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Sturm und Drang in Money Market Funds: When Money Market Funds cease to be Narrow

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centre for financial Research
Look deeper

Sturm und Drang in Money Market Funds:

When Money Market Funds Cease to Be Narrow [‡]

Stephan Jank and Michael Wedow*

September 30, 2010

Abstract

This paper investigates the returns and flows of German money market funds before and during the liquidity crisis of 2007/2008. The main findings of this paper are: in liquid times, money market funds enhanced their returns by investing in less liquid papers. By doing so they outperformed other funds as long as liquidity in the market was high. Investing in less liquid assets, however, widens the narrow structure of money market funds and makes them vulnerable to runs. During the shortening of liquidity caused by the subprime crisis, illiquid funds experienced runs, while more liquid funds functioned as a safe haven.

Keywords: Money Market Funds, Liquidity Crisis, Strategic Complementarities, Runs, Narrow Banking

JEL: G12, G20, G21

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1 Introduction

Money market funds (MMFs) are normally seen as an extremely safe investment because they only invest in short-term, high-grade debt. For this reason, MMFs should only have a minimum exposure to interest rate, credit or liquidity risk. However, during the subprime crisis, money market funds contributed to the crisis when the Reserve Primary Fund lowered its share value below USD1. Redemption of shares at this and other funds caused a liquidity squeeze in the money market. Since then, money market funds in the US but also in Europe have experienced significant net sales. These events have led to the issuance of new rules on both sides of the Atlantic to make money market funds more secure.[1] Both reforms provide more stringent rules for disclosure, liquidity and credit risk. However, they differ in that the US industry maintains a stable share value while in Europe floating net asset values (NAV) prevail. In this paper, we explore the crisis of the German money market funds, which faced severe outflows and falling returns during the subprime crisis of 2007/2008. The aim of this paper is to investigate the reasons for the crisis in German money market funds.

Open-end mutual funds in general, in a similar way to banks, offer demand deposit contracts, meaning that investors can withdraw their money at any time. Withdrawals, however, impose a negative externality on the remaining investors in the fund (e.g. Edelen 1999, Nanda, Narayanan & Warther 2000). This is because when facing outflows, fund managers have to sell their assets at an unfavorable time. The expectation that some investors will withdraw their money can lead the remaining investors to follow, and can result in a panic-based run (Diamond & Dybvig 1983, Goldstein & Pauzner 2005, Chen, Goldstein & Jiang 2010). The likelihood of such a run increases if the negative externality increases. Therefore, runs are more likely in funds that hold less liquid assets.

Money market funds are perceived as a close alternative to a bank account. With regard to the US, a stable share value and the higher interest rate paid by money market funds has made this type of mutual fund an attractive and widely used means of payment and cash management for retail and institu-

[1] The SEC published final rules on money market fund reform in February 2010. In Europe, the Committee of European Securities Regulators (CESR) published its guidelines on a common definition of MMFs in May 2010.

tional investors. However, given that they only invest in short-term, high grade debt, runs used to be considered unlikely (Gorton & Pennacchi 1992, Pennacchi 2006). In essence, money market funds close the maturity gap that makes banks vulnerable to runs. MMFs are therefore often considered to be "narrow banks". As a result, MMFs can provide liquidity services without needing a socially costly deposit insurance.

MMFs have become a significant provider of liquidity not only in the United States but also in other countries. Since the first MMF was established in the US in the 70s, assets have grown to a total of USD 4,957 billion in 2007 worldwide. Overall, money market funds account for over 19% of all mutual fund assets in the world, which makes them the second largest group after equity funds.[2] The growing relevance of MMFs as financial intermediaries makes it important to investigate what makes them prone to runs in times of financial turmoil.

In this article, we use a panel of German retail MMFs to study the behavior of fund managers and investors before and during the shortening of liquidity which started with the US subprime crisis. First, we document that the performance of MMFs is usually highly persistent and mostly driven by the expense ratio. Our main finding is that even though returns are persistent overall, there are some periods that do not show persistence. Most importantly, the winning funds of 2006 (before the liquidity crisis) are the losing funds of 2007 (in the liquidity crisis) and vice versa. Second, we examine the causes for persistence in returns. We find that not only expenses but also the portfolio structure drive performance persistence. While money market funds that invest in illiquid assets outperform during liquid times, they underperform in illiquid times. Third, we investigate the investor flows into and out of MMFs. There is a significant performance-flow relationship, meaning that investors withdraw their money from funds that underperform and invest in funds that outperform. More importantly, we relate investor flows to market liquidity and the portfolio structure of money market funds. A shock to market liquidity can have two effects on investors. Investors can either continue to perceive money market funds as a safe haven which would show in a continuing inflow. Alternatively, a sudden drop in market liquidity may cause investors to withdraw their funds when they are concerned about a deterioration in the value of

