}_{S,-1} < 0)$	0.1056	0.0776	0.0141	0.7139***	0.6330***	0.2964***
	(0.0799)	(0.0727)	(0.0125)	(0.2460)	(0.2263)	(0.0539)
$I(\text{Performance}_{S,-1} < 0)$	−0.0043***	−0.0039***	−0.0013**	−0.0030***	−0.0026***	−0.0027***
	(0.0006)	(0.0005)	(0.0006)	(0.0009)	(0.0008)	(0.0007)
$\text{Flow}_{S,-1}$	0.0206***	0.0384***	0.0228***	−0.0118*	−0.0007	−0.0115*
	(0.0050)	(0.0061)	(0.0050)	(0.0066)	(0.0080)	(0.0066)
$\log(\text{Asset})_S$	0.0027***	0.0023***	0.0028***	0.0031***	0.0027***	0.0032***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)
$\log(\text{Age})_S$	−0.0149***	−0.0134***	−0.0154***	−0.0117***	−0.0106***	−0.0118***
	(0.0005)	(0.0005)	(0.0005)	(0.0008)	(0.0007)	(0.0008)
Winsorized Flows	NO	YES	NO	NO	YES	NO
Monthly FE	YES	YES	YES	YES	YES	YES
Strategy Cluster	YES	YES	YES	YES	YES	YES
Adj. R^2	0.0143	0.0172	0.0121	0.0082	0.0088	0.0078
Num. obs.	327026	327026	327026	147339	147339	147339
N Clusters	4599	4599	4599	1894	1894	1894

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

First-mover Advantage at Asset Market Level

- If a first-mover advantage at the asset market level driven by "shared" limited market liquidity affects direct investor behavior, three testable conditions for cross-validation must hold:

  - Investor portfolio sales must be:
    - more sensitive to past performance during times when overall market liquidity is low
    - more sensitive to past performance for less liquid strategy portfolios
    - less sensitive to past performance when accounts in a strategy are large

- Results validate the conjecture that "shared" limited market liquidity results in strategic complementarity at the asset market level among direct investors with overlapping portfolios

Market Level FMA: Time-varying market liquidity

- If a first-mover advantage at the asset market level driven by "shared" limited market liquidity exists, flows must be more sensitive to past performance during times when overall market liquidity is low

	$\text{Alpha}_{S,-1} < 0$			
	VIX	DFL	HOW	TED
$\text{Alpha}_{S,-1}$	0.6128***	0.4942*	0.6177***	0.6837***
	(0.2240)	(0.2700)	(0.2223)	(0.2238)
$\text{Alpha}_{S,-1} \times \text{I(Market Illiquidity}_t)$	0.6695**	0.9443***	0.8287**	0.5599**
	(0.2992)	(0.3486)	(0.3485)	(0.2802)
$\text{I(Market Illiquidity}_t)$	−0.0028**	−0.0026*	−0.0027**	−0.0036***
	(0.0013)	(0.0014)	(0.0014)	(0.0012)
$\text{Flow}_{S,-1}$	−0.0117	−0.0184*	−0.0187*	−0.0118
	(0.0104)	(0.0102)	(0.0102)	(0.0104)
$\log(\text{Asset})_S$	0.0032***	0.0032***	0.0033***	0.0032***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
$\log(\text{Age})_S$	−0.0114***	−0.0122***	−0.0123***	−0.0115***
	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Monthly FE	YES	YES	YES	YES
Strategy Cluster	YES	YES	YES	YES
Adj. R^2	0.0082	0.0091	0.0089	0.0082
Num. obs.	48367	43764	43764	48367
N Clusters	1674	1645	1645	1674

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Market Level FMA: Varying portfolio liquidity

- If a first-mover advantage at the asset market level driven by "shared" limited market liquidity exists, flows must be more sensitive to past performance for less liquid portfolios

