Implicit Guarantees and Risk Taking: Evidence from Money Market Funds

Money and Payments Workshop
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Motivation

- Implicit guarantees
  - Firm’s termination generates bankruptcy costs
  - Generate incentives for owner or third-parties to bail out a firm
  - Can affect firm’s risk taking outside bankruptcy

- Importance of implicit guarantees
  - Difficult to measure (similar to costs of financial distress)
  - Often exist between parent company and subsidiary
  - Important in financial industry (to avoid inefficient runs)
Research Question

- How do implicit guarantees affect risk taking?
- Theory (largely in banking) emphasizes two effects:
  - Beneficiary of guarantee increases risk taking (moral hazard)
  - Provider of guarantee reduces risk taking (internalizes the cost)
- But limited empirical work
Empirical challenges

1. Implicit guarantees are non-contractual
2. Risk taking is difficult to measure
3. Provision of implicit guarantees is endogenous
Setting: Money Market Funds

- Money market funds are regulated by SEC
  - Must invest in safe money market instruments (high ratings, short maturity, etc.)
  - In exchange, can value investments at cost and sell demand deposits with stable Net Asset Value ($1 per share)
  - Structured like a “narrow bank”

- Money market funds are subject to bank runs
  - “Breaking the buck” is one mechanism to stop run (before 2008, only used once by small fund in 1994)
  - Alternatively, fund sponsor provides guarantee to stop run
Setting: Money Market Mutual Funds

Sponsor

<table>
<thead>
<tr>
<th>Chooses managers</th>
<th>Provides implicit guarantee</th>
</tr>
</thead>
</table>

Money Market Funds

- Certificate of Deposits
- (Asset-Backed) Commercial Paper
- Repurchase Agreements
- Obligations
- Treasury Bills

<table>
<thead>
<tr>
<th>Demand Deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>(sold at a fixed NAV, usually $1)</td>
</tr>
</tbody>
</table>

Certificate of Deposits
(Asset-Backed) Commercial Paper
Repurchase Agreements
Obligations
Treasury Bills

Demand Deposits
(sold at a fixed NAV, usually $1)
Advantage of our setting

- Implicit guarantees are central to this industry

- Large and important industry ($3 trillion in 2008)
  - Assets under management about the size of equity mutual funds
  - Demand deposits provided similar to commercial banking sector

- Can observe and measure risk-taking decisions
  - Weekly data on fund holdings, flows, and returns
Empirical Strategy

  - Prior to 2007, most money market instruments had similar yields
  - Large decline in collateral values of money market instruments
  - Some instruments became riskier (expansion in risk-taking opportunities)
  - Strong incentives to take on more risk (“yield chasing”)
Expansion in Risk-Taking Opportunities

Pre Post

Spread Relative to Treasuries (%)

-0.2 0 0.2 0.4 0.6 0.8 1 1.2 1.4

Jan-06 Mar-06 May-06 Jul-06 Sep-06 Nov-06 Jan-07 Mar-07 May-07 Jul-07 Sep-07 Nov-07 Jan-08 Mar-08 May-08 Jul-08

Repo Deposits Obligation FRNS CP ABCP
Empirical Strategy


- Use variation in “ability” to provide implicit guarantees
  - Guarantee after shock depends on sponsor’s capital

- Sponsor capital determined by mutual fund organization
  - All sponsors are part of larger mutual fund organization
  - Some mutual fund organizations are affiliated with banks
Results: The Tale of Two Funds

- Reserve Primary Fund
  - Oldest fund in the money market fund industry
  - Known for its safe approach to investing
  - Sponsored by Reserve Funds
Results: The Tale of Two Funds

- Reserve Primary Fund
  - Oldest fund in the money market fund industry
  - Known for its safe approach to investing
  - Sponsored by Reserve Funds

- Columbia Cash Reserves Fund
  - Large, well-known fund
  - Sponsored by Bank of America
Results: The Tale of Two Funds

- Reserve Primary Fund
  - Oldest fund in the money market fund industry
  - Known for its safe approach to investing
  - Sponsored by Reserve Funds (little capital)

