Money Market Funds Since the 2010 Regulatory Reforms

More Transparency, Increased Liquidity, and Lower Credit Risk

Fall 2012

CENTER FOR CAPITAL MARKETS COMPETITIVENESS

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About the Authors

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Dr. Drew B. Winters is the Lucille and Raymond Pickering chair in finance and chair of the Finance Area at Texas Tech University. He earned his Ph.D. in finance from the University of Georgia in 1990, an M.B.A. in finance and management information systems from the University of Georgia in 1986, and a B.S. in accounting and computer science from Duke University in 1982. He has served as a visiting research economist at the Federal Reserve Bank of St. Louis, studying money markets. Before his academic career he worked as a loan officer for First Union National Bank and as a certified public accountant at a public accounting firm. Dr. Winters has focused his academic career on the study of money markets and institutions. He has published 28 journal articles on money markets in leading journals such as the *Journal of Business, Journal of Banking and Finance, Financial Management,* and *Journal of Financial Research*. Dr. Winters currently serves as a co-editor of the *Journal of Financial Research*. His recent research has focused on the commercial paper market during the financial crisis, the impact of the Asset backed commercial paper MMMF Liquidity Facility (AMLF) program, and the impact of changes to Rule 2a-7 of the Investment Company Act.

Money Market Funds Since the 2010 Regulatory Reforms

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Executive Summary

Since the 2008 financial crisis, there has been a vigorous debate among academics, policymakers, and money market participants surrounding the role of money market funds (MMFs) during the crisis. In response to large redemptions from MMFs during the crisis, the government intervened with the guarantee of MMF shares by the Department of the Treasury. In the wake of the financial crisis, under the apparent presumption that Reserve Primary's "breaking the buck" precipitated a run on MMFs, the Securities and Exchange Commission (SEC) implemented an overhaul of MMF regulation through changes to Rule 2a-7 of the Investment Company Act that were adopted on January 27, 2010. The major changes to Rule 2a-7 tightened credit quality and liquidity constraints and mandated that MMFs conduct stress tests to determine whether net asset value (NAV) could be maintained in response to hypothetical risks. In addition, the SEC required new reporting standards with detailed monthly disclosures for MMFs.

Despite little specific evidence about the efficacy of the 2010 reforms, regulators such as SEC Chairman Mary Schapiro, Secretary of the Treasury Timothy Geithner, and Federal Reserve System Chairman Ben Bernanke continue to call for additional regulation of MMFs, largely based on what happened in 2008. The debate about further MMF reform needs to be informed by the impact of the 2010 reforms. This report starts to fill that gap by presenting some analysis of MMF data on liquidity, credit risk, redemption patterns, and net cash flows from 2008 to 2012, focusing in particular on what has happened in the industry since the 2010 reforms. We also examine whether redemptions from MMFs since the reforms have had any impact on the supply of funds in the commercial paper (CP) market. We used MMF data filed with the SEC to examine changes in liquidity, credit risk, redemptions, and net cash flow and CP data available from the Federal Reserve System to examine the impact of the

MMF market on the CP market. Finally, we examine the issues in light of the post-2008 academic literature on MMFs. We find—

- The changes adopted by the SEC in January 2010 were followed by a shortening of the weighted average maturity (WAM) of assets in prime institutional funds. The data reveal that all MMFs are more actively managing WAM following these regulatory changes. Accordingly, MMFs are now more liquid and better able to handle a significant change in redemptions.

- Since the 2008 crisis, we observe a significant decrease in the credit risk of assets held by prime MMFs. They have shifted their portfolios from relatively higher-risk assets (such as commercial paper) to relatively lower-risk assets (such as Treasuries). Since 2010, we see evidence of MMFs more dynamically shifting holdings across asset classes or geographies in response to evolving risks. This flexibility is enhanced by the shorter WAMs.

- The 2010 reforms required significantly more detailed disclosure of holdings and more frequent disclosures—now monthly in addition to quarterly. The result of the dramatically increased transparency is that any investors can now obtain timely, accurate data on the risk of any fund in which they invest.

- While prime MMFs with exposure to the eurozone experienced negative net cash flow in the summer of 2011, so did Treasury and agency MMFs that had no exposure to eurozone risk, indicating that the increase in redemptions during this period reflected a general increase in demand for liquidity and was not necessarily a specific reaction to financial instability in Europe.

- While the largest MMFs experienced substantial redemptions in the summer of 2011, typical of institutional investors' use of MMF as a cash management product, these funds also experienced substantial net inflows of cash during this same period. On net, the mean asset holdings of the largest MMFs remained remarkably stable over the summer of 2011. Thus, we see no evidence of anything resembling a "run" during this period, nor do we see any evidence that MMFs represented a systemic risk to the financial system.

- Significant outflows from MMFs in 2008 occurred exclusively against prime institutional MMFs that cater to large, sophisticated investors. MMFs catering to retail investors did not experience significant outflows, and many experienced inflows as investors moved from prime institutional funds toward the perceived safer retail funds. Based on existing research, there is no evidence that any retail investor was affected by such outflows from MMFs, and thus retail investors would receive little benefit from any additional regulation of MMFs.

- Typical monthly redemptions from the largest institutional prime and agency MMFs are substantially higher than those from typical MMFs. Thus, it will be extremely difficult to adopt a one-size-fits-all rule limiting redemptions from MMFs.

- Large redemptions against MMFs in the summer of 2011 had no measurable impact on the non-financial commercial paper (non-FCP) market or the asset-backed commercial paper (ABCP) market. We did observe an overall reduction in MMF holdings of financial commercial paper (FCP) in prime MMFs due to a small shift from FCP to less risky assets. However, even in the summer of 2011, we see no evidence that large financial firms had significant problems raising funds. Even though prime MMFs reduced holdings of FCP, it is well understood that FCP issuers have alternative funding sources. Overall, there is no evidence that the CP market experienced a "freeze" despite substantial redemptions in 2011.

In conclusion, we believe it is important to recognize that in the 40-year history of MMFs, there have been only two funds that have "broken the buck" and only one instance of significant redemptions from a relatively small set of funds. Given this history of amazing stability, along with the findings summarized above, it seems ill-advised to propose additional reforms that could substantially alter the structure of the MMF industry and potentially lead to a host of unintended consequences.

Background and the Debate Over Further Regulation of Money Market Funds

Since the 2008 financial crisis, there has been a vigorous debate among academics, policymakers, and money market participants surrounding the role of money market funds (MMFs) during the crisis. In response to large redemptions from MMFs during the crisis, the government intervened with the guarantee of MMF shares by the Department of the Treasury. In the wake of the financial crisis, under the apparent presumption that the Reserve Primary Fund's "breaking the buck" precipitated a run on MMFs, the Securities and Exchange Commission (SEC) implemented an overhaul of MMF regulation through changes to Rule 2a-7 of the Investment Company Act that were adopted on January 27, 2010 . The major changes to Rule 2a-7 tightened credit quality and liquidity constraints and mandated that MMFs conduct stress tests to determine whether net asset value (NAV) could be maintained in response to hypothetical risks. At the same time, MMFs were required to begin reporting detailed monthly disclosure of their asset holdings.

The efficacy of the increased regulation was tested during the summer of 2011, when there were large redemptions against prime institutional MMFs with exposure to eurozone risk during the European debt crisis. While no MMF "broke the buck" during that period, some academics and policymakers have asserted that a so-called "quiet" or "slow-motion" run provided evidence that the 2010 reforms were insufficient to prevent runs against MMFs.[1] On the other hand, others have asserted that the summer of 2011 is evidence that MMFs were able to handle large redemptions in an orderly fashion. There is concern, however, that the large redemptions that summer disrupted the commercial paper (CP) market. For example, a study by Chernenko and Sunderam (2012) has reported that "risk taking by money market funds, in the form of investments in risky Eurozone banks, [drove] large investor redemptions in the summer of 2011, significantly reducing the ability of other firms to raise

[1] A paper by Chernenko and Sunderam (2012) refers to the summer 2011 redemptions as a "quiet run," and they mention a 2011 article in the *Economist* that uses the term "slow-motion run."

short-term financing."[2] Their paper thus raises the specter of MMFs being a systemic risk to the financial system.

Since the summer 2011 redemptions, there have been calls for further regulation, primarily spearheaded by SEC Chairman Mary Schapiro, but also supported by Secretary of the Treasury Timothy Geithner and Federal Reserve System Chairman Ben Bernanke. Chairman Shapiro has asserted that the 2010 reforms are not sufficient to prevent runs on MMFs because MMFs purportedly "have no ability to absorb a loss above a certain size without breaking the buck" and because "investors have every incentive to run at the first sign of a problem."[3] To address these structural problems Chairman Schapiro has supported requiring MMFs to report a floating NAV, hold additional capital, and require a 30-day holdback on investor redemptions.

Failing to obtain a majority of SEC commissioners to support her proposals, Chairman Schapiro has recently referred the issue to the Financial Stability Oversight Council (FSOC), which is tasked by statute to address systemic risks to the financial system. In a September 27, 2012, letter, Secretary Geithner has requested that the FSOC take up Chairman Schapiro's proposals, but that it also consider a proposal by dissenting SEC Commissioners Daniel Gallagher and Troy Paredes allowing for temporary "gates" on redemptions at the discretion of the boards of directors of MMFs.[4] In addition, Secretary Geithner's letter reminds the FSOC that it "has the authority and duty to designate any nonbank financial company that could pose a threat to U.S. financial stability" and he requests that the FSOC evaluate the MMF industry to identify firms that represent a potential systemic risk. Under the Dodd-Frank Wall Street Reform and Consumer Protection Act (the Dodd-Frank Act), such designated firms would be subject to supervision by the Federal Reserve. Depending on the actions of the FSOC, MMFs could be facing significant additional regulation in 2013.

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[2] Chernenko and Sunderam (2012), p. 1.

[3] Statement of SEC Chairman Mary L. Schapiro on Money Market Fund Reform (2012-166), August 22, 2012.

[4] See Statement on the Regulation of Money Market Funds by Commissioner Daniel M. Gallagher; Commissioner Troy A. Paredes, U.S. Securities and Exchange Commission, August 28, 2012, and Letter from Secretary Geithner to the Financial Stability Oversight Council, September 27, 2012.

In the quickly evolving landscape, there remain a number of issues related to MMF regulatory reform that are open to debate. Some of these issues were nicely summarized in the August 28, 2012, statement by SEC Commissioners Gallagher and Paredes, but others have also raised them:

- In light of the confounding events surrounding the financial crisis (e.g., the Lehman bankruptcy and subsequent bailout of AIG), did the "breaking the buck" by a single MMF cause the 2008 run on MMFs?
- Given that there were substantial cash inflows to Treasury MMFs in September 2008 consistent with a flight to quality, is a one-size-fits-all approach to MMF regulation appropriate?
- Have the revisions of Rule 2a-7 improved the liquidity and credit risk profiles of MMFs?
- Has the substantially increased transparency of the monthly holdings of MMFs reduced the risk of runs?
- What was the impact of the eurozone crisis or the U.S. debt ceiling debacle on the redemptions and net cash flows of MMFs, and was their performance in summer 2011 indicative of a run?
- What was the impact of the 2008 crisis and the 2011 so-called "quiet run" on the commercial paper market?

Illuminating the Debate

The purpose of this report is to illuminate the debate on MMF reform with some facts derived from data. Using information from regulatory disclosures (SEC Forms N-Q and N-MFP) and data on the commercial paper market from the Federal Reserve System, we examine the evolution from 2007 until 2012 of MMF liquidity and risk profiles, MMF redemptions and net cash flows, and volume in the commercial paper market, addressing the following specific questions:

- How has the weighted average maturity (WAM) of MMF assets changed since the 2010 reforms?
- How has the proportion of risky assets in MMFs changed since 2010?
- Was the pattern of redemptions and net cash flows in the summer of 2011 consistent with a purported "quiet run?"
- How did the composition of MMF commercial paper investments change during the eurozone crisis and the U.S. debt ceiling debacle?

