“Shadow Banking, Regulatory Changes, and the Resulting Financial Market and Real Economy Effects”

Russ Wermers
University of Maryland at College Park
Director, Center for Financial Policy at the University of Maryland
Visiting Economist: Office of Financial Research, U.S. Department of Treasury*

*My presentation does not necessarily reflect the views of the United States Treasury Department
Providers of Credit
(From OFR’s Recently Released Report)
“Runnable Liabilities” (Also from OFR Report)

Figure 16. Runnable Liabilities in the U.S. Financial System (percent of GDP)
Runnable liabilities declined during the crisis and have not returned to precrisis levels

Note: Data as of Dec. 31, 2015. Runnable liabilities include repurchase agreements (repos), securities lending, commercial paper, money market funds, and uninsured bank deposits. Repos reflect “Federal Funds & Security Repurchase Agreements” from the Financial Accounts of the United States, minus the repo liabilities of the Federal Reserve System and total Federal Funds purchased reported by bank holding companies on Form Y-9C. Uninsured deposits reflect total “Domestic Office Deposits” minus “Estimated Insured Deposits” from the Federal Deposit Insurance Corporation Statistics on Banking. GDP stands for gross domestic product.

Sources: Federal Reserve Board of Governors, Financial Stability Oversight Council, Haver Analytics, OFR analysis
Outline of My Talk: 5 Topics*

1. Evidence of Strategic (Run-Like) Behavior in Short-Term Funding Markets
2. How Does Increased Portfolio Disclosure Affect Strategic Behavior in Short-Term Funding Markets?
3. Where is the Cash? Issues with Measuring Cash Markets
4. Effects of Reduced Levels of Investment in Short-Term Funding Markets on Financial and Non-Financial Firms
5. Future Research Directions and Data

*I have benefitted from (publicly-available) data and discussions with economists from the: Federal Reserve Board, Office of Comptroller of the Currency, and Office of Financial Research
Topic 1: Evidence of Strategic (Run-Like) Behavior in Short-Term Funding Markets

Evidence from: “Runs on Money Market Mutual Funds”
(American Economic Review, September 2016)

Lawrence Schmidt    Allan Timmermann    Russ Wermers
UC San Diego        UC San Diego        University of Maryland
Key Events of September 2008

- 9/15/2008: Lehman Brothers declared bankruptcy
- 9/16/2008: Reserve Primary Fund “breaks the buck”: closing 4 pm NAV = $0.97 per share
- 9/17/2008: Putnam shut down a $12.3 billion money fund due to redemption pressure
- 9/17/2008: Wachovia announced it would support 3 of its money funds in trouble

Regulatory Responses:
- 9/19/2008: Treasury announces it will guarantee certain MMF assets
- 10/7/2008: Fed announces “Commercial Paper Funding Facility”
- 10/21/2008: the Federal Reserve announces “Money Market Investor Funding Facility”
Outflows Were Very Heterogeneous During the Money Fund Crisis of September 2008

Figure 1. Money Market Mutual Fund Flows in September–October 2008
Predictions from a Simple Model
(Morris and Shin (2001) and Angeletos and Werning (2006), adding a Fraction of Investors Who are “Inattentive”)

(i) Within funds, outflows from share class $S$, $p \cdot A^*(\theta, z, \omega)$, are larger than outflows from share class $U$, $q \cdot A^*(\theta, z, \omega)$.

(ii) Since $A^*(\theta, z, \omega_2) - A^*(\theta, z, \omega_1) \geq 0$ for any $\omega_2 \geq \omega_1$, expected outflows for each type of share class are weakly increasing in the fraction of sophisticated investors, $\omega$. Moreover, the marginal effect of changing $\omega$ on expected outflows is higher for type $S$ than for type $U$ investors.