- Columbia Cash Reserves Fund
  - Large, well-known fund
  - Sponsored by Bank of America (significant capital)
Reserve Primary: Assets and Return

Pre | Post

- Assets
- Return

Basispoints

$ billion

6/22/22 - 8/22/22
Columbia Cash Reserves: Assets and Return

Graph showing the changes in assets and return over time.
Reserve Primary: More Risk Taking

- Pre
- Post

- U.S. + Repos
- ABCP
- Other
Columbia Cash: No Change in Risk Taking

![Graph showing percentage changes in different categories over time. The categories include ABCP, US & Repo, and Other.](Image)
Sponsors with Capital Provided Guarantees

- Lehman’s bankruptcy triggered a market-wide run on the money market fund sector

- Financial support provided post-Lehman
  - None for Reserve Primary Fund (liquidated)
  - Financial support for Columbia Cash by Bank of America (~$600 million for all BOA money funds)

- Eventually, all funds bailed out by the government
Sponsors with Capital Provided Guarantees

- Lehman’s bankruptcy triggered a market-wide run on the money market fund sector

- Financial support provided post-Lehman
  - None for Reserve Primary Fund (liquidated)
  - Financial support for Columbia Cash by Bank of America (~$600 million for all BOA money funds)

- Eventually, all funds bailed out by the government
Data

- Data:
  - iMoneyNet money market data: asset values, returns, holdings
  - CRSP mutual fund data
  - Compustat data: implicit guarantees (sponsors’ equity)
  - SEC data on fund support

- Time Period:
  - Weekly data for the period 2005-2009

- Sample:
  - All institutional, prime money market funds
### Largest Money Market Funds (Table 1, 2007)

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Assets</th>
<th>Sponsor Name</th>
<th>Equity</th>
<th>Rating</th>
<th>Congl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.P. Morgan</td>
<td>88.4</td>
<td>J.P. Morgan</td>
<td>55.8</td>
<td>A+</td>
<td>Y</td>
</tr>
<tr>
<td>Columbia Cash Reserves</td>
<td>41.3</td>
<td>Bank of America</td>
<td>57.1</td>
<td>AA-</td>
<td>Y</td>
</tr>
<tr>
<td>BlackRock Liquidity</td>
<td>34.4</td>
<td>Blackrock</td>
<td>0.4</td>
<td>A+</td>
<td>N</td>
</tr>
<tr>
<td>Fidelity Instit</td>
<td>27.7</td>
<td>Fidelity</td>
<td>0.0</td>
<td>NR</td>
<td>N</td>
</tr>
<tr>
<td>Goldman Sachs FS Prime</td>
<td>27.1</td>
<td>Goldman Sachs</td>
<td>30.1</td>
<td>AA-</td>
<td>Y</td>
</tr>
<tr>
<td>Morgan Stanley Inst</td>
<td>26.3</td>
<td>Morgan Stanley</td>
<td>32.0</td>
<td>A+</td>
<td>Y</td>
</tr>
<tr>
<td>Dreyfus Instit Cash</td>
<td>25.5</td>
<td>Deutsche Bank</td>
<td>5.0</td>
<td>A+</td>
<td>Y</td>
</tr>
<tr>
<td>Columbia MM Reserves</td>
<td>22.0</td>
<td>Bank of America</td>
<td>57.1</td>
<td>AA-</td>
<td>Y</td>
</tr>
<tr>
<td>Federated Prime</td>
<td>22.0</td>
<td>Federated</td>
<td>0.0</td>
<td>NR</td>
<td>N</td>
</tr>
<tr>
<td>AIM STIT Liquid Assets</td>
<td>21.5</td>
<td>AIM Advisors</td>
<td>0.0</td>
<td>NR</td>
<td>N</td>
</tr>
</tbody>
</table>
# Summary Statistics (Table 2, January 2007)

