Increasing Corporate Bond Liquidity Premium and Post-Crisis Regulations

Botao Wu
NYU Stern

June 10, 2022

Motivation: A Puzzle

Motivation: A Puzzle

- Practitioners have been complaining about lack of liquidity due to tightening regulations that disincentivize dealer banks from actively market making.

  Goldman Sachs: *"it isn't that they can't get trades done; it's that they can't get trades done as quickly, in the same size and at the same price as they did historically"*.

Motivation: A Puzzle

- Practitioners have been complaining about lack of liquidity due to tightening regulations that disincentivize dealer banks from actively market making.

  Goldman Sachs: *"it isn't that they can't get trades done; it's that they can't get trades done as quickly, in the same size and at the same price as they did historically"*.

- Yet post-crisis bid-ask spreads and transaction costs have been at the same level as the pre-crisis.

  SEC: *"we do not observe an increase in corporate bond transaction costs [...] during the "Regulatory" and the "Post regulatory" sub period [...] These findings do not suggest that regulations reduced corporate bond market liquidity"*.

Motivation: A Puzzle

- Practitioners have been complaining about lack of liquidity due to tightening regulations that disincentivize dealer banks from actively market making.

  Goldman Sachs: *"it isn't that they can't get trades done; it's that they can't get trades done as quickly, in the same size and at the same price as they did historically"*.

- Yet post-crisis bid-ask spreads and transaction costs have been at the same level as the pre-crisis.

  SEC: *"we do not observe an increase in corporate bond transaction costs [...] during the "Regulatory" and the "Post regulatory" sub period [...] These findings do not suggest that regulations reduced corporate bond market liquidity"*.

- Existing studies look at the *transaction costs*.

Motivation: A Puzzle

- Practitioners have been complaining about lack of liquidity due to tightening regulations that disincentivize dealer banks from actively market making.

  Goldman Sachs: *"it isn't that they can't get trades done; it's that they can't get trades done as quickly, in the same size and at the same price as they did historically"*.

- Yet post-crisis bid-ask spreads and transaction costs have been at the same level as the pre-crisis.

  SEC: *"we do not observe an increase in corporate bond transaction costs [...] during the "Regulatory" and the "Post regulatory" sub period [...] These findings do not suggest that regulations reduced corporate bond market liquidity"*.

- Existing studies look at the *transaction costs*.

- **This Paper: if liquidity has deteriorated after the crisis, investors should require a higher premium for holding illiquid bonds.**

I. Empirical Method

I. Empirical Method

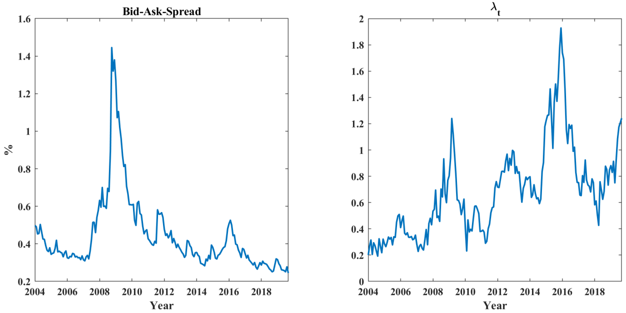
Monthly cross-sectional regression (Dick-Nielsen, Lando, Feldhütter 2012): Theory

$$Yield\text{-}Spread_{it} = \overbrace{\lambda_t \times Bid\text{-}Ask\text{-}Spread_{it}}^{\text{Liquidity Premium}} + \gamma_t' Bond\text{-}and\text{-}CreditControls_{it} + \epsilon_{it}$$

I. Empirical Method

Monthly cross-sectional regression (Dick-Nielsen, Lando, Feldhütter 2012): Theory

