

Money Market Mutual Funds: Fund Structure and Regulatory Reform

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ABSTRACT

Money Market Mutual Funds, originally designed as a safe channel for investors' money, experienced staggering industry-wide withdrawals during the economic downturn of 2008. In order to prevent Money Market runs, regulatory action is necessary. Following the regulatory structure in the banking industry, this paper empirically examines the possibility and effectiveness of employing two regulatory approaches, an industry-wide insurance system and a fund-level risk monitoring system, in the Money Market industry.

I. INTRODUCTION

During the financial crisis of 2008, Money Market Mutual Funds (MMMFs) experienced huge net outflows, adding risk to the already turbulent financial markets. Faced with unprecedented demands for redemption, MMMFs sold assets at the equivalent of fire sale prices. Not fully appreciating that MMMFs can, and do in fact, lose value, investors lost confidence in these funds, as well as in other financial instruments. Markets were in great turmoil and the stock market lost a significant portion of its value. During this crisis of confidence, the Securities and Exchange Commission (SEC) intervened to stem the fears of the investing public and reduce the demand for MMMF redemptions. This intervention resulted in a relative stabilization of the MMMF industry. Despite this relative stabilization, its reflection on MMMFs increased the need for American investors to better understand the MMMF industry and its risk structure.

This paper strives to identify the fragileness of the MMMF industry through a comparison of its structure with that of the banking industry. Banks risks are regulated in two ways: bank specific regulations and industry-wide safety nets. The regulator has identified specific capital requirements for individual banks in order to maintain their ability to meet redemptions. Additionally, the Federal Deposit Insurance Corporation (FDIC) was established to ensure the safety of depositors' money. A similar structural investigation in the MMMF industry will help monitor the risk of MMMFs, thus enhancing the incentives to invest in MMMFs.

The paper is organized as follows. The next two sections provide a review on the MMMF industry and a discussion on the risk structure of MMMFs. Section four presents the methodologies and discusses the test results. The final section concludes the paper.

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II. AN OVERVIEW ON MONEY MARKET MUTUAL FUND INDUSTRY

MMMFs provide both retail and institutional investors a low risk way to receive the benefits of pooled investing. Since the inception of the industry in 1971, MMMFs have been economically important because they serve as the intermediary between investors who desire a liquid investment and borrowers who seek short term capital. Usually perceived as low-risk investments, MMMFs are classified into three distinct market segments: Prime MMMFs, Government MMMFs, and Tax Free MMMFs. Prime MMMFs invest mainly in private debt instruments such as commercial papers, certificates of deposit, and variable rate demand notes. Compared to Government and Tax-Free MMMFs, Prime MMMFs typically offer the highest yield and generally have the most Assets Under Management (AUM). As of January 1st, 2011, Prime MMMFs held \$1.79 trillion in AUM, representing 55% of the entire MMMF industry.

MMMFs in the United States are required to have a rounded Net-Asset-Value (NAV) of \$1.00 per share. The NAV is calculated by dividing the total value of the fund's portfolio, less its liabilities, by the total number of shares outstanding. The NAV remains a steady \$1.00 per share, despite gains and losses in the fund, by adjusting the number of shares held by investors. When a fund's assets increase in value, investors receive a corresponding adjustment in their number of shares, allowing the NAV to remain at \$1.00. In contrast, if an investor redeems her shares, the decrease in the number of shares in the fund is matched by an equivalent decrease in assets held by the fund (as her shares are redeemed at \$1.00 per share), resulting in an unchanged NAV of \$1.00 per share. It is important to note, however, that the NAV is rounded to the nearest cent and thus may fall as far as \$0.995 before the fund 'breaks the buck.' When a fund 'breaks the buck,' it means the fund's NAV has fallen below \$1.00. This can happen when the fund's investment income falls short of operating expenses and investment losses. When the NAV falls below \$1.00, investors' concerns and fears lead them to demand redemptions and seek more secure investments, resulting in net outflows from MMMFs.

Despite its perceived safety, the MMMF industry is inherently susceptible to runs. MMMF investments are structured to allow for instantaneous purchase or redemption from the fund. When a large number of investors seek to redeem their MMMF investments suddenly and simultaneously, it is nearly impossible for the fund to meet all redemptions. Furthermore, MMMFs are not insured nor are fund sponsors formally obligated to support the funds in an emergency. Consequently, if a fund is 'breaking the buck,' there is an incentive for investors to redeem ahead of their peer investors, as investors are afraid that the fund may not be able to meet all investor redemptions (Collins and Mack, 1994).

