Institutional Ownership and Liquidity in the U.S. Corporate Bond Market

Haiyue Yu

Columbia MAFN

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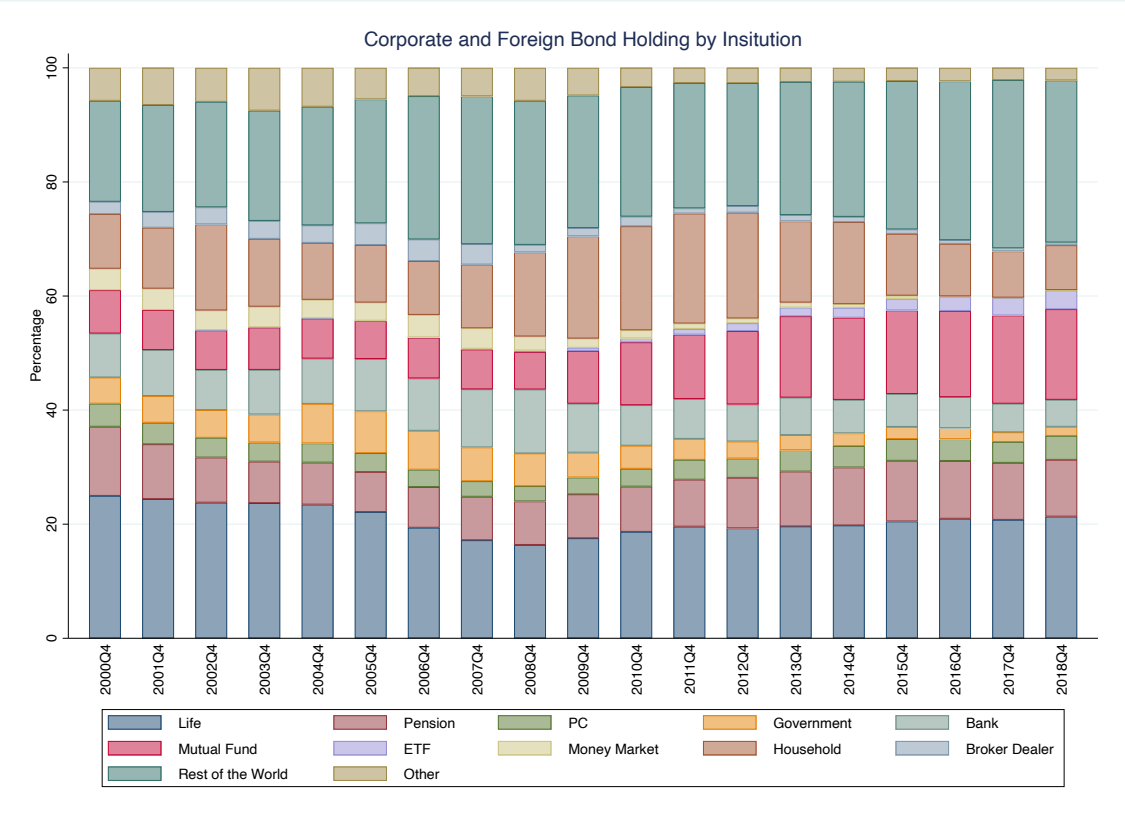
US Corporate Bond Market

- The U.S. corporate bond market is large and important $\sim$\$11.2 trillion in 2024Q4
- Much less liquid than stocks, liquidity plays an important role in credit spread variation
- Significant disruption and price dislocation in March 2020

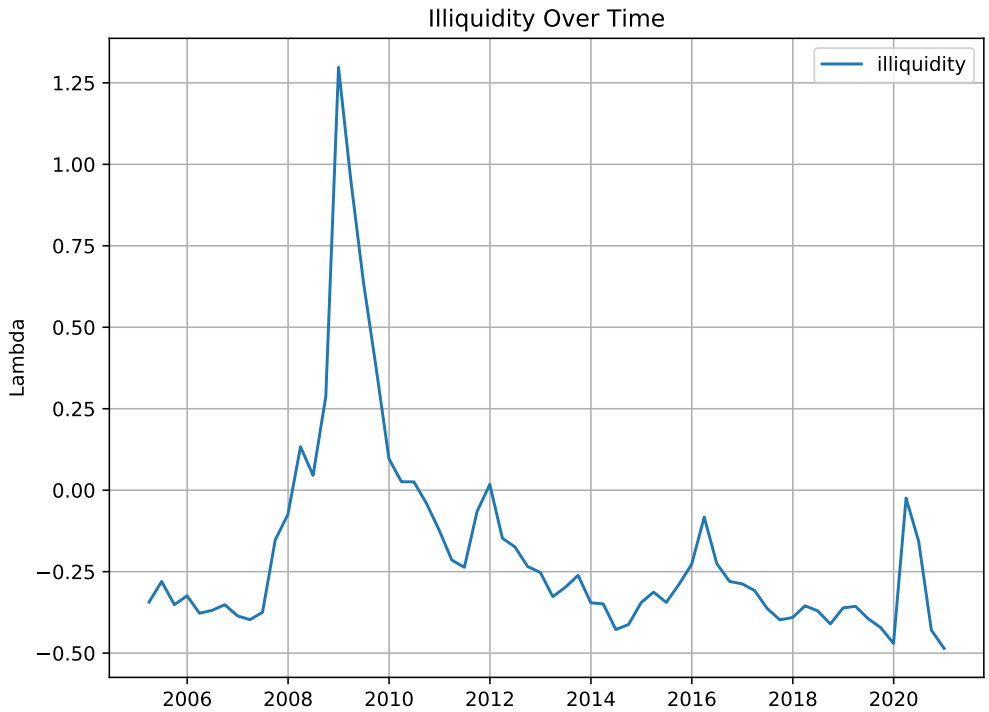
Major Investors

- Long-term investors: Insurance companies, Pension
- Short-term investors: Mututal funds and ETF (LQD, HYG)



Measure of (il)Liquidity

- Bid-Ask Spread
- Market Impact - Amihud Measure (Price Movement/Quantity)
- Turnover
- Liquidity Risk: e.g. Std(Bid-ask spread)
- PC1 of the above



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- The U.S. corporate bond market is large >$10 trillion
- Market participants have been widely worried about **liquidity**

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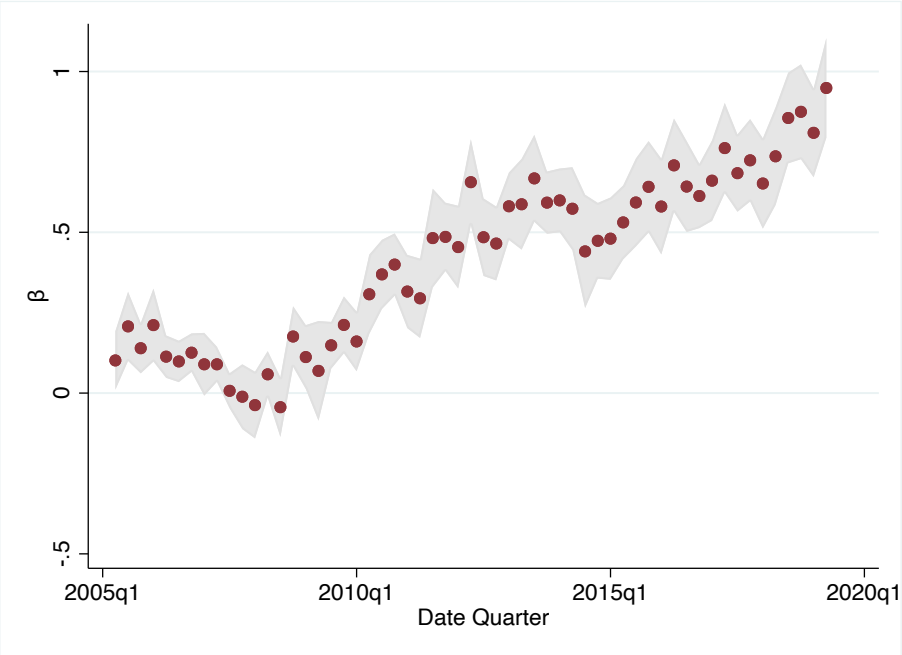
New fact

- As a potential reconciliation, we establish that credit spreads have grown significantly more "sensitive" to bid-ask spreads from 2005 to 2019

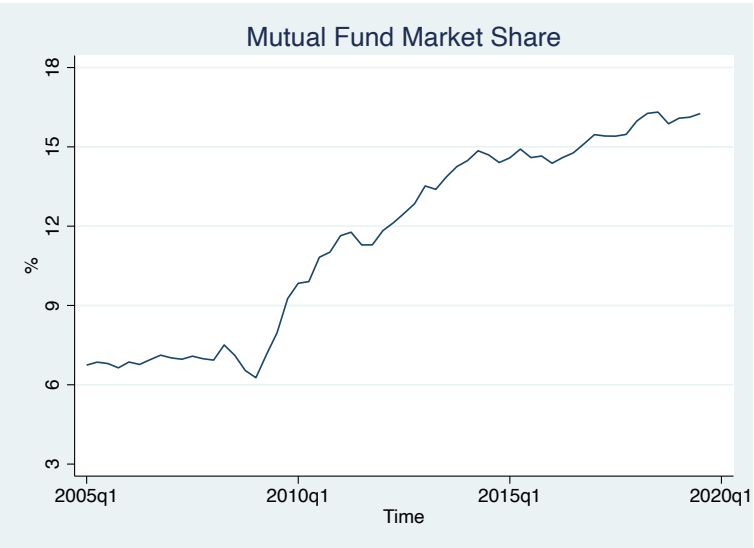
$$CS_{i,t} = \alpha_t + \beta_t BA_{i,t} + \epsilon_{i,t}$$



$\Rightarrow$ Increased fragility before the Covid-19 bond market disruption

Investor Composition Shifts

- Mutual fund and ETF shares increased significantly over this time period in the U.S.
  - From less than 8% in 2005 to over 20% in 2019
  - Mutual funds and ETFs are short-term investors compared to other major investors, e.g. insurance companies
- In the cross-section, we find
  - Short-term investors hold short-term and risky bonds
  - Bonds held by short-term investors have more trading activities and credit spreads are more "sensitive" to bid-ask spreads



