

Do Buy-Side Institutions Supply Liquidity in Bond Markets? Evidence from Mutual Funds

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Bond market structure

Corporate bonds trade in over-the-counter (OTC) markets:

- **Sell side = Dealers**
- **Buy side = Customers:** Mutual funds, pension funds, insurance companies, retail investors, among others.

Vast majority of transactions are intermediated by dealers.

Growth in electronic markets => Request-for-quote (RFQ) systems, intermediated by dealers.

Dealers play an important role.

Motivation

Explosion in corporate bond issuance

- \$4.8 trillion in 2006 to \$8.5 trillion in 2016.
- 2016: Equity - \$200 billion; Corporate Bonds - \$1.5 trillion.

Dealers have reduced capital for market making

- Bessembinder, Jacobsen, Maxwell, and Venkataraman (2017); Dick-Neilsen and Rossi (2016); Schultz (2017); Bao, O'Hara, and Zhao (2017); Friewald and Nagler (2016); Choi and Huh (2016).

Investor flows of bond funds are sensitive to performance

- Goldstein, Jiang, and Ng (2017).

Liquidity problem in bond market?

Motivation

SEC guidelines for bond fund managers:

“Assess funds liquidity, and the ability to meet potential redemptions...during both normal and stressed environments, including assessing their source of liquidity.”

Greenwich Associate 2017 survey: 78% of credit investors describe buy-side institutions as an important source of liquidity.

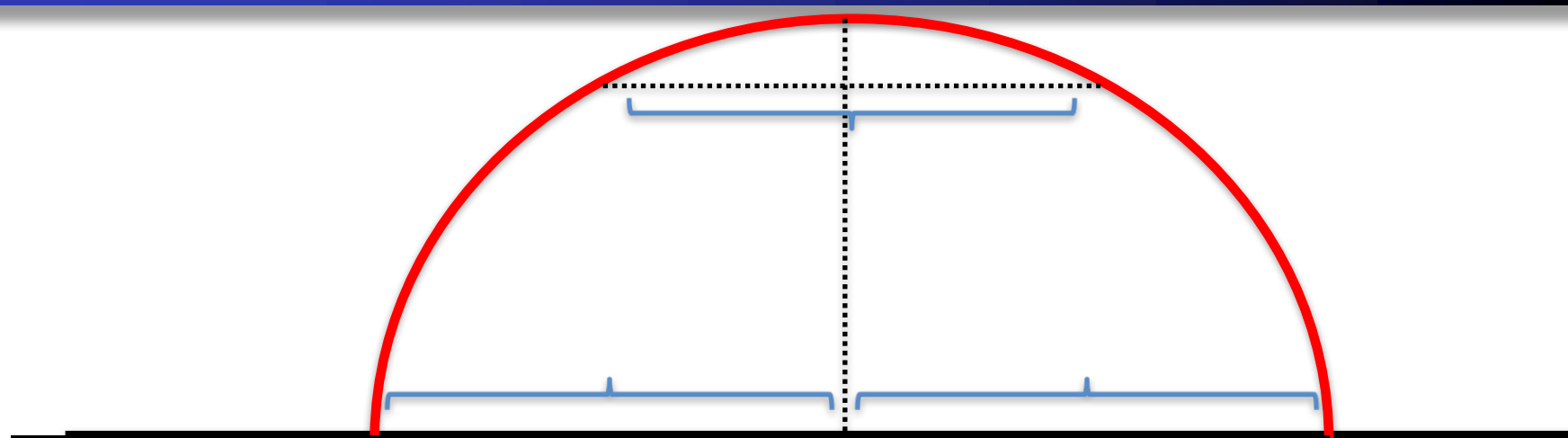
Question: do buy-side institutions serve as liquidity suppliers?

- This study provides preliminary evidence.

This Study

- Examines **bond mutual funds as liquidity suppliers**. Their share of ownership doubled from 7% in 2006 to 18% in 2016.
 - Methodology: **Trading Style** as liquidity “demand” vs. “supply”
 - Trading style is **persistent**, and **varies across funds**.
 - **Flexibility in portfolio holdings** is associated with liquidity supply.
 - Liquidity supply is associated with **higher fund performance**.
- **Contributions**
 - **Methodology**: inventory cycle & trading style.
 - **Buy-side institutions as a channel** of liquidity supply.
 - Trading style → predict bond fund performance.