MMMFs also have structural shortcomings that are compounded by investor culture. The NAV promotes a false sense of security to investors. Since the NAV is rounded and investors do not see regular gains and losses on their investments, MMMFs are often mistakenly considered to be risk free. Moreover, as MMMFs are not high yield investment vehicles, they appeal to risk-averse investors who may be sensitive to the slightest chance of a negative market event. Evidence during the market downturn of 2008 shows that MMMF investors redeem and move their money into more secure investments when there is any indication of trouble in the MMMF industry. For example, when the President of Federal Reserve Bank of Boston Eric

Rosengren gave a speech on June 3, 2011, citing MMMFs as a source of financial instability, Prime MMMFs' AUM decreased by over 3% of total AUM, or \$4 billion during the following two weeks. Furthermore, when the *Wall Street Journal* published "Money Market Mayhem" on June 27, 2011, an article highlighting MMMFs' exposure to struggling European nations, Prime MMMF AUM fell by 2%, or \$2.5 billion, in one week. Lastly, when the Financial Stability Oversight Committee (FSOC) released its report on July 26, 2011, in which MMMFs were identified as an area of concern, Prime MMMF AUM decreased by \$5.4 billion, representing over 4% of total Prime AUM (iMoneyNet data). As supported in the aforementioned examples, the success of money market mutual funds is significantly dependent upon the actions of investors, who tend to be conservative but frequently respond abruptly via redemptions when concerned about the safety of their investments.

III. MONEY MARKET MUTUAL FUNDS IN THE GLOBAL FINANCIAL CRISIS

Despite the structural instability of MMMFs, as of August 2008, AUM totaled \$3.5 trillion and the Weighted Average Yield (WAY) for all MMMFs was over 2% (iMoneyNet data). However, when Lehman Brothers failed on September 15, 2008, investors were concerned about the Reserve Primary Fund, a large MMMF that held significant exposure to Lehman Brothers. Not surprisingly, investors redeemed shares in massive and sudden fashion. At the same period, over a four-day period from September 15 to 19, 2008, Prime MMMFs lost over \$300 billion in AUM (iMoneyNet data). As a result, MMMFs were forced to sell assets in an attempt to meet abrupt demand for redemptions.

Unfortunately, some assets proved more difficult to sell. The spreads on Asset-Backed Commercial Paper (ABCP) increased significantly and investors shunned longer-term securities. This situation resulted in ABCP to be issued only in overnight maturities, and the resulting effects on the short-term credit market were severe. Businesses across many industries, which traditionally relied on short-term funding from MMMFs, suffered from this lack of liquidity.

In an effort to soothe the concerns of MMMF investors, the government intervened. On September 19, 2008, the United States Treasury issued a temporary guarantee on MMMFs (Anderson and Gascon, 2009). The program was intended to slow the run on MMMFs by assuring investors their money would be safe. Additionally, the Federal Reserve Bank created the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF). The AMLF provided funding, in the form of loans, to banks and bank holding companies to purchase high quality, eligible ABCP from MMMFs at no risk of loss. In tandem, the two immediate interventions helped slow the run on MMMFs and restore the short-term funding markets. The temporary guarantee by the Treasury ended nearly one year later, on September 18, 2009; the AMLF ended on February 1, 2010.

Although effective in the short term, both the Treasury Temporary Guarantee Program and the Federal Reserve AMLF were inadequate remedies to MMMF industry's structural flaws. On January 27, 2010, the SEC passed 2a7, an amendment to the Investment Act of 1940 that addressed many of the MMMF industry structural deficiencies (Agapova, 2011). In an effort to address concerns over a fund's ability to meet sudden

redemption requests, SEC 2a7 regulations mandate that a MMMF maintain a daily liquidity position of 10%, and a weekly liquidity position of 30%. These restrictions are intended to provide MMMFs a liquidity cushion large enough to avoid the forced selling of assets in unfavorable markets. The SEC intervention resulted in improvement of MMMF portfolios by stipulating that a taxable MMMF may not invest more than 3% of its portfolio in second-tier securities or hold a single second-tier security exposure larger than 0.5%. These regulatory changes are expected to reduce the likelihood that a fund would break the buck because of a single credit event. Furthermore, in an effort to address interest rate risk, the SEC amended certain regulations regarding portfolio maturity. Specifically, a portfolio may not have a Weighted Average Maturity (WAM) over 60 days, increasing the previous WAM restrictions of 90 days. The SEC also adopted a rule change now permitting MMMFs at risk of “breaking the buck” to suspend redemptions until the fund can liquidate its portfolio in an orderly manner, thus avoiding the risk of further depressing market valuations through liquidation at fire sale prices.