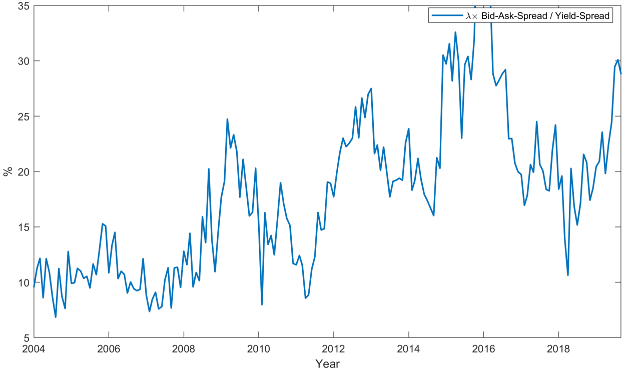
$$Yield\text{-}Spread_{it} = \overbrace{\lambda_t \times Bid\text{-}Ask\text{-}Spread_{it}}^{\text{Liquidity Premium}} + \gamma_t' Bond\text{-}and\text{-}CreditControls_{it} + \epsilon_{it}$$



The left panel is the aggregate bid-ask spread.
The right panel is λ_t.

I. Liquidity Premium has increased

- Liquidity premium ($\lambda \times$ *Bid-Ask-Spread*) has also increased:



- Over 20% of the credit spread is now due to illiquidity compared to 10% before the crisis.

- From liquidity premium's perspective it is consistent with practitioner's observation that liquidity has gone *worse*!

I. Liquidity Premium has increased: variations across different episodes

- average $\lambda_t \times$ *Bid-Ask-Spread*$_{it}$ / *Yield-Spread*$_{it}$.

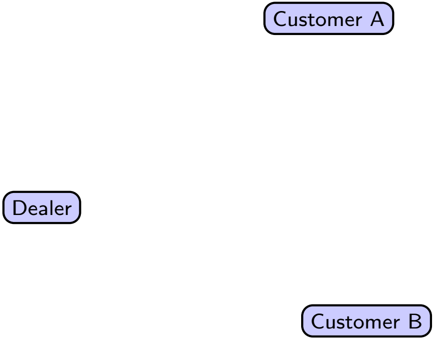
Rating	A and above	BBB	Speculative
Crisis – Pre-Crisis	14.673*** (3.48)	1.813 (0.72)	-0.473 (-0.35)
Post-Crisis – Crisis	0.309 (0.07)	3.425 (1.42)	-1.347 (-0.79)
Basel II.5 – Post-Crisis	-5.344 (-1.64)	**2.604**** (2.08)	**14.763***** (6.06)
Basel III – Basel II.5	**-8.210**** (-2.20)	**-2.848***** (-2.63)	3.719 (1.37)
Post-Volcker – Basel III	-1.401 (-0.64)	-0.947 (-0.77)	**4.970*** (1.90)
Post-Volcker – Pre-Crisis	0.028 (0.02)	**4.047***** (2.70)	**21.633***** (11.13)

- average $\lambda_t \times$ *Bid-Ask-Spread*$_{it}$.

Rating	A and above	BBB	Speculative
Post-Volcker – Pre-Crisis	0.014 (0.92)	**0.116***** (2.88)	**0.987***** (7.01)

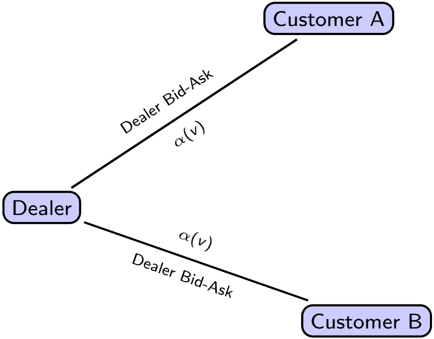
II. Low Bid-Ask Spread vs High Liquidity Premium: Model of **Trading Delays**

- Duffie, Garleanu and Pedersen (2005), Lagos and Rocheteau (2009).
- Dealer cost k affects the market making v.



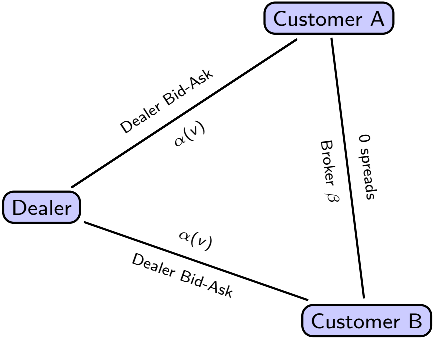
II. Low Bid-Ask Spread vs High Liquidity Premium: Model of **Trading Delays**

- Duffie, Garleanu and Pedersen (2005), Lagos and Rocheteau (2009).
- Dealer cost k affects the market making v.