(iii) Within funds, the difference in outflows between share class $S$ and share class $U$, $(p - q) \cdot A^*(\theta, z, \omega)$, is increasing in $\omega$. 
Testing the Predictions with Empirical Data

**Figure 2. Summary of Tests of Theoretical Predictions**

- **Prediction**
  1. A > C and B > D
  2. A > B and C > D
  3. A–C > B–D

- **Source of ID**
  - Within
  - Between
  - Within

- **Share class type**
  - Inst. large (low ER)
  - Inst. small (high ER)
  - Retail

- **Net outflows (%)**: value-weighted

- **High frac large inst.**
- **Low frac large inst.**
- **95% CI**
Portfolio risk proxies:
- AVGYIELD: Average gross yield over previous 6 months
- LIQUIDRT: % of TNA invested in repos, Treasury securities, and other U.S. agency notes. Definition follows Duygan-Bump et al (forthcoming). We construct a “real-time” estimate following Strahan and Tanyeri (forthcoming)

Investor risk proxies:
- EXPR: Expense ratio. Proxy for investor sophistication
- FLOWSTDEV: Volatility of daily log flows over previous 6 months

Sponsor risk proxy:
- PIPERC: % complex TNA in Prime Inst funds. Proxy for reputation variable in Kacperczyk and Schnabl (forthcoming)

Fund size (LOGTNA)

Lagged flows:
- \( Y_{i,t-1} \) – lagged equal-weighted mean in category.
- Allow for asymmetry and/or interactions with other variables

Note: category names from McCabe (2010)
Institutional investors in low expense ratio shareclasses had larger redemptions

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$EXPR$</td>
<td>0.67***</td>
<td>0.67***</td>
<td>0.77***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4.786)</td>
<td>(4.244)</td>
<td>(2.942)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Indicators:**

- $25 < EXPR \leq 45$
  - $-1.21$  
  - $(-0.274)$

- $15 < EXPR \leq 25$
  - $-23.09***$  
  - $(-3.562)$

- $EXPR \leq 15$
  - $-55.09***$  
  - $(-3.658)$

**Dummies Clustering**

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Complex</th>
<th>Fund</th>
<th>None</th>
<th>Complex</th>
<th>Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clustering</td>
<td>Fund</td>
<td>Complex</td>
<td>Fund</td>
<td>Fund</td>
<td>Complex</td>
<td>Fund</td>
</tr>
<tr>
<td>$N$</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.102</td>
<td>0.349</td>
<td>0.519</td>
<td>0.174</td>
<td>0.423</td>
<td>0.624</td>
</tr>
</tbody>
</table>

- Evidence of a nonlinearity: extremely low $EXPR$ shareclasses had extremely large outflows, all else constant
Fitted Model: Expense Ratio as a Predictor of Runs on 9/17

More Sophisticated Investors

Less Sophisticated Investors

Average expense ratio

1 standard deviation
Fixed- vs. Floating NAV
(Money Funds vs. Ultra Short-Term Bond Funds)

Panel A. Cumulative daily returns

Panel B. Cumulative monthly flows

Figure 3. Cumulative Returns and Flows for MMMF and Ultra-Short Bond Funds
Putting it together:
What Did We Learn?

- September 2008 period unique for study of MMMF run-like behavior
- Focus on heterogeneity allows us to zoom in on the primary drivers of dynamics in fund flows during the crisis period
- Portfolio characteristics did play an important role in determining the magnitude of the outflows
- We also find evidence of strategic complementarities at work:
  - Large amount of dispersion in potential outcomes, even for funds with similar observable characteristics
  - Investor and fund sponsor characteristics highly relevant, particularly for the left tail of the flow distribution
  - Sophisticated investors appeared to react to actions of less sophisticated investors
Topic 2: Evidence of Strategic (Run-Like) Behavior in Short-Term Funding Markets

Evidence from: “Portfolio Transparency, Heterogeneous Investors, and Risk-Shifting During the Eurozone Crisis” (Working Paper)