As a consequence to the events of 2008, MMMF problems are no longer overlooked. Further reform to the MMMF industry is foreseeable. Before any possible regulatory options are implemented, it is necessary to understand the forces that drive investors’ action in Prime MMMFs. This paper strives to identify the major forces in MMMF industry by following the regulatory principles in the banking industry. Commercial banks typically offer very low interest rates to depositors and similarly to MMMFs are considered one of the safest cash holding vehicles available. Nevertheless, there have been periods throughout history in which investors lacked confidence in banks’ ability to meet their redemptions, leading to a run on the industry. However, with improved regulatory standards and the introduction of the FDIC in 1933, the likelihood of runs on banking institutions has lessened significantly. The FDIC was established in response to a series of bank failures during the 1920s and 1930s. The FDIC insures deposits in the United States against bank failure, inspires public confidence in the commercial banking industry, and helps maintain stability in the financial system. Together, the establishment of capital reserve requirements and the FDIC has improved the safety of the commercial banking industry (Schaeck, 2008). Following the two-layer regulatory intervention applied in the banking industry, this paper analyzes how fund performance and investor activities change in the MMMF industry with respect to factors in two major groups – fund specific factors and industry wide factors – to provide empirical evidence to support possible regulatory proposals.

IV. EMPIRICAL TESTS

From January 2007 to December 2009, the U. S. economy experienced booming economic growth, suffered its worst recession in the last eighty years, and entered a period of slow economic recovery. These time segments are tested during this 36-month period, and the fund-specific as well as industry-wide factors’ effects on Prime MMMF AUM are analyzed.

The data used in this study are retrieved from imoney.net. Table 1 describes the variables that may influence the size of AUM as they appear in the regression models. The six explanatory variables can be divided into three groups. The first group includes factors that influence the risk level of a specific fund,

Weighted Average Maturity in days (WAM) and percentage of holding that is maturing in 7 days (MATin7days). The WAM factor is expected to have a positive relationship whereas MATin7days is expected to have a negative relationship with AUM, because the longer the maturity, the higher the risk, and correspondingly the higher the expected return of the fund. As a consequence, higher expected return is expected to attract more assets in-flows. The second group includes factors that influence the risk of MMMFs at the industry level. VIX, the Chicago Board Options Exchange Volatility Index, is the widely used proxy to reflect the uncertainty of the overall market. Treasury Eurodollar Spread (TEDspread), calculated as the spread between Eurodollar and T-bill, is a variable usually used to reflect credit risk level in financial markets. Fund performance variables are the last group. We include Fund Management Fee (MGTfee) and Simple Daily Yield (DAYnet). It is expected that the higher the return, or Simple Daily Yield (DAYnet), and the lower the Fund Management Fee (MGTfee), the more likely the fund will attract more assets in-flows. The definitions of the variables are shown in Table 1.

Table 1: Definitions of Variables

Variable Name	Definition
AUM	Assets Under Management (in million US dollars)
MGTfee	Fund Management Fee (%)
DAYnet	Simple Daily Yield (%)
WAM	Weighted Average Maturity (in days)
MATin7days	Percentage of Holding Maturing in 7 days
VIX	Chicago Board Options Exchange Volatility Index
TEDspread	Treasury Eurodollar Spread (%)

We use panel data to identify which factors among the six independent variables are significant in relationship to AUM through the whole study period (Table 2). The test results show that every factor except TEDspread in the model is statistically significant. The signs of the coefficients are as expected as well. Management Fees (MGTfee) contributes negatively to AUM; that is, the higher a fund's expense ratio, the less investment money the fund is likely to attract. Daily Simple Yields (DAYnet) contributes positively to AUM, meaning that when investors receive a higher return on their money from a fund, they are more likely to invest with that fund. Weighted Average Maturity (WAM), a measure of a fund's risk appetite, positively affects AUM. As a fund takes on more risk, by increasing WAM, AUM rises. The percent of securities maturing in 7 days (MATin7days) operates consistently with the WAM. That is, as MATin7days decreases, WAM increases accordingly. Therefore, the negative significant influence of MATin7days is consistent with the findings related to WAM. A rising VIX indicates a more volatile market. As demonstrated in Table 2, VIX is positive significant, indicating that as the market becomes more volatile, investors will shift assets into

MMMFs. This reflects the general perception on MMMFs as safe investment vehicles. The full model does not indicate any significant influence from TEDspread. This can be explained by the high correlation, with a $\rho=0.718$, between VIX and TEDspread. A multicollinearity problem may exist because of the high correlation between the two factors. So in the following tests, we separate the two market factors to test their explanatory power respectively.