<table>
<thead>
<tr>
<th>Fund Characteristics</th>
<th>All</th>
<th>Low Equity</th>
<th>High Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNA ($mil)</td>
<td>6,052</td>
<td>5,074</td>
<td>7,031</td>
</tr>
<tr>
<td></td>
<td>(10,367)</td>
<td>(7,555)</td>
<td>(12,547)</td>
</tr>
<tr>
<td>Spread (annualized %)</td>
<td>0.22</td>
<td>0.21</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>(0.43)</td>
<td>(0.22)</td>
<td>(0.56)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>12.7</td>
<td>14.0</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>(6.4)</td>
<td>(6.8)</td>
<td>(5.7)</td>
</tr>
<tr>
<td>Annual Expenses (%)</td>
<td>0.31</td>
<td>0.34</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>(0.19)</td>
<td>(0.20)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Observations</td>
<td>146</td>
<td>73</td>
<td>73</td>
</tr>
</tbody>
</table>
Response to a Large Shock

1. Expansion in risk-taking opportunities

2. Flow-performance relationship

3. Impact of capital on risk taking before/after + high/low capital sponsors (diff.-in-diff. estimation)
Expansion of Risk-Taking Opportunities

- Evidence on average riskiness of money market instruments
  - Safe asset classes: U.S. Treasury & Agency, Deposits, and Repos
  - Risky asset classes: Commercial Paper, Floating Rate Notes, and Bank Obligations

\[
\text{Spread}_{it+1} = \alpha_i + d_t + \beta_j \text{Asset Class}_{jit} + \beta_c \text{Controls}_{it} + \varepsilon_{it+1}
\]

- Unit of observation: Fund-Week
- \(\text{Spread}_{it+1}\) : Fund Return relative to 1-month Treasury Bill Rate
- \(\text{Asset Class}_{jit}\) : Asset Class (in percentage points)
- \(\text{Controls}_{it}\) : Log(Size), Expenses, Age, Flows, Log(FamilySize)
## Returns and Asset Categories (Table 3)

<table>
<thead>
<tr>
<th>Asset Category</th>
<th>Spread$_t$</th>
<th>Post (1)</th>
<th>Pre (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset-backed CP$_{t-1}$</td>
<td>0.765***</td>
<td>0.169***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.077)</td>
<td>(0.029)</td>
<td></td>
</tr>
<tr>
<td>Repurchase Agreements$_{t-1}$</td>
<td>0.131*</td>
<td>0.148***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.075)</td>
<td>(0.035)</td>
<td></td>
</tr>
</tbody>
</table>

Controls: Y Y  
Week Fixed Effects: Y Y  
Fund Fixed Effects: N N  
Observations: 7,717 7,585  
R-squared: 0.92 0.82

Note: Standard errors clustered at fund level
Benefits of Risk Taking

- Estimate flow-performance relationship

\[ \text{Flow}_{it+1} = \alpha_i + d_t + \beta_1 \text{Spread}_{it} + \beta_2 \text{Controls}_{it} + \epsilon_{it+1} \]

- \text{Flow}_{it+1}: Fund flow from t to t+1
- \text{Spread}_{it}: Fund return minus 3-month Treasury Bill Rate
- \text{Controls}_{it}: Fund size, expense ratio, fund age, fund family size
# Flow-Performance Relationship (Table 4)

<table>
<thead>
<tr>
<th>Period</th>
<th>Fund Flow(_{i,t+1})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post (1)</td>
</tr>
<tr>
<td><strong>Spread(_{i,t})</strong></td>
<td>0.010** (0.004)</td>
</tr>
<tr>
<td><strong>Log(Equity)(<em>{i})*Spread(</em>{i,t})</strong></td>
<td>-0.001 (0.001)</td>
</tr>
<tr>
<td><strong>Log(Equity)(_{i})</strong></td>
<td>0.002 (0.002)</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td>Y</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>7,725</td>
</tr>
</tbody>
</table>

**Economic significance:** One std. dev increase in spread associated with 37% increase in fund size/year.

**Note:** Standard errors clustered at fund and week level.
Identification: Choice of Sponsor Capital

- Sponsor capital unlikely to be chosen in anticipation of money market fund risk taking
  - Some fund mutual organization are affiliated with other large financial conglomerates (chosen prior to 2007)
  - Affiliation chosen based on characteristics of entire mutual fund organization (e.g., for diversification)
  - Money market funds represent small share of revenue income; Change in risk-taking opportunities was unexpected
Capital and Risk Taking