Emily Gallagher  Lawrence Schmidt  Allan Timmermann  Russ Wermers
Washington University in St. Louis  UC San Diego  UC San Diego  University of Maryland
2010 Amendments to Rule 2a-7
Allow Unprecedented Empirical Tests
of the Effect of Portfolio Transparency
(in Short-Term Funding Markets)

- Theoretical models with endogenous information acquisition imply testable predictions about which types of information investors will choose to acquire, and how they subsequently act on that information
  - For example, Kacperczyk, et al., 2016; Mackowiak and Wiederholt, 2015; and Sims, 2003

- This is particularly relevant if certain types of information are more costly (or valuable) to acquire, and some investors have a comparative advantage at acquiring costly information (the “Selective Information Acquisition Hypothesis”)

The Laboratory: Money market mutual funds (MMFs) during the Eurozone crisis of 2011–2012

Why study this market?

1. MMFs are large ($2.7tr) and seen as a potential source of systemic risk

2. MMFs investors are:
   • Highly risk-averse
   • **Heterogeneous in their sophistication levels** (unlike long-term funds)

3. The eurozone crisis: only private credit shock since MMFs began reporting portfolio holdings data monthly (Nov. 2010).

4. Unique data:
   • Monthly portfolio information: construct a credit risk measure for each fund that evolves with market conditions.
   • **Proprietary data on the types of investors in each MMF.**
The Laboratory: Money market funds (MMFs) during the Eurozone crisis of 2011–2012

Four Major Databases...

SEC Form N-MFP
- Security holdings
- Monthly, 2011-2012
- Individual observation: date-fund-issuer-security

Risk Management Institute (RMI), National University of Singapore
- Forward-looking cumulative default probabilities
- Tenors of 1, 3, 6, 12, and 24 months ahead.
- Monthly, 2011-2012
- Daily, Apr.-Sep. 2011
- Individual observation: date-issuer-tenor

iMoneyNet
- Assets, yields, expenses
- Daily, 2011-2012
- Individual observation: date-fund-class

Investment Company Institute (ICI)
- Shareholder types
- Annual, 2011 and 2012
- Individual observation: date-fund-class

Hand-matched by issuer parent name

Matched by SEC EDGAR identifiers, CIK codes

Matched by ticker

Figure 3: Data aggregation process
“Institutional” Share Classes are Not Always So

(a) The portion of aggregate assets of prime MMFs owned by different types of investors

All share classes

- Individuals: 40%
- Nonfinancials: 19%
- Financials: 12%
- Plans and trusts: 25%
- Nonprofits: 2%
- Other institutions: 2%

Sophisticated investors: 34%

Institutional share classes

- Individuals: 25%
- Plans and trusts: 23%
- Financials: 18%
- Nonfinancials: 28%
- Other institutions: 3%
- Nonprofits: 3%

Sophisticated investors: 52%
...And this degree of variation is needed to determine whether the threat of being monitored alters fund manager portfolio choices during a crisis.
Outflows: concentrated in MMFs with greater sophisticated ownership

Unique feature of the eurozone crisis helps with identification:

- Outflows from MMFs calm after July 2011.
- Meanwhile, European credit risk remains elevated until Sep. 2012.

This means:

- We can measure investor monitoring at the beginning of the crisis.
- And then identify what effect monitoring had on fund portfolios through the duration of the crisis.
- Like Granger, we avoid problem of isolating contemporaneous causality.
Manager responses to risk are stronger in funds with more sophisticated investors.

**Short-run:**
- High SOPH funds $\uparrow$ Risk more than Low SOPH

**Mid-run:**
- High SOPH funds $\downarrow$ Risk more than Low SOPH

**Risk response of the average High SOPH fund – Low SOPH fund (normalized by average ELM)**

---

### %Δ:
- All
- Europe
- Asia/Pacific
- Americas

---

### Crisis resolved:
- Heavy outflows
Results

Short-run:
• Funds with heavier outflows become temporarily riskier.