	$\text{Alpha}_{S,-1} < 0$			
	10-month window	12-month window	10-month window	12-month window
$\text{Alpha}_{S,-1}$	0.6331***	0.7042***	0.3520	0.3791
	(0.2225)	(0.2222)	(0.3200)	(0.3208)
$\text{Alpha}_{S,-1} \times I(\text{Portfolio Illiquidity}_{S,t-1})$	0.7971**	0.7004**	1.1526**	1.2344**
	(0.3199)	(0.3264)	(0.5737)	(0.5710)
$\text{Alpha}_{S,-1} \times I(\text{Market Illiquidity}_t)$			0.8063*	0.9358**
			(0.4349)	(0.4266)
$\text{Alpha}_{S,-1} \times I(\text{Portfolio Illiquidity}_{S,t-1}) \times I(\text{Market Illiquidity}_t)$			−0.5856	−0.9585
			(0.7216)	(0.7275)
$I(\text{Portfolio Illiquidity}_{S,t-1})$	−0.0019	−0.0015	−0.0018	−0.0007
	(0.0014)	(0.0014)	(0.0019)	(0.0020)
$I(\text{Market Illiquidity}_t)$			−0.0025	−0.0020
			(0.0016)	(0.0016)
$I(\text{Portfolio Illiquidity}_{S,t-1}) \times I(\text{Market Illiquidity}_t)$			−0.0000	−0.0014
			(0.0027)	(0.0027)
$\text{Flow}_{S,-1}$	−0.0122	−0.0132	−0.0187*	−0.0194*
	(0.0106)	(0.0108)	(0.0104)	(0.0106)
$\log(\text{Asset})_S$	0.0033***	0.0034***	0.0032***	0.0033***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
$\log(\text{Age})_S$	−0.0103***	−0.0101***	−0.0107***	−0.0107***
	(0.0011)	(0.0011)	(0.0011)	(0.0012)
Monthly FE	YES	YES	YES	YES
Strategy Cluster	YES	YES	YES	YES
Adj. R^2	0.0079	0.0079	0.0088	0.0088
Num. obs.	42980	41960	39192	38330
N Clusters	1475	1444	1452	1417

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Market Level FMA: Internalizing market impact

- If a first-mover advantage at the asset market level driven by "shared" limited market liquidity exists, flows must be less sensitive when accounts are large

			$Alpha_{-1} < 0$		
	All	All	Institutional	Retail	Both
$Alpha_{S,-1}$	0.8004***	4.7212***	0.4936	1.1971	0.7885***
	(0.1822)	(1.7478)	(0.3375)	(0.7093)	(0.2072)
$Alpha_{S,-1} \times \log(\text{Average account size})$		−0.2115**			
		(0.0829)			
$Alpha_{S,-1} \times \log(\text{Number of accounts})$		−0.1108			
		(0.1473)			
$Flow_{S,-1}$	−0.0110	−0.0112	−0.0243	−0.0147	−0.0050
	(0.0104)	(0.0104)	(0.0151)	(0.0314)	(0.0149)
$\log(\text{Average account size})$	0.0031***	0.0026***	0.0061***	0.0036**	0.0029***
	(0.0003)	(0.0004)	(0.0007)	(0.0015)	(0.0004)
$\log(\text{Number of accounts})$	0.0038***	0.0035***	0.0055***	0.0023**	0.0034***
	(0.0004)	(0.0005)	(0.0009)	(0.0010)	(0.0006)
$\log(\text{Age})_S$	−0.0115***	−0.0114***	−0.0110***	−0.0148***	−0.0104***
	(0.0010)	(0.0010)	(0.0015)	(0.0028)	(0.0014)
Monthly FE	YES	YES	YES	YES	YES
Strategy Cluster	YES	YES	YES	YES	YES
Adj. R^2	0.0078	0.0080	0.0116	0.0094	0.0065
Num. obs.	48552	48552	15930	5798	26824
N Clusters	1674	1674	539	235	909

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Benchmarking Mutual Fund Investor Behavior

- The appropriate benchmark to assess the supposed systemic risk driven by the structure of mutual funds is the behavior of direct investors in equivalent portfolios that cannot rely on NAV redemption or a common liquidity pool

- Morningstar monthly sample of actively managed US bond mutual funds from 2000 to 2021. Match each fund based on portfolio liquidity and five return distribution characteristics to a benchmark SMA strategy within the same investment objective