- Do data on the largest MMFs (those most likely to be deemed as systemically risky by the FSOC) reveal any evidence of systemic risk during the eurozone crisis?

- What was the impact of the pattern of MMF redemptions during the summer of 2011 on the commercial paper market?

Our findings are summarized below:

- Liquidity and credit risk in the MMF industry have improved measurably and on a sustained basis since the 2010 reforms.

- The pattern of redemptions among prime MMFs in the summer of 2011 was similar to the pattern of redemptions among Treasury and agency MMFs, indicating a general demand for liquidity rather than a "quiet run" on prime MMFs, since Treasury and agency MMFs had negligible eurozone exposure.

- During the eurozone crisis, prime MMFs shifted their holdings from the eurozone to North America, Asia/Pacific (largely to Australia), and the U.K., indicating a rational response to the evolving European situation.

- While the five largest prime MMFs experienced unusually large redemptions in the summer of 2011, there was some offsetting of the redemptions with positive net cash flows during that period. Further, the mean asset holdings of the five largest prime remained remarkably stable over the summer of 2011.

- Our analysis of commercial paper issuances and commercial paper outstanding during the summer of 2011 reveals no unusual impact of the large MMF redemptions on the market.

Based on these observations, we conclude that the reforms of 2010 improved transparency, liquidity, and risk in the MMF industry. Given the remarkable stability of the industry in the summer of 2011 during the eurozone crisis and uncertainty about whether the U.S. would raise its debt ceiling, we question whether there is sufficient evidence to support additional reform, especially given that to the extent that MMFs experienced unusually large redemptions that summer, we did not see any associated disruption to the commercial paper market. Certainly, at the very least, policymakers should pause to examine the efficacy of the 2010 reforms more rigorously with recent data before pushing additional limits on the MMF industry based on the "perfect storm" that occurred in 2008. Further, we question the potential efficacy of the proposed reforms (e.g., floating net asset value, redemption holdbacks, and

additional capital requirements) and are concerned that any purported benefits of these proposals may not outweigh the costs from potential unintended consequences.

In the following section, we move to a description of our data. Then we discuss the results of our analysis and implications for potential MMF reforms. Next, we review the recent literature on MMFs for evidence related to the questions raised above. Finally, we make some concluding remarks.

Description of the Data

This section describes the data we use to address the questions raised above. The MMF data comes from iMoneyNet, a firm that compiles information from SEC Forms N-Q and N-MFP and converts it to a format that is simple to obtain, organize, and interpret. We also analyze data on the commercial paper market to assess the impact on that market of large redemptions against MMFs from 2008 through 2012. The commercial paper data are available online from the Board of Governors of the Federal Reserve System (http://federalreserve.gov/datadownload/Choose.aspx?rel=CP).

Monthly and Quarterly Disclosure

Since March 2004, every registered investment company has been required to file Form N-Q with the SEC at the end of the first and third quarters. Form N-Q requires funds to report their investments as of the reporting date by the type of security (CP, repo, certificate of deposit, etc.). Based on this information, iMoneyNet classifies MMFs as taxable vs. tax-free, retail vs. institutional, or government/agency vs. prime funds.

The 2010 reforms require *monthly* disclosures on Form N-MFP since March 2010. Form N-MFP provides much more detailed information about MMF investments than Form N-Q. Combined with the increased frequency of reporting, Form N-MFP greatly increases MMF transparency. Form N-MFPs are made public 60 days after filing. Form N-MFP is organized in two parts. Part 1 reports whether the fund is a master fund or feeder fund, the type of fund (Treasury, agency, prime, single state, other tax exempt), weighted average maturity (WAM), weighted asset life (WAL), net assets, amortized cost, yield,

minimum initial investment, redemptions, and net cash flows. Part 2 gives detailed information on each security held. Part 2 also includes the name of issuer and Committee on Uniform Securities Identification Procedures; the type of security (for example, Treasury; Treasury repo; CP, FCP, or ABCP); the credit rating and name of agency providing the rating; the maturity date under Rule 2a-7 and the legal maturity date; the identity of guarantors, if any; the principal amount and amortized cost of securities held; and whether the security is illiquid. Because more detailed information is available from the Form N-MFP data, iMoneyNet uses the Form N-MFP data to classify MMFs as Treasury, government/agency, prime, single state, or other tax-exempt funds. Thus, our discussions of the results and the figures or tables differ slightly in nomenclature depending on whether we are interpreting the quarterly or monthly data.

Focus of the Data Analysis

To simplify our discussions and facilitate interpretation of the industry trends, we focus our analysis primarily on prime funds because they have been the subject of highest concern with respect to susceptibility to significant redemptions. Further, among MMFs, prime funds are the major investors in CP and much of the concern about potential systemic risk of MMFs relates to interrelations with the CP market. We also analyze MMFs that invest primarily in Treasury securities and agency securities, mainly to benchmark trends in relation to the prime funds. We do not analyze tax-free funds because in our initial review of their data, we saw that these MMFs were not materially affected by large redemptions. While form N-MFP data became available in November 2010, we begin our analysis of those data in January 2011. From our discussions with other experts on MMFs, we believe there may have been some initial inconsistency in how MMFs interpreted the form and reported the data. Our industry sources indicate that those inconsistencies were largely resolved by January 2011. We do not analyze MMFs with assets of $10,000 or less because they often have redemptions above 100% and these outliers potentially distort the results. Finally, we do not analyze feeder funds because they ultimately pass cash

inflows through to master funds. Therefore, the feeder funds would not provide a true picture of redemptions and net cash flows for a typical fund. Our analysis focuses on master funds.

MMF Classifications: Differences in Monthly and Quarterly Disclosures

We now turn to a description of the various MMF classifications. Retail funds are those typically marketed toward smaller investors and often have an initial deposit minimum of $1,000. In contrast, institutional funds are marketed toward large institutional investors and often require an initial minimum deposit of $1 million. Prime funds invest primarily in CP and are considered the riskiest funds. In the quarterly reporting format (Form N-Q), government/agency funds invest primarily in securities issued by the U.S. Treasury or government agencies. The monthly format categorizes MMFs separately for those primarily investing in U.S. Treasury securities (Treasury MMFs) or government/agency securities (agency MMFs).

To analyze longer-term trends, tracing back to the 2008 financial crisis, only the quarterly data are available. And, as we discussed above, there are more detailed data on securities holdings in the more recently implemented monthly reporting. Therefore, to achieve consistency in the data series, in some analyses we rely on the quarterly data and in others we rely on the more recent monthly data. In our analysis of WAM and portfolio composition from 2007 through 2012, we rely on the quarterly data. In our analysis of MMF redemptions and net cash flows, we rely on the monthly data. Further, using the monthly data, we are able to analyze three types of MMFs: prime, Treasury, and agency funds. Recall from above that the quarterly data combine Treasury and agency funds into one category. To provide some perspective on the depth and breadth of the data covered by our analysis, in Table 1 we provide some key statistics from the quarterly data and list the largest five funds in each category. (Tables are located in the Appendix at the end of this report)

Analysis of Eurozone Exposure

We conduct some analysis of MMF exposure to the eurozone because of the European banking crisis in summer 2011. For this analysis we focus on prime MMF holdings of financial commercial paper (FCP). The more detailed disclosure in Form N-MFP identifies the issuers of securities held by MMFs. We then use the home country of the issuer to classify MMF holdings by region (European Union, other countries in Europe, North America, Asia/Pacific, etc.).

Commercial Paper Data

For our analysis of the CP market we use data from the Board of Governors of the Federal Reserve System (http://www.federalreserve.gov/datadownload/Choose.aspx?rel=CP). These data are monthly non-seasonally adjusted dollar amounts outstanding and new CP issues for the entire market and for the major different classifications of CP.

Direction of the Analysis

In the next section of the report we provide some evidence on whether the 2010 Rule 2a-7 reforms were effective in reducing the potential for MMFs to pose a systemic risk to the stability of the U.S. financial system using the data described above. We address three main questions:

- How did the Rule 2a-7 changes in January 2010 affect the liquidity and risk of assets held by MMFs?
- During the summer of 2011, how did the level of redemptions and net cash flow change among types of MMFs, and were any such changes related to a fund's exposure to the eurozone?
- If there were unusually large redemptions among some MMFs in the summer of 2011, did the redemptions have an impact on the CP market?

Improvement in the Liquidity of MMFs

To make MMFs more liquid and better able to meet redemptions, the 2010 Rule 2a-7 reforms reduced the maximum weighted average maturity (WAM) of assets held by MMFs from 90 to 60 days and limited the weighted average life (WAL) of an MMF's portfolio to 120 days. Figure 1 shows the average WAM from the first quarter of 2007 through the second quarter of 2012 for government retail funds, government institutional funds, prime retail funds and prime institutional funds.

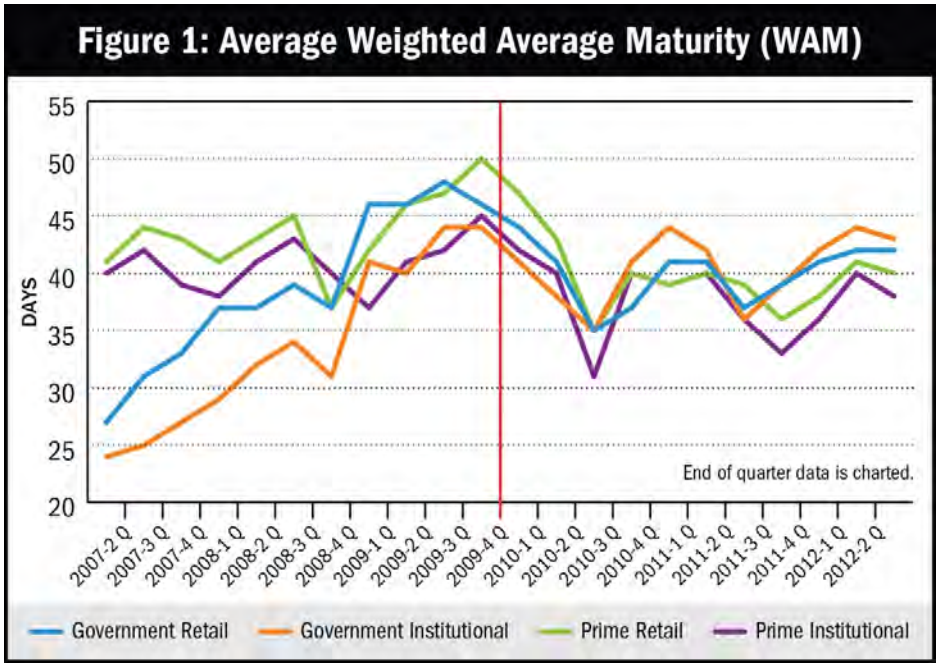


Figure 1 reveals several interesting facts. First, going into the financial crisis, WAM varied substantially across the different types of taxable MMFs.[5] Second, following the Lehman bankruptcy (third quarter 2008) and throughout 2009, WAM increased substantially in all categories. Third, there was a substantial decrease in WAM across all categories of MMFs that started once the new regulations were announced in fourth quarter 2009 and continued through second quarter 2010.