Fund holdings versus Inventory cycle



	Load phase	Peak phase	Unload phase
Change in Dealer Inventory	Increase	No change	Decrease
Bond return	Negative	Zero	Positive
Change in Fund holdings	Increase	Increase	Increase
Correlation with inventory	Liquidity supply	Not classified	Liquidity demand
Our definition	Positive Inventory Cycle		
Trading style	Liquidity supply	Liquidity supply	Liquidity supply

Research on corporate bond market

- Liquidity

- Bonds are **more expensive to trade** than stocks (Schultz, 2001; Harris, 2015).
- **Transaction costs decline after TRACE** (Bessembinder, Maxwell, Venkataraman, 2006; Edwards, Harris, Piwowar, 2007; Goldstein, Hotchkiss, Sirri, 2007.)
- **Dealer network effects** (Di Maggio, Kermani and Song, 2016; O'Hara, Wang and Zhou, 2015; Hendershott, Li, Livdan and Schurhoff, 2016).
- Post-crisis bank regulations – **Dealer capital has declined**.
- **Investor flows** of bond funds are sensitive to performance.

- The current landscape

- **Electronic request-for-quote systems are picking market share** (25%) in younger, investment grade bonds (Hendershott and Madhavan, 2015).

Bond versus Equity markets

Trading style in equity markets:

- Anand, Irvine, Puckett, and Venkataraman, 2013; Da, Gao, and Jagannathan, 2011; Cheng, Hameed, Subrahmanyam, Titman, 2017; Nagel, 2012.

Strategies observed in equity markets are difficult to implement in bond markets.

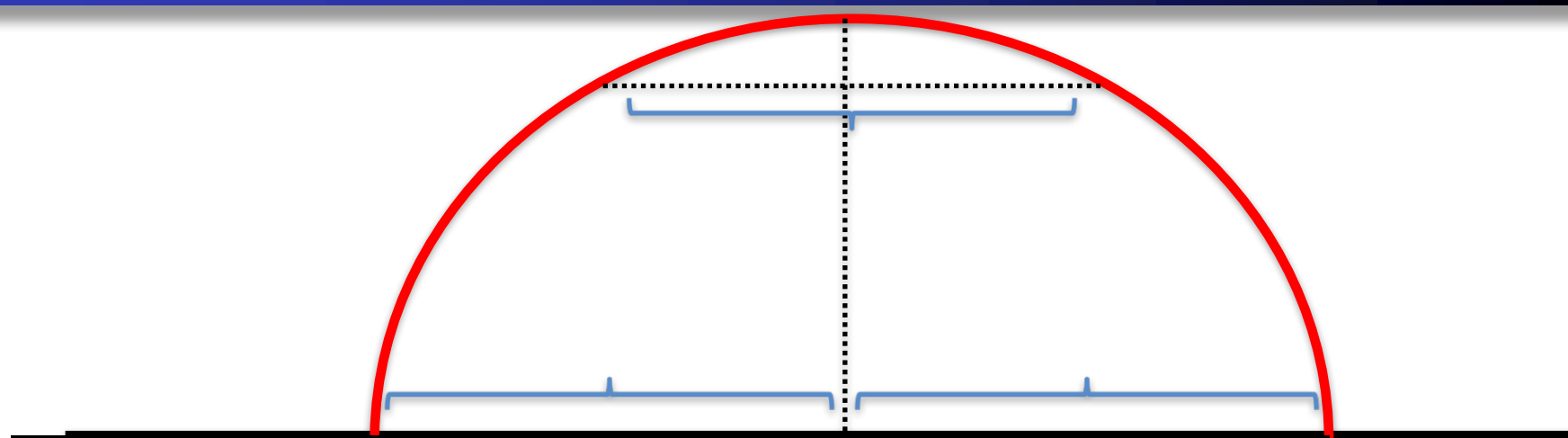
- **Fragmented** versus Centralized.
- **Dealer intermediated** versus Direct Access.
- **Opaque**, illiquid versus transparent and active.

Enhanced TRACE data with dealer ids versus less-precise approaches in equity markets.