	All Mutual Funds	Matched Mutual Funds	Matched SMAs	Pooled
$\text{Performance}_{i,-1}$	0.6737***	0.6741***	−0.0651	−0.0651
	(0.2005)	(0.2025)	(0.3995)	(0.3995)
$\text{Performance}_{i,-1} \times \text{I}(\text{Performance}_{i,-1} < 0)$	0.5603*	0.6352*	1.4248**	1.4248**
	(0.3210)	(0.3234)	(0.6665)	(0.6665)
$\text{I}(\text{Performance}_{i,-1} < 0)$	−0.0040***	−0.0039***	−0.0017	−0.0017
	(0.0006)	(0.0007)	(0.0015)	(0.0015)
$\text{MF}_i \times \text{Performance}_{i,-1}$				0.7392
				(0.4411)
$\text{MF}_i \times \text{Performance}_{i,-1} \times \text{I}(\text{Performance}_{i,-1} < 0)$				−0.7896
				(0.7404)
$\text{MF}_i \times \text{I}(\text{Performance}_{i,-1} < 0)$				−0.0023
				(0.0016)
Monthly FE	YES	YES	YES	YES
Fund/Strategy Cluster	YES	YES	YES	YES
Adj. R^2	0.0635	0.0626	0.0072	0.0352
Num. obs.	87042	86488	36991	123479
N Clusters	608	576	342	852

Conclusions and Implications

Conclusions

- A first-mover advantage driven by strategic complementarity at the asset market level results in a pattern of investor behavior that matches that found among mutual fund investors

  - Behavior is driven by "shared" limited market liquidity and not a mutual fund-like structure

- Strategic complementarity at the asset market level is more fundamental than any (potential) strategic complementarity at the fund level

- The appropriate benchmark to assess the supposed systemic risk inherent in the structure of mutual funds is the behavior of direct investors in equivalent portfolios but who do not rely on NAV redemption or a common liquidity pool

Implications

- A holistic view the financial ecosystem allows regulators to design effective and efficient regulations

Strategic Complementarity among Investors with Overlapping Portfolios

by Christof W. Stahel

Discussion by

Mark Flannery

University of Florida

Motivation

- Goldstein et al. (2017) observe concave Flow Performance relations in bond funds and argue that this characteristic may cause instability.
  - The worse the return, the more fund investors want to sell out.
  - In other words, a large negative bond fund return might elicit overwhelming sales of relatively illiquid assets.
- What is thought to motivate fund investors' large response to a big loss?
  - Sticky NAV. Tomorrow's NAV will be lower ➜ sell now, at today's "too high" NAV.
  - Subsequent fund transaction costs. If many fund holders exit today, remaining investors will bear unusually high transaction costs ➜ sell now
  - **The negative return causes revised expectations about future (true) values ➜ sell now.**

- Related empirical implications (not discussed here)
  - May be worse at funds with less liquid assets and/or less cash
  - May be worse when market conditions are illiquid

Separately Managed Accounts

- I'd like some further details, but these are presented as

  - Portfolios whose contents are known to the econometrician

  - No externalities:

    - Transaction costs are within the account owners' control
    - Account owners can trade directly and get market prices, although the market has a <u>limited ability to absorb traded volume</u> at "fair market value" transaction prices.
    - (Funds face the same potential market illiquidity, from which their cash holdings can provide some protection.)

  - **SMA owners may also revise their future expected returns downward in response to a large negative return, leading them to want to sell.**

What does the paper do?

- Hypothesizes that SMA owners will be less anxious to exit their investments than similar mutual fund owners, because SMA owners are not subject to the same negative externalities.
  - In other words: SMAs should exhibit more limited flows following negative bond returns.

- The paper's analysis resembles that in Goldstein et al. (2017), setting up a nice comparison.

- Compare the two papers' "Table 2".

Table 2. SMA Flow-Performance Relations

	Fixed Income Focused			Equity Focused		
	Alpha	Alpha	Excess Return	Alpha	Alpha	Excess Return
Performance	0.1044	0.1304	-0.1150***	0.3329***	0.3272***	0.0073
Perf*I(Perf<0)	0.7139***	0.6330***	0.2964***	0.1056	0.0776	0.0141
I(Perf<0)	-0.0030***	-0.0026***	-0.0027***	0.0043	-0.0039***	-0.0013**
Lagged Flow	-0.0118*	-0.0007	-0.0115*	0.0206***	0.0384***	0.0228***
log(Asset)	0.0031***	0.0027***	0.0032***	0.0027***	0.0023***	0.0028***
log(Age)	-0.0117***	-0.010***	-0.0118***	-0.0149***	-0.0134***	-0.0154***
Winsorized Flows	NO	YES	NO	NO	YES	NO
Monthly FE	YES	YES	YES	YES	YES	YES
Strategy Cluster	YES	YES	YES	YES	YES	YES
Adj. R2	0.0082	0.0088	0.0078	0.0143	0.0172	0.0121
Num. obs	147,339	147,339	147,339	327,026	327,026	327,026
Num. clusters	1,894	1,894	1,894	4,599	4,599	4,599