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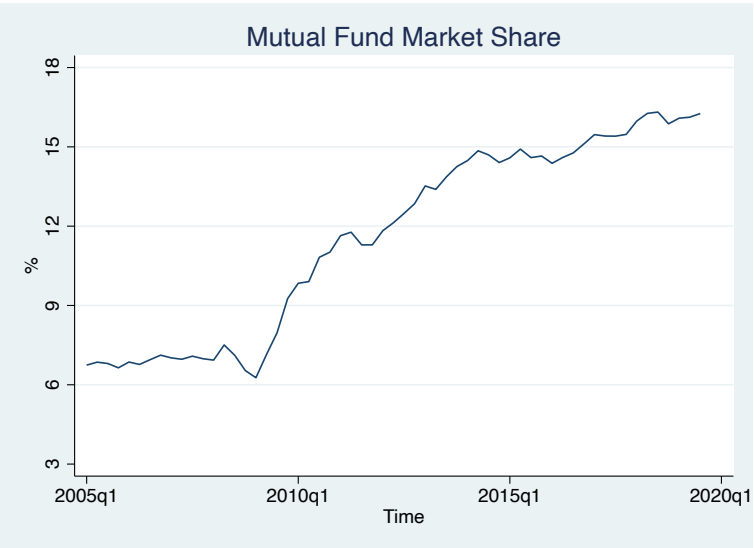

Model Summary

- We build a heterogeneous investor model with heterogeneous assets, to rationalize the reduced form facts
- Key model ingredients
  - Investors with different trading needs choose which assets to hold
  - Bonds are illiquid subject to search frictions and bid-ask spreads
- Model implications
  - Short term investors (e.g. mutual funds) prefer liquid assets (e.g. treasury) due to higher trading needs
  - Risk-free rates $\downarrow \Rightarrow$ short-term investors enter the corporate bond market
  - Market participants $\uparrow \Rightarrow$ bid-ask spreads $\downarrow$
  - Investor trading needs $\uparrow \Rightarrow$ "sensitivity" of credit spreads to bid-ask spreads $\uparrow$
- The model can quantitatively match the change in the liquidity component

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Main Take-away

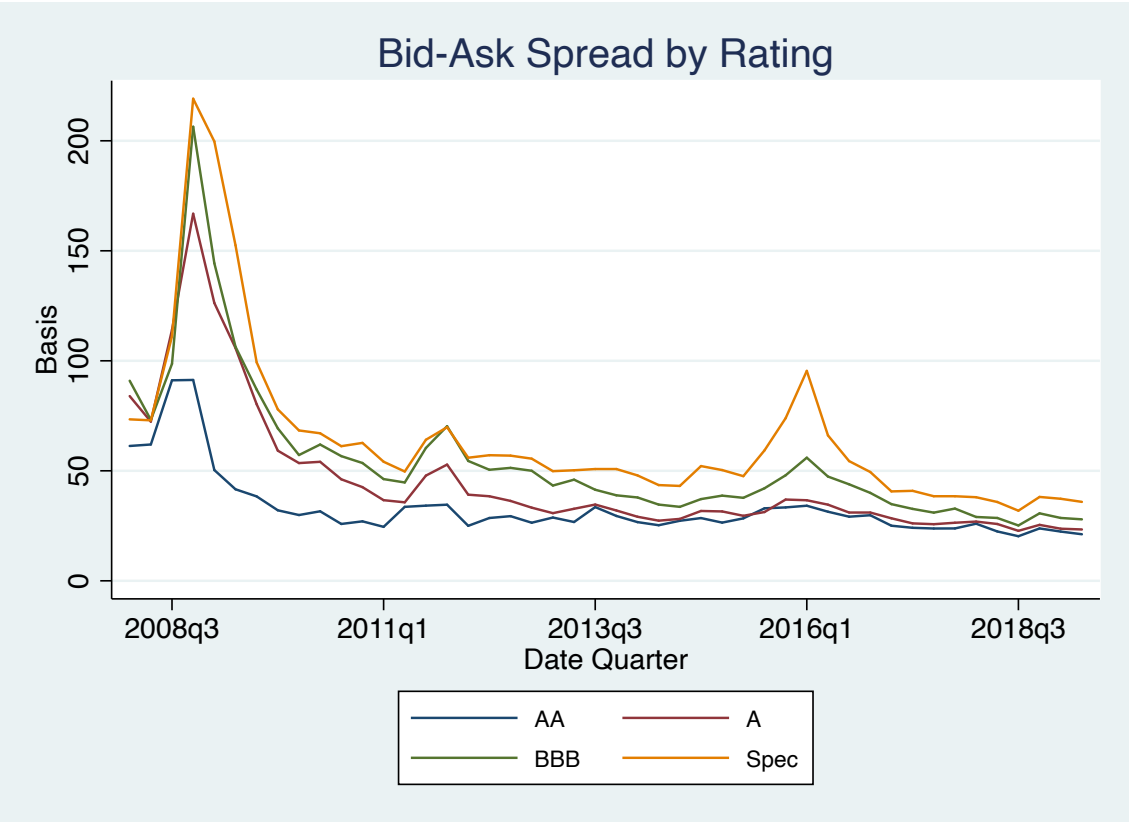
- *Simply looking at the level of liquidity is insufficient, the liquidity component may be increasing despite the fact that bid-ask spreads are falling*
- Important for understanding the impact of dealer regulations and unconventional monetary policy

Data

- WRDS: Bid-ask spreads (baseline measurement of transaction cost)
- TRACE: Other measures of transaction cost
  - Imputed round-trip cost
  - Own estimate of bid-ask spread
  - Largest principal component of several liquidity measures as in Dick-Nielsen, Feldhütter and Lando (2012)
- Mergent: Other bond characteristics
- eMaxx: Quarterly investor holding data on corporate bonds: Life insurance, mutual funds, P&C insurance etc. Coverage around 50 percent

Bid-ask Spreads

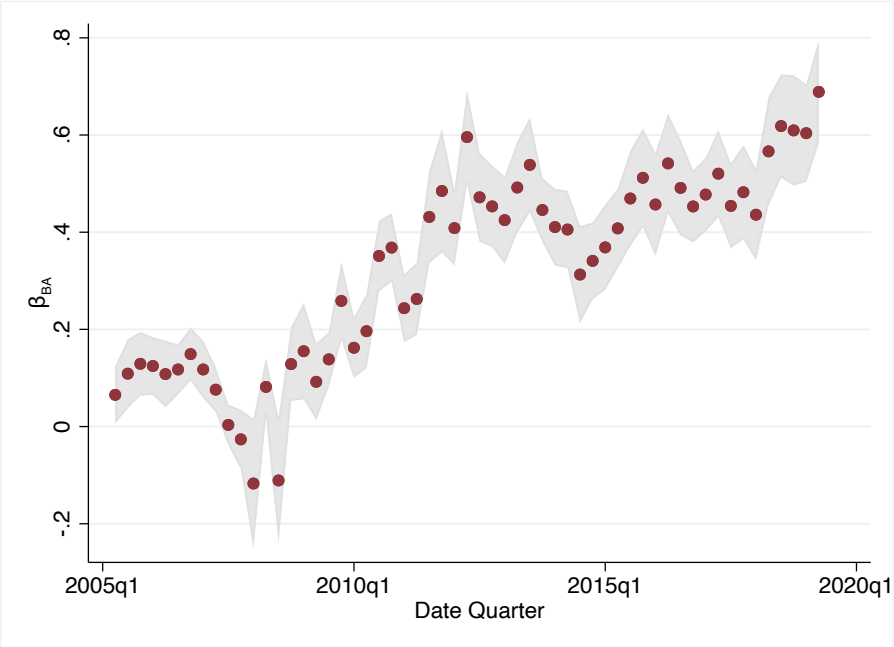
- Bid-ask spreads have been (weakly) declining since the financial crisis



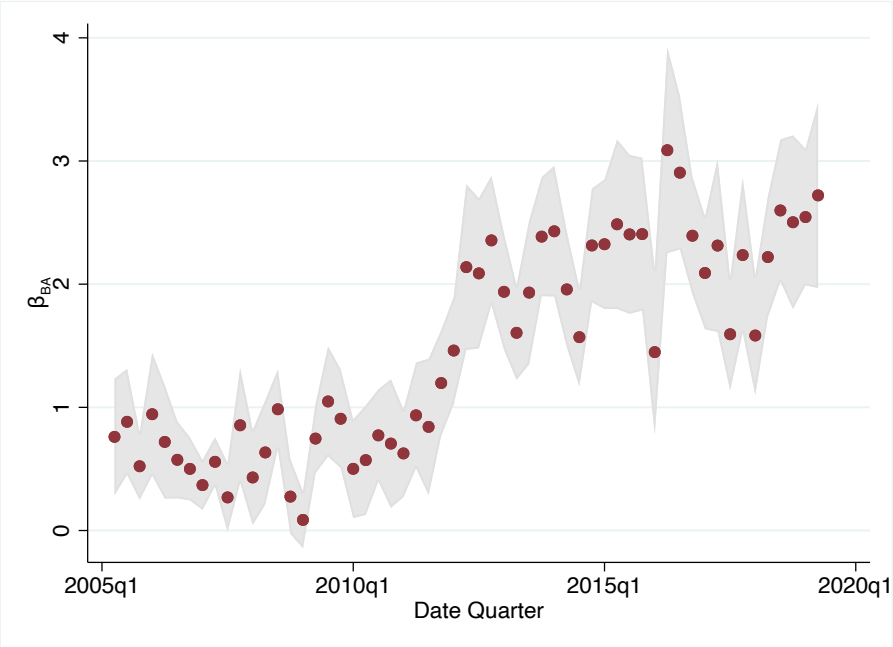
Loading of CS on BA

- The loading of credit spreads on bid-ask spreads has increased significantly over time