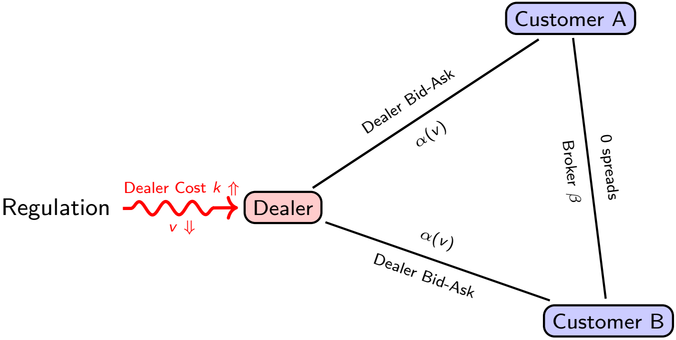
II. Low Bid-Ask Spread vs High Liquidity Premium: Model of **Trading Delays**

- Duffie, Garleanu and Pedersen (2005), Lagos and Rocheteau (2009).
- Dealer cost k affects the market making v.



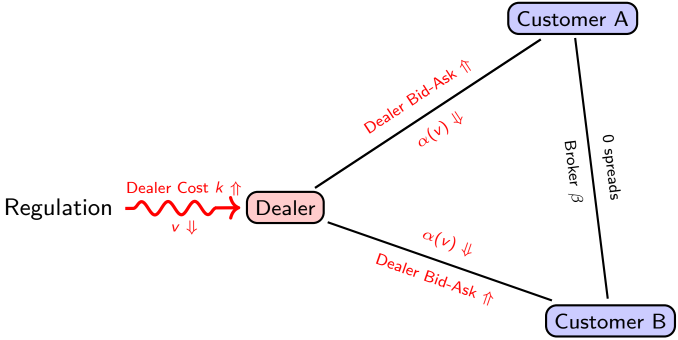
II. Low Bid-Ask Spread vs High Liquidity Premium: Model of **Trading Delays**

- Duffie, Garleanu and Pedersen (2005), Lagos and Rocheteau (2009).
- Dealer cost k affects the market making v.



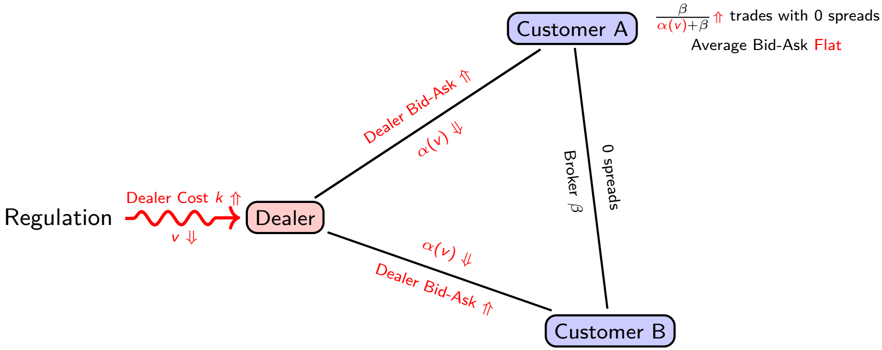
II. Low Bid-Ask Spread vs High Liquidity Premium: Model of **Trading Delays**

- Duffie, Garleanu and Pedersen (2005), Lagos and Rocheteau (2009).
- Dealer cost k affects the market making v.



