The Microstructure of the TIPS Market

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Motivation

• Introduction of TIPS offered multiple possible benefits
  – Hedge against inflation => lower Treasury borrowing costs
  – Market-based measure of inflation expectations

• Benefits not fully realized because of lack of liquidity
  – Liquidity premium offsets inflation risk premium
  – Liquidity premium complicates inferences of inflation expectations

• Despite importance of liquidity and large market size, there is virtually no quantitative evidence on TIPS liquidity
Objectives

Use novel tick data from the interdealer market to characterize the liquidity of the TIPS market, including:

- Trading activity and liquidity by sector
- Liquidity over securities’ life cycles
- Intraday patterns
- Effects of announcement at daily and intraday frequency
Related Literature

• Work examining microstructure of nominal Treasury market, including various liquidity and announcement effect studies
  – Numerous papers by Fleming and others
• Studies of announcement effects in indexed market
  – Beechey and Wright (2008), in particular
• Papers on inflation risk premium and liquidity premium
Remainder of Talk

• Market structure
• Data
• Empirical results
• Conclusions
Market Structure

- Like nominal market, with over-the-counter secondary market, central role for dealers, and interdealer trading via brokers.
- At auction, TIPS are bought more by investment funds and less by foreign accounts and dealers and brokers.
- Dealers aggregate TIPS position is usually close to flat.
- Trading occurs via outright trades, breakeven inflation trades, and issue-for-issue switch trades.
Data

• Proprietary tick data for outright trading in interdealer market
• March 4, 2005 to March 27, 2008 sample period
• Outright TIPS trading averages $562 million per day
  – Accounts for about 42% of interdealer trading (over sample)
  – Much of remainder: breakeven inflation trades
• TIPS trading accounts for ~1% of interdealer Treasury trading
  – TIPS account for 7-10% of outstanding Treasury debt over sample
### Trading Activity by Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Volume</th>
<th>Number of Trades</th>
<th>Trade Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 year</td>
<td>109.6</td>
<td>11.2</td>
<td>9.5</td>
</tr>
<tr>
<td>10 year</td>
<td>402.7</td>
<td>46.4</td>
<td>8.8</td>
</tr>
<tr>
<td>20 year</td>
<td>36.4</td>
<td>7.5</td>
<td>4.7</td>
</tr>
<tr>
<td>30 year</td>
<td>13.4</td>
<td>4.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>562.1</td>
<td>69.4</td>
<td>7.1</td>
</tr>
</tbody>
</table>
### Trading Activity by On-the-Run/Off-the-Run Status

#### Panel A: On-the-Run Securities

<table>
<thead>
<tr>
<th>Sector</th>
<th>Volume</th>
<th>Number of Trades</th>
<th>Trade Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year</td>
<td>86.6</td>
<td>9.1</td>
<td>9.3</td>
</tr>
<tr>
<td>10-year</td>
<td>136.3</td>
<td>18.2</td>
<td>7.2</td>
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<tr>
<td>20-year</td>
<td>29.7</td>
<td>6.2</td>
<td>4.6</td>
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</tbody>
</table>

#### Panel B: Off-the-Run Securities

<table>
<thead>
<tr>
<th>Sector</th>
<th>Volume</th>
<th>Number of Trades</th>
<th>Trade Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year</td>
<td>27.2</td>
<td>2.1</td>
<td>10.9</td>
</tr>
<tr>
<td>10-year</td>
<td>21.9</td>
<td>2.4</td>
<td>9.0</td>
</tr>
<tr>
<td>20-year</td>
<td>6.4</td>
<td>1.3</td>
<td>5.3</td>
</tr>
</tbody>
</table>
Trading Volume Around Off-the-Run Date

![Bar chart showing trading volume around an off-the-run date with a peak on the auction day. The x-axis represents trading days relative to the auction of the next security, ranging from -60 to 60 days. The y-axis represents millions of dollars, ranging from 0 to 250 million.]
Quote Measures by On-the-Run/Off-the-Run Status

<table>
<thead>
<tr>
<th>Sector</th>
<th>Bid-Ask Spread</th>
<th>Quote Size</th>
<th>Market Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year</td>
<td>2.4</td>
<td>1.3</td>
<td>42.2</td>
</tr>
<tr>
<td>10-year</td>
<td>2.9</td>
<td>1.3</td>
<td>59.7</td>
</tr>
<tr>
<td>20-year</td>
<td>6.8</td>
<td>1.1</td>
<td>27.4</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>5-year</td>
<td>2.5</td>
<td>1.2</td>
<td>19.4</td>
</tr>
<tr>
<td>10-year</td>
<td>2.6</td>
<td>1.3</td>
<td>14.8</td>
</tr>
<tr>
<td>20-year</td>
<td>7.0</td>
<td>1.1</td>
<td>7.7</td>
</tr>
</tbody>
</table>
Intraday Trading Volume of 10-Year Note
Intraday Bid-Ask Spread of 10-Year Note
Intraday Price Volatility of 10-Year Note
Intraday Market Prevalence of 10-Year Note
Announcement Effects at Daily Level

- Analyze effects of announcements on trading activity at a daily level
- CPI, employment report, FOMC, and TIPS auction results
- Regress trading activity on announcement dummy variables
- Results robust to day-of-week effects
Trading Volume on Annt. and Non-Annt. Days

- Non-Announcement Day: 527.4
- TIPS Auction Day: 975.2
- CPI Release Day: 862.7
- FOMC Announcement Day: 662.2
- Employment Report Day: 531.9
High-Frequency Analysis of Announcement Effects

• Able to discern announcement effects more precisely
• Focus on price volatility, trading frequency, bid-ask spreads
• Compare announcement days to non-announcement days
  – Effectively control for intraday patterns
• Consider same announcements as before
Price Volatility on FOMC and Non-Annt. Days
Trading Frequency on FOMC and Non-Annt. Days
Bid-Ask Spread on FOMC and Non-Annt. Days
Trading Frequency on Auction and Non-Annt. Days
Conclusions

- Identify features seen in nominal market; also new features
- Bid-ask spreads are poor cross-sectional liquidity measure -- they do not differ despite other liquidity/activity differences
- Ownership and uses of TIPS probably behind intraday pattern of activity, which differs from nominal market
- Cash flow attributes of TIPS and market size/ownership likely explain importance of CPI and auction announcements