$$CS_{it} = \alpha_t + \beta_t BA_{it} + \gamma_t^\top X_{it} + \epsilon_{it}$$



Investment Grade



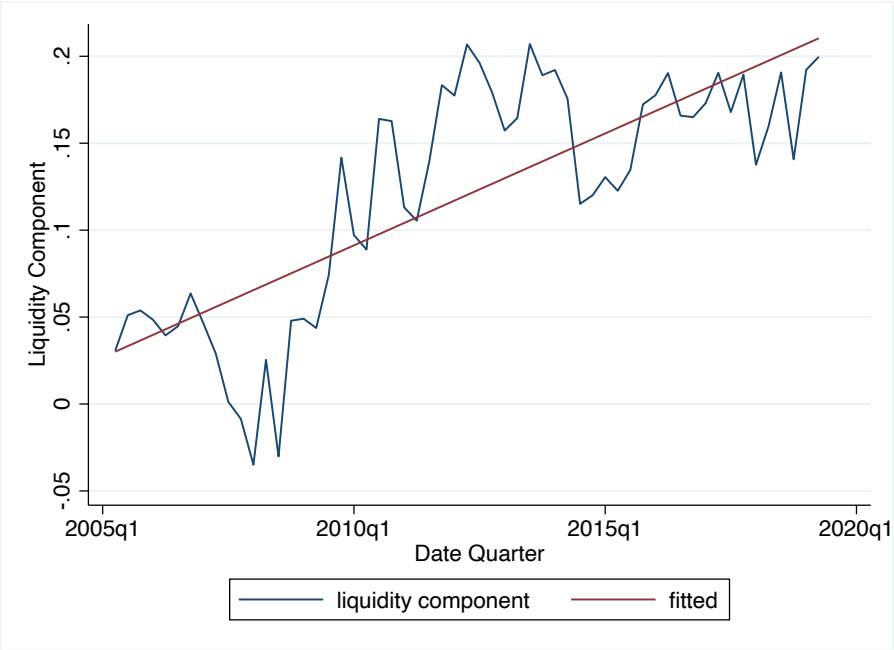
High Yield

▸ Correlation coefficient ▸ CDS ▸ By investor group

Total Compensation for Liquidity

- As a result, the liquidity component has increased from 5-10% to 20-30%

$$liq\_comp_t = med\left[\frac{\beta_t \times BA_{it}}{CS_{it}}\right]$$



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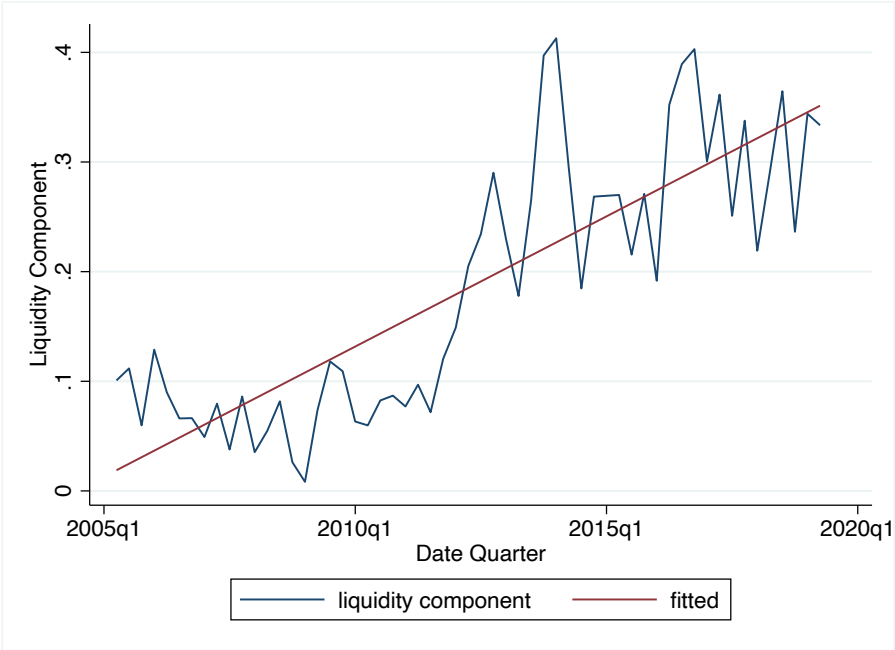

High Yield

Measure Investor Turnover

- Use holdings data (eMaxx) to measure investor turnover
  - For fund j in period t,

$$net\_transaction_{j,t} = \frac{\left| \sum_i holding_{i,j,t+1} - \sum_i holding_{i,j,t} \right|}{\sum_i holding_{i,j,t}}$$

$$NT_{j,t} = \frac{1}{T} \sum_{t'=1}^{T} net\_transaction_{j,t-t'}$$

    we take $T = 4$ in the baseline case

  - For bond i in period t:

$$Inv\_Comp_{i,t} = \frac{\sum_j holding_{i,j,t} * NT_{j,t}}{\sum_j holding_{i,j,t}}$$

    (Only include bonds that eMaxx has $\geq 20\%$ of coverage)

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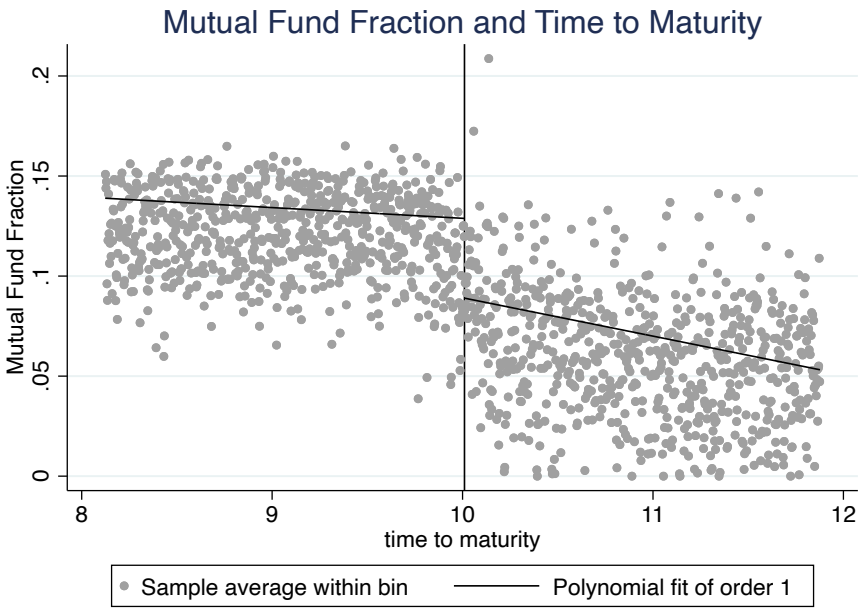
Summary Statistics and Sorting

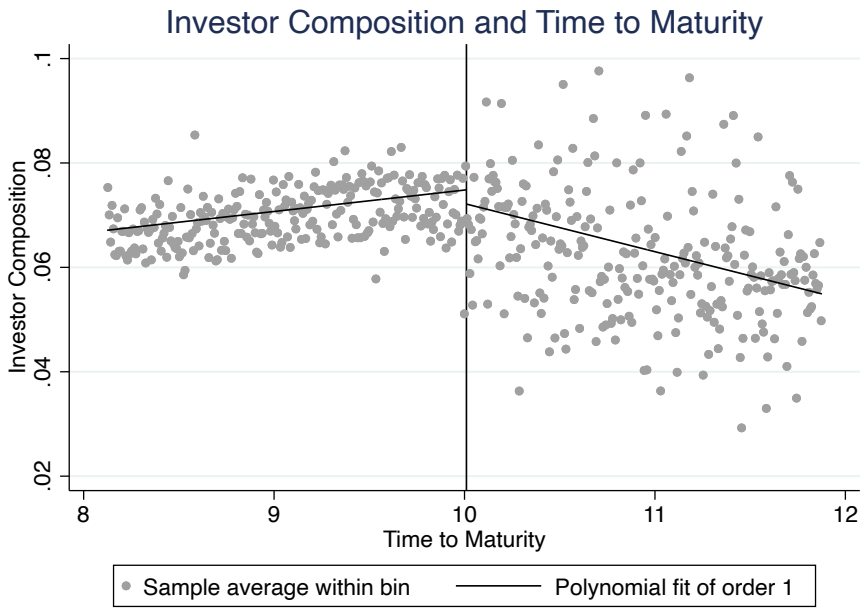
Investor type	Life insurance	Mutual funds	P&C
Amount (trillion)	2.067	2.239	0.365
Net transaction	0.067	0.179	0.092
Average bid-ask spreads (bps)	31.792	29.721	25.436
Time to maturity	10.253	8.992	5.956
Fraction of AAA-A	0.435	0.259	0.483
Fraction of BBB	0.495	0.410	0.434
Fraction of high yield	0.069	0.330	0.084

- Short-term investors hold shorter-term and riskier bonds ▸ Details
- Bonds held by short-term investors have lower bid-ask spreads and higher turnover rates ▸ Details

Discontinuity in Investor Composition

- Discontinuous change in investor composition around the 10-year maturity threshold
  - Intermediate bond funds are the largest type of fixed-income mutual funds by AUM
  - Often restricted to invest in bonds with maturity less than 10-years (Also look at subsample of bonds with maturity > 10 at time of issuance)





Investor Composition and Trading Activity

- Bonds held by short-term investors have higher turnover rates and more trades

$$Y_{i,t} = \alpha + \beta_1 \widehat{Inv\_Comp}_{i,t} + \gamma^\top \mathbf{X_{i,t}} + \epsilon_{i,t}$$

	(1) Inv Comp	(2) Turnover	(3) No. of Trades	(4) Inv Comp	(5) Turnover	(6) No. of Trades
$\mathbf{1}_{ttm>10}$	-0.00575***			-0.00677***		
	(-5.84)			(-7.26)		
Inv_Comp		24.66***	76.22***		19.48***	63.13***
		(6.40)	(7.96)		(8.12)	(9.60)
Time to Maturity	0.00337***	0.0247*	0.0144	0.00326***	0.0190*	-0.00406
	(6.08)	(2.30)	(0.48)	(8.87)	(2.64)	(-0.19)
Log(Amount)	0.00441***	-0.0547**	0.828***	0.00417***	-0.0369**	0.869***
	(7.64)	(-3.17)	(16.16)	(7.87)	(-3.03)	(22.36)
Bandwidth	1.691	1.691	1.691	2.231	2.231	2.231
Sample	Full	Full	Full	Subsample	Subsample	Subsample

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Investor Composition and Loading of Bid-ask Spreads

- Bonds held by short-term investors have larger loading of credit spreads on bid-ask spreads

$$CS_{i,t} = \alpha + \beta_1 BA_{i,t} + \beta_2 \widehat{Inv\_Comp}_{i,t} + \beta_3 BA_{i,t} \times \widehat{Inv\_Comp}_{i,t} + \gamma^\top \mathbf{X_{i,t}} + \epsilon_{i,t}.$$