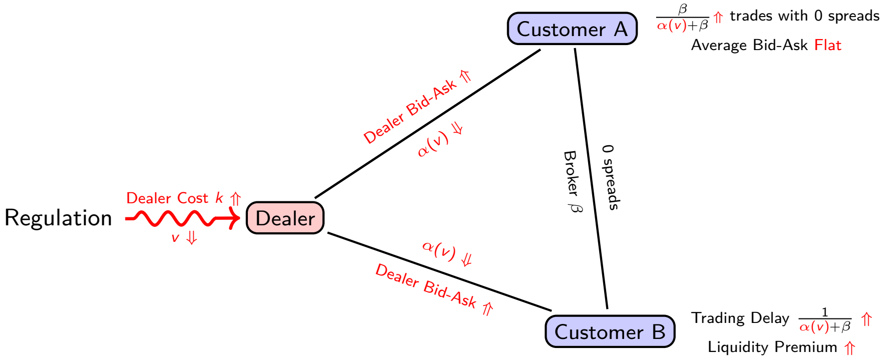
II. Low Bid-Ask Spread vs High Liquidity Premium: Model of **Trading Delays**

- Duffie, Garleanu and Pedersen (2005), Lagos and Rocheteau (2009).
- Dealer cost k affects the market making v.

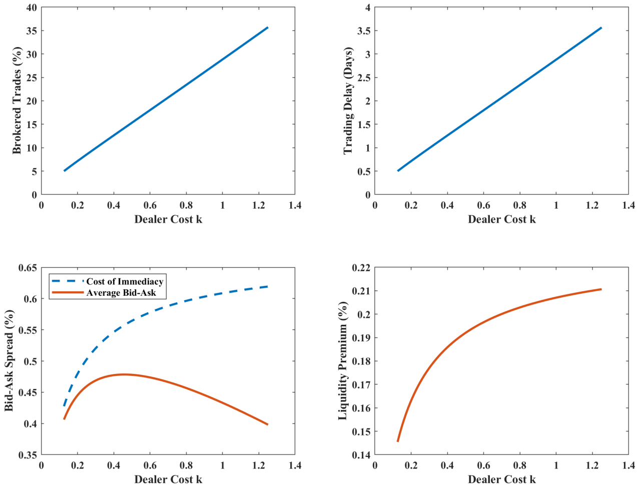


II. Low Bid-Ask Spread vs High Liquidity Premium: Model of **Trading Delays**

- Duffie, Garleanu and Pedersen (2005), Lagos and Rocheteau (2009).
- Dealer cost k affects the market making v.



II. Model generated statistics (Time Series)



Notes: Calibration is based on Feldhütter (2012) and the average BBB-rated bond.

II. Model generated statistics (Cross Section)

To theoretically justify the cross-sectional regression:

II. Model generated statistics (Cross Section)

To theoretically justify the cross-sectional regression:

- Introduce Bond Heterogeneity: default λ_D^m, maturity λ_T^m of bond m

II. Model generated statistics (Cross Section)

To theoretically justify the cross-sectional regression:

- Introduce Bond Heterogeneity: default λ_D^m, maturity λ_T^m of bond m
- Can write liquidity premium of bond m (LP^m) as linear function of its bid-ask spread ($\frac{BA^m}{p^m}$):

$$LP^m = \lambda \times \frac{BA^m}{p^m}$$

II. Model generated statistics (Cross Section)

To theoretically justify the cross-sectional regression:

- Introduce Bond Heterogeneity: default λ_D^m, maturity λ_T^m of bond m
- Can write liquidity premium of bond m (LP^m) as linear function of its bid-ask spread ($\frac{BA^m}{p^m}$):

$$LP^m = \lambda \times \frac{BA^m}{p^m}$$

or in terms of the total credit spread: Regression Model

$$y^m - r^m = \underbrace{\lambda \frac{BA^m}{p^m}}_{\text{Liquidity Premium}} + \underbrace{\lambda_D^m}_{\text{Default Premium}} \tag{1}$$

II. Model generated statistics (Cross Section)

To theoretically justify the cross-sectional regression:

- Introduce Bond Heterogeneity: default λ_D^m, maturity λ_T^m of bond m
- Can write liquidity premium of bond m (LP^m) as linear function of its bid-ask spread ($\frac{BA^m}{p^m}$):

$$LP^m = \lambda \times \frac{BA^m}{p^m}$$

or in terms of the total credit spread: Regression Model

$$y^m - r^m = \underbrace{\lambda \frac{BA^m}{p^m}}_{\text{Liquidity Premium}} + \underbrace{\lambda_D^m}_{\text{Default Premium}} \quad (1)$$