Inventory cycle based on enhanced TRACE

- Capture the idea of dealer inventory management:
 - **Customers sell (buy)** → **Positive (Negative)** dealer inventory.
 - AGGREGATE net inventory across dealers captures pressure.
 - **Bond funds supply liquidity if they absorb dealers' inventory.**
- Inventory cycle: Zero crossing
 - Peaks > \$5 million for IG/Large bonds; \$3 million for other bonds.
 - At least 5 days in duration.
 - 90-day rolling average: Slow-moving market; “prop” positions of dealers.
- Minimum overlap of 50% between a fund's reporting window and the inventory cycle in a bond.

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Inventory cycle: descriptive statistics

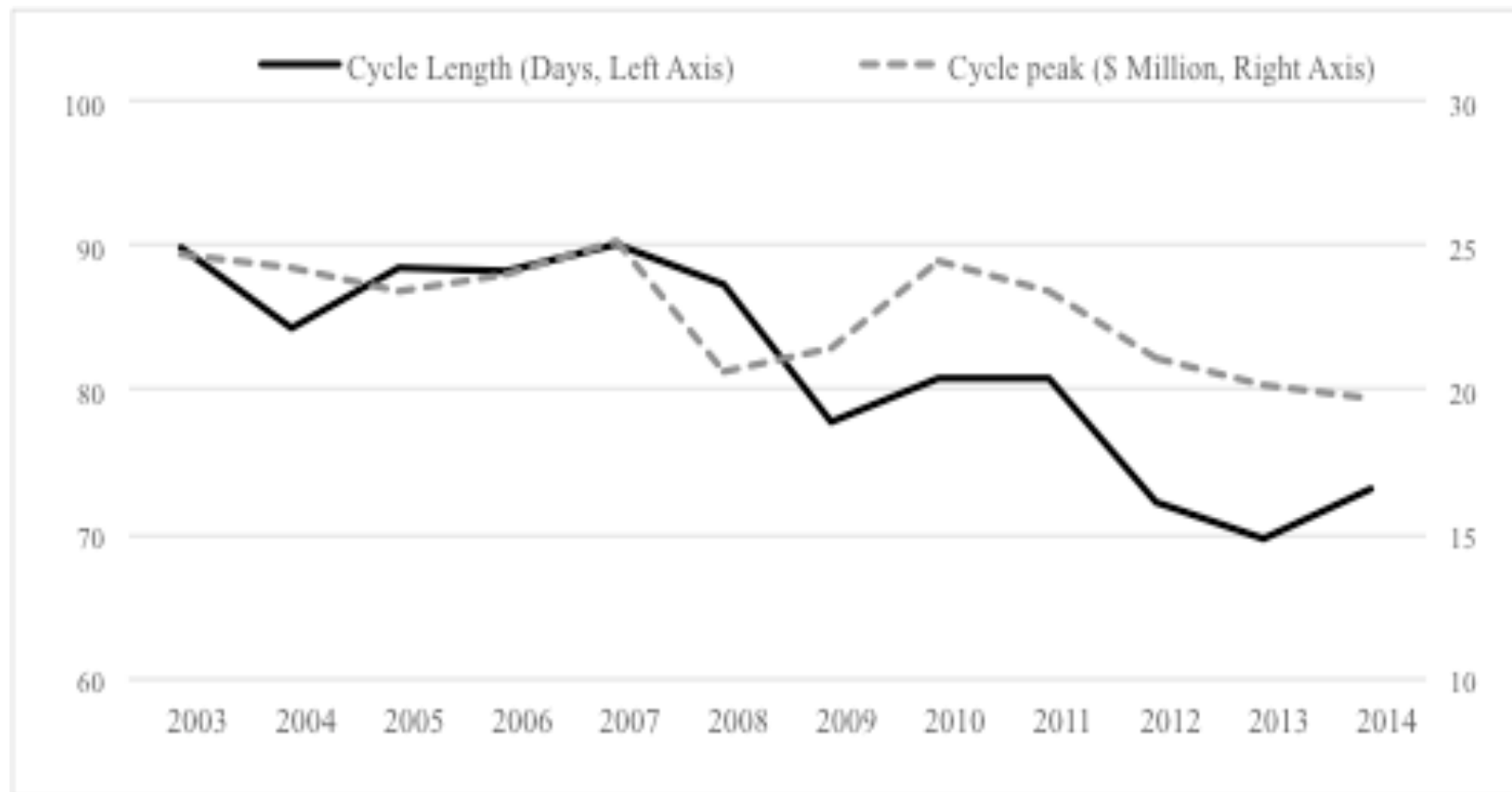
- Cycle is about 75 days on average; declining over the years.
- Returns during loading and unloading periods are consistent with idea of dealers supplying liquidity.

