The Flight from Maturity

Gary Gorton, Yale and NBER
Andrew Metrick, Yale and NBER
Lei Xie, Yale
During the crisis short-term lending became shorter and shorter.

BearingPoint: “Borrowing money from other banks or even between different departments of the same bank for more than a day has become very difficult.”

BP interviews: “…liquidity in the unsecured market is currently concentrated in ‘Overnight’ transactions.”
We study three short-term unsecured markets: CP, FF, Eurodollars, and the secured market—repo.

Show that in normal times these markets are the same, i.e., all are ‘near’ riskless. i.e., borrowers are riskless.

In the crisis, there are no riskless borrowers. There is a flight from maturity.
Four Money Markets

• Secured market: repo lenders get collateral.
• Unsecured markets appear to screen borrowers to maintain high quality.
  – CP issuers require minimum ratings—orderly exit.
  – FF-must be a regulated bank.
  – Eurodollars-largely regulated entities.
Spreads and the Slope of the Term Structure of Spreads

• $r_{ti}^\tau$ is the annualized rate of return at time $t$ for money market instrument $i$ with maturity $\tau$.

• Define: $\theta_{t,i}^\tau \equiv r_{t,i}^\tau - r_{t,OIS}^\tau$ as the spread between the rate on money market instrument $i$ and the overnight index swap (OIS) rate at date $t$ for maturity $\tau$.

• $\Phi_{t,i}^{\tau_2,\tau_1} \equiv \theta_{t,i}^{\tau_2} - \theta_{t,i}^{\tau_1}$, where $\tau_2 > \tau_1$, is the slope of the term structure of spreads (various maturities).
Preliminary Hypotheses about Money Markets

1. $\Theta_{t,i}^{\tau} \approx 0$, for $i=$CP, FF, Euro$, and for all $\tau$. I.e., borrowers in unsecured markets are screened. Only high quality firms can borrow. Money markets are near riskless.

2. $\Phi_{t,i}^{\tau_2,1} \approx 0$, i.e., term structure flat; no term premium. (It could be that $\theta_{t,i}^{\tau} > 0$, but term structure flat.)
Crisis Hypotheses

• Crisis: An event in which there are no high quality firms in the money markets.

• One possible outcome: no trade at all. For the CP market we have issuance data, and there was (short) issuance during the crisis.

• In the unsecured market, screening during the crisis might take the form of “time tranching,” i.e., lenders are only willing to lend at very short horizons. Borrowers want long.

3. Hypothesis: $\Phi_{t,i}^{\tau,1} > 0$, i.e., the slope becomes positive – the flight from maturity.

• In repo, haircuts rise. In addition, it may be that $\Phi_{t,i}^{\tau,1} > 0$. 
Crisis Hypotheses continued

• $\Phi_{t,i}^{\tau2,1} > 0$, i.e., the slope becomes positive.
• The slope becomes positive if there are no safe borrowers....
  
  ...and no one wants to lend long.
• So, Hypothesis 4: $\Delta\Phi_{t,i}^{\tau2,1} > 0 \rightarrow$ counterparty risk is higher in the future.
Should we express the hypothesis as $\Phi_t,ir_{2,1} > 0$ (if slope increases) then counterparty risk is higher in the future?
Data

• Daily data Jan 2006- Apr 2009 on repo rates for:
  – Various terms: Overnight, 1 month, 3 month.
  – Various asset classes: different ABS classes, CLOs, CDOs, corporate bonds (by rating category).

• Daily data on FF, CP, Eurodollars for various terms.

• Issuance data for CP, by category of issuer.
the period should be 2006 to 2009.