- Estimate impact of equity capital on risk taking:

\[ \text{Risk}_{it+1} = \alpha_t + \beta_1 \text{Log(Equity)}_i + \beta_2 \text{Controls}_{it} + \epsilon_{it+1} \]

- **Four (weekly) measures of risk:**
  - Fund spread (Return – Tbill rate)
  - Holdings risk (share of risky assets: ABCP, CP, Obligations, FRNs)
  - Concentration risk
  - Portfolio maturity

- **Log(Equity):** Sponsor’s equity as of January 2007
More Equity Capital => Lower Spread

Regression of Spread on Log(Equity)
More Equity Capital => Less Holdings Risk

Regression of Holdings Risk on Log(Equity)
More Equity Capital => Lower Concentration

Regression of Concentration Risk on Log(Equity)
More Equity Capital => Shorter Maturity

Regression of Maturity Risk on Log(Equity)
### Equity Capital and Risk Taking (Table 5)

<table>
<thead>
<tr>
<th></th>
<th>Spread_{i,t+1}</th>
<th>Holdings Risk_{i,t+1}</th>
<th>Concentration Risk_{i,t+1}</th>
<th>Maturity Risk_{i,t+1}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(Equity)_i*Post_t</td>
<td>-0.019***</td>
<td>-0.020***</td>
<td>-0.012*</td>
<td>-0.896**</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.007)</td>
<td>(0.006)</td>
<td>(0.403)</td>
</tr>
</tbody>
</table>

**Economic Significance:**

One st.dev. rise in equity leads to \(~20\%\) drop in c-x st.dev. of risk

Note: Standard errors clustered at sponsor and week level
Direct Evidence on Guarantees

- Ex-post evidence on guarantees in the wake of a market-wide crisis (due to Lehman’s bankruptcy)

- Were sponsors with more capital more likely to support funds?

- Were investors less likely to ask for redemptions from funds sponsored by companies with more capital?
## Capital and Support/Redemptions (Table 6)

<table>
<thead>
<tr>
<th></th>
<th>Support</th>
<th>Redemptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(Equity)$_i$</td>
<td>0.065*** (0.024)</td>
<td>-0.016** (0.006)</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Observations</td>
<td>140</td>
<td>140</td>
</tr>
</tbody>
</table>

Note: Standard errors clustered at sponsor level
Identification Test: Retail Funds

- However, results could be driven by interaction of unobserved sponsor characteristics interacted with post:
  - e.g., Quality of risk management

- Look at the effects on retail funds – “placebo” group
  - Retail funds have the same sponsor structure
  - Flows less sensitive to returns (smaller stakes, higher transaction costs)

- Similar to a triple-difference approach
## Capital and Risk Taking, Placebo (Table 6)

<table>
<thead>
<tr>
<th></th>
<th>Spread\textsubscript{t}</th>
<th>Holdings Risk\textsubscript{t}</th>
<th>Concentration Risk\textsubscript{t}</th>
<th>Maturity Risk\textsubscript{t}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retail</td>
<td>Inst.</td>
<td>Retail</td>
<td>Inst.</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Log(Equity)\textsubscript{i}</td>
<td>-0.003 (0.015)</td>
<td>-0.019*** (0.006)</td>
<td>0.006 (0.015)</td>
<td>-0.018** (0.008)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-0.008 (0.017)</td>
<td>-0.015* (0.009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.040 (1.012)</td>
<td>-1.542* (0.792)</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Week FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Observations</td>
<td>5,869</td>
<td>7,717</td>
<td>5,866</td>
<td>7,717</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.85</td>
<td>0.89</td>
<td>0.18</td>
<td>0.11</td>
</tr>
<tr>
<td>DD: Log(Equity)\textsubscript{t-1} × Institutional</td>
<td>-0.016 (0.012)</td>
<td>-0.024** (0.011)</td>
<td>-0.007 (0.015)</td>
<td>-2.571*** (0.993)</td>
</tr>
</tbody>
</table>

Note: Standard errors clustered at sponsor and week level.
Identification Test: Government Intervention

- After Lehman’s default, government provided explicit guarantee to all money market funds.

- Explicit guarantee mitigated the role of implicit guarantees.