	Positive Inventory Cycle (N = 86,876)			Negative Inventory Cycle (N = 79,423)			Diff. Mean
	Mean	Std. Dev.	Median	Mean	Std. Dev.	Median	
Cycle length (Days)							
Loading	38.391	35.984	28.000	37.760	33.171	29.000	0.631
Unloading	40.031	30.750	33.000	39.246	31.906	31.000	0.786
Full	79.319	53.789	77.000	77.783	54.100	76.000	1.535
Peak inventory (\$ Million)	22.209	20.701	14.864	18.049	16.967	11.921	4.160***
Bond return (%)							
Loading	-0.222	2.980	-0.064	0.615	3.207	0.122	-0.838***
Unloading	0.188	3.035	0.084	-0.082	3.114	-0.070	0.270***
Full	-0.056	4.455	-0.016	0.527	4.817	0.067	-0.583***

Inventory cycles: Time-series

Shorter and “Shallow” in recent years.

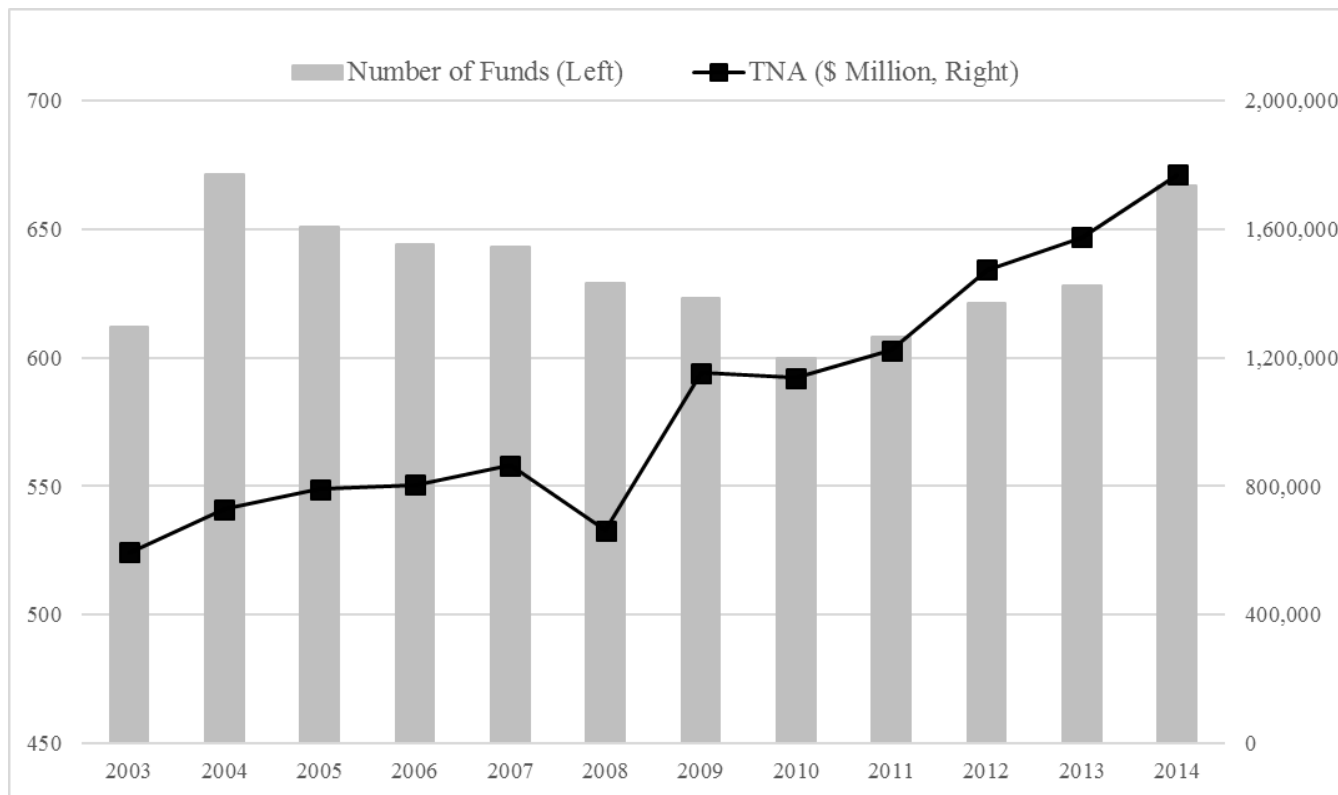
- Decline in dealer capital.