[2]Worldwide Fund Statistics of the Investment Company Institute (ICI)

their shares. The likelihood of a run depends crucially on the liquidity of the portfolio. Redemptions of shares at a fund with less liquid assets will result in higher costs and thus impose a larger negative externality on the remaining investors. This in turn raises the probability of a run. Our results confirm that in times of extreme market illiquidity, people withdraw their money from less liquid funds and we observe run-like phenomena. Liquid funds, on the other hand, show no significant outflows and continue to function as a safe haven.

The results of this paper contribute to our understanding of the stability of financial intermediaries. Our results suggest that, in a competitive environment where investors react to good or bad performance, MMF managers have an incentive to invest in riskier assets in order to enhance their performance. The narrow structure of MMFs is thereby widened and the probability of a run on the fund increases. In addition, the evidence presented in this paper shows that a floating net asset value does not prevent a run on money market funds.

2 Related Literature

This article refers to several strands of literature: persistence of MMF returns is a well-known fact in the literature and documented by several studies (e.g. Domian & Reichenstein 1998, Christoffersen & Musto 2002, Dahlquist, Engström & Söderlind 2000). Performance persistence of MMFs is generally attributed to the strong persistence of expense ratios. Domian & Reichenstein (1998) find that the expense ratio plus a dummy variable indicating whether a fund exclusively invests in government securities explain 87% of the cross sectional difference in net returns. They conclude that MMFs are a financial commodity and best selected by the lowest expense ratio.

A logical question that follows is, how can MMFs with high and low expense ratios coexist in an competitive environment? Christoffersen & Musto (2002) argue that fund managers can charge their investors different prices because they face different demand curves. In particular, investors differ in their sensitivity to management fees. Therefore, fund managers are able to charge higher expense ratios without losing all existing investors. This allows some fund managers to persistently have higher expense ratios and to underperform

other funds.

Using a non-parametric method proposed by Brown, Goetzmann, Ibbotson & Ross (1992), we are able to have a disaggregate view on performance persistence of MMFs. Even though persistence in our sample is very strong and present in the majority of years, we also find that several years show no persistence and a reversal in performance from one year to another. The persistence of expense ratios is not able to explain years without persistence or a reversal in performance. This result suggests that an additional factor is driving MMFs' return persistence.

Other studies argue that MMFs are not a mere commodity, meaning that fund expenses are not the only determinant of returns. Koppenhaver (1999) shows in a cross-sectional regression that, in addition to expenses, other portfolio characteristics also affect returns. The share of agency securities and commercial papers is assumed to be a proxy for credit risk and has a positive effect on returns. Further, a higher weighted average maturity results in a higher return. In this sense, fund managers can offset the annual expenses and enhance returns by increasing credit or interest rate risk.

We follow this line of argument and investigate how money market fund managers can enhance their returns by investing in less liquid assets. This paper contributes to the literature above in showing that the impact of liquid assets is not constant over time but varies as a function of market-wide liquidity: money market funds with illiquid assets outperform in liquid times but underperform in illiquid times (see Acharya & Pedersen 2005, Massa & Phalippou 2005).[3]

Literature abounds on the negative effect of outflows on the remaining investors in the fund (e.g. Chordia 1996, Nanda, Narayanan & Warther 2000, Edelen 1999). Redemptions create costs, which include for example liquidity-based trading, price impact and commissions. In addition, the fund might be forced to deviate from its desired portfolio also resulting in costs. There-

[3]We primarily relate the performance of MMFs to liquidity risk and not to credit and other risks. MMFs typically invest in high-grade assets which exhibit limited credit risk. However, the sudden and rapid downgrade of various asset classes during the subprime crisis uncovered previously unexpected credit risks. Disentangling credit from liquidity risk is difficult given that, particularly in times of market-wide distress, they go hand in hand.

fore, fund managers set front and back-end fees to dissuade redemptions, and investors self-select themselves into a fund according to their liquidity needs (e.g. Chordia 1996). Since it usually takes a few days for the fund manager to restore the cash balance, the costs of redemptions mainly affect the remaining investors in the fund. For this reason, withdrawals impose a negative externality on the remaining investors.