Medium- & Long-run:
• The average fund reallocated risk from Europe (France and Belgium) to Asia (Japan).
• Initially riskier funds (i.e., higher $ELM$) made larger shifts.
• The influence of a fund’s initial risk level on its portfolio risk reallocations is increasing in the sophistication of its investors (i.e., $SOPH$).
Conclusion

Summary of the Mechanism (facilitated by disclosure)

Sophisticated investors monitor:
• Performing advanced credit analytics and redeeming at the early-stages of a shock.
• But, monitoring is selective.

Manager risk allocations respond to monitoring behavior:
• Observing the monitoring behavior of investors across funds.
• Reallocating portfolio risks to mitigate outflows but doesn’t necessarily reduce all forms of risk.
→ Exacerbate the liquidity shocks in Europe; but also limit contagion.

Policy Implications

The SEC’s 2014 reforms will segregate “sophisticated” investors from retail investors. This should:
• Reduce *negative externalities* imposed by sophisticated investors, through their redemption behavior, on their less sophisticated counterparts.
• But also reduce *positive externalities* from sophisticated investors acting as de facto credit analysts for less sophisticated investors in the same fund. (?)
Topic 3: Where is the Cash?
Issues with Measuring Cash Markets
Repositories for U.S. Cash Investments

• 1. U.S. Money market mutual funds ($2.7 trillion)
• 2. Offshore Money market mutual funds (?)
• 3. Private liquidity funds (unregistered, not available to retail investors)
• 4. Short-term investment funds (unregistered, sponsored by banks and asset management companies) ($283 billion—next slide)
• 5. Stable Value Funds (unregistered, offered to retail 401(k) plans) ($700 billion)
• 6. Ultrashort Bond Funds (registered and unregistered) (Probably less than $100 billion)
• 7. Separate accounts (unregistered, little data available)
STIF Providers - 12/31/15

Notes:
1. STIFs total $283.6 billion
2. Major STIF Provider converted to a state charted trust company after 4Q2009 - data used was publicly reported as of 12/31/2009
3. All figures are in billions
4. Source: Annual Call Report data
Topic 4: Effects of Reduced Levels of Investment in Short-Term Funding Markets on Financial and Non-Financial Firms
• Corporations now holding a great deal of cash
• Financing with long-term debt rather than short-term commercial paper
• Who is holding commercial paper that used to be held by Prime Money Market Funds?
• Commercial paper yields and municipal yields are increasing due to reduced demand by Money Market Funds
Topic 5: Future Research Directions and Data
Longer-Term Funds as “Shadow Banks”

- Bond Funds, both short-term and long-term
- Open-end mutual funds, in general
  - Daily liquidity against long-term asset holdings
- Exchange-Traded Funds
- Hedge Funds
Current and Future Data Sources

• iMoneyNet: Shareclass-level daily flows, Form N-MFP portfolio data
• New Form ADV: Enhanced Investment Advisor Data
• New Form-PORT: Non-MMF (e.g., equity mutual fund) liquidity data—amount of portfolio in (1) highly liquid, (2)
Summary

• Research on short-term funding markets have gone from “nobody cares” to a very hot area

• A “perfect storm” of:
  • Financial crisis and ensuing concerns about liquidity of long-term assets
  • Increased capital standards for banks
  • Radical changes in money market mutual fund regulations
    • Floating NAV for Prime and Muni funds—Institutional
    • Institutional Shareclasses must be purely institutional, and have a separate portfolio (fund)—not commingled with Retail Shareclasses
  • Ongoing Eurozone banking crises
  • Aging demographics—low consumption creating concentrated pools of capital
  • Increasing movement toward cashless economies
Summary (continued)

• Research using these new data sheds light on:
  • “Bank runs”
  • Portfolio transparency, resulting investor behavior, and resulting fund manager risk selection
  • Reaction of aggregate investors to various crises
    • Eurozone
    • Debt-ceiling
  • Reaction of aggregate investors to economic conditions
    • Current bond sell-off