Bond fund holdings from Morningstar

Open-end taxable bond mutual funds with average allocation to corporate bonds of 30% or greater.

- Morningstar classifications- Corporate, High-yield, Multisector, Nontraditional, Bank loan, Preferred stock, Short-term, Intermediate-term, and Long-term.



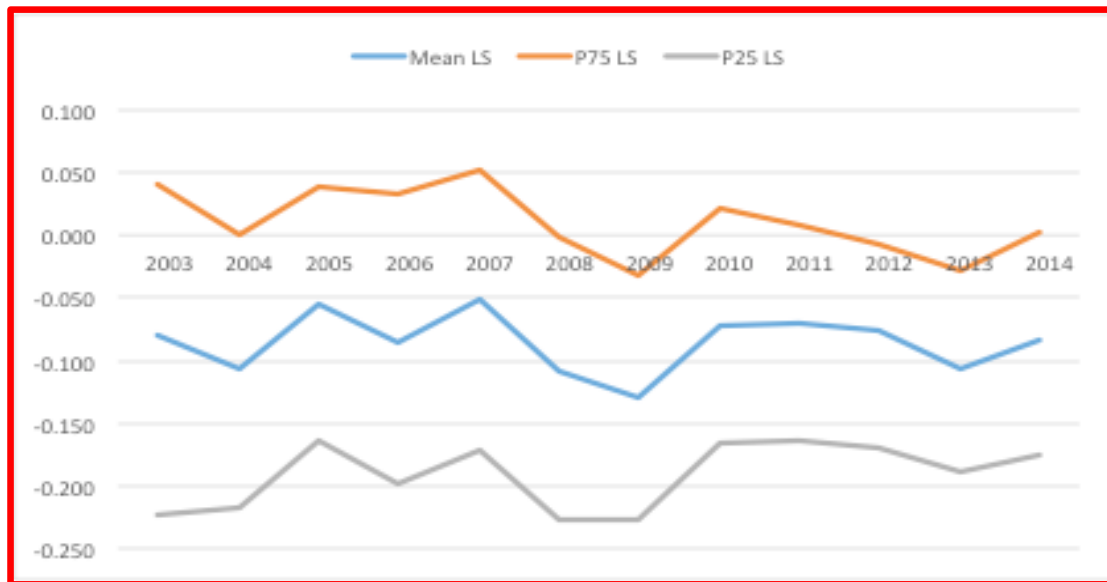
Trading Style: Fund-Level

Aggregate across all position changes in each fund-period

$$LS_score = \frac{Liquidity\ supplied\ (\$) - Liquidity\ demanded\ (\$)}{Liquidity\ supplied\ (\$) + Liquidity\ demanded\ (\$) + Unclassified\ (\$)}$$

Panel A: Summary Statistics of Net LS Fraction

	N	Mean	Std. Dev.	Pct. 25	Median	Pct. 75	Mean Unclass'd Fraction
Pooled	40,828	-0.090	0.355	-0.291	-0.093	0.103	0.136
Fund average	962	-0.081	0.145	-0.139	-0.091	-0.030	0.145



Persistence of trading style

- Ranking of *LS_score* is **persistent**.
- Future *LS_score* increases monotonically across quintiles.