	(1) CS	(2) CS	(3) CS	(4) CS
Bid Ask	0.378***	0.687***	0.232***	0.300*
	(4.74)	(4.86)	(5.41)	(2.17)
Inv Comp	-0.776	2.036	-1.166*	-2.479
	(-1.49)	(1.26)	(-2.47)	(-0.89)
Inv Comp × Bid Ask		48.65***		55.86***
		(6.61)		(3.93)
sample	Full	Full	Subsample	Subsample

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Summary

- Over time, the loading of credit spread on bid-ask spread has been increasing, leading to an increase in the liquidity component
- In the cross-section, short-term investors hold more short-term and high-default-intensity bonds
  - Bonds held by more short-term investors have higher turnover rates and larger number of trades
  - Bonds held by short-term investors are more "sensitive" to bid-ask spreads

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Introduction

- Median investment grade corporate bond has 47 investors
- Price impact/illiquidity can be large with limited number of investors
- This paper provides a new mechanism for liquidity and bond price dynamics $\rightarrow$ the concentration of investor ownership.
  - Considerable dispersion of investor concentration within a firm.
  - Bonds with lower investor concentration (more investors):
    - have higher turnover, lower bid-ask spread, better liquidity
    - larger drawdown (price drop) but faster recovery during the COVID-19 and Financial Crises

Investor Concentration

- Investor Concentration for bond i at time t:
  - $HHI_{i,t} = \sum_{j=0}^{j=N_{i,t}} s_{ijt}^2$, s_{ijt}: share of bond i held by investor j at t.
  - Symmetric case $HHI_{i,t} = \frac{1}{N_{i,t}}$.

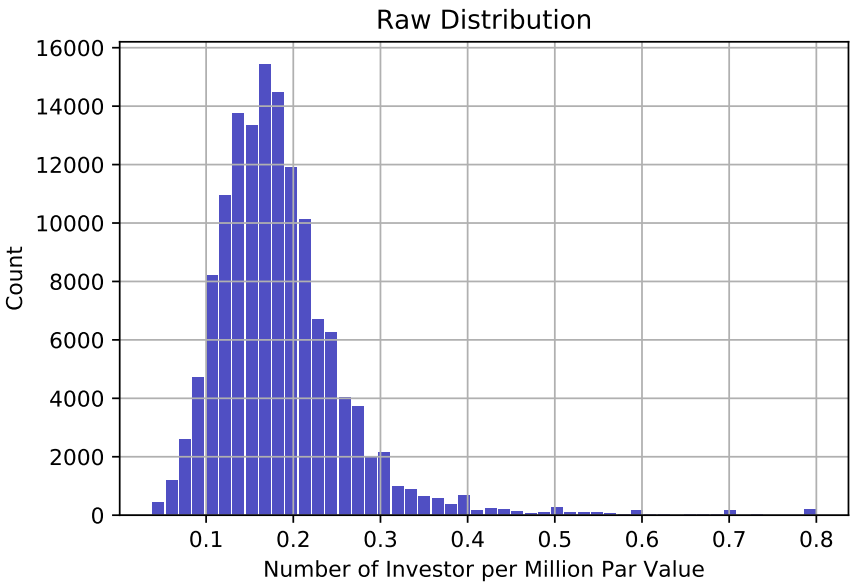
Table: Summary Statistics for Investor Concentration

	Bond Size (Million)	Number of Investors	HHI
mean	350.1	55.43	0.105
std	309.1	40.39	0.116
min	10.3	1.00	0.012
25%	150.0	26.00	0.049
50%	287.0	47.00	0.070
75%	472.0	75.00	0.111
max	5545.0	558.00	1.000

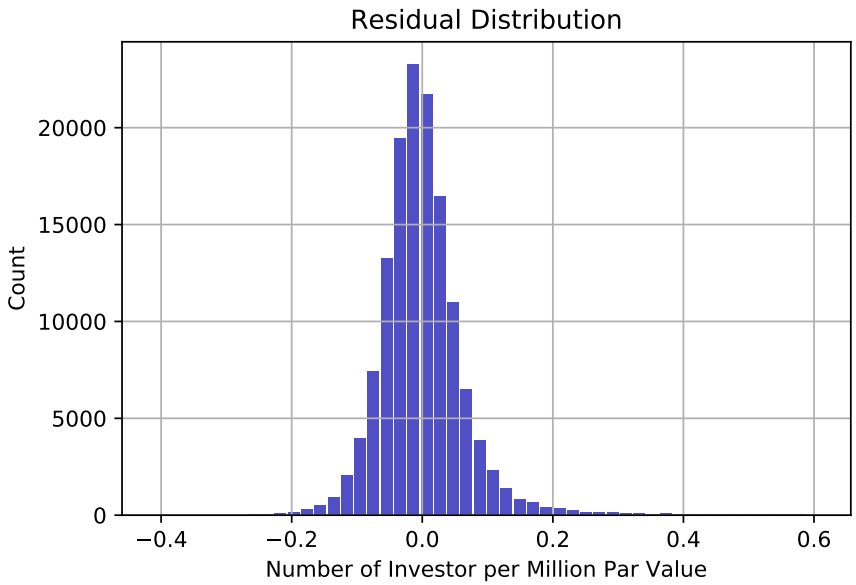
US Investmen Grade bond, sample period is from 2005Q1 to 2019Q4.

Investor Concentration in the Bond Market

Figure: Distribution of Investor Concentration of Investment Grade Bond



Raw Distribution - Investor No per Million Par



Within Firm - Investor No per Million Par

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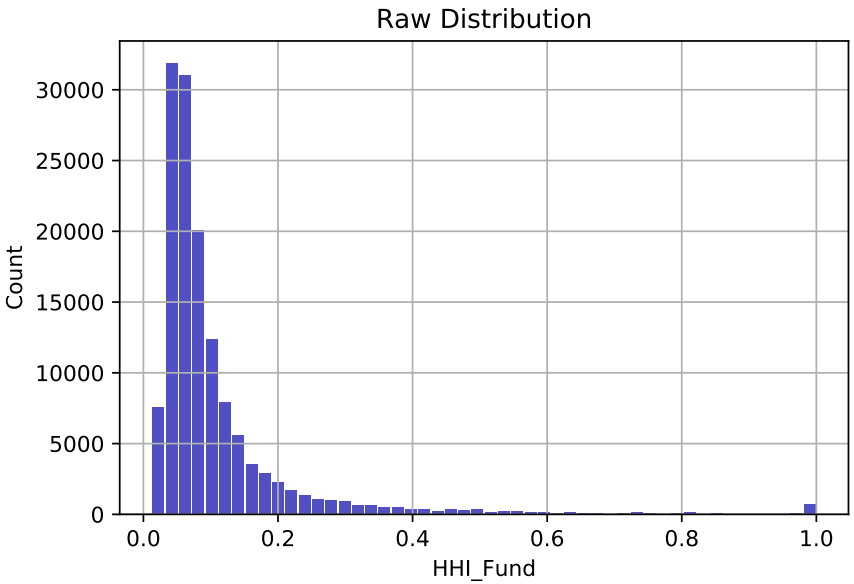
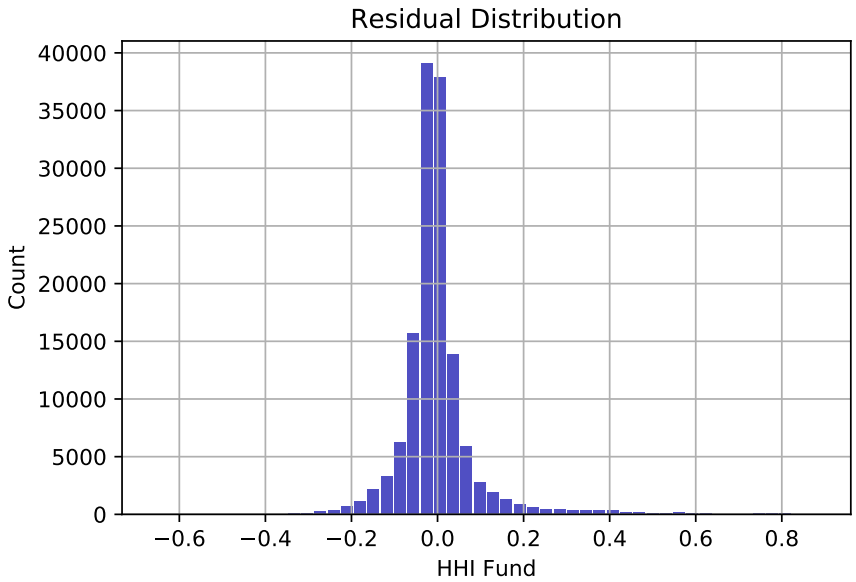


Raw Distribution - HHI



Within Firm - HHI

Cross Sectional Results

$$(il)liquidity_{i,t} = \alpha + \beta_1 investor\_concentration_{i,t} + \gamma^\top \mathbf{X_{i,t}} + \mu_{f,t} + \epsilon_{i,t}.$$

	Turnover	Illiquidity	Bid-Ask Spread (bps)
Investor Concent (HHI)	-0.848***	0.509**	25.89**
	(-5.99)	(3.27)	(3.16)
Lin Share	-0.532***	0.693***	27.98***
	(-9.24)	(9.61)	(7.54)
Mut Share	0.187*	-0.372***	-19.47***
	(2.23)	(-4.51)	(-4.53)
Firm×Time	Yes	Yes	Yes
Rating×Time	Yes	Yes	Yes
N	137546	134755	137364
adj. R^2	0.449	0.528	0.511

t statistics in parentheses

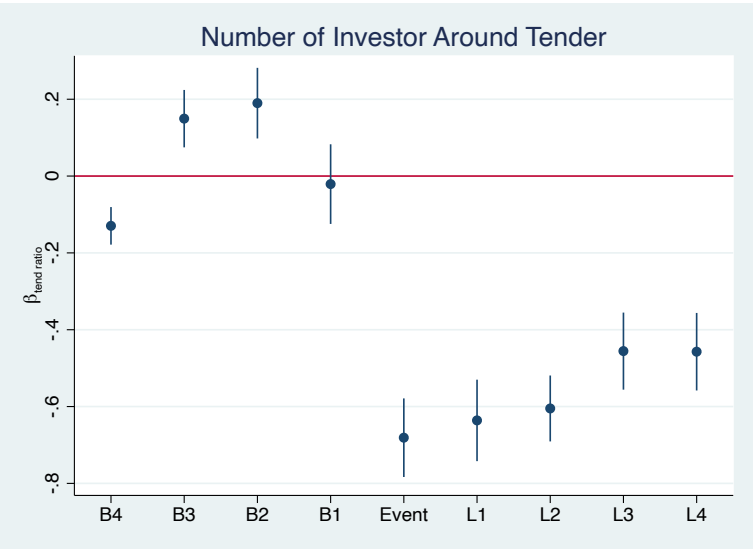
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Control for bond coupon rate, whether the bond is redeemable, rating fixed effects and firm*time fixed effects. Turnover and illiquidity are standardized. Clustered at firm and time levels. Sample period: 2005Q1 to 2019Q4.