- Can show model-generated λ increases over time as $k \Uparrow$: $\frac{\partial \lambda}{\partial k} = \frac{\partial \lambda}{\partial v} \frac{\partial v}{\partial k} > 0$

II. Model Takeaways

II. Model Takeaways

- Illiquidity has 2 dimensions:

$$LP^m = \frac{BA^m}{p^m} \times \lambda : \text{Transaction-Cost} \times \text{Delay}$$

II. Model Takeaways

- Illiquidity has 2 dimensions:

$$LP^m = \frac{BA^m}{p^m} \times \lambda : \text{Transaction-Cost} \times \text{Delay}$$

- But trading delays are not directly observable in the realized transaction-level data...

II. Estimation of (Unobserved) Trading Delays

- Estimate trading delay every month, $\frac{1}{\alpha_t+\beta_t}$, by targeting the moment of liquidity premium LP:

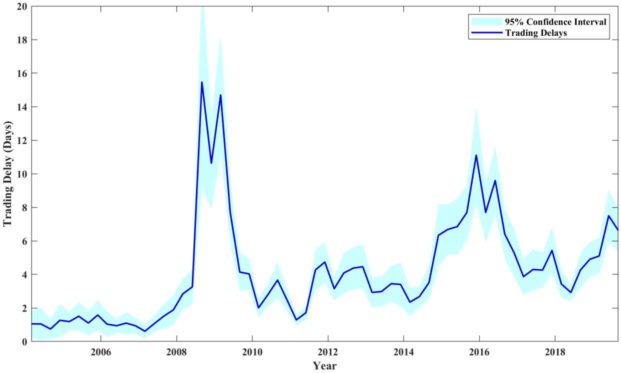
$$\min_{\alpha_t,\beta_t} \sum_m \left[LP_t^m - \widehat{LP^m}_t\right]^2.$$

LP_t^m is the liquidity premium of bond m at time t in the data.
$\widehat{LP^m}_t$ is the model-implied liquidity premium by substituting in the default λ_{Dt}^m, maturity λ_{Tt}^m and riskless yield r_t^m of bond m in month t. [1]

[1] Identification is achieved by the parameter restrictions using $\frac{\beta}{\alpha+\beta}$ or λ.

II. Model-Implied (Unobservable) Trading Delays

Figure Trading Delays

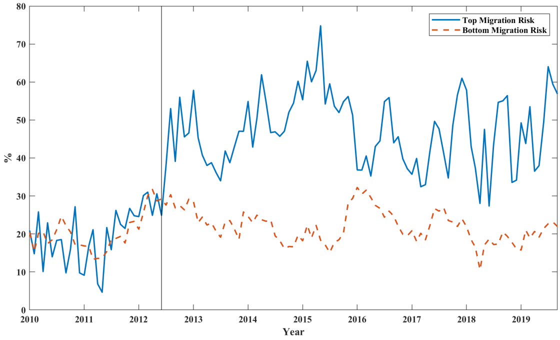


Notes: The shaded area is the 95% confidence interval of the estimated trading delays based on the asymptotic normality and the delta method.

- Goldman Sachs Global Investment Research: "trade that historically may have taken a day to get done now needs to [...] take a week or two to execute".

III.Impact of Regulations: Basel II.5

- Introduced in June 2012. Incremental risk charge and SVaR account for default and migration risk for credit products.
- According to a BIS survey, Basel II.5 was seen to have the largest impact on bond liquidity (CGFS 2016).
- Use bond yield volatility to proxy migration risk and risk charges.

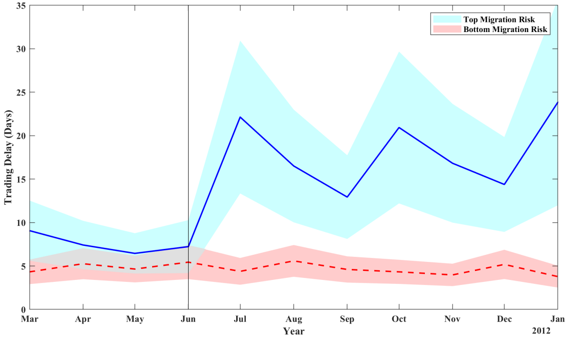


Liquidity premium (as a fraction of yield spread) of the bonds in the top and bottom of the credit migration risk distribution, proxied by the yield volatility each month. The vertical line is June 2012 (Basel II.5).