- => The effect on risk taking should become smaller.

- Test this prediction by comparing three sub-periods:
  (1) Jul.06-Jul.07; (2) Aug.07-Aug.08; (3) Jan. 09-Nov. 09.
## Government Intervention post-Lehman (Table 7)

<table>
<thead>
<tr>
<th>Model</th>
<th>Spread&lt;sub&gt;t&lt;/sub&gt;</th>
<th>Holdings Risk&lt;sub&gt;t&lt;/sub&gt;</th>
<th>Concentration Risk&lt;sub&gt;t&lt;/sub&gt;</th>
<th>Maturity Risk&lt;sub&gt;t&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>0.000</td>
<td>0.002</td>
<td>-0.003</td>
<td>-0.646</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log(Equity)&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.002</td>
<td>0.009</td>
<td>0.011</td>
<td>0.623</td>
</tr>
<tr>
<td>Log(Equity)&lt;sub&gt;t-1&lt;/sub&gt;×Post&lt;sub&gt;t&lt;/sub&gt;</td>
<td>-0.019***</td>
<td>-0.020***</td>
<td>-0.012**</td>
<td>-0.896**</td>
</tr>
<tr>
<td>Log(Equity)&lt;sub&gt;t-1&lt;/sub&gt;×Post-Lehman&lt;sub&gt;t&lt;/sub&gt;</td>
<td>-0.011</td>
<td>0.008</td>
<td>0.018**</td>
<td>-0.083</td>
</tr>
<tr>
<td>Fund Controls</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Week F.E.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>21,087</td>
<td>21,087</td>
<td>21,087</td>
<td>21,087</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.938</td>
<td>0.139</td>
<td>0.159</td>
<td>0.159</td>
</tr>
</tbody>
</table>

Note: Standard errors clustered at sponsor level
Additional Tests (1)

- **Credit rating/Affiliation as measures of implicit guarantee**
  - Owners with higher credit rating more able to raise capital in case of distress
  - Owners with more diverse operations more able to raise capital
  - Look at the credit rating/diversity of the fund owner instead of TTE
  - The results are qualitatively and quantitatively similar – supporting the guarantee story

- **Fund flow volatility drives risk taking**
  - Differences in volatility of fund flows explains fund risk taking
  - Control for pre-period standard deviation and lagged standard deviation of fund flows
  - Results on risk taking remain almost unchanged
Additional Tests (2)

- **Reputation costs at the family level**
  - Reputation costs of the entire family may affect incentives to take risk
  - Families with larger non-money market assets face greater reputation costs
  - Controlling for fraction of mmfs in other assets does not affect the results

- **Career concerns**
  - Managerial career concerns may affect incentives to take risk
  - Chevalier and Ellison (1997) use age/tenure as proxies for career concerns
  - Controlling for managerial tenure does not affect the results

- **Managerial Compensation**
  - Differences in compensation may drive differences in individual risk taking
  - Also, they may explain differences in flow-performance relationship
  - Controlling for compensation does not alter the risk results
Conclusion

- Implicit guarantees reduce risk taking in money market funds

- A new, microeconomic view on the role of implicit guarantees and bailouts
  - Literature largely focused on macroeconomics of bailouts (the role of government)
  - Guarantees by financial institutions do not necessarily increase risk taking (Volcker rule on commercial banks)
Basic Intuition: Players and Timing

- Players: managers, sponsors, and investors
  - Fund sponsors perfectly aligned with fund managers
- 2 types of sponsors: high-capital (HC) and low-capital (LC)
  - HC have ability to provide support to managers; LC don’t
- Fund investors solely condition their flows on past performance (little incentives to get info; “yield chasers”)
- At time 1, managers choose their levels of risk ($r_H$ or $r_L$)
- At time 2, possibility of a run: HC decide whether to provide support
Basic Intuition: Payoffs

- If a fund survives, it maintains its franchise value, $\gamma$
- If a fund experiences a run, liquidation cost of $\delta(r)$
- HC can preserve franchise value by bailout out the fund
  - $H1$: HC internalize expected losses and take on less risk
  - $H2$: HC more like to provide guarantees in case of a run