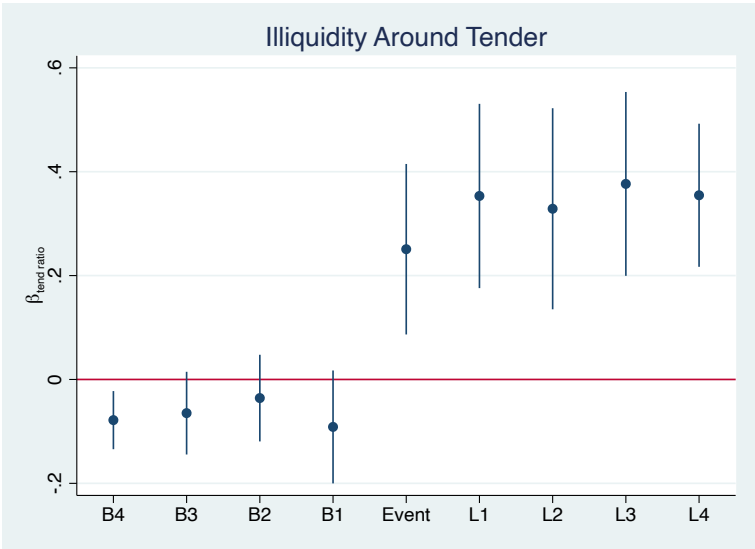
The Size Effect

$$illiquidity_{i,t} = \alpha_i + \mu_{f,t} + \sum_{\tau=-4}^{\tau=4} \beta_\tau \, TenderRatio_{i,\tau,t} + \gamma^\top \mathbf{X_{i,t}} + \epsilon_{i,t}$$

$TenderRatio = \frac{AmountPreTender - AmountAfterTender}{AmountPreTender}$. Only firms that have tender offer during those period are included.



log Number of Investors



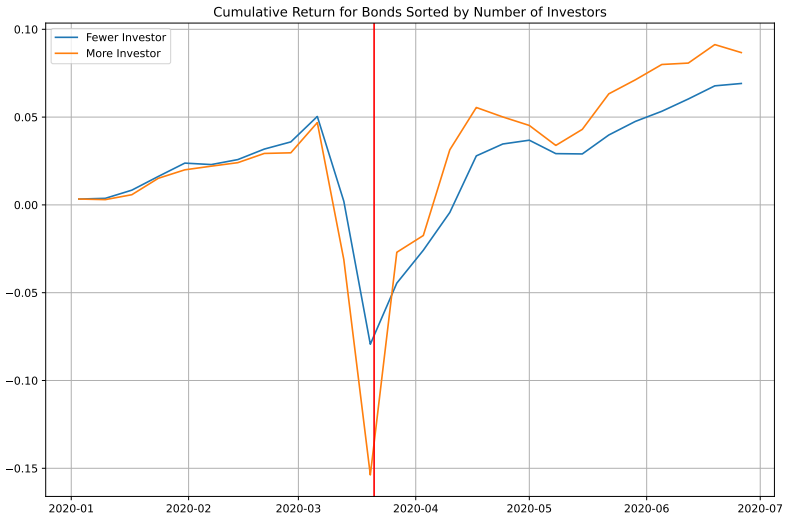
Illiquidity

B4-B1 are the coefficients before the event, L1- L4 are the coefficients are the event.

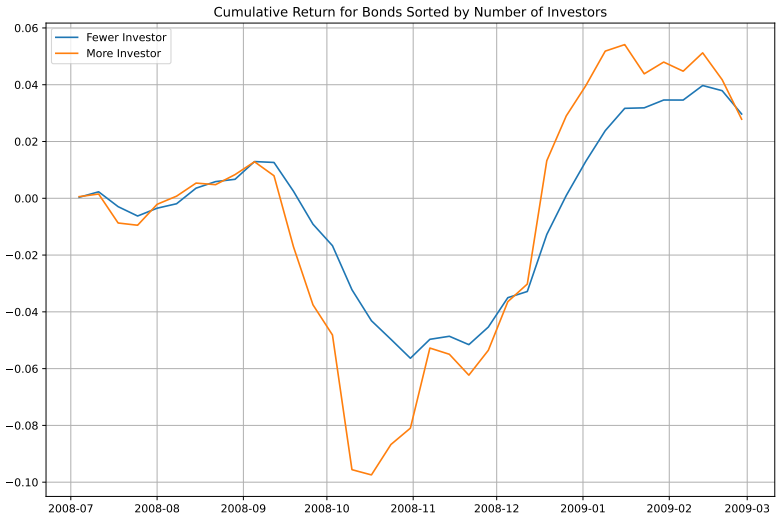
Price Dynamics During the Crises

- One standard deviation increase in investor concentration is associated with 94bps (120bps) decrease in drawdown during 2020 (2008).
- Bonds with less investor concentration also recover faster (shorter half life).

Figure: Cumulative Return by Investor Concentration



COVID-19 Crisis



Financial Crisis

First group the bond by rating category then time to maturity. Then within each rating*time-to-maturity group, we further group the bond by number of investors and calculate the average return for different investor concentration groups.

During the Crisis - Drawdown

$$Drawdown_{i,event} = -minimum\{cumret_{i,event,t}\}$$

$$Drawdown_{i,event} = \alpha + \beta_1 concentration_{i,event} + \gamma^\top \mathbf{X_{i,event}} + \mu_{f,event} + \epsilon_{i,event}.$$

	Financial Crisis	COVID	Drawdown Combine
Investor Concent	-2.367***	-1.646**	-1.843***
	(-3.48)	(-3.24)	(-4.51)
Lin Share	-3.761*	-4.181***	-3.750***
	(-2.57)	(-3.37)	(-3.98)
Mut Share	-5.463	1.743**	1.787**
	(-0.94)	(2.96)	(2.90)
N	1487	2683	4170
adj. R^2	0.784	0.750	0.773

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Control for bond size, time to maturity, time to maturity*2, bond age, coupon rate, whether the bond is redeemable, rating*event effects and firm*event fixed effects.

During the Crisis - Recovery

$$recovery = cumret_T - min_{t=1,2...T}\{cumret_t\}$$

	Financial	COVID-19	Recovery	Recovery
Investor Concent	-6.748***	-3.997***	-4.573***	-1.374*
	(-3.33)	(-4.69)	(-4.32)	(-2.12)
drawdown				1.882***
				(22.30)
N	1487	2683	4170	4170
adj. R^2	0.719	0.727	0.772	0.922

t statistics in parentheses

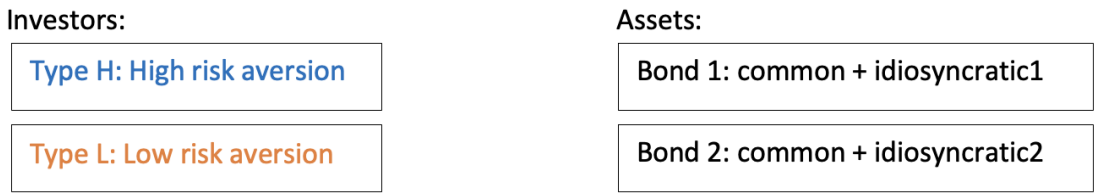
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Control for bond size, time to maturity, time to maturity*2, bond age, coupon rate, whether the bond is redeemable, rating*event effects and firm*event fixed effects.

Model Summary

Extend Vayanos (1999):

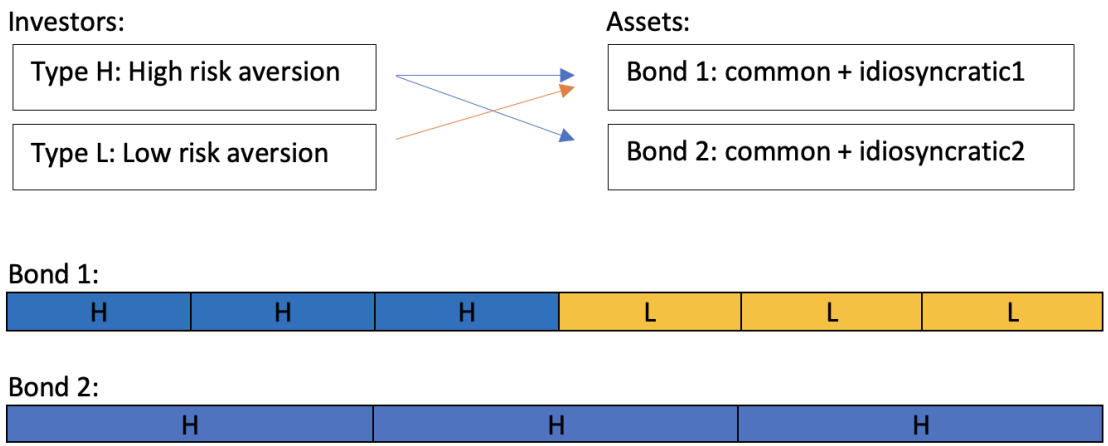
- Two types of investors with different risk aversion, trade to hedge risks. Two symmetric risky assets.
- Investors pay upfront fixed participation cost to trade in a new market.