Compare to Goldstein et al. (2017), Table 2

Table 2. Flow Performance Comparison

	Fixed Income Focused			Equity Focused		
	SMAs 2000-2021		**Goldstein 1992-2014**	SMAs 2000-2021		**Goldstein 1992-2014**
	Alpha	Alpha	**Alpha**	Alpha	Alpha	**Alpha**
Performance	0.1	0.13	**0.238***	0.33***	0.33***	**0.99***
Perf*I(Perf<0)	0.71***	0.63***	**0.621***	0.11	0.08	**-0.575***
I(Perf<0)	-0.0030***	-0.0026***	**-.010***	0.0043	-0.0039***	**-0.08***
Lagged Flow	-0.012*	-0.0007	**0.152***	0.0216***	0.08***	**0.118***
log(Asset)	0.0031***	0.0027***		0.0027***	0.0023***	
log(Age)	-0.0117***	-0.010***		-0.0149***	-0.0134***	
Monthly FE	YES	YES	**YES**	YES	YES	**YES**
Adj. R2	0.0082	0.0088	**0.0646**	0.0143	0.0172	**0.0583**
Num. obs	147,339	147,339	**307,242**	327,026	327,026	**1,578,506(?)**

Suggestion: carefully compare SMA and MF regressions; understand implications of coefficient differences, such as

1. Implications of different coefficients for the basic question?

2. Do flow-performance coefficients differ significantly between MFs and SMAs?

3. Why do the <u>lagged flows'</u> coefficients differ so much for the fixed income regressions?

4. Why are the SMAs' R-squared statistics so much lower?

Conclusion

The paper establishes some intriguing similarities between bond MF and SMA flows.

1. Does this mean that the "strategic complementarities" are unimportant?

2. More institutional information about SMAs would help think about this.

3. Additional comparisons between SMAs' and bond funds' regression results would help establish the
    *   Further interpretations of comparable flow-performance coefficients.
    *   Compare the effects of market illiquidity between SMAs and MFs?

Discussion of
"Strategic Complementarity among Investors With Overlapping Portfolios" by Christof W. Stahel

Laura T. Starks

McCombs School of Business

University of Texas at Austin

Primary asset owners?
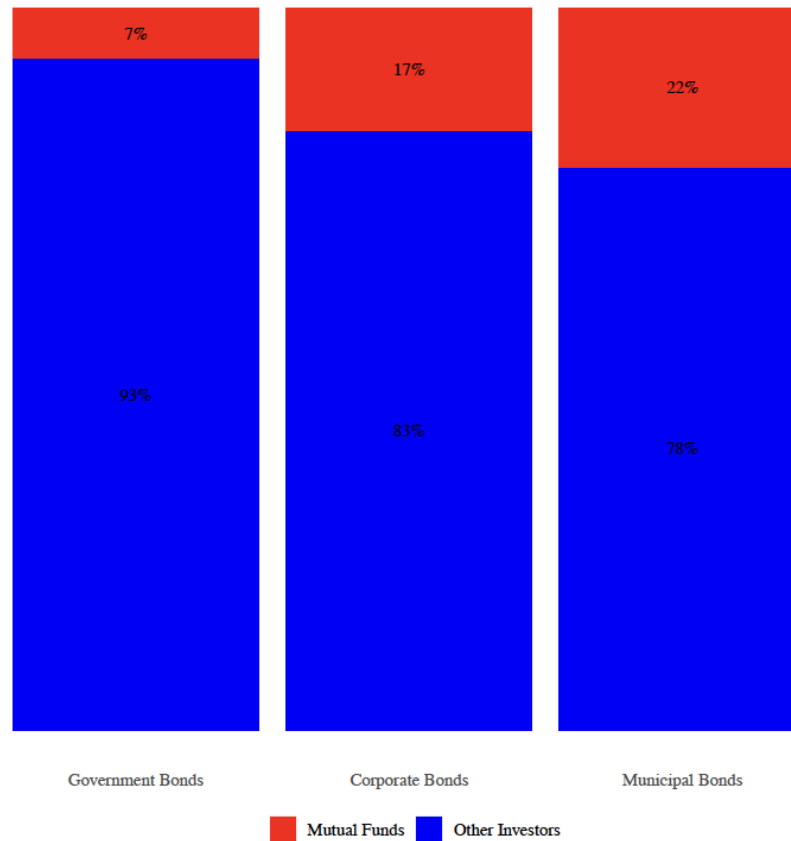
Figure 1. Share of Total Fixed-Income Markets Holdings End of 2019