Since 2010 the average WAM of all types of funds has stayed below 45 days, well below the 60-day maximum. Interestingly, the average WAM of prime funds, both retail and institutional, is lower in

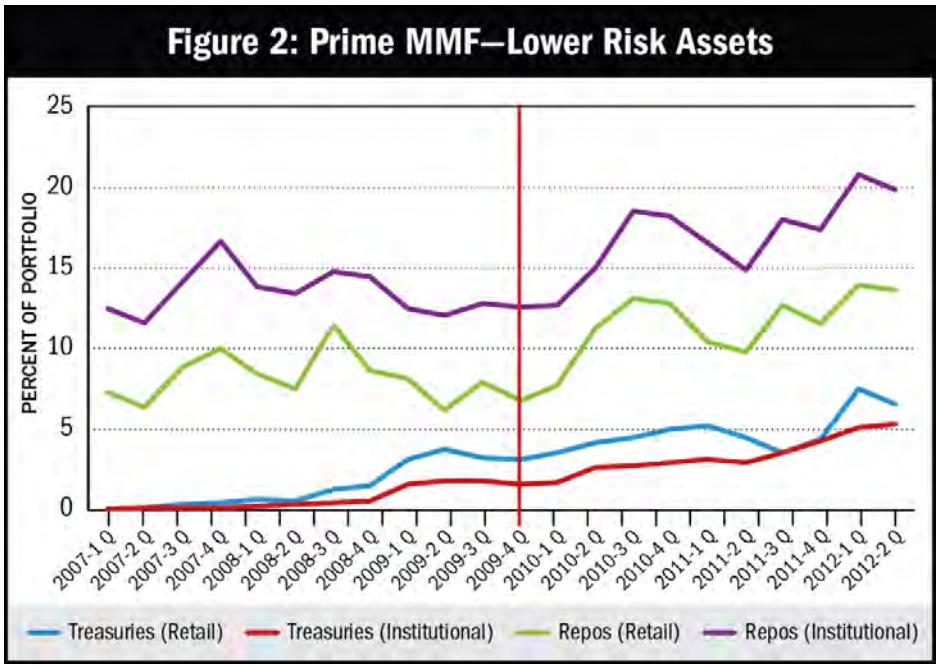
[5] The MMF categories in Figure 1 are those used by iMoneyNet in its Money Fund Report.

2012 than pre-financial crisis levels in early 2008. The average WAM of prime funds since first quarter 2010 declined by approximately four days compared to the average WAM of prime funds in the 2008–2009 period. For prime retail funds, the average WAM in 2008–2009 was approximately 45 days, declining to an average of 39 days since first quarter 2010. For the same periods, the average WAM for prime institutional funds declined from 41 to 37 days. Thus, the Rule2a-7 reforms are associated with an improvement in the liquidity of MMFs. Whether the decline in WAM is due to the reforms themselves, market forces, or some combination, it is clear that on average MMFs have stayed well below the 60-day maximum, even before the reforms.

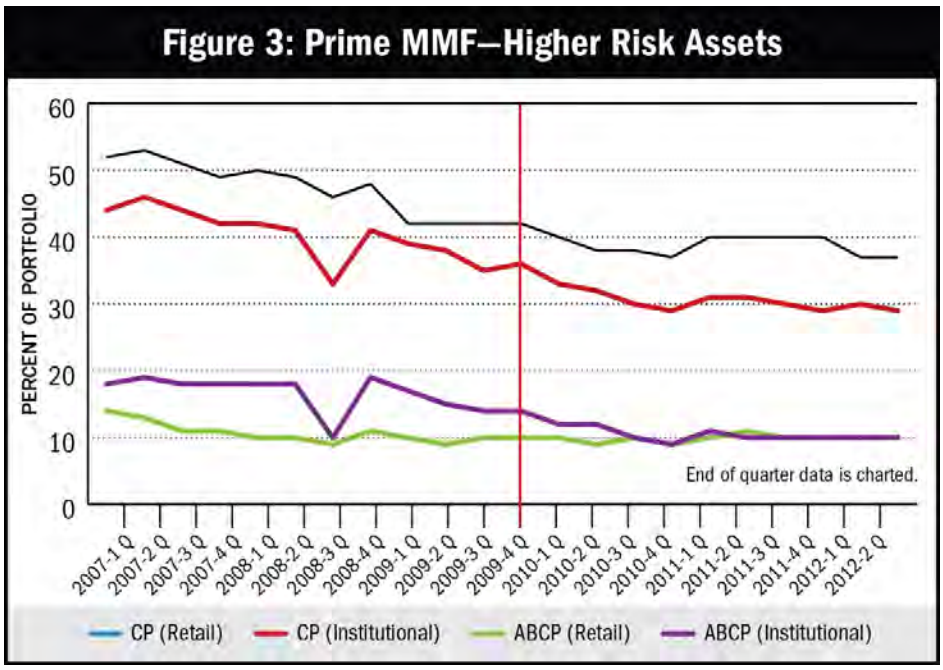
Less Risky Assets in MMF Portfolios

A second objective of the Rule 2a-7 reforms was to reduce the risk of MMF portfolios. This change mainly affected prime MMFs because government/agency MMFs already held low-risk securities. The 2010 reforms reduced the maximum percentage of a portfolio invested in second tier securities (those rated A2/P2 or below) from 5% to 3%. Figures 2 and 3 show the evolution of prime MMF holdings in low-risk (Treasuries and repos) and high-risk (CP and ABCP) assets from first quarter 2007 through second quarter 2012. Treasury securities are the least risky money market securities. Repos are also considered low risk because they are backed by high-quality collateral (typically, Treasury and agency securities). Commercial paper is the riskiest of the traditional money market securities. And, as a class, ABCP is considered a riskier form of commercial paper. Second-tier commercial paper (ratings A2/P2 or below) is also of higher risk. Generally, however, MMFs hold little second tier CP. In our analysis of MMFs by the various types from 2007 to 2012, we see that second tier CP never accounts for more than 1% of assets.

Figures 2 and 3 show that entering the financial crisis, prime MMFs held almost no Treasuries, but by second quarter 2012 prime MMFs held about 5% of their portfolios in Treasuries on average.



Repo holdings also increase by at least 5 percentage points and make up almost 15% of retail fund and 20% of institutional fund assets by second quarter 2012. Over the same period, holdings of CP decrease across all categories by at least 10 percentage points. ABCP holdings in prime retail MMFs are fairly stable from 2007 to 2012 at about 10% of assets, while ABCP holdings in prime institutional MMFs decrease by about 10 percentage points from fourth quarter 2009 through fourth quarter 2010. Together these findings demonstrate that the holdings of both prime retail and institutional MMFs have become much less risky since the start of the financial crisis.



MMF Redemptions and Net Cash Flow During Summer 2011

Earlier in the report we referenced some uncertainty in the financial markets in summer 2011 related to the eurozone crisis and the congressional efforts to raise the U.S. debt ceiling. In this section we examine MMF redemptions in the summer of 2011. In particular, in response to a paper by Chernenko and Sunderam (2012) that asserts that there was a "quiet" or "slow-motion" run against MMFs with eurozone exposure, we examine whether the redemption pattern reflected a more general increase in the demand for liquidity given the uncertainties that summer and address whether any sort of "run" took place. We analyze fund-level redemptions and net cash flows across 2011 for Treasury, government/agency, and prime MMFs. For these analyses, we use Form N-MFP data, which means that MMFs are classified slightly differently than when we used the Form N-Q data in the preceding section. Thus, there are slight differences in the names of the classes of funds under discussion in this section.

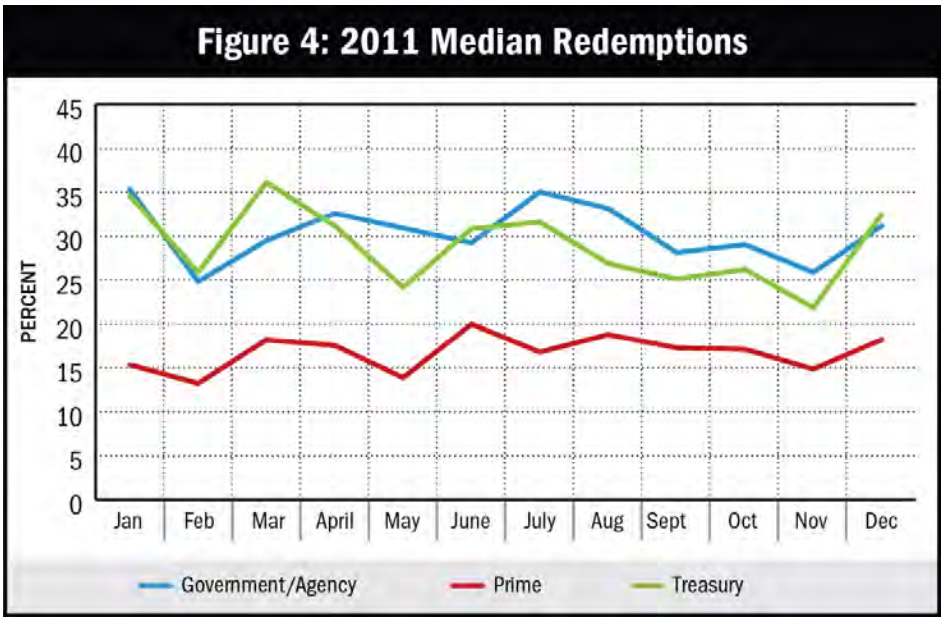


Figure 4 shows median redemptions as a percentage of fund assets by fund class monthly from January 2011 to December 2011. Figure 5 shows median net cash flow as a percentage of fund assets over the same period. We base our analysis on medians rather than means because of a few large outliers. The conclusions would not be meaningfully different had we focused on the means.

As Figure 4 shows, between 13% and 20% of assets were redeemed from the typical prime MMF in a month. This is substantially less than the 25% to 35% redemption rate for the typical Treasury or

government/agency MMF. In addition, while prime MMF redemptions do spike in June to their highest levels of the year, they immediately fall, and monthly redemptions in July and August are fairly typical for the year. We do not see this pattern of redemptions against prime funds as indicative of any kind of run—quiet, slow-motion, or otherwise.

Notably, redemptions from Treasury funds also spike in June and remain high in July. The June spike in Treasury redemptions is of similar magnitude (about 6 percentage points) to the June spike seen in prime MMFs. We also see that government/agency redemptions spike in July and remain high in August. Given that all funds experienced higher than typical redemptions in summer 2011, we believe there was a general increase in the demand for liquidity (perhaps related to seasonal factors or to general uncertainty about the eurozone and the U.S. debt ceiling) and not a quiet run specifically against MMFs with eurozone exposure. As we will discuss later, in our data we do see a modest shift in prime MMF holdings away from the eurozone to Asia/Pacific and North America. Given a more general demand for liquidity, however, it is not surprising that prime MMFs with eurozone exposure would see a higher redemption rate than those with less exposure.