Avg. Net LS Fraction Quintile	Avg. Number of Traded CUSIPs	Avg. Net LS Fraction			Percentage in Avg. Net LS Fraction [t+1, t+12] Quintile				
		[t-11, t]	[t+1, t+12]	[t+13, t+24]	1 (Low)	2	3	4	5 (High)
1 (Low)	18.964	-0.319	-0.108	-0.103	28.36	19.18	17.09	16.42	18.94
2	36.619	-0.164	-0.104	-0.101	19.79	24.71	22.47	19.18	13.85
3	40.825	-0.091	-0.089	-0.090	16.29	22.48	24.13	21.82	15.29
4	35.632	-0.015	-0.077	-0.080	16.94	18.84	21.54	23.09	19.59
5 (High)	17.392	0.159	-0.044	-0.046	18.86	14.55	14.54	19.24	32.80
5 - 1	-1.572	0.478***	0.063***	0.056***	H0: Rows and Columns are Independent $\chi^2 > 2,000***$				
Std. Error	(1.540)	(0.008)	(0.010)	(0.010)					

Bond funds with LS trading style:

- ❖ Liquid bonds: younger; larger; better quality.
- ❖ Lower portfolio risk.
- ❖ Smaller and younger funds.
- ❖ Lower volatility in investor flows.
- ❖ Higher rear load (exit fee)
- ❖ Fund fixed effect: Identity of the fund.

Higher flexibility is associated with a liquidity supplying trading style.

Determinants of Trading Style

	Dep. Var. = Avg. <i>LS_score</i> [t+1, t+12] Q5 dummy		Dep. Var. = Avg. <i>LS_score_IPO</i> [t+1, t+12] Q5 dummy	
	(1)	(2)	(3)	(4)
<u>Non-investment characteristics</u>				
Institutional fund dummy	-0.001 (0.013)	-0.038 (0.035)	-0.003 (0.014)	-0.021 (0.035)
Rear load	0.012 (0.008)	0.020** (0.010)	0.018** (0.008)	0.027** (0.011)
ln(TNA)	-0.024*** (0.004)	-0.015** (0.007)	-0.016*** (0.004)	-0.013* (0.008)
ln(Age)	-0.024*** (0.009)	-0.006 (0.025)	-0.020** (0.010)	0.014 (0.025)
<u>Investment Characteristics</u>				
% Cash	0.011 (0.011)	0.008 (0.010)	0.001 (0.010)	0.004 (0.011)
% Corporate bonds	-0.017 (0.027)	0.013 (0.022)	0.030 (0.027)	0.036 (0.023)
Average duration	-0.015*** (0.004)	-0.009 (0.006)	-0.012*** (0.004)	-0.011 (0.007)
Average credit rating	-0.010*** (0.003)	-0.008*** (0.003)	-0.014*** (0.003)	-0.008** (0.003)
ln(Average bond issue size)	0.166*** (0.020)	0.069*** (0.020)	0.095*** (0.021)	0.052** (0.022)
ln(Average bond age)	-0.013*** (0.004)	0.000 (0.004)	-0.014*** (0.004)	-0.002 (0.004)
<u>Flows and Returns</u>				
Avg. flow [t-11, t]	0.001* (0.000)	0.000 (0.000)	0.001*** (0.000)	0.001* (0.000)
Avg. return [t-11, t]	-0.016 (0.015)	-0.014 (0.014)	-0.008 (0.013)	-0.009 (0.013)
Std. dev. flow [t-11, t]	-0.001 (0.001)	-0.003** (0.001)	-0.001 (0.001)	-0.002** (0.001)
Std. dev. return [t-11, t]	-0.046*** (0.014)	-0.034** (0.014)	-0.052*** (0.014)	-0.033** (0.014)
Fund classification fixed effects	YES	NO	YES	NO
Time fixed effects	YES	YES	YES	YES
Fund fixed effects	NO	YES	NO	YES
Observations	39,517	39,517	39,618	39,618
R-squared (total)	0.078	0.232	0.064	0.212