Model Summary

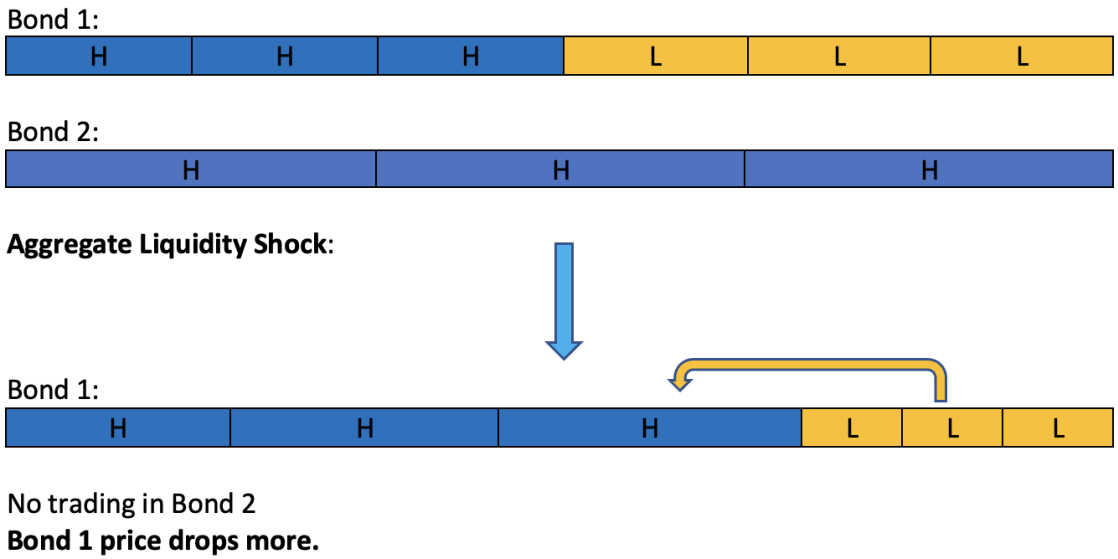
Model implications:

- High risk aversion investors hold both risky assets, low risk aversion hold one.
- Due to the complimentary effect of liquidity, one market has more investors, more liquid, but higher price.



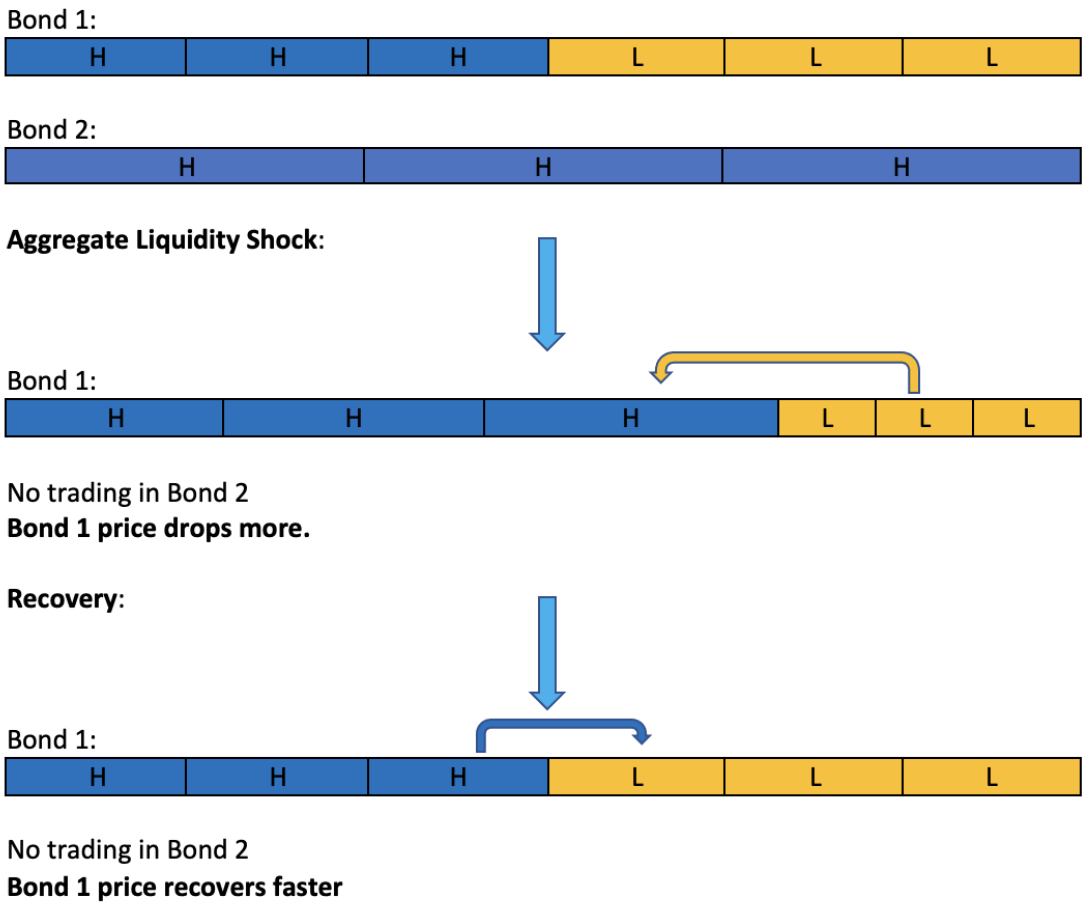
Model Summary

- Aggregate liquidity shock hits, less risk-averse investors sell to the more risk-averse investors in market 1.
  - $\Rightarrow$ Bond 1's price drops more.



Model Summary

- Along the recovery path, less risk-averse investors buy back the assets they originally hold.
  - $\Rightarrow$ Faster recovery (shorter half life) for bond 1.

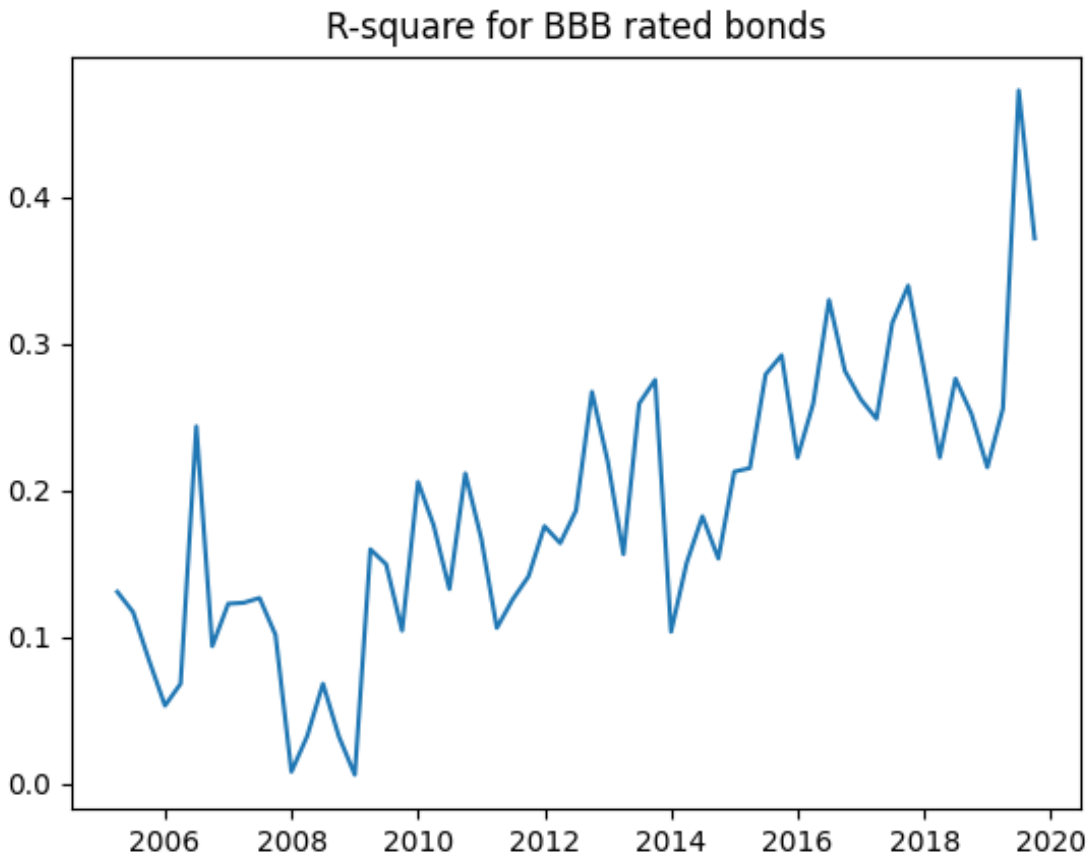


Main Take-away

- Uncover a new channel through which institutional ownership matters in illiquid markets - *the Concentration of Investor Ownership.*
- Further highlight the importance of understanding investor *segmentation* in the corporate bond market.