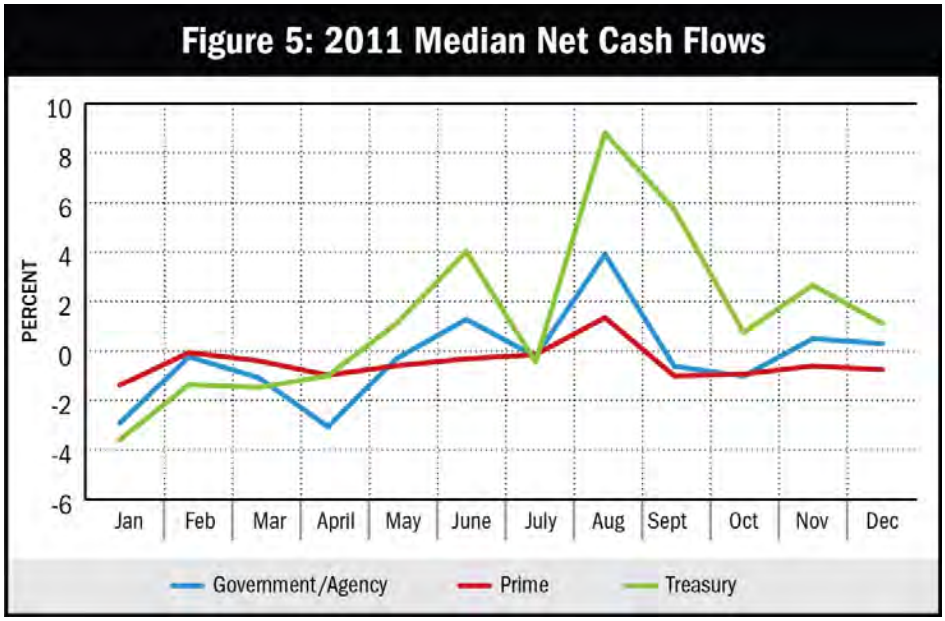


Figure 5 shows that the typical prime MMF experienced negative net cash flows (i.e., the MMF decreased in size) for most months in 2011 with a peak in June 2011, but the June decrease is only by 0.30% of net assets. For 11 months in 2011, median net cash flows were negative for prime MMFs; ironically, however, in August 2011 the median net cash flow was a positive 1.35%. The typical Treasury

and government/agency MMF also experienced several months with median negative cash flow in 2011 (five months of net negative cash flow for Treasury MMFs and eight months of net negative cash flow for government/agency MMFs). In fact, in July Treasury MMFs have median net cash flows of minus 0.44% and government/agency MMFs have net cash flows of minus 0.21%. Somewhat surprisingly, given the discussions of a quiet run in summer 2011, prime MMFs had a higher median net cash flow (i.e., lower median net *outflow*, minus 0.14%) than the other two fund classes. Finally, all three categories of MMFs have positive net cash flows in August 2011. The evidence suggests that there was not a major exodus from prime or other MMFs in summer 2011 and that all three types of funds experienced similar changes in net cash flow over the year.

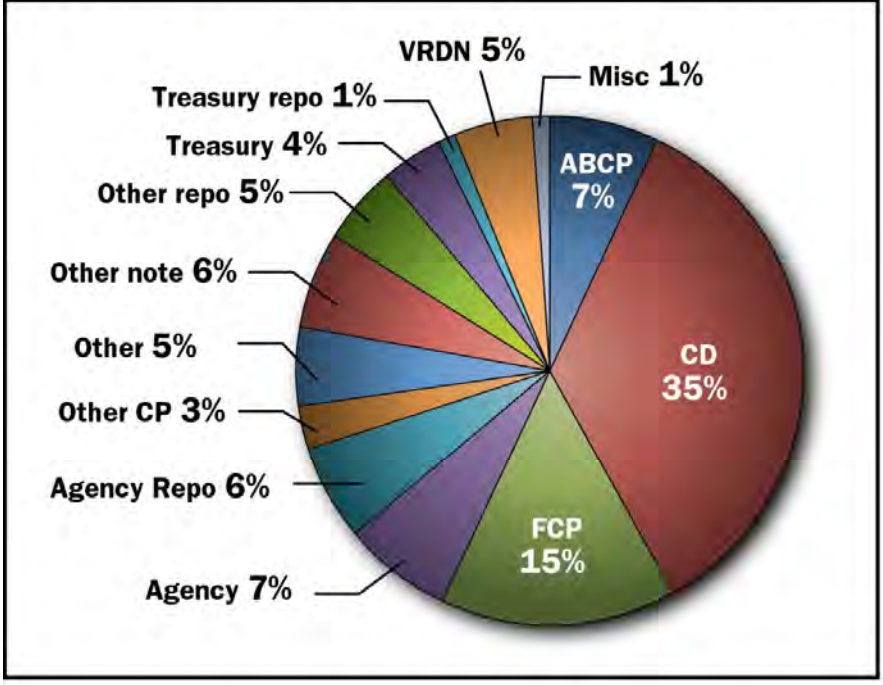
Overall, the results in Figures 4 and 5 show that during summer 2011 all classes of MMFs—prime, Treasury, and government/agency—experienced high levels of redemptions and several months of negative net cash flow. The fact that Treasury and government/agency MMFs have very little (if any) exposure to eurozone bank commercial paper or certificates of deposit suggests a general increase in the demand for liquidity, perhaps related to the financial situation in Europe, but perhaps also related to other issues that summer, such as the U.S. debt ceiling debacle.

To provide a little more detail on a possible role of the eurozone crisis in the redemption and net cash flow patterns for prime MMFs in summer 2011, Table 2 summarizes prime MMF redemptions and net cash flows based on prime MMFs' holdings of eurozone securities. Table 2 shows that prime MMFs with eurozone exposure had negative net cash flows during the summer of 2011 while those with no eurozone exposure had positive cash flows, consistent with the Chernenko and Sunderam paper. We note, however, that while redemptions against prime MMFs with eurozone exposure were higher, during months when the net cash flows were negative, the magnitude of the declines was less than 1% of assets. Further, prime MMFs without eurozone exposure did not experience unusually large increases in net cash flow in the same period (an increase of 0.19% in June 2011 and 1.06% in July). In conclusion, we do not find any compelling evidence of a run against prime MMFs in the summer of 2011.

Changes in Holdings of Prime MMFs From April to September 2011

In this section we document changes in asset holdings of prime MMFs by region to provide further insight into the purported quiet run. We take two snapshots of prime MMF asset holdings—one in April 2011 and one in September 2011—and highlight shifts over the summer of 2011 among types of securities held (Figure 6) and regions of the world (Figure 7).

Figure 6: Prime MMF Asset Composition in April 2011



Prime MMF Asset Composition in September 2011

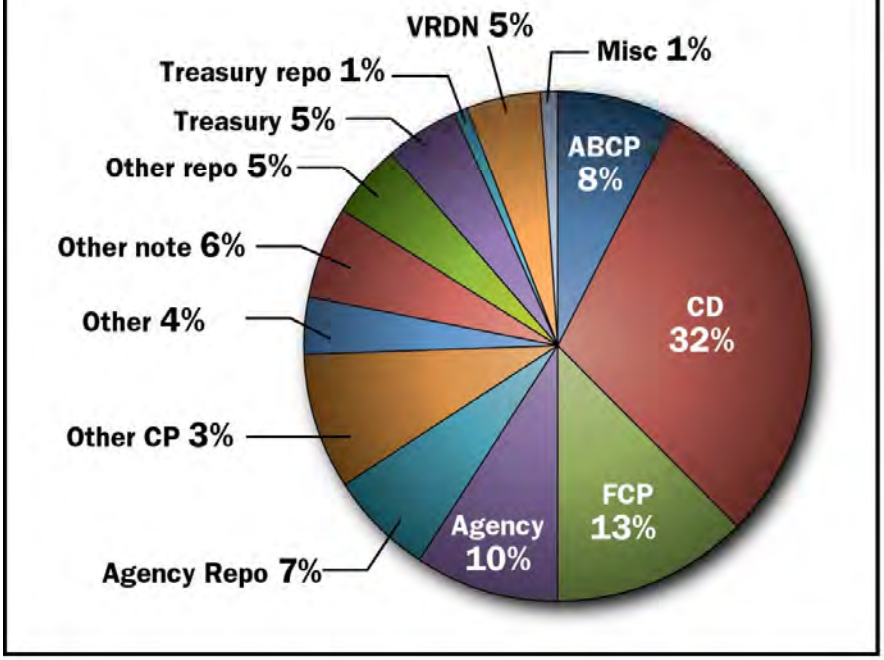
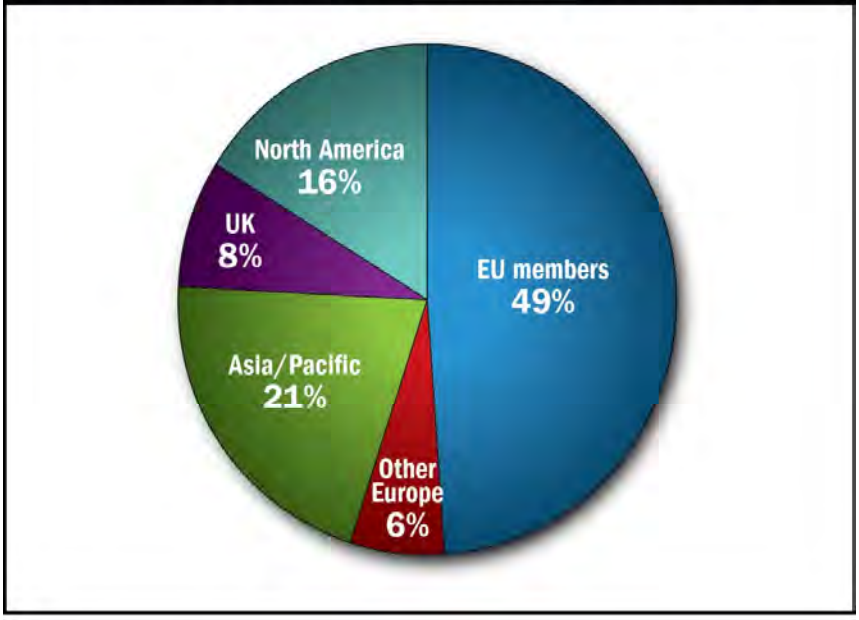


Figure 6 shows that the portfolio mix by security type is fairly stable across the summer of 2011 (based on the comparison of April and September portfolios). There are, however, declines in certificate of deposit (CD) holdings (from 35% to 32% of assets) and FCP holdings (from 15% to 13%). These

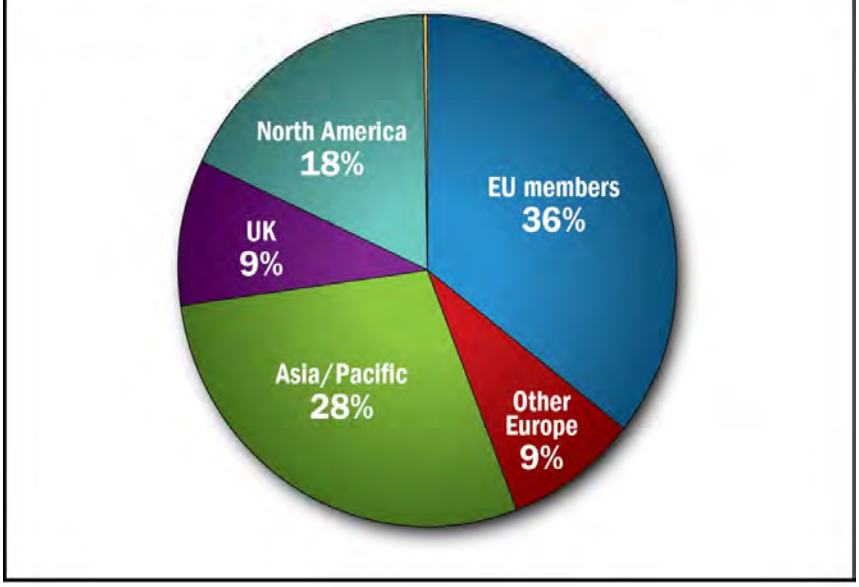
CD and FCP holdings would contain the exposure to eurozone banks. Figure 6 shows that prime MMFs move approximately 5% of their portfolios from CDs and FCP into lower-risk Treasuries, repos, and agency securities.

In contrast, Figure 7 shows dramatic changes in regional exposure. Exposure to European Union member countries declined from 49% of holdings in April 2011 to 36% by September. The major shift in holdings was to Asia/Pacific countries (a 7% increase), with more modest shifts to all other regions, including North America. Interestingly, a more detailed examination of the data shows that the vast majority of the shift to Asia/Pacific countries was a shift to FCP issued by Australian banks. Across the summer of 2011 the type of securities in the asset allocation was relatively stable, but prime MMFs clearly reduced their exposure away from Europe and toward less risky parts of the world.