Table 2: Full Model of GLS Regression Based on the Whole Study Period

Variable	Coef.	Std. Err.	z value	Pr > z
intercept	1076.40***	352.70	3.05	0.002
MGTfee	-9565.80***	352.05	-27.17	0.000
DAYnet	149.10***	30.53	4.88	0.000
WAM	77.76***	4.49	17.30	0.000
MATin7days	-1232.28***	371.94	-3.31	0.001
VIX	19.15**	7.55	2.54	0.011
TEDspread	-21.93	84.75	-0.26	0.796

N=25012 Rsq=0.043

** significant at the 5% level; *** significant at the 1% level

Since there was a dramatic outflow of assets in Prime MMMFs during the period of economic downturn between July 2008 and June 2009, we then divide the dataset into two subsets: One covers the period from July 2008 to June 2009 to reflect the assets flow in abnormal economic situation, and the other covers other months, including the periods from January 2007 to June 2008 and then from July 2009 to December 2009 to reflect the assets flow in normal period. Tables 3A and Table 3B show the results during normal period. We include only one of the two macro factors, VIX or TEDspread, in each test to separately examine the contributions of market volatility and credit risk.

As can be seen, the performance factors and fund level risk factors still demonstrate similar influences to assets flow as shown in the pooled dataset. For the market factors, when only TEDspread is included, the test results reveal that TEDspread is not significant with a p -value of 0.11, indicating that AUM of Prime MMMFs is not very sensitive to the changes of TEDspread during normal economic periods. On the other hand, AUM is highly sensitive to the changes of VIX during this period.

Table 3A: GLS Regression during Normal Periods with VIX Dropped in Model

Variable	Coef.	Std. Err.	z value	Pr > z
intercept	1343.25***	378.68	3.55	0.000
MGTfee	9375.43***	408.14	-22.97	0.000
DAYnet	115.42***	32.01	3.61	0.000
WAM	76.27***	5.62	13.57	0.000
MATin7days	1044.91**	452.54	-2.31	0.021
TEDspread	166.41	104.26	1.60	0.110

N= 16971 Rsq=0.042

** significant at the 5% level; *** significant at the 1% level

Table 3B: GLS Regression during Normal Periods with TEDspread Dropped in Model

Variable	Coef.	Std. Err.	z value	Pr > z
intercept	293.25	525.71	0.56	0.577
MGTfee	9330.70***	408.31	-22.85	0.000
DAYnet	168.18***	34.53	4.87	0.000
WAM	75.81***	5.61	13.50	0.000
MATin7days	-1076.91**	452.20	-2.38	0.017
VIX	49.02***	15.40	3.18	0.001

N=16971 Rsq=0.042

** significant at the 5% level; *** significant at the 1% level

Table 4A: GLS Regression during Abnormal Periods with VIX Dropped in Model

Variable	Coef.	Std. Err.	z value	Pr > z
intercept	2150.20***	524.21	4.10	0.000
mgfee	-9191.69***	691.51	-13.29	0.000
daynet	954.17***	140.54	6.79	0.000
wam	72.94***	7.60	9.50	0.000
matin7days	1276.30*	653.89	-1.95	0.051
EDspread	-472.49***	117.09	-4.04	0.000

N=8041 Rsq=0.050

* significant at the 10% level ; ** significant at the 5% level; *** significant at the 1% level

Table 4B: GLS Regression during Abnormal Periods with TEDspread Dropped in Model

Variable	Coef.	Std. Err.	z value	Pr > z
intercept	3422.87***	652.16	5.25	0.000
MGTfee	-9109.95***	692.02	-13.16	0.000
DAYnet	1054.97***	146.88	7.18	0.000
WAM	72.12***	7.63	9.45	0.000
MATin7days	-1309.82**	653.43	-2.00	0.045
VIX	-56.41***	12.11	-4.66	0.000

N=8041 Rsq=0.051

** significant at the 5% level; *** significant at the 1% level

Tables 4A and 4B show the results for the period of economic downturn. Both VIX and TEDspread demonstrate significant negative contribution to AUM, indicating that during the abnormal market period, investors will redeem more shares from MMMFs when there is an increase in volatility of the market and credit risk, a phenomenon that is opposite to what happens during normal economic periods.