Appendix: R-squared for BBB-bond regression

$$CS_{i,t} = \alpha_t + \beta_t BA_{i,t} + \epsilon_{i,t}$$



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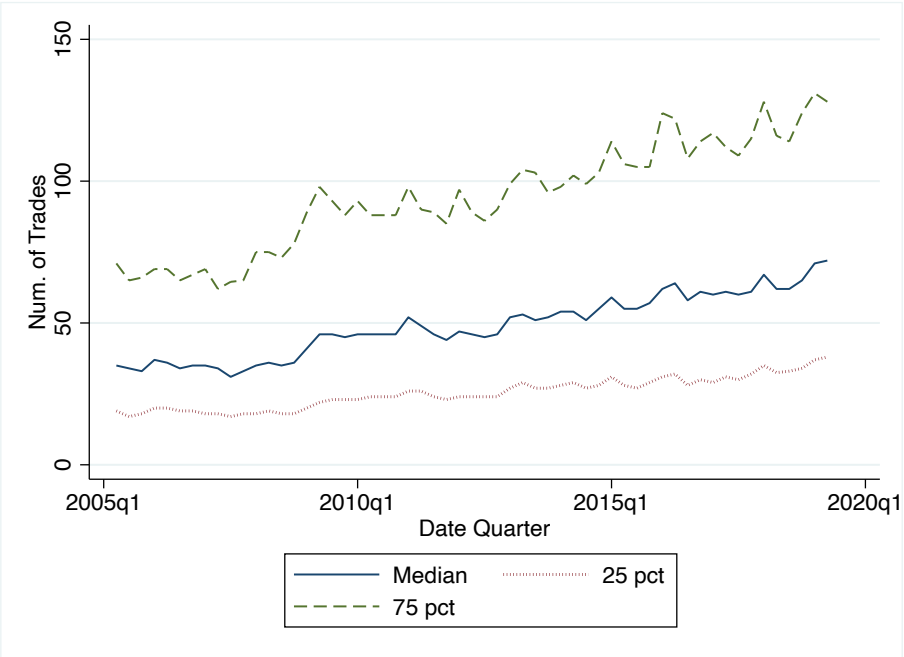
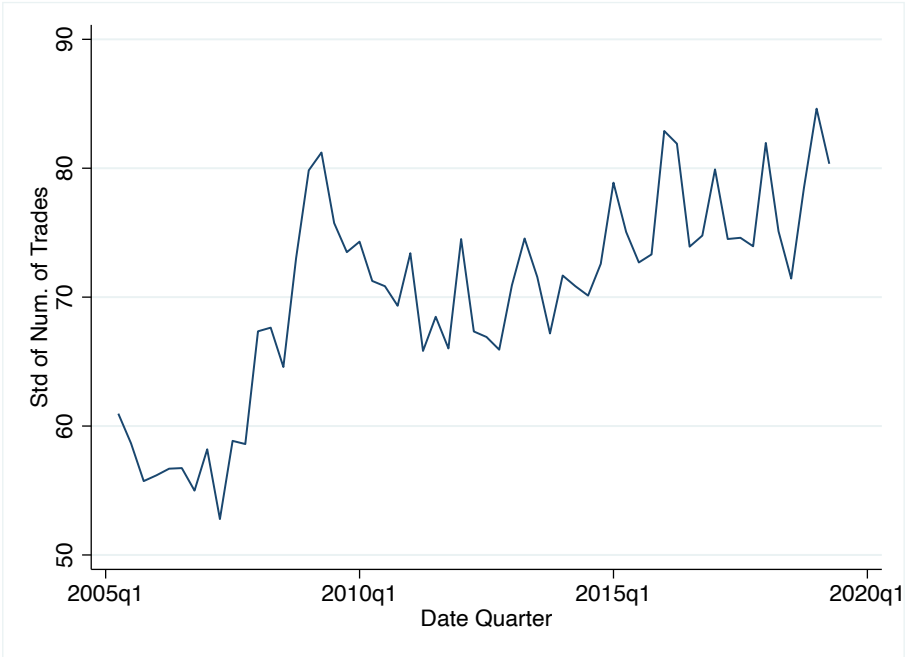
Appendix: Number of Quarterly Trades Over Time

Figure: Number of Quarterly Trades Over Time



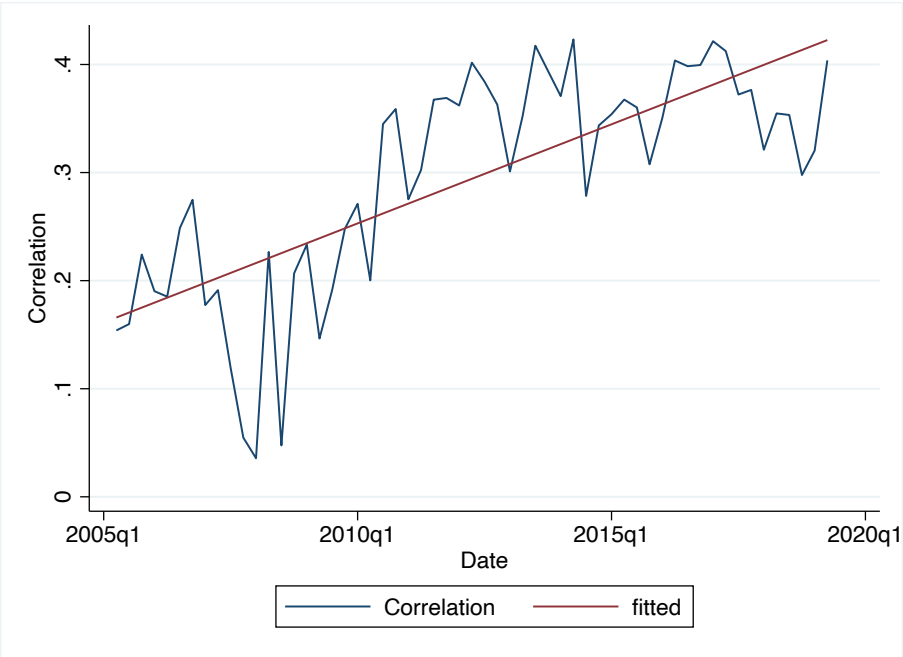
Number of Trades



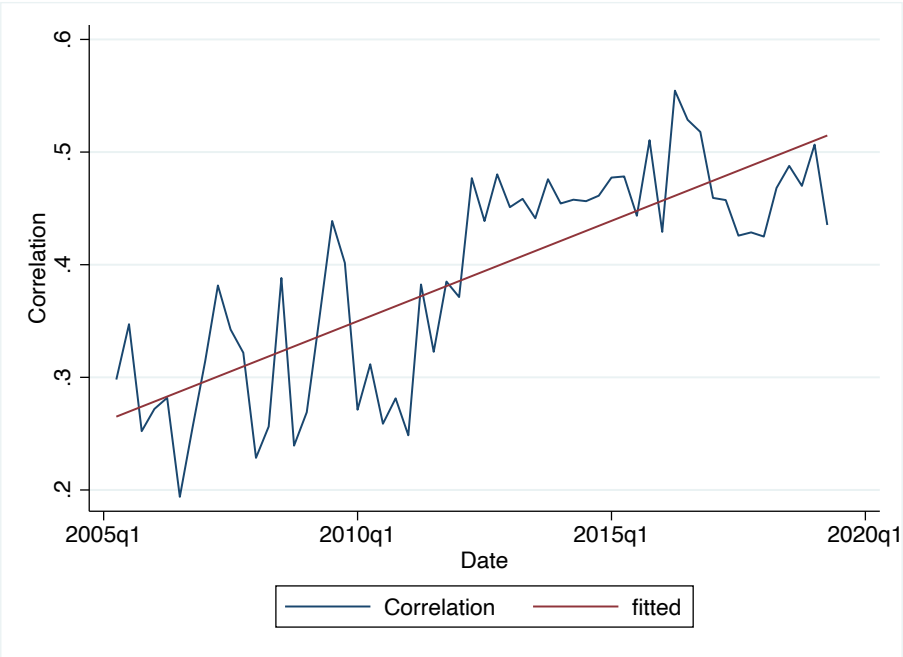
Dispersion of Trades

Appendix: Correlation between CS and BA

Figure: Correlation between Credit Spreads and Bid-ask Spreads



Investment-Grade



High-Yield

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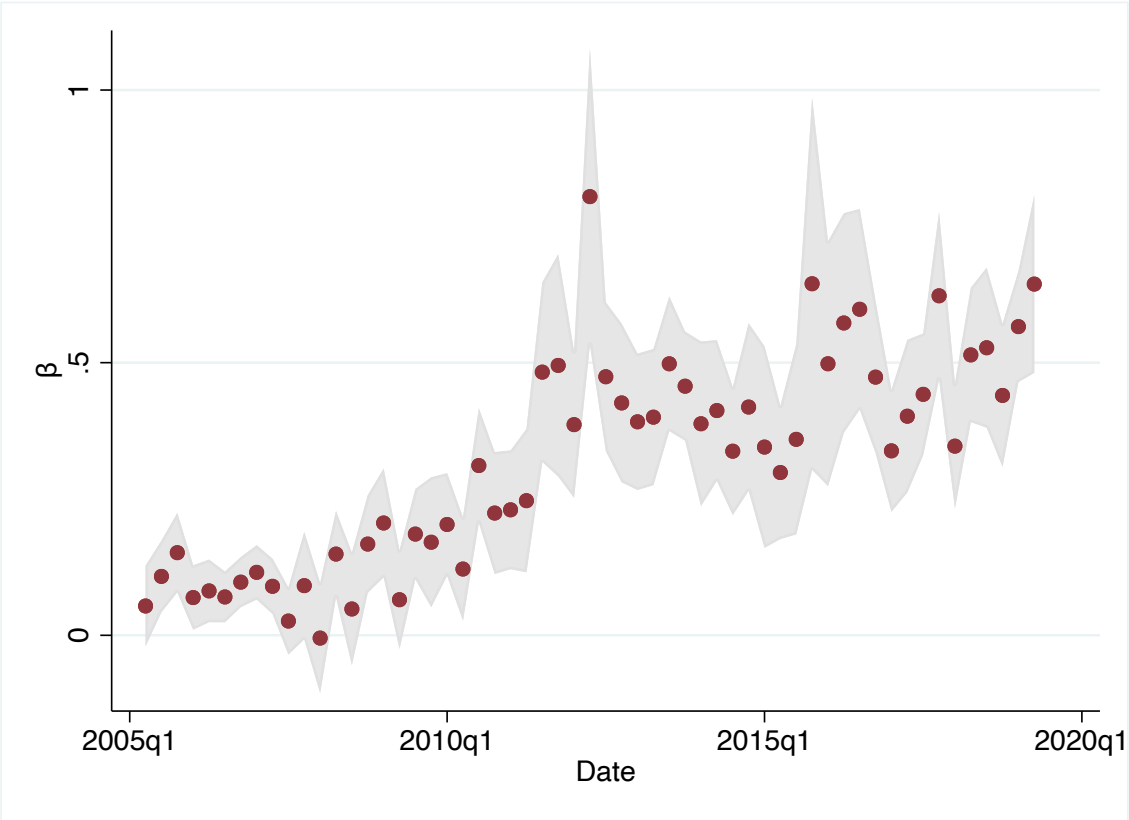
Appendix: Controlling for CDS

$$CS_{it} = \alpha_t + \beta_t BA_{it} + \gamma_t^\top X_{it} + \epsilon_{it}$$

(X_{it} : *bond characteristics, CDS spreads and firm characteristics*)