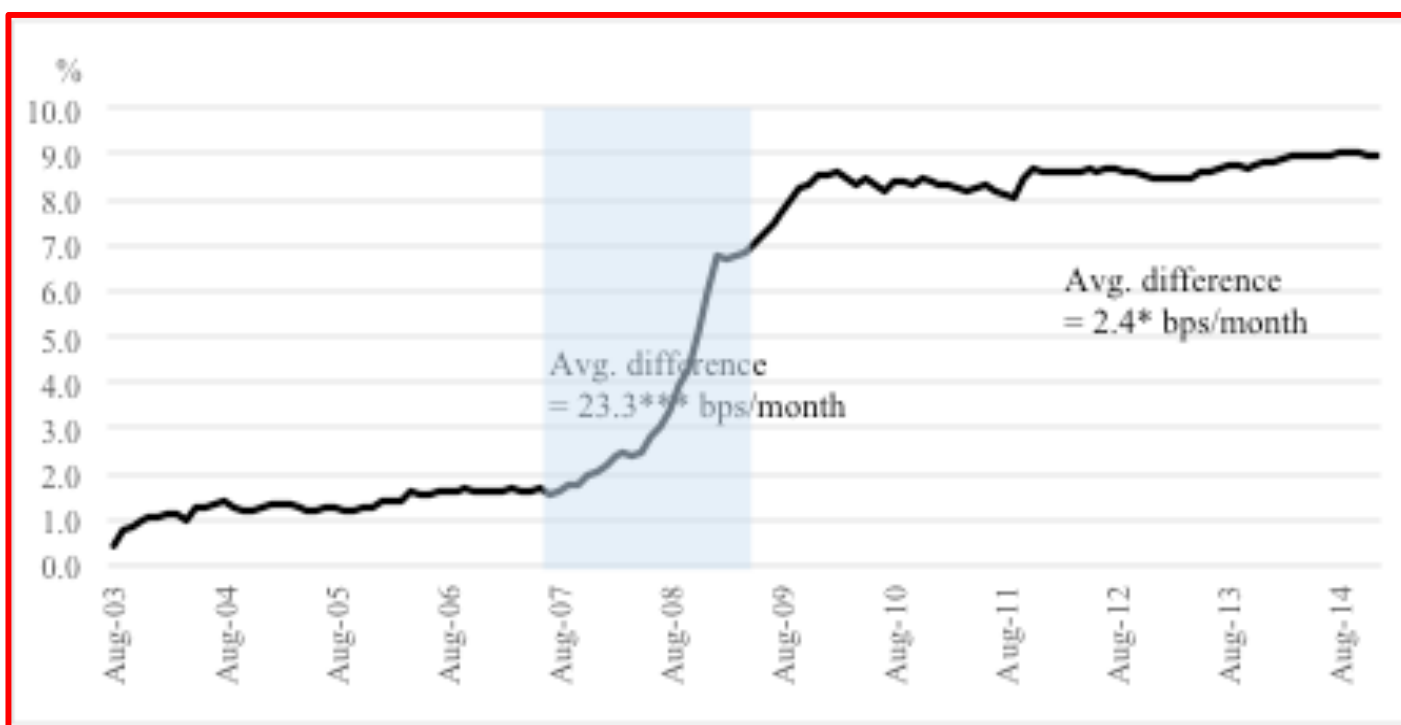
Trading style and Fund Performance

- Multi factor model (Chen and Qin (2017)) over a rolling 18-month period $[t-18, t-1]$ to estimate betas.
- Fund Alpha $[t] = \text{Actual return} - \text{Expected return}$
- Market Stress: TED Spread; Financial Crisis indicator variable; St. Louis Fed Financial Stress Index (FSI); VIX.
- Control variables: Fund attributes; Bond portfolio characteristics.

Does $LS_score [t-14, t-1]$ explain fund performance $[t]$?

Trading Style and Fund Performance

Funds in *LS_score* Q5 **outperforms** those in Q1, especially during stressful times.



Effects on Performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Main Variables</u>							
Avg. LS-score [$t-12, t-1$]	0.152** (0.066)		0.087*** (0.033)	0.128*** (0.039)	0.129*** (0.044)	0.122*** (0.039)	0.123*** (0.040)
Avg. LS-score [$t-12, t-1$] Q1		-0.032** (0.015)					
Avg. LS-score [$t-12, t-1$] Q5		0.033** (0.016)					
Crisis x Avg. LS-score [$t-12, t-1$]			0.312** (0.126)	0.020 (0.109)	0.073 (0.104)	0.013 (0.111)	0.063 (0.102)
TED x Avg. LS-score [$t-12, t-1$]				0.300*** (0.046)		0.298*** (0.041)	
VIX x Avg. LS-score [$t-12, t-1$]					0.018*** (0.006)		0.018*** (0.006)
Fund classification fixed effects	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES
Observations	58,428	58,428	58,428	58,428	58,428	58,428	58,428
R-squared (total)	0.246	0.246	0.247	0.248	0.249	0.251	0.252

Summary

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