Percentage ownership of corporate bonds

	2010	2020
Rest of World	23%	28%
Insurance companies	22%	26%
RICs	14%	21%
Households	19%	7%
Banks and dealers	9%	5%
Other	14%	12%

Data from ICI Viewpoints:
"Growth in Bond Mutual Funds: See the Whole Picture"
By Sean Collins and Shelly Antoniewicz

Increased liquidity

Figure 1
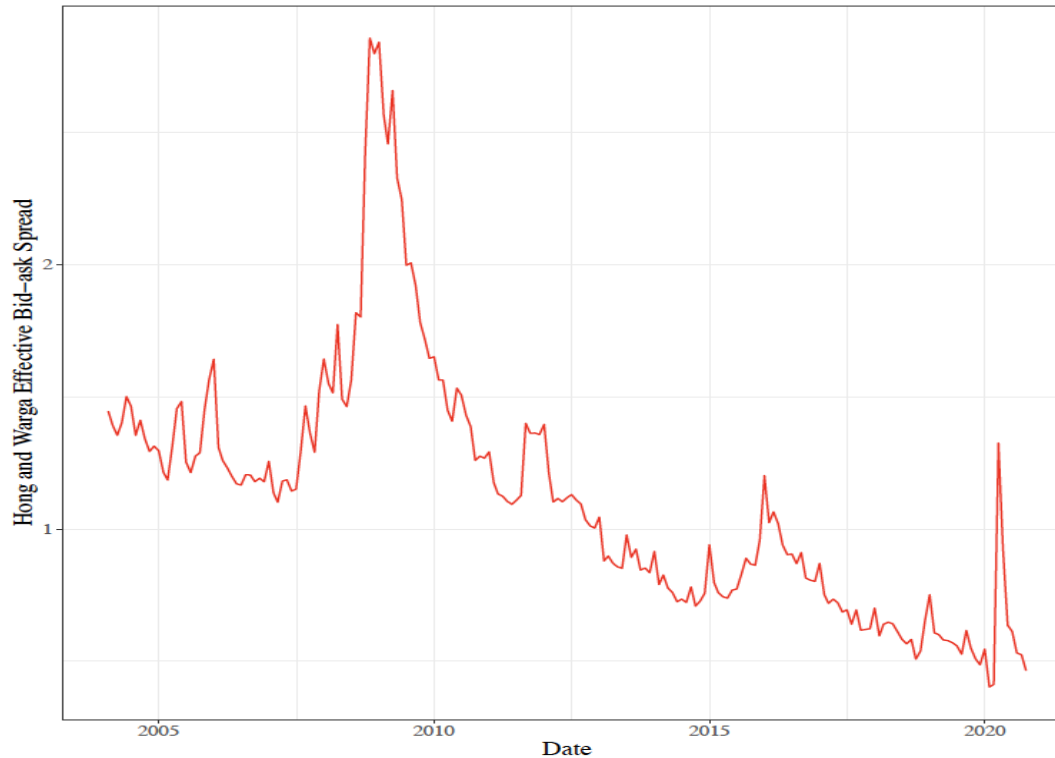**Assets in Bond Mutual Funds**
Trillions of dollars, year-end
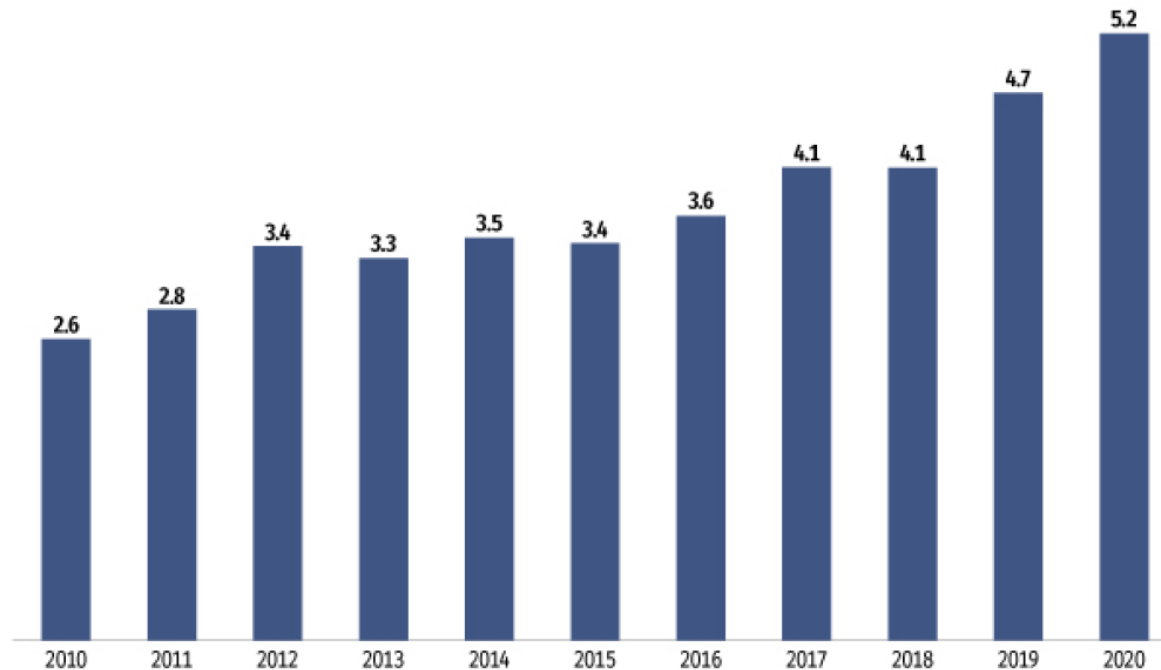
Figure from ICI Viewpoints:
"Growth in Bond Mutual Funds: See the Whole Picture"
By Sean Collins and Shelly Antoniewicz