Figure 7: Regional Composition of Prime MMF Financial Commercial paper Holdings in April 2011



Regional Composition of Prime MMF Financial Commercial paper Holdings in September 2011



These patterns are consistent with a general shift to less credit risk by prime MMFs, as seen in the quarterly data referenced in Figures 2 and 3, and a shift to more liquidity, as shown in Figure 1. In particular, from first quarter 2011 to third quarter 2011, prime retail MMFs decreased their average WAM from 40 to 36 days and prime institutional MMFs decreased WAM from 40 to 33 days. Further, we also observe that overall holdings among all MMFs in our sample declined from $1.584 trillion in April 2011 to approximately $1.470 trillion in September 2011 (a decline of $114 billion or 7.2%). Prime MMF holdings declined from $367 billion to $360 billion over the same period (a decline of $7 billion or 1.9%).

Far from a quiet run that purportedly disrupted nonfinancial commercial paper markets, as asserted by Chernenko and Sunderam (2012), we conclude from these data that MMFs made modest, orderly shifts in asset holdings to less credit risk and higher liquidity during a period of relative uncertainty in the financial markets, perhaps due to seasonal liquidity demand, the eurozone crisis, the U.S. debt ceiling debacle, and/or other events. We note that during the summer of 2011 no MMF "broke the buck," and we do not observe any activity even approximating a run. And, as we will show later, the commercial paper markets continued to function normally in the summer of 2011, despite larger redemptions against MMFs in that period.

Systemically Risky MMFs?

As discussed earlier in the report, Chairman Shapiro has referred the proposed MMF reforms to Secretary Geithner, and Secretary Geithner has asked the FSOC to consider these reforms and to assess whether MMFs pose a systemic risk to the stability of the financial system. To provide some insight into the issue of systemic risk, we analyze redemptions and net cash flows during the summer of 2011 for the largest MMFs—those MMFs that are most likely to be judged by the FSOC to be systemically risky.

Table 3 (see Appendix) presents data on asset holdings, redemptions, and net cash flow for the Fidelity MMF, which is by far the largest MMF, based on assets, catering to retail investors.[6] During summer 2011 the Fidelity MMF held approximately 7% of assets held by all master MMFs. Table 4

[6] Vanguard is the second largest MMF during this period and is also a retail MMF. We do not analyze Vanguard because Vanguard is not listed as a master fund.

presents the mean and median value of assets, redemptions, and net cash flow for the five largest prime institutional, government/agency, and Treasury funds, again based on assets. These largest funds hold approximately 14%, 8%, and 5% of all assets held by all master MMFs.

The most important insight from Table 3 is that there is very little change in the assets held by the Fidelity fund over this period despite the fact that the fund experienced 20% in redemptions each month. The stability comes from the fact that the monthly redemptions are largely matched by new funds being deposited each month, as can be seen from the modest changes in net cash flow, which cluster around 0%. In addition, it is notable that the monthly redemptions from the Fidelity fund are comparable to the redemptions from the typical prime fund as reported in Figure 4.

Table 4 (Panel A) shows that the assets held by the five largest prime institutional MMFs are less than half of the assets held by the Fidelity fund, and the total holdings of the typical fund are generally less than $50 billion. The $50 billion figure is a relevant benchmark in that the FSOC has identified it as a criterion for assessing systemic risk. A second notable point is that during summer 2011 the rate of monthly redemptions from these five funds is substantially higher than the monthly redemptions from the Fidelity fund and is higher than the rate of redemptions from the typical prime fund seen in Figure 4. On average, monthly redemptions are approximately 75% of the total value of assets, which is three times the redemption rate from Fidelity. This is strong evidence that retail and institutional investors are very different. It is not unusual for the MMFs that serve large institutional investors to experience very high rates of redemptions in a month. The third point is that the summer of 2011 was a period of unusually large redemptions, with median redemptions rates of around 100%. But redemptions alone do not tell the whole story. August 2011 had the highest redemption rate but was also a month with positive net cash flow, indicating that these MMFs were able to attract investment in excess of redemptions. Again, however, one of the more striking features of these funds is their relative stability, with the typical fund starting the period with approximately $43 billion in assets and ending the period with around $41 billion in assets.

Table 4 (Panel B) provides statistics for the five largest government/agency MMFs. These MMFs have about half the level of assets of the largest prime institutional MMFs and less than 20% of the assets of Fidelity. Similar to the largest prime institutional funds, the monthly redemption rate for the largest government/agency MMFs is substantially higher than the redemption rate of the typical government/agency fund reported in Figure 4. These MMFs experience substantial redemptions, with more than half of the typical MMF's assets being redeemed almost every month. These MMFs also exhibit large negative net cash flows in July 2011, again suggesting that the negative cash flows in the summer of 2011 were not simply driven by eurozone exposure.

Table 4 (Panel C) provides summary statistics for the five largest Treasury MMFs. These MMFs have relatively low levels of redemptions that are comparable to the redemption level seen in Figure 4 for the typical Treasury MMF. However, redemptions in these five MMFs spike in July, with the median fund experiencing a net cash flow of minus 26.5%. This is yet more evidence that increasing demand for liquidity accounts for much of the redemptions from all classes of MMFs seen in the summer of 2011.

There are a couple of key points to take away from Tables 3 and 4. First, the largest prime institutional and government/agency funds have much higher redemption rates than the typical fund in these categories, meaning it will be extremely difficult to impose a one-size-fits-all limit on redemptions from these funds. Second, despite the high redemption rates, all of these funds have fairly stable asset holdings, which suggests that even the largest funds are not systemically risky.

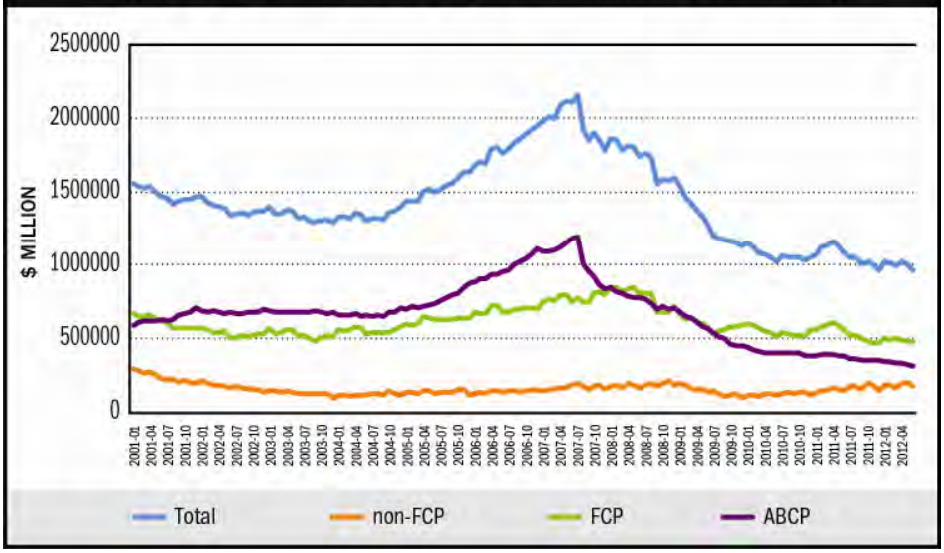
The Commercial Paper Market in Summer 2011

Cherenko and Sunderam (2012) suggest that prime MMFs purchased less CP across the summer of 2011. Consistent with this finding, Figure 3 shows a more than 10 percentage point decline in portfolio holdings of CP by MMFs since the beginning of 2007. These points raise the concern about the flow of funds from MMFs creating a systemic risk to the economy through their holdings of CP and the ability of nonfinancial CP issuers to raise funds at times when MMFs experience large redemptions. In this section we examine relationships between redemptions from MMFs and the CP market. To address

these questions, we analyze fluctuations in the amount of CP outstanding and examine monthly CP issues.

To get a broad overview, we show the evolution of CP outstanding since 2001 in Figure 8. This figure shows that CP outstanding peaks in July 2007, prior to the beginning of the financial crisis, and has been declining since this date. Since 2007, outstanding CP has declined by approximately $1.2 trillion.

Figure 8: Commercial Paper Amounts Outstanding



Most of the decline is accounted for by the decline of ABCP outstanding, approximately $800 billion of the overall decline. Another $350 billion of the overall decline is from FCP. Most of the decline in the overall market occurred between 2007 and 2009. Note that CP outstanding is cyclical, especially nonfinancial CP (Anderson and Gascon, 2009). The overall trend in Figure 8 reflects the deep recession since the financial crisis. Another factor associated with the supply of CP is corporate cash holdings. As has been frequently reported, nonfinancial corporations have been holding relatively large amounts of cash since the financial crisis, perhaps reducing the demand for CP funding. One report, citing the Board of Governors' Flow of Funds data, indicates that corporations held $1.74 trillion in liquid assets in first quarter 2012 compared to average cash holdings of $1.3 trillion in the period 2001–2008.[7]

[7] See John Merline, "Corporations Hoard $1.7 Tril Cash As Job Gains Stall," *Investor's Business Daily*, June 7, 2012, http://news.investors.com/060712-614033-corporations-hoard-17-tril-cash-as-job-gains-stall.aspx#ixzz28eClvIro.

The CP market saw a slight increase in the amount outstanding between 2010 and the middle of 2011, before falling again starting in the summer of 2011. The declines in 2011 can be attributed to ABCP and FCP, both of which have been steadily declining since the financial crisis. There was a slight rise in FCP outstanding starting in mid-2010, peaking in mid-2011, and since then the amount outstanding began to fall before stabilizing by the end of 2011. By the end of 2011 the total amount of FCP outstanding had returned to levels similar to those in 2004, prior to the large increase in FCP that preceded the financial crisis. Finally, the nonfinancial CP market has remained fairly stable throughout the entire decade and, if anything, has experienced a slight rise in the amount outstanding since 2010.

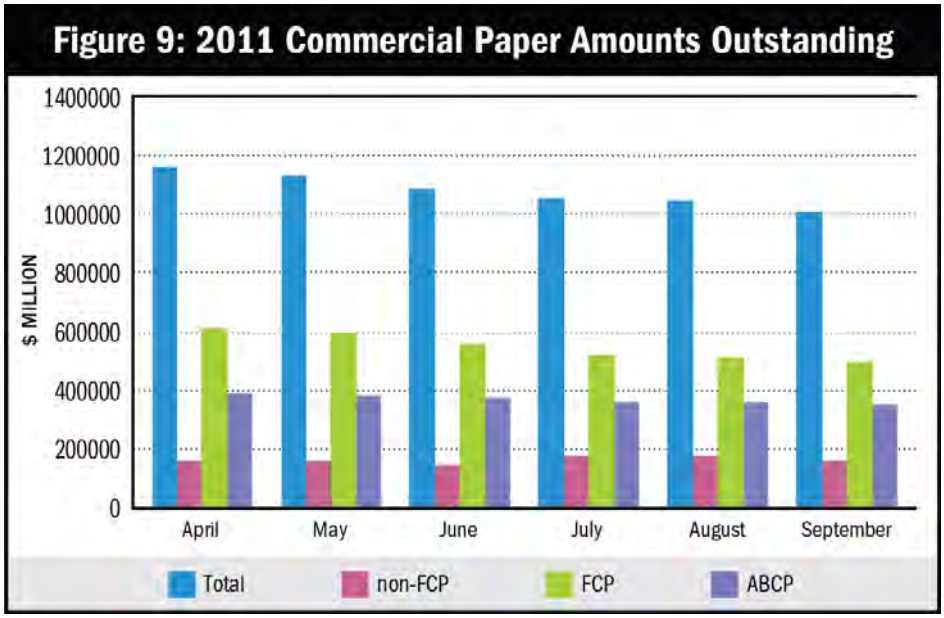
To further assess whether there were any disruptions of the CP market associated with the large MMF redemptions in summer 2011 we compared average monthly CP outstanding for June–August 2010 with June–August 2011. We summarize the results below:

CP Type	Average Monthly Outstanding June–August 2010	Average Monthly Outstanding June–August 2011
All CP	$1.05 trillion	$1.06 trillion
FCP	$525 billion	$530 billion
Non-FCP	$125 billion	$166 billion
ABCP	$401 billion	$366 billion

Compared to the same period in 2010, the summer of 2011 shows no sign of disruption potentially related to a purported quiet run. In fact, the nonfinancial CP sector, which was the main concern mentioned in the Chernenko and Sunderam study, *increased* by $41 billion. We do observe a decline in ABCP, but that decline is in line with the longer-term trend seen since the financial crisis and does not appear related to prime MMF redemptions in summer 2011.