The industry-wide examination is intended to identify external market indices that the MMMF industry, as a whole, can use to hedge against and in turn offset systematic risk. The above results indicate that both VIX and TEDspread have a very close negative relationship with the asset flows of MMMFs during abnormal economic downturn, while during normal economic periods, VIX has significant positive impact to asset flows and TEDspread does not demonstrate significant relationship with asset flows. Since MMMFs are considered to be safer investment vehicles, an increase in asset in-flows to MMMFs due to the increase of market volatility during normal economic periods is an action that is not likely to trigger fund runs. As a result, risk hedging for MMMF industry is not necessary during normal economic periods. It is only during the abnormal economic period that risk hedging for the industry becomes important. Our test results indicate that between the two market variables, VIX and TEDspread, TEDspread is a better index to hedge the systematic risk in MMMF industry, because asset flows are only sensitive to TEDspread during abnormal periods and not sensitive during normal periods.

More specifically, since TEDspread is the spread between T-bill and Eurodollar, if a reserve fund is to be used to hedge against the risk of overall industry, the reserve fund can long T-bill and short Eurodollar futures contracts. As a result, when credit risk increases during abnormal economic downturn, TEDspread increases and money flows out of money markets; this outflow will be offset by the increases in value of the reserve fund as the result of hedging.

The above analysis demonstrates the viability and applicability of an industry-wide insurance system. The reserve fund outlined above will serve as a form of insurance. In an abnormal economic situation, the reserve fund will serve as a liquidity buffer, because its value is expected to increase due to hedging; whereas in a normal economic situation, the value of the reserve fund is not going to change dramatically.

Next we further examine the relationship between fund maturity and AUM in depth. We plot WAM, measured in days, against changes in MMMFs' AUM.¹ While not conclusive, a cursory analysis of the plots indicates that AUM, and in turn investor behavior, is significantly more volatile when WAM increases over 40 days. Most of the dramatic changes in AUM occurred between the range of a WAM of 40 days to 60 days.

The specific reason that causes this phenomenon deserves further investigation. However, we can tell from this result that if a fund-level risk monitoring process is to be employed, a WAM of 40 days can be the cut-off point for stricter monitoring actions. This result indicates that the aforementioned regulation restricting a portfolio from having a WAM over 60 days may not be adequate, because our plots between AUM and WAM indicate that most of the dramatic changes in AUM happened in funds with a WAM from 40 days to 60 days.

V. Conclusion and Further Inquiry

The MMMF industry is not as safe as regulating agencies and the investing public perceive it to be. Underscored by the events in the financial crises of 2008 is the important role that MMMFs play in maintaining financial stability in the United States economy. The regulatory structure of MMMFs, then, could be a source of financial instability. This paper examines and identifies a regulatory recommendation to mitigate the chance of a run on MMMFs, and in turn a major market event in the economy. This paper's analysis lends itself to a regulatory recommendation similar to the structure of bank regulation, on fund-specific and industry-wide level: applying stricter monitoring process for funds with Weighted Average Maturity over 40 days, and creating a reserve fund to long T-bill and short Eurodollar future contracts. Together, the fund-specific and industry-wide recommendations will provide a regulatory framework that will help mitigate the risk of Money Market Mutual Funds, while maintaining the incentives to invest in Money Market Mutual Funds.

Despite the significance of the findings of this study, there remains considerable opportunity for further research. As illustrated in previous sections, this paper strives to empirically test the viability of employing a dual-pronged regulatory structure. The individual fund level regulatory evaluation indicates that as the Weighted Average Maturity increases to over 40 days, MMMF Assets Under Management become much more volatile. However, this observation is not sufficient for identifying the underlying reasons that cause the phenomenon. Developing a clear understanding of causes is necessary to support a regulatory recommendation. While the analysis of this paper identifies a very important opportunity for regulators, it does not address the interconnectedness of factors, highlighting the gaps where further research is needed

ENDNOTE

1. The plot results are available from the authors upon request.

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