Aggregate U.S. Corporate Bond Market Liquidity

Figure 4. Aggregate US Corporate Bond Market Liquidity
Figures show the aggregate effective bid–ask spread from Hong and Warga (2000) computed using TRACE from 2005 through March 2021.

Effects of Liquidity Risk Management Rule for Mutual Funds

Allocations to illiquid corporate bonds across time
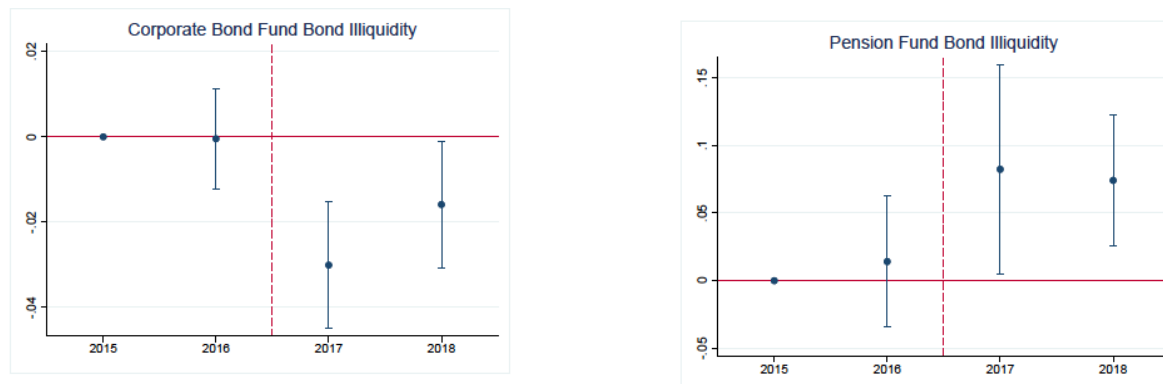as compared to corporate bond funds with liquid assets

Figure 3 from Tim Park's dissertation:
"Fragile Liquidity: Analysis of the Mutual Fund
Liquidity Risk Management Rule" UT Austin 2022

Commonality in liquidity

- Stocks with high mutual fund ownership have comovements in liquidity about twice as large as those for stocks with low mutual fund ownership. (Koch, Ruenzi, Starks RFS 2016)

- What about commonality in liquidity for SMAs? for sovereign wealth funds?