Figure 9 focuses on CP outstanding from April 2011 to September 2011. CP outstanding overall declined from $1.16 trillion in April to $1.00 trillion in September, a decline of approximately $160 billion or 13.8%. Non-FCP declined from approximately $162 billion to $159 billion, a drop of approximately 1.9%. FCP outstanding experienced the largest decline during this period, falling by 19%. FCP also declined from April to September 2010, but only by 5.1%. ABCP outstanding fell by about 10% from April to September 2011. These data are consistent with the longer-term trends of decreasing FCP and ABCP outstanding and slightly increasing non-FCP outstanding driving the overall downward trend in CP outstanding since 2007. Nothing in these data alarms us. The CP market appears to be evolving in an orderly fashion since the financial crisis. More important to the task at hand, these data do not support a conclusion of a systemic role for MMFs related to the functioning of the CP market.

Figure 9: 2011 Commercial Paper Amounts Outstanding



While CP outstanding reflects the overall supply of CP funding, new issues of CP provide a better reflection of current activity in the market. Figure 10 shows monthly issues of one-month CP since 2001. We focus on the 30-day CP market because the one-month market is the nonovernight market that typically has the most activity and is most representative of the overall CP market, since only the

highest-quality issuers can borrow in the longer term (i.e., 45-day or 90-day) CP markets.[8] The data confirm that new issue activity mirrors the CP outstanding trends. In the longer term, it is clear that ABCP drives the overall trend in CP issues. As Figure 10 shows, FCP and non-FCP activity is a small fraction of overall CP issues, but an increasing fraction as the overall CP market shrinks due to declining ABCP issues.

Figure 10: New Issues of 30-day CP

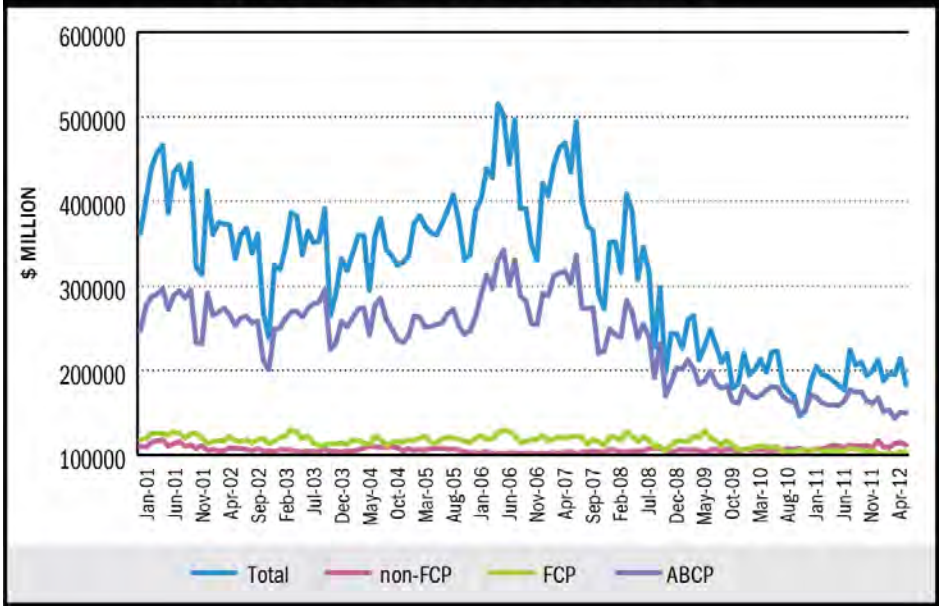


Figure 11: New Issues of 30-day FCP and Non-FCP

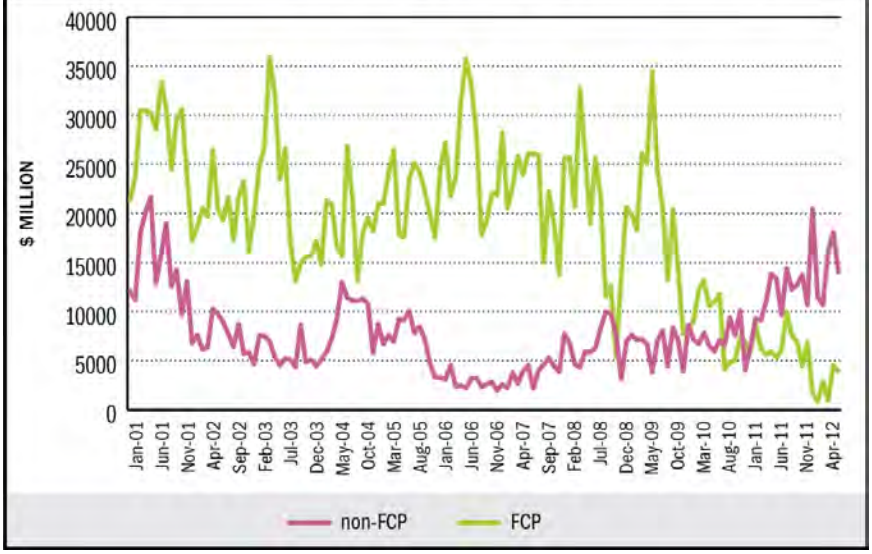
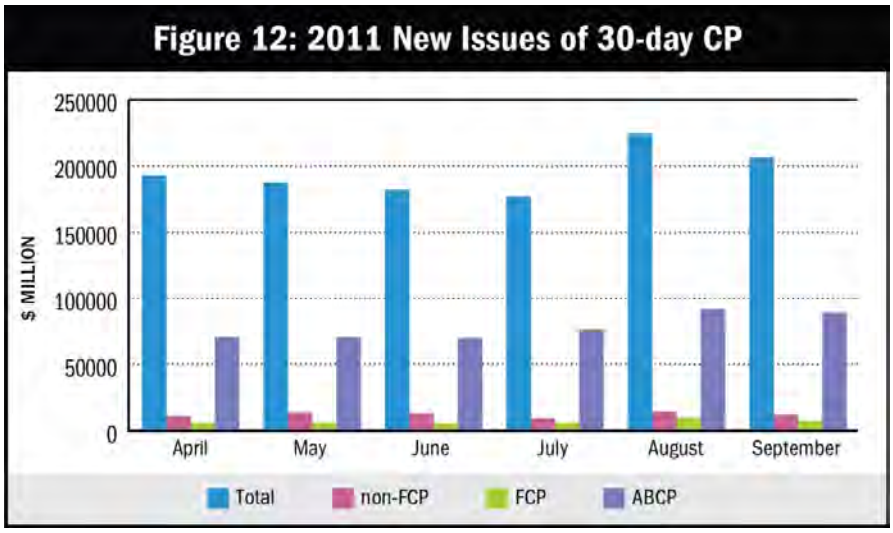


Figure 11 follows the new issues of FCP and non-FCP since 2001. Since 2007, FCP issues have trended sharply downward and non-FCP issues have been trending upward, mainly since the 2007 recession ended in June 2009

[8] Note that the Fed reports new CP issues in maturity (or term) "buckets." Those with terms of one to four days are classified in the so-called "overnight" market. The next buckets contain issues with terms of 5 to 9 days and 10 to 20 days. The so-called "30-day" bucket contains issues with terms of 21 to 40 days. Only issuers with the highest credit quality can issue beyond the 30-day bucket, which is considered the broadest and deepest market.

(http://www.nber.org/cycles/cyclesmain.html). It is notable that the decline in FCP issues has coincided with continued Fed policies that have increased reserves in the banking system and kept the cost of alternative sources of liquidity very low for most financial institutions. The increase in non-FCP issues seems in line with the cyclical nature of the CP market.

Figure 12 focuses on summer 2011 and shows that during this period overall CP issues actually peaked in August, when MMFs were supposedly in the midst of a run. Further, monthly issues of FCP and non-FCP do not appear out of line with issues during the rest of the year. From the analysis of CP issues, we do not see any convincing evidence that the pattern of MMF redemptions in summer 2011 affected the CP market in any material way, contrary to the assertions of Chernenko and Sunderam (2012).



In the remainder of the report we examine the recent spate of research on MMFs for evidence related to the current issues, focusing on empirical studies during and after the financial crisis, as well as some papers that studied the performance of related financial instruments such as CP and ABCP. We also review some of the research addressing the current regulatory proposals.

Redemptions and Net Cash Flows of MMFs in 2008

One of the first efforts to examine what happened to MMFs during the financial crisis was undertaken by the Investment Company Institute (ICI) (2009). This report was issued in March 2009 just after the end of the financial crisis, so its analysis should be considered as being preliminary at that time. However, it did identify a number of important aspects of the events that occurred in the MMF industry in September 2008, most importantly that the large net cash outflows that occurred were focused in

prime MMFs and that tax-exempt and government funds actually experienced net inflows of cash. A later report by Treasury Strategies Inc. (TS) (2012) provides some insight corroborating the ICI findings. The TS report documents that in the weeks following the "cap" on the federal MMF guarantees at September 19, 2008, levels, "investors poured $250 billion additional, non-guaranteed assets into MMFs, including $170 billion into prime funds."[9] The ICI report also recommended reforms designed to reduce the riskiness and increase liquidity and transparency of MMFs. These recommendations were included in the reforms adopted by the SEC in 2010.

Three papers examine the flow of funds among MMFs in September/October 2008: McCabe (2010); Akay, Griffiths, and Winters (2012); and Wermers (2012). These papers have a number of similarities. First, all confirm the findings of the ICI (2009) report that net cash outflows were concentrated among prime funds and that government funds experienced a net inflow of cash. Further, each paper finds that even among prime funds, net outflows were concentrated among prime institutional funds. McCabe (2010) and Akay, Griffiths, and Winters (2012) show that redemptions were actually concentrated among the riskiest prime institutional funds. McCabe also finds that redemptions were concentrated among funds with the riskiest sponsors (e.g., sponsors with the widest credit default swap spreads). The papers also show that the 2008 withdrawals were not driven by panic on the part of retail investors, but instead were a response by the most informed, sophisticated institutional investors to changes in their perceptions of the riskiness of their investments. Funds catering to small retail investors—which had always invested in the safest assets—experienced very little disruption, and some experienced a significant increase in net cash inflow.

The Purported "Quiet Run" in Summer 2011

Chernenko and Sunderam (2012) examine fund flows of prime MMFs during the summer of 2011, a time of great uncertainty in the financial markets because of the eurozone crisis and concerns over the U.S. government debt ceiling. They examine whether investors exited prime MMFs with

[9] Treasury Strategies Inc., "Dissecting the Financial Collapse of 2007-2008: A Two-Year Flight to Quality," May 2012, p. 1.

exposure to European banks and, if so, whether those redemptions created a systemic risk by hindering the ability of other firms to borrow from MMFs. They find large fund flows out of prime MMFs with larger Eurozone exposure during the summer of 2011. Further, they find that these same prime MMFs reduce their purchases of commercial paper and this reduction is only partially offset by increases in commercial paper purchases by prime MMFs with low eurozone exposure. The authors conclude that their findings are consistent with MMFs representing a systemic risk.