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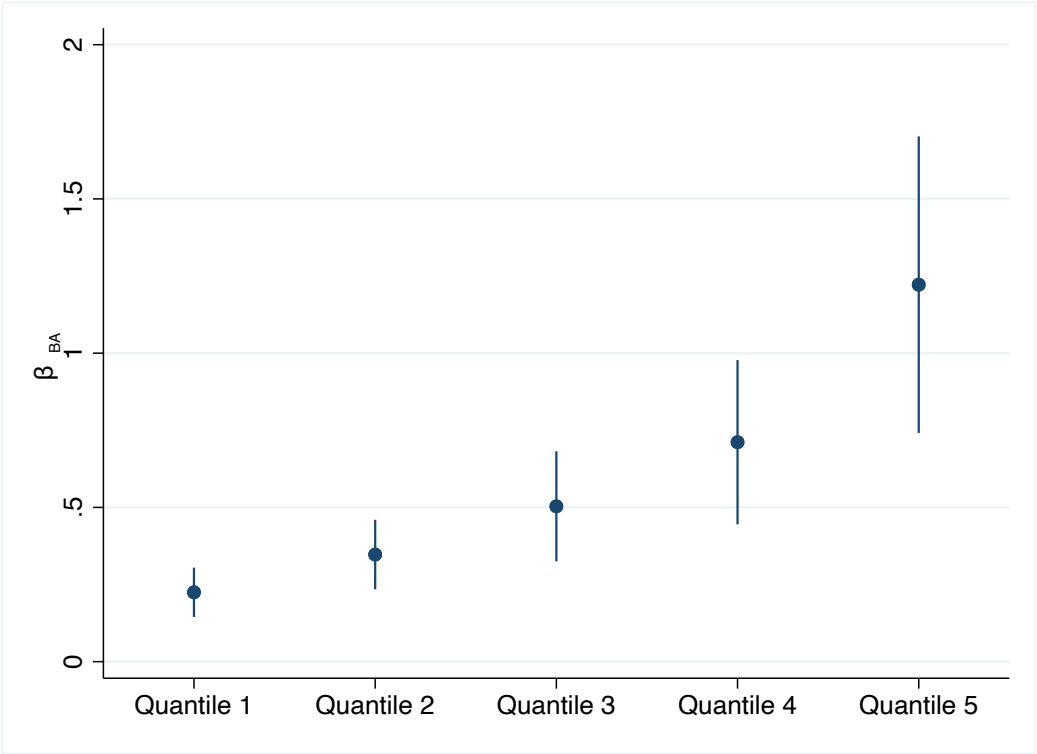
Appendix: Loading of CS on BA Sorting by Investor Type

Sort the bond by investor composition. Then run the following regression

$$CS_{it} = \alpha + \beta_1 BA_{it} + \gamma^\top X_{it} + \epsilon_{it}$$



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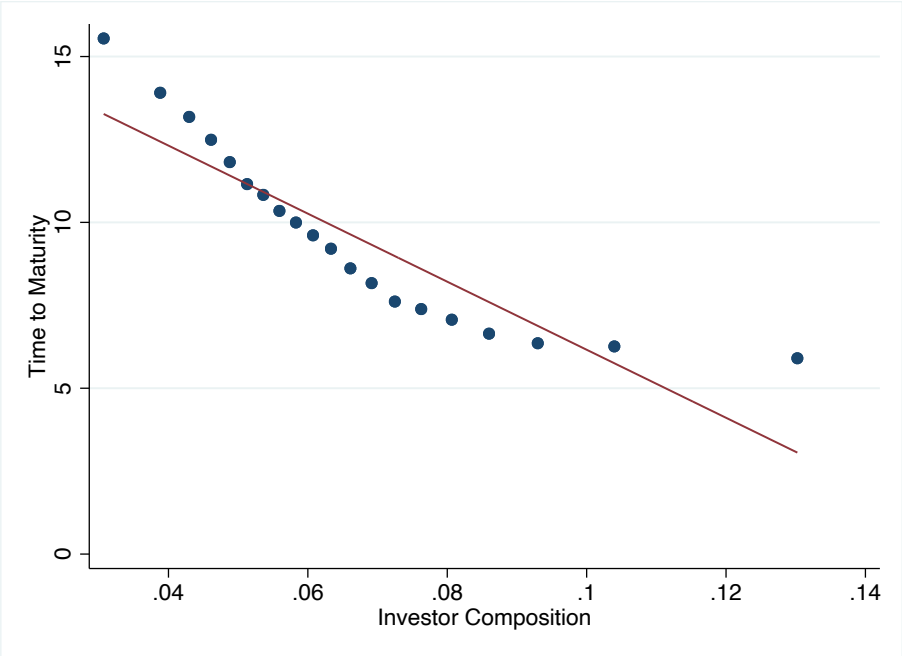
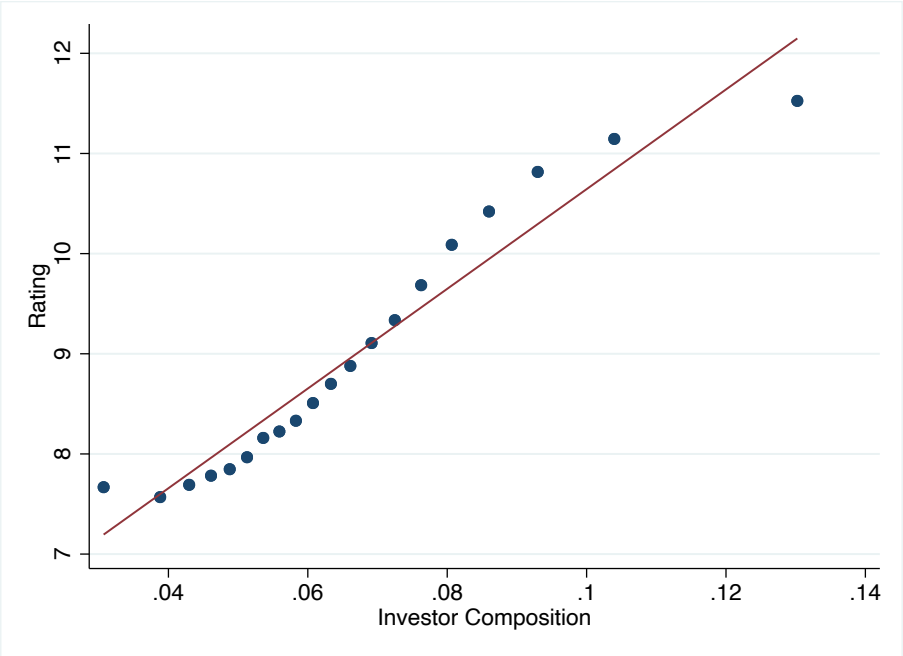
Appendix: Sorting patterns

- Short-term investors hold shorter-term and riskier bonds



Time to Maturity



Bond Ratings

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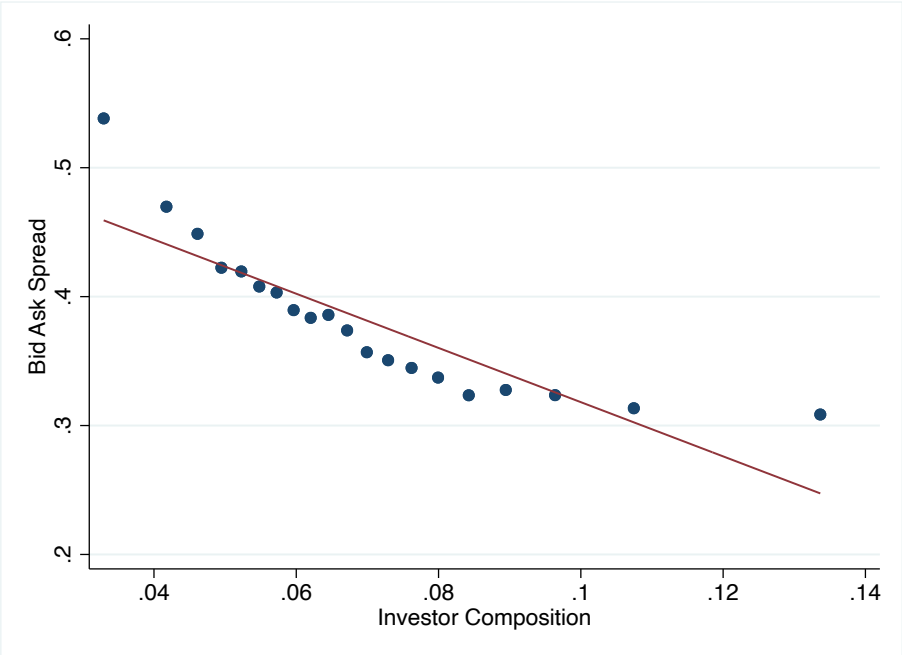
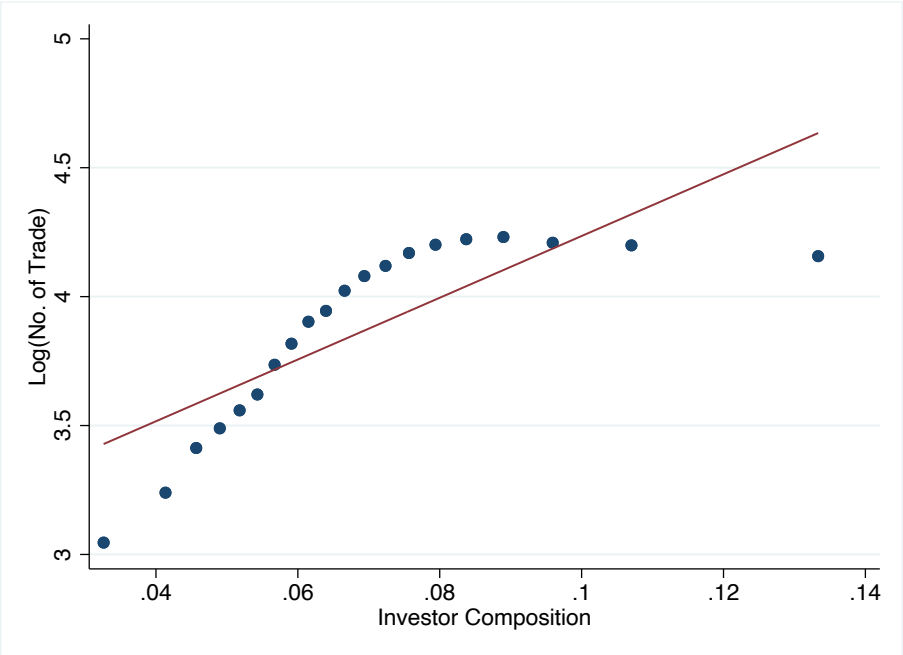
Appendix: Sorting



Bid-ask Spread



Bond Turnover

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