III.Impact of Regulations: Basel II.5

- Translate the impact into the unobserved trading delays:

Figure Basel II.5 and Trading Delays



Trading delays of the bonds in the top and bottom of the Basel II.5 risk charge each month, proxied by the corporate bond yield change volatility. The shaded area is the 95% confidence interval of the estimated trading delays. The vertical line is June 2012 (Basel II.5).

Literature and Contributions

Literature and Contributions

- Corporate bond liquidity through *transaction costs*: (Bao, O'Hara and Zhou 2018, Dick-Nielsen and Rossi 2018; Trebbi and Xiao 2019, Anderson and Stulz 2017).
  - I show Basel II.5 has a sizeable impact on the liquidity premium and the implied trading delays.

Literature and Contributions

- Corporate bond liquidity through *transaction costs*: (Bao, O'Hara and Zhou 2018, Dick-Nielsen and Rossi 2018; Trebbi and Xiao 2019, Anderson and Stulz 2017).
  - I show Basel II.5 has a sizeable impact on the liquidity premium and the implied trading delays.
- Corporate bond liquidity through *trading activities*: (Goldstein and Hotchkiss 2020; Bessembinder, Jacobson, Maxwell and Venkataraman 2018).
  - I study the immediacy dimension of liquidity in the corporate bond market.

Literature and Contributions

- Corporate bond liquidity through *transaction costs*: (Bao, O'Hara and Zhou 2018, Dick-Nielsen and Rossi 2018; Trebbi and Xiao 2019, Anderson and Stulz 2017).
  - I show Basel II.5 has a sizeable impact on the liquidity premium and the implied trading delays.
- Corporate bond liquidity through *trading activities*: (Goldstein and Hotchkiss 2020; Bessembinder, Jacobson, Maxwell and Venkataraman 2018).
  - I study the immediacy dimension of liquidity in the corporate bond market.
- Large OTC search theory literature (Duffie, Garleanu, and Pedersen 2005), but few are able to identify the trading delays in the data.
  - I propose to use the liquidity premium to estimate the *latent* trading delays.

Literature and Contributions

- Corporate bond liquidity through *transaction costs*: (Bao, O'Hara and Zhou 2018, Dick-Nielsen and Rossi 2018; Trebbi and Xiao 2019, Anderson and Stulz 2017).
  - I show Basel II.5 has a sizeable impact on the liquidity premium and the implied trading delays.
- Corporate bond liquidity through *trading activities*: (Goldstein and Hotchkiss 2020; Bessembinder, Jacobson, Maxwell and Venkataraman 2018).
  - I study the immediacy dimension of liquidity in the corporate bond market.
- Large OTC search theory literature (Duffie, Garleanu, and Pedersen 2005), but few are able to identify the trading delays in the data.
  - I propose to use the liquidity premium to estimate the *latent* trading delays.
- Investor demand and bond liquidity: Electronic Trading (O'Hara and Zhou 2021); ETF (Shim and Todorov 2021); Mutual Funds (Li and Yu 2021).
  - I focus on the dealer liquidity supply, and the rising trading delays and liquidity premium.

Conclusions

Dick-Nielsen and Rossi (2018): *"Discouraging air travel might well lower the actual realized cost of transportation (taking the bus is cheaper) [...] Traveling from Los Angeles to New York in 3 days by bus is not the same as completing the trip in 5 hours by plane."*

- Reconcile the puzzle of low bid-ask spread vs. lack of liquidity; Propose alternative liquidity measures: liquidity premium (trading delays).
- Build an OTC model that bridges the unobservable trading delays, and the easily-measurable liquidity premium.
- Use liquidity premium and trading delays to understand the impact of regulations on market liquidity.

Thank You!