We have several concerns about the analysis and conclusions in this paper. First, the authors continually use the term "run" to describe the withdrawals from prime MMFs that occurred in 2011, without ever providing a theory for why these withdrawals constitute a run. Presumably any characterization of a run should be able to distinguish between the decisions by investors to withdraw money for liquidity reasons from widespread withdrawals that result from a common shock to the financial sector. Cherenko and Sunderam simply assert that the withdrawals seen were a run.

Second, they compare redemptions from prime MMFs between March 2011 and May 2011 with redemptions from these same funds between June 2011 and August 2011. Liquidity demands vary throughout the year, so comparing redemptions early in the year to those in the summer could mask the effect of normal seasonal fluctuations in the demand for liquidity. The summer of 2011 could be a period of high liquidity demand, possibly related to general economic uncertainty. One way to assess whether the redemptions from prime MMFs were driven by broader liquidity concerns would be to compare prime MMF redemptions to those of Treasury or agency MMFs during the same period.

Third, Cherenko and Sunderam make assertions about the availability of CP financing based only on the amount of CP taken up by the MMF industry. They do not examine the actual amount of CP outstanding or new issuances of CP during this period. If, as they assert, the withdrawals from MMFs during this period disrupted in the CP market, then presumably this effect would show up in data from the CP market.

Finally, Cherenko and Sunderam find that prime MMFs with high eurozone exposure bought less commercial paper in the summer of 2011 and that this reduction is only partially offset by other prime MMFs. Thus, they conclude that "… money funds effectively transmit distress from Eurozone banks to other firms, particularly nonfinancial firms, by temporarily disrupting the ability to raise financing in the money markets."[10] This conclusion is at odds with some institutional details of the CP market, outlined below.

First, nonfinancial CP issues are backed by a standby line of credit to facilitate rolling over outstanding CP during market disruptions. These standby lines of credit exist specifically to address the concern raised by the authors about disruptions to nonfinancial firms.

Second, the amount of ABCP outstanding has been declining since it peaked in 2007, so finding a decline in this segment of the CP market is not evidence of a constraint related to eurozone exposure.

Third, the large issuers of FCP are among the largest, most sophisticated financial firms in the country. Presumably if the problems the authors point out really existed, these firms would have made arrangements to deal with these problems in advance—such as developing a more diverse set of CP purchasers from whom they obtain funding—ensuring that large redemptions against MMFs such as those that occurred in the summer of 2011 would have little impact on their ability to roll over their CP. Given the paper's shortcomings, we caution against basing decisions about additional regulation on its results.

Links Between MMFs and the Commercial Paper Market

Given the close interaction between MMFs and the CP market, several papers have examined how events in each of these markets affect the other market: McCabe (2010); Kacperczyk and Schnabl (2010); Griffiths, Kotomin, and Winters (2011); Covitz, Liang, and Suarez (2012); and Griffiths, Kotomin, and Winters (2012). These papers typically look at two crises in the CP market, the first starting in 2007 when BNP Paribas halted redemptions from its MMF that held large amounts of ABCP primarily backed

[10] Cherenko and Sunderam (2012), p. 1.

by U.S. subprime mortgages, and the crisis that started in September 2008 with the bankruptcy of Lehman.

These papers report similar findings on the 2007 crisis. First, investors' decisions to get out of the CP market reflected a concern about the riskiness of investments, with riskier CP suffering a larger decline in demand. Second, these concerns about quality were prevalent among all investors in the CP market, not just MMFs. Third, the decline in the CP market in 2007 was focused on ABCP, in particular ABCP backed by subprime mortgages. In 2007, both the FCP market and the non-FCP market continued to operate with very little disruption. Finally, losses in the ABCP market were primarily incurred by the banks that originally securitized the assets. In particular, during this period there is no evidence that MMFs experienced net cash outflows due to concerns about the CP market. In fact, MMFs appeared to have experienced a positive net cash flow over this period as investors moved from the CP market to the MMF market.[11] Between July 2007 and December 2007, $1.3 trillion flowed out of the CP market, while between August 2007 and August 2008 MMFs experienced an increase in assets of approximately $1 trillion (ICI, 2009). This response on the part of investors was quite similar to what had occurred during previous problems in the CP market and reflected their belief that MMFs were a safe investment (Pennacchi, 2006).

When analyzing the events surrounding the 2008 crisis, the papers cited above again tell a similar story. First, the failure of Lehman combined with the other events roiling the financial markets led investors to reconsider the riskiness of CP and to seek safer investments. This led some investors to sell their CP but also led others to withdraw money from prime institutional MMFs with large exposures to CP—that is, prime MMFs that served institutional investors. As the investors in prime MMFs began withdrawing their money, these funds had to liquidate their holdings in an effort to meet the redemption demands, which, in turn, pushed the price of CP even lower. Again, however, it is important to recognize that these events were focused on a very specific segment of the CP market and MMF

[11] ICI (2009) reports that money market mutual funds managed 24% of U.S. business short-term assets in 2006.

industry. Among MMFs, net cash outflows occurred almost exclusively among prime funds catering to large institutional investors. MMFs catering to retail investors avoided net cash outflows and the need to liquidate holdings. In the CP market it was primarily ABCP and CP issued by financial firms that saw the largest decline in demand; the nonfinancial CP market remained relatively stable throughout this period (Griffiths et al., 2012).

Finally, Acharya, Schnabl, and Suarez (2009) examine how the ABCP market functioned prior to the crisis. These authors show that much of the growth in this market was the result of regulatory arbitrage on the part of large banks. Banks started by securitizing bundles of loans. To avoid having these securities count against their capital requirements, banks created conduits or Special Investment Vehicles (SIVs) and transferred ownership of these securitized loans to the SIVs. To finance the purchase of loans, SIVs issued ABCP that were backed by the securitized loans. However, in order to get MMFs to purchase the ABCP, in many instances banks offered a guarantee on the ABCP, essentially guaranteeing that the ABCP could be redeemed for full value at maturity. Acharya and colleagues document that as of January 1, 2007, 75% of all ABCP came with the strongest form of a guarantee, a liquidity or credit guarantee. Since ultimately the banks were responsible for honoring the guarantee, banks still held the risk from these securitized loans even though they did not report the value of these loans on their balance sheets. The authors point out that this structure ensured that losses in the ABCP market were almost exclusively absorbed by the large banks that securitized these loans and not the purchasers of the ABCP, such as MMFs.

The results in Archarya et al. (2009) provide some additional insight into events surrounding the 2008 crisis and calls for reform of MMFs. The first insight concerns the role of MMF sponsor support. To the extent that sponsors are providing liquidity to MMFs by purchasing ABCP with a guarantee from sponsor funds, this support should be viewed as simply an effort on the part of the sponsor to help the fund manage temporary timing issues related to a mismatch between withdrawals and payments from maturing assets. In return for providing the temporary liquidity, sponsors obtain an almost riskless asset

that will mature in a few days or weeks. Second, if there are problems in how the ABCP market functions, these problems appear to be a function of banks' abilities to move securitized loans off their books while continuing to hold the risk from these assets, and so any reforms should presumably focus on this practice.

Calls for Reform

As we discussed above, the ICI (2009) report included a discussion of a number of potential MMF reforms, many of which were subsequently adopted by the SEC in 2010. These reforms included shortening the allowable weighted average maturity for assets held by the fund from 90 to 60 days, requiring funds to be able to liquidate 10% of their assets in a day and 30% in a week, requiring funds to provide a monthly inventory of holdings, which is made public after 60 days, and subjecting funds to periodic stress tests to determine their ability to withstand shocks in financial markets.

Despite the regulatory changes that have already occurred, there continue to be calls for additional regulations, such as ending the stable NAV and requiring funds to maintain a capital buffer. Several papers have critically examined these additional regulations: ICI (2009); the report from the President's Working Group on Financial Markets (2010); the Squam Lake Group report (2011); Fisch and Roiter (2011); Macey (2011); Duffie (2012); and McCabe, Capriani, Holscher, and Martin (2012). All of the papers point out problems with the NAV proposal. First, it would impose substantial costs on investors and push many—particularly institutional investors—to move their money into less regulated sectors of the market. Second, given the lack of an active secondary market for many of the assets held by MMFs, it would be difficult to price on a regular basis, making it difficult to operationalize the proposal. Third, a floating NAV does not change investors' incentives to remove their money quickly when they believe there has been a change in the riskiness of the fund. In other words, MMFs reporting floating NAVs can still experience runs.

Many of these same papers discuss the limitations of creating a capital buffer, focusing primarily on the length of time it would take or the expense involved in setting up a buffer that would be large

enough to withstand the redemptions that would occur during a significant financial crisis and also raising the issue of who would be responsible for financing the creation of a buffer. In the end, several of these papers conclude that the costs of many of these additional regulations exceed their potential benefits.

Lessons for Policymakers From the MMF Literature

To summarize, the literature on MMFs offers some important evidence and conclusions that should be seriously weighed before imposing additional regulation MMFs. First, the large redemptions that occurred in September 2008 were focused on large prime funds that catered to sophisticated and knowledgeable institutional investors. To the extent that any investors in MMFs were hurt during this period, they were large institutional investors who were well aware of the risks they were undertaking when investing in MMFs. Funds that catered to small retail investors did not lose money. Second, a number of regulations have already been adopted that are designed to reduce the riskiness and increase the liquidity and transparency of MMFs.[12] Third, the evidence shows that the non-FCP market continued operating relatively normally throughout the 2007 and 2008 crises in the CP market, and only the ABCP market experienced problems during the 2007 crisis. Fourth, because of guarantees provided on most ABCP, losses on these assets were primarily absorbed by large banks and not by MMF investors. In addition, redemptions in both the CP and MMF markets were prompted by concerns on the part of investors about the riskiness of these assets and were not due to uninformed, irrational panics. Fifth, we caution against basing reforms on the results of Chernenko and Sunderam (2012) because of serious shortcomings in their analysis. Finally, additional reforms that have been proposed, such as floating NAV and capital buffers, are all potentially quite costly, and it is not clear how they could be effectively implemented.

[12] The changes to Rule 2a-7, which were adopted in January 2010, are designed to reduce the risks of MMFs. The SEC rule change to require MMFs to report monthly on Form N-MFP is intended to improve MMF transparency.

Summary of Major Findings and Conclusions

- The changes adopted by the SEC in January 2010 were followed by a shortening of the WAM of assets in prime institutional funds. The data reveal that all MMFs are more actively managing WAM following these regulatory changes. Accordingly, MMFs are now more liquid and better able to handle a significant change in redemptions.

- Since the 2008 crisis, we observe a significant decrease in the credit risk of assets held by prime MMFs. They have shifted their portfolios from relatively higher-risk assets (such as commercial paper) to relatively lower-risk assets (such as Treasuries). Since 2010, we see evidence of MMFs more dynamically shifting holdings across asset classes or geographies in response to evolving risks. This flexibility is enhanced by the shorter WAMs.

- The 2010 reforms required significantly more detailed disclosure of holdings and more frequent disclosures—now monthly in addition to quarterly. The result of the dramatically increased transparency is that any investors can now obtain timely, accurate data on the risk of any fund in which they invest.

- While prime MMFs with exposure to the eurozone experienced negative net cash flow in the summer of 2011, so did Treasury and agency MMFs that had no exposure to eurozone risk, indicating that the increase in redemptions during this period reflected a general increase in demand for liquidity and was not necessarily a specific reaction to financial instability in Europe.

- While the largest MMFs experienced substantial redemptions in the summer of 2011, typical of institutional investors' use of MMF as a cash management product, these funds also experienced substantial net inflows of cash during the same period. On net, the mean asset holdings of the largest MMFs remained remarkably stable over the summer of 2011. Thus, we see no evidence of anything resembling a run during this period, nor do we see any evidence that MMFs represented a systemic risk to the financial system.

