Bank Liquidity and the Cost of Debt

Sam Miller and Rhiannon Sowerbutts

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Our Paper’s Contribution

- Little research on link between bank liquidity and funding costs.
- Build a model where more liquid firms have lower funding costs.
- Find initial empirical evidence for this relationship.
- This effect may imply higher optimal liquidity requirements.
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Policy question: what is the economic cost of higher liquidity requirements?

- Inspiration comes from capital requirements’ "M-M" offsets.
- There’s some opportunity cost for firms - liquid assets yield less.
- *but* if their liquidity risk is reduced then the risk premium on their funding should fall.
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The model set up

- **Three periods:** t=0, 1, 2
- Two types of agent: a bank and a continuum of investors, normalised to size 1.
- The bank is funded by fixed amounts of debt (D) and equity (E).
- The bank owns the equity, investors own the debt. $E = 1 - D$. 

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- The bank can choose between cash (c) and loans (1-c) in period 0.
- Loans have a random yield $R$ in period 2.
- The bank can repo loans to raise up to $\theta R(1 - c)$ in period 1, where $\theta < 1$
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Some proportion of investors $W \in [0, 1]$ decide whether to withdraw based on their signal.

The bank will fail in period 1 if $\theta R (1 - c) + c < WD$.

If the bank fails then runners receive 1, other investors receive 0.

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Solving the model

Solve backwards:

1. Find the optimal run strategy for investors, given the bank’s choices of $c$ and $r_D$.
2. Given the run strategy, find the minimum $r_D$ in period 0 necessary to participate.
3. Given $r_D$ and the investor’s run strategy, find the bank’s optimal cash choice.
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Equilibrium consists of bank choice $c, r_D$ and investor strategy.
Run strategy

- In period 1, investors know the insolvency point of the bank $R_0$ is given by $R_0(1 - c) + c = Dr_D$.
- For signals $x_i < R_0$ it is strictly dominant for investors to run because they expect insolvency.
- However there will also be some point $R^0$ such that $\theta R^0(1 - c) + c = D$ where the bank is immune to runs.
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Unique equilibrium "switching point" $R^*$: investors run if they receive signals below and vice versa.

- The frequency of bank runs is given by $P(R < R^*)$.
- Generally we have $R^* > R_0$ i.e. solvent banks will suffer runs, even if all investors believe they are solvent.
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Comparative static - more cash

- We have a unique equilibrium "switching point" $R^*$: investors run if they receive signals below and vice versa.
- The frequency of bank runs is given by $P(R < R^*)$.
- Holding more cash reduces $R^*$ and the frequency of bank runs.
Equilibrium funding cost

**Figure:** Well capitalised bank

**Figure:** Badly capitalised bank
Empirical specification

We want to test our model’s prediction that funding costs decline with cash choice.

\[
\text{cost of funding}_{it} = \alpha_i + \beta_1 \frac{\text{equity}}{\text{total assets}_{it}} + \beta_2 \frac{\text{liquid assets}}{\text{total assets}_{it}} \\
+ \beta_3 \frac{\text{short term debt}}{\text{total assets}_{it}} + \gamma Z_t + \epsilon_{it} \tag{1}
\]

- Data in logs
- Balance sheet data: Fed FRY9C disclosures
- Controls $Z_t$ for VIX index and US Treasury yield
- CDS spreads: Bloomberg
- Time periods: quarterly data 2009-2016
- 6 firms: JPMorgan, Goldman, Morgan Stanley, Bank of America, Citigroup, Wells Fargo
Correlations

- JPMorgan Chase & Co.
- Bank of America Corporation
- Citigroup Inc.
- The Goldman Sachs Group, Inc.
- Wells Fargo & Company
- Morgan Stanley
### Initial results

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) FE only</th>
<th>(2) FE + BS Variables</th>
<th>(3) FE + BS Variables + Controls</th>
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<tbody>
<tr>
<td>liq asset ratio</td>
<td>-0.465** (-3.086)</td>
<td>-0.389*** (-4.251)</td>
<td>-0.243*** (-4.276)</td>
</tr>
<tr>
<td>leverage ratio</td>
<td>-1.813*** (-4.947)</td>
<td>-1.115*** (-6.007)</td>
<td></td>
</tr>
<tr>
<td>ST debt ratio</td>
<td>0.0398 (0.915)</td>
<td>0.0130 (0.609)</td>
<td></td>
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<tr>
<td>Constant</td>
<td>5.178*** (34.47)</td>
<td>8.704*** (11.80)</td>
<td>6.921*** (14.15)</td>
</tr>
<tr>
<td>Observations</td>
<td>198</td>
<td>198</td>
<td>198</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.181</td>
<td>0.301</td>
<td>0.706</td>
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<tr>
<td>Number of firmid</td>
<td>6</td>
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<td>Fixed Effects</td>
<td>YES</td>
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Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Magnitude of effect

• 1% change in liquidity associated with .24% change in CDS.
  • NOT percentage points.
  • If bank with LAR of 10% raises to 11%, that's a 10% increase.
  • If CDS spread starts at 100bps, predicted decline to 97.6bps.
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- Dropping each firm out the sample
- Specification changes e.g. broader liquidity measure, deeper lags
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- BUT model is very simple and numeric simulations could be improved.
- Provided some evidence for an association between liquidity and CDS spreads.
- BUT sample is small and US only - need more widespread liquidity disclosures or different measure of funding costs.
Summary and further work

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