Measuring Liquidity in the Bond Market

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Sources of bond transactions data:

- **TRACE system** (started in 2002). Implemented in three phases - Full coverage of bond transactions by Dec 2004.

- **Mergent FISD** (NAIC transactions from 1994). Covers only transactions by insurance companies.

Use NAIC transactions to augment TRACE before Dec 2004.
Bond Trading Over Time

Percentage of outstanding bonds trading

- Percentage trading based on no of bond issues
- Percentage trading based on face value

Period:
- 2000Q1 to 2010Q1
Did trading really improve?
Average Maturity at Issuance Time

Time to maturity (in years)

Period

Average Bond Issue Maturity
Bond Trading by Rating Category

- AAA/AA: 10.00%
- A: 30.00%
- BBB: 22.00%
- BB: 10.00%
- B: 5.00%
- CCC/CC/C/D: 2.00%

Bonds Trading by Age

- 0 to 2 years: 12.00%
- 4 to 6 years: 10.00%
- 8 to 12 years: 8.00%
- 14 to 20 years: 6.00%
- 22 to 30 years: 4.00%
- 32 to 40 years: 2.00%
- 42 to 55 years: 0.00%
## Bond Trading Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Bond-Year Observations</th>
<th>Mean</th>
<th>Std Dev</th>
<th>25th Pctl</th>
<th>50th Pctl</th>
<th>75th Pctl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Days With Trading During a Year</td>
<td>159,513</td>
<td>34</td>
<td>54</td>
<td>2</td>
<td>10</td>
<td>39</td>
</tr>
<tr>
<td>Percent of Bond Face Value Traded During a Year</td>
<td>159,513</td>
<td>23%</td>
<td>30%</td>
<td>3%</td>
<td>12%</td>
<td>29%</td>
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<tr>
<td>Number of Transactions During a Year</td>
<td>159,513</td>
<td>190</td>
<td>767</td>
<td>4</td>
<td>21</td>
<td>94</td>
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</tbody>
</table>
Test the model of Acharya and Pedersen (2005) in the bond market.

Bond spreads should reflect:

- A premium to hold illiquid bonds - Liquidity Level
- A premium to hold bonds whose liquidity co-moves with the market – Systematic Liquidity Risk
Based on bond holders’ liquidity preferences
  – Allow computation of liquidity levels for bonds that do not trade
  – Allow estimation of systematic bond liquidity risks

We use *Morningstar & NAIC Bond Holdings* Databases
Computation of Implied Liquidity Measures

- **Investor 1**
  - Bond 1 (traded)
  - Bond 2 (traded)
  - Bond 3 (not traded)
  - Investor 1 liquidity preference

- **Investor 2**
  - Bond 3 (not traded)
  - Bond 4 (traded)
  - Bond 5 (traded)
  - Investor 2 liquidity preference

**Liquidity level for bonds that trade**

- Amihud (2002): \( \frac{1}{N} \sum \frac{|R_i|}{\text{Daily Trading Volume}} \)
- Roll (1984): \( 2 \times \sqrt{-\text{cov}(R_{t-1}, R_t)} \)
- Price Dispersion (Dick-Nielsen et al. 2009): \( \frac{1}{N} \sum \frac{P_{i,\max} - P_{i,\min}}{P_{i,\text{last}}} \)
<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
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<tbody>
<tr>
<td>Amihud</td>
<td>1388</td>
<td>2058</td>
<td>3571</td>
<td>3329</td>
<td>2881</td>
<td>2737</td>
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<tr>
<td>Roll</td>
<td>1102</td>
<td>1530</td>
<td>2543</td>
<td>2337</td>
<td>1961</td>
<td>1916</td>
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<tr>
<td>Dispersion</td>
<td>924</td>
<td>1260</td>
<td>2191</td>
<td>1992</td>
<td>1737</td>
<td>1983</td>
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<tr>
<td>I-Amihud</td>
<td>7326</td>
<td>7754</td>
<td>7655</td>
<td>7622</td>
<td>7575</td>
<td>6980</td>
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<tr>
<td>I-Roll</td>
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<td>7723</td>
<td>7633</td>
<td>7599</td>
<td>7538</td>
<td>6953</td>
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<tr>
<td>I-Dispersion</td>
<td>7318</td>
<td>7750</td>
<td>7653</td>
<td>7617</td>
<td>7564</td>
<td>6974</td>
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</tbody>
</table>
Residual Liquidity is computed by orthogonalizing on: (1) current quarter 5-year CDS spread, (2) recovery rate, (3) term structure level, (4) curvature, (5) slope factors, (6) industry, (7) ratings and (8) bonds fixed effects.
Impact of liquidity risks on bond spreads

- **Liquidity risks:**
  
  - covariance between changes in individual bond liquidity levels and changes in bond market liquidity scaled by variance of bond market returns.
  
  - covariance between changes in individual bond liquidity levels and changes in bond market returns scaled by variance of bond market returns.
Liquidity risk seems to be as important as liquidity level in explaining the quarterly bond spreads.
The Impact of Accounting Information Releases on Bond Liquidity

Replication of Easton Monahan and Vasvari (2009)