Lei, 9/29/2010
Preliminaries: Window-Dressing

Quarter End Overnight Repo Spread, Pre-Crisis
Preliminaries continued

![Graph showing Quarter End Overnight Repo Spread, During Crisis](image-url)
$$\theta_{t, repo}^G = \alpha + \beta_{\text{Quarter}} - \text{end Dummy} + \varepsilon_t$$

**Overnight Spread: Pre-Crisis Period**

- Repo
- CP
- LIBOR
- Fed Fund

- Normal Period Mean
- Quarter End Mean
L1
Here the dependent variable should be overnight spread?
Lei, 9/29/2010
One-month Spread: Comparison

- Repo
  - Before the crisis
  - During the crisis
- CP
- LIBOR
- Fed Fund

Comparing before and during the crisis, Repo showed the highest spread, followed by CP and Fed Fund. LIBOR had a notably lower spread during the crisis.
Three-month Spread: Comparison

- **Repo**
- **CP**
- **LIBOR**
- **Fed Fund**

- Before the crisis
- During the crisis
Repo Spreads Curves for A-AAA ABS-Auto / CC / SL

- 1/2/2007
- 6/2/2008
- 10/1/2008
Hypothesis 4: $\Delta \Phi_{ti}^{\tau21} > 0 \rightarrow$ counterparty risk is higher in the future.

\[
\Delta \theta_{repo}^{2m} = \alpha + \sum_{j=1}^{a} \beta_{j} \Phi_{tj}^{m2} + \sum_{j=1}^{a} \Delta \theta_{repo}^{2m} + \text{Qend dummy} + \Delta 10Yr\text{Treasury} \\
+ \Delta(10Yr\text{Treasury})^2 + \Delta VIX + \Delta S&P + \Delta(10Yr - 2Yr) + \epsilon_t
\]
## Repo: Pre-Crisis

\[
\Delta \theta_{t_{\text{repo}}}^{3m} = \alpha + \sum_{j=1}^{4} \beta_{j} \Phi_{t-j_{\text{repo}}}^{1m1d} + \sum_{j=1}^{4} \Delta \theta_{t-j_{\text{repo}}}^{2m} + \text{Qend dummy} + \Delta 10Yr \text{Treasury} + \Delta (10Yr \text{Treasury})^2 + \Delta \text{VIX} + \Delta S&P + \Delta (10Yr - 2Yr) + e_t
\]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Slope F-test</strong></td>
<td>0.07</td>
<td>6.87</td>
<td>4.65</td>
<td>4.59</td>
<td>0.07</td>
<td>4.00</td>
<td>3.72</td>
<td>5.42</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td><strong>ProbF</strong></td>
<td>0.80</td>
<td>0.01</td>
<td>0.03</td>
<td>0.03</td>
<td>0.80</td>
<td>0.05</td>
<td>0.05</td>
<td>0.02</td>
<td>0.77</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>Lags F-test</strong></td>
<td>52.30</td>
<td>0.17</td>
<td>0.35</td>
<td>0.15</td>
<td>52.30</td>
<td>0.51</td>
<td>2.40</td>
<td>82.22</td>
<td>50.79</td>
<td>52.30</td>
</tr>
<tr>
<td><strong>ProbF</strong></td>
<td>0.00</td>
<td>0.68</td>
<td>0.55</td>
<td>0.70</td>
<td>0.00</td>
<td>0.48</td>
<td>0.12</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>
## Repo: During Crisis

\[
\Delta \theta_{t,repo}^{5m} = \alpha + \sum_{j=1}^{4} \beta_j \Phi_{1m, t, repo} + \sum_{j=1}^{4} \Delta \theta_{t-j, repo}^{2m} + Q\text{end dummy} + \Delta 10Yr\text{ Treasury} \\
+ \Delta (10Yr\text{ Treasury})^2 + \Delta VIX + \Delta S&P + \Delta (10Yr - 2Yr) + \epsilon_t
\]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Slope F-test</strong></td>
<td>8.86</td>
<td>24.40</td>
<td>8.54</td>
<td>2.61</td>
<td>11.11</td>
<td>11.49</td>
<td>13.69</td>
<td>8.84</td>
<td>2.87</td>
<td>2.18</td>
</tr>
<tr>
<td><strong>ProbF</strong></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.11</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.09</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td><strong>Lags F-test</strong></td>
<td>18.41</td>
<td>11.85</td>
<td>16.94</td>
<td>0.01</td>
<td>12.11</td>
<td>21.46</td>
<td>24.61</td>
<td>41.24</td>
<td>0.32</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>ProbF</strong></td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.92</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.57</td>
<td>0.88</td>
</tr>
</tbody>
</table>
### CP, FF, Euro$: Pre-Crisis

