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

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*My presentation does not necessarily reflect the views of the United States Treasury Department

Providers of Credit (From OFR's Recently Released Report)

Figure 14. Providers of Credit to U.S. Real Economy (\$ trillions)

Shadow banking accounts for close to 40 percent of total credit provided in the United States



Note: ABS stands for asset-backed securities. "Funds" includes pension funds, money market funds, mutual funds, exchangetraded funds, real estate investment trusts, and private funds. "Other" includes insurance companies, finance companies, and broker-dealers.

Sources: Haver Analytics, OFR analysis

"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)

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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
- 9/19/2008: Fed announces "Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility"
- 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



Panel B. Cumulative flows (\$ billion)

Panel C. Total September 15–19 fund-level flows



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 $A^*(\theta, z, \omega_2) A^*(\theta, z, \omega_1) \ge 0$ for any $\omega_2 \ge \omega_1$, expected outflows for each type of share class are weakly increasing in the fraction of sophisticated investors, ω . Moreover, the marginal effect of changing ω 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 ω .

Testing the Predictions with Empirical Data



FIGURE 2. SUMMARY OF TESTS OF THEORETICAL PREDICTIONS

Fund Characteristics of Interest

- 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) December 17, 2016 Runs on Money M

Institutional investors in low expense ratio shareclasses had larger redemptions

2	(1)	(2)	(3)	(4)	(5)	(6)
EXPR	0.67^{***}	0.67^{***}	0.77^{***}			
	(4.786)	(4.244)	(2.942)			
Indicators:						
$25 < EXPR \le 45$				-1.21	-1.70	-1.17
				(-0.274)	(-0.216)	(-0.116)
$15 < EXPR \le 25$				-23.09***	-23.17^{**}	-23.82**
				(-3.562)	(-2.648)	(-2.084)
$EXPR \le 15$				-55.09***	-65.96^{***}	-88.79***
				(-3.658)	(-4.181)	(-2.907)
Dummies	None	Complex	Fund	None	Complex	Fund
Clustering	Fund	Complex	Fund	Fund	Complex	Fund
N	245	245	245	245	245	245
R^2	0.102	0.349	0.519	0.174	0.423	0.624

 Evidence of a nonlinearity: extremely low EXPR shareclasses had extremely large outflows, all else constant

December 17, 2016

Fitted Model: Expense Ratio as a Predictor of Runs on 9/17



December 17, 2016

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



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)

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2010 Amendments to Rule 2a-7 Allow Unpredented 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?

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- 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



Source: Ivashina, Scharfstein, and Stein (2015)

Figure II

Money Market Fund Exposure to European Banks

Four Major Databases...



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



A Novel Measure of Investor Sophistication



...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.

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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).
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Bps:

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- 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

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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.
- \rightarrow Exacerbate the liquidity shocks in Europe; but also <u>limit contagion</u>.

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)
- Output Constraints (Index output Constraints of the second second
- 7. Separate accounts (unregistered, little data available)

STIF Providers - 12/31/15



- Blackrock Institutional Trust Company, NA
- State Street Bank and Trust Company
- Major STIF Provider
- Bank of New York Mellon
- JPMorgan Chase Bank, NA
- Wells Fargo Bank, NA
- Wellington Trust Company, NA
- All Other

4. Source: Annual Call Report data

STIF Assets - US Banking System



National Banks All US Banks

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)
 - https://www.sec.gov/rules/final/2016/33-10233.pdf

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