- Significant outflows from MMFs in 2008 occurred exclusively among prime institutional MMFs that cater to large sophisticated investors. MMFs catering to retail investors did not experience significant outflows, and many experienced inflows as investors moved from prime institutional funds toward the perceived safer retail funds. Based on existing research, there is no evidence that any retail investor was affected by such outflows from MMFs. Thus, retail investors would receive little benefit from any additional regulation of MMFs.

- Typical monthly redemptions from the largest institutional prime and agency MMFs are substantially higher than those from typical MMFs. Thus, it will be extremely difficult to adopt a one-size-fits-all rule limiting redemptions from MMFs.

- Large redemptions against MMFs in the summer of 2011 had no measurable impact on the non-FCP market or the ABCP market. We did observe an overall reduction in MMF holdings of FCP in prime MMFs due to a small shift from FCP to less risky assets. However, even in the summer of 2011, we see no evidence that large financial firms had significant problems raising funds. Even though prime MMFs reduced holdings of FCP, it is well understood that FCP issuers have alternative funding sources. Overall, there is no evidence that the CP market experienced a "freeze" despite substantial redemptions in 2011.

Based on these findings, we conclude that the reforms of 2010 improved transparency and liquidity, and lowered risk in the MMF industry. Given the remarkable stability of the industry in the summer of 2011 during the eurozone crisis and uncertainty about whether the U.S. would raise its debt ceiling, we question whether there is sufficient evidence to support additional reforms, especially given that to the extent that MMFs experienced unusually large redemptions that summer, we do not see any associated disruption to the commercial paper market.

Important Remaining Issues

We end the report by raising two issues we believe have been overlooked by the existing literature on money market funds.

First, since retail investors were largely spared any losses and disruptions in the 2008 run, and since as far as we are aware, there has never been a run on retail money market funds, any additional regulation of MMFs designed to reduce the probability of a run will impose additional costs on retail investors without providing any meaningful additional benefits to them. Instead, these regulations will primarily prevent large institutional investors from imposing costs on each other. Before considering any one-size-fits-all regulation, a deeper understanding of the relative benefits and costs between retail and institutional investors is needed. Based on our review of the literature, we do not believe the benefit-cost trade-off favors additional regulation.

Second, while it seems clear that the "breaking of the buck" by the Reserve Primary Fund was due to the bankruptcy of Lehman, there were many other events in September and October of 2008 that confound the purported impact of the Reserve Primary problems on MMF cash flows. Given the other events that occurred in September/October 2008—Bank of America's acquisition of Merrill Lynch under government pressure, the government takeover of Fannie Mae and Freddie Mac, the Federal Reserve bailout of AIG, the announcement of the Troubled Asset Relief Program (TARP), Federal Reserve Chairman Bernanke and U.S. Treasury Secretary Paulson testifying on Capitol Hill that the U.S. financial markets were on the verge of collapse, the failure of Congress to initially pass the TARP legislation, and

the eventual passage of TARP. Even before September 2008, a number of other events contributed to uncertainty and eventual panic. In March 2008, JP Morgan acquired Bear Stearns in a government-driven transaction. And throughout the summer of 2008, there were a number of large bank failures, including Washington Mutual and others. By the time Lehman collapsed and AIG was taken over, there was absolute panic in the markets. Investors' confidence had been eviscerated by that point.

Given this "perfect storm," it is difficult, if not impossible, to identify a single event that that caused investors to decide to withdraw their money from funds with exposure to the riskiest parts of the market—CP—and move toward funds investing in safer assets such as government securities. Given the unprecedented nature of these events, it is hard to imagine any regulatory change that would prevent a similar response on the part of investors to a similar set of circumstances. For example, it is difficult to imagine that MMF reporting of floating NAVs would have prevented the massive redemptions in 2008. In the end, we believe it is important to recognize that in the 40-year history of money market funds, there have been two funds that have "broken the buck" and at most one purported run on a relatively small set of funds. Given this history of amazing stability, it seems Ill-advised to propose additional reforms that could substantially alter the structure of the MMF industry and potentially lead to a host of unintended consequences.

Appendix

Tables 1 - 4

Table 1: Data Summary

Panel A: Government Retail

Date	Total Assets ($ billions)	Number of Funds
Q1 - 2007	$173	216
Q1 – 2008	249	203
Q1 - 2009	298	202
Q1- 2010	203	200
Q1 - 2011	185	191
Q1 - 2012	190	188

Top 5 Government Retail Funds

2007 Vanguard (Admiral), Edward Jones, Federated, First American, Vanguard (Federal)
2008 Vanguard (Admiral), Edward Jones, Schwab (US Treasury), Federated, Schwab (Govt)
2009 Schwab (US Treasury), Vanguard (Admiral), Schwab (Govt), Federated, Edward Jones
2010 Vanguard (Admiral), Schwab (US Treasury), Schwab (Govt), Edward Jones, Federated
2011 Schwab (US Treasury), Vanguard (Admiral), Schwab (Govt), Edward Jones, Federated
2012 Schwab (US Treasury), Schwab (Govt), Vanguard (Admiral), Edward Jones, Federated

Panel B: Government Institutional

Date	Total Assets ($ billions)	Number of Funds
Q1 – 2007	$ 254	357
Q1 – 2008	711	374
Q1 - 2009	1,107	349
Q1- 2010	707	339
Q1 - 2011	598	329
Q1 - 2012	676	327

Top 5 Government Institutional Funds

2007 B of A, Goldman, Wells Fargo, Federated, First American
2008 Wells Fargo, Federated (Govt), Goldman, Federated (Treasury), Fidelity
2009 Goldman, Federated (Govt), Fidelity, JP Morgan, Wells Fargo
2010 Fidelity, JP Morgan, Federated, Goldman, Dreyfus
2011 JP Morgan, Goldman, Fidelity, Federated, Wells Fargo
2012 JP Morgan, Fidelity, Goldman (Govt), Goldman (Treasury), Federated

Table 1 (continued)

Panel C: Prime Retail

Date	Total Assets ($ billions)	Number of Funds
Q1 -2007	$667	363
Q1 – 2008	798	345
Q1 - 2009	759	341
Q1- 2010	717	339
Q1 - 2011	537	332
Q1 - 2012	511	304

Five Largest Prime Retail Funds

2007 Fidelity, Vanguard, Schwab, Western, Centennial
2008 Fidelity, Vanguard, Schwab (Value), Western, Schwab (Cash)
2009 Fidelity, Vanguard, Schwab (Value), Schwab (Cash), Cash Management Trust
2010 Fidelity, Vanguard, Schwab (Cash), Schwab (Value), American
2011 Fidelity, Vanguard, Schwab (Cash), Schwab (Advsior), UBS RMA
2012 Fidelity, Vanguard, Schwab (Cash), UBS RMA, Schwab (Money Portfolio)

Panel D: Prime Institutional

Date	Total Assets ($ billions)	Number of Funds
Q1 - 2007	$914	347
Q1 – 2008	1,212	358
Q1 - 2009	1,102	322
Q1- 2010	1081	299
Q1 - 2011	1077	288
Q1 - 2012	924	275

Five Largest Prime Institutional Funds

2007 JP Morgan (Capital), Fidelity, Morgan Stanley, BlackRock, JP Morgan
2008 Goldman, BlackRock, JP Morgan (Capital), Dreyfus, Reserve Primary
2009 JP Morgan (Capital), BlackRock, JP Morgan, Fidelity, Dreyfus
2010 JP Morgan (Capital), BlackRock, JP Morgan, Fidelity (Prime), Fidelity
2011 JP Morgan, BlackRock, Federated, Fidelity, Dreyfus
2012 JP Morgan, Federated, BlackRock (Liquidity), Fidelity, BlackRock (Cash)

Table 2: Prime MMF Redemptions and Net Cash Flows

Month	Median Redemptions (% of Total Assets)	Median Net Cash Flow (% of Total Assets)
Panel A: Prime MMFs with Eurozone Exposure		
6	32.49	-0.62
7	28.74	-0.68
8	28.38	0.64
Panel B: Prime MMFs with no Eurozone Exposure		
6	8.77	0.19
7	10.29	1.06
8	9.58	3.25

Table 3: Total Assets, Redemptions and Net Cash Flows from the Fidelity Retail MMF

Date	Assets ($ billion)	Redemptions (% of Total Assets)	Net Cash Flow (% of Total Assets)
1-2011	$117	21.76	-1.81
2-2011	116	20.08	-0.79
3-2011	116	24.26	-0.52
4-2011	116	20.69	-0.55
5-2011	116	18.74	0.50
6-2011	117	17.60	1.05
7-2011	118	17.56	0.58
8-2011	120	26.84	1.32
9-2011	119	17.25	-0.65
10-2011	120	17.41	0.87
11-2011	120	18.12	-0.63
12-2011	120	18.26	0.69
3-2012	115	21.82	-0.92
6-2012	115	16.34	-0.14

Table 4: Total Assets, Redemptions and net Cash Flows from the Five Largest MMF by Type of Fund

	Assets ($ billion)		Redemptions (%of Total Assets)		Net Cash Flow (% of Total Assets)	
Date	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
Panel A: Five Largest Prime Institutional MMFs (by Assets)						
1-2011	$52	$43	61.71	74.36	1.20	1.78
2-2011	53	47	60.35	61.71	1.81	0.66
3-2011	52	45	77.86	80.36	-0.71	-2.28
4-2011	54	47	59.84	73.22	4.37	5.53
5-2011	55	51	64.40	68.12	1.93	1.77
6-2011	48	43	88.80	97.48	-16.20	-18.18
7-2011	44	40	81.36	102.80	-11.52	-9.34
8-2011	43	40	104.60	105.92	1.36	1.68
9-2011	42	40	79.76	84.38	-0.86	0.29
10-2011	40	38	67.80	66.26	-4.32	-4.63
11-2011	41	40	89.61	99.61	3.26	2.98
12-2011	43	41	80.03	85.21	3.05	2.57
3-2012	44	40	78.19	90.48	-3.68	-5.81
6-2012	43	38	70.01	64.64	-5.05	-7.21
Panel B: Five largest Government/Agency MMFs (by Assets)						
1-2011	$27	$28	64.30	57.95	-12.50	-11.58
2-2011	27	26	45.41	46.98	-0.35	0.54
3-2011	04	30	64.55	65.03	1.47	2.63
4-2011	25	28	64.67	63.23	-8.62	-6.92
5-2011	24	25	62.19	60.87	-3.51	-3.98
6-2011	26	25	51.33	53.94	1.82	1.62
7-2011	23	22	78.85	75.00	-14.03	-8.69
8-2011	27	27	57.72	57.93	15.05	15.23
9-2011	28	27	56.05	71.75	3.77	0.70
10-2011	28	28	64.07	66.08	-0.47	-1.51
11-2011	31	28	54.99	56.22	9.16	10.89
12-2011	32	31	58.57	68.88	-2.05	-1.92
3-2012	26	26	66.55	86.21	-9.16	-13.40
6-2012	25	24	65.68	64.93	-1.84	-1.20
Panel C: Five Largest Treasury MMFs (by assets)						
1-2011	$15	$15	28.82	35.22	-5.49	-7.20
2-2011	15	16	21.97	23.88	-0.51	-0.36
3-2011	16	17	26.96	26.15	4.29	2.51
4-2011	16	16	25.88	32.15	-1.58	-4.09
5-2011	16	17	20.35	21.04	4.11	1.41
6-2011	18	17	22.07	22.55	7.56	8.28
7-2011	16	15	41.53	54.69	-16.02	-26.51
8-2011	18	16	29.85	28.94	15.39	17.36
9-2011	19	16	22.60	22.91	6.66	6.76
10-2011	20	19	15.19	22.39	4.51	2.28
11-2011	21	20	17.35	20.59	3.22	3.99
12-2011	21	19	32.58	27.75	2.94	-0.04
3-2012	21	19	16.50	24.33	1.48	1.25
6-2012	20	19	32.97	27.92	0.02	-0.68

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