\[
\Delta \theta_{t,i}^{3m} = \alpha + \sum_{j=1}^{5} \beta_{j,i} \Phi_{t-j}^{1m1d} + \sum_{j=1}^{4} \Delta \theta_{t-j,i}^{5m} + \text{Qend dummy} + \Delta 10Yr \text{Treasury} + \Delta (10Yr \text{Treasury})^2 + \Delta VIX + \Delta S&P + \Delta (10Yr - 2Yr) + \varepsilon_t
\]

<table>
<thead>
<tr>
<th></th>
<th>A2/P2 Nonfinancial</th>
<th>AA Asset-backed</th>
<th>AA Financial</th>
<th>AA Nonfinancial</th>
<th>LIB</th>
<th>Fed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope F-test</td>
<td>0.09</td>
<td>1.08</td>
<td>1.40</td>
<td>0.81</td>
<td>1.22</td>
<td>0.85</td>
</tr>
<tr>
<td>ProbF</td>
<td>0.76</td>
<td>0.30</td>
<td>0.24</td>
<td>0.37</td>
<td>0.27</td>
<td>0.36</td>
</tr>
<tr>
<td>Lags F-test</td>
<td>92.40</td>
<td>0.42</td>
<td>0.02</td>
<td>0.17</td>
<td>2.99</td>
<td>95.68</td>
</tr>
<tr>
<td>ProbF</td>
<td>0.00</td>
<td>0.51</td>
<td>0.90</td>
<td>0.68</td>
<td>0.08</td>
<td>0.00</td>
</tr>
</tbody>
</table>
CP, FF, Euro$: During-Crisis

\[ \Delta \theta_{t+1}^{\text{AA}} = \alpha + \sum_{j=1}^{h} \beta_j \Phi_{t-j}^{\text{A2/P2 AA Asset-backed}} + \sum_{j=1}^{d} \Delta \theta_{t-j}^{\text{A2/P2 AA Nonfinancial LIB Fed}} + Q \text{end dummy} + \Delta 10Yr Treasury + \Delta (10Yr Treasury)^2 + \Delta VIX + \Delta S&P + \Delta (10Yr - 2Yr) + e_t \]

<table>
<thead>
<tr>
<th></th>
<th>A2/P2 Nonfinancial</th>
<th>AA Asset-backed</th>
<th>AA Financial</th>
<th>AA Nonfinancial</th>
<th>LIB</th>
<th>Fed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope F-test</td>
<td>40.80</td>
<td>3.99</td>
<td>1.92</td>
<td>0.48</td>
<td>6.17</td>
<td>29.63</td>
</tr>
<tr>
<td>Prob F</td>
<td>0.00</td>
<td>0.05</td>
<td>0.17</td>
<td>0.49</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Lags F-test</td>
<td>14.44</td>
<td>34.81</td>
<td>22.82</td>
<td>9.17</td>
<td>27.11</td>
<td>15.80</td>
</tr>
<tr>
<td>Prob F</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Final Thoughts

• Money markets normally consist of riskless borrowers (who window dress).
• In the crisis, there are no riskless borrowers.
• Lenders generally flee to very short maturity in response; spread term structures positive.
• Positive slopes forecast counterparty risk – lenders right to flee longer maturities.
• Suggests role of slope as indicator for policy.