Chen, Goldstein & Jiang (2010) consider this negative externality in the context of strategic complementarities in mutual funds. In the framework of global games, they are able to develop testable predictions about runs (Carlsson & van Damme 1993, Goldstein & Pauzner 2005). The expectation that other investors will withdraw their money can cause further investors to withdraw their money, resulting in a "self-fulfilling run". Since the negative externality increases with the illiquidity of the fund, illiquid funds are more likely to experience runs than liquid funds. Chen et al. (2010) argue further that the externality caused by withdrawals can be internalized if the number of investors is small enough. This article shows that strategic complementarities can even exist in a relatively liquid sector of money market funds.

Finally, this article contributes to the literature concerned with the financial stability of narrow banking. Banks finance long-term loans with short-term deposits. This maturity intermediation makes banks vulnerable to runs (Diamond & Dybvig 1983). One remedy to avoid bank runs is to insure deposits and thereby establish trust in the bank. Deposit insurance, however, comes at a cost: it can lead to moral hazard because managers, insured against a bank run, may invest in riskier assets. A possible solution to this dilemma is the narrow banking approach (Gorton & Pennacchi 1992, Miller 1998). Since the key problem of bank runs is the maturity gap, narrow banking suggests reducing or eliminating this gap. The narrow banking approach proposes that the two main functions of a bank deposit taking and lending should be separated into two firms. Instead of financing long-term obligations with demand deposits, narrow banks rely on short-term, high-quality securities. In theory, the reduction of the maturity gap would make narrow banks immune to bank runs and a (socially) costly deposit insurance would not be needed. In practice, money market funds are often considered to be a form of narrow banking. MMFs provide liquidity services to their investors by investing exclusively in high-grade debt with short maturity and the deposits are, in contrast to banks,

not insured.

There are a number of papers that investigate whether MMFs are indeed immune to liquidity or credit shocks. Gorton & Pennacchi (1992) analyze in an event study how a default in the commercial paper market affects the commercial paper spread and whether this leads to withdrawals from money market funds. Their main result is that an individual commercial paper default has no significant impact on the commercial paper spread and does not result in a run on MMFs. In a similar study, Miles (2001) compares the response of MMFs and commercial banks to monetary shocks. He finds that money market funds have no difficulties withstanding a monetary shock.

More recently, a debate evolved around the question of whether commercial banks have an advantage in hedging liquidity risk in comparison to other financial intermediaries such as MMFs. Gatev & Strahan (2006) argue that the advantage of commercial banks in hedging against liquidity risk originates from the fact that flows into banks co-vary with market illiquidity. In other words, following an illiquidity shock, commercial banks experience inflows instead of outflows. Pennacchi (2006), however, finds a similar result for MMFs. Using vector autoregression (VAR) he finds that after a liquidity shock, MMFs experience inflows and the dimension of these inflows is similar to those of large commercial banks.

This article contributes to the studies investigating financial stability of MMFs in two important ways. First, we use individual money market funds instead of aggregate data to assess the investor behavior conditioned on market liquidity and fund portfolio liquidity. Second, we investigate the stability of MMFs against liquidity shocks for a non-US sample. This permits us to gain an insight into how the concept of MMFs works under a different regulatory setting and particularly under a floating NAV.

3 Institutional Background

There are several differences between US and German money market funds which potentially matter for the stability of MMFs.

While money market funds have existed for quite some time in the United States, they are fairly new in Germany and were only introduced in the mid-nineties. As a consequence, money market funds play only a minor role in Germany's financial system. In the United States, money market funds account for 25.8% of all mutual fund assets. In comparison, in Germany, money market funds represent only 7.6% of all mutual fund assets.[4]

The majority of US money market funds have a constant net asset value (CNAV) meaning that the value of one share, usually one dollar, remains unchanged. Income is reflected in an increase in the number of shares. In Germany, MMFs have an accumulating net asset value (ANAV), meaning that they are priced mark-to-market. Income of the fund is directly reflected by an increase in the share value. Gorton & Pennacchi (1992) argue that the popularity of constant net asset value in the US is mostly due to a simplified tax treatment.

To maintain a fixed asset value, US MMFs use amortized cost valuation. This method can lead to arbitrage possibilities when the valuation method deviates from the mark-to-market value.[5] If the market price decreases and the amortized cost valuation overprices the share value substantially, there is an incentive for investors to withdraw their money. In this way, a fixed net asset value makes MMFs more vulnerable to runs. On the other hand, market discipline forces MMFs with a constant net asset value to reduce the risk of their portfolio.

In both the US and Germany, MMFs have to invest in securities with a maximum maturity of one year. In the US, the weighted average maturity of a money market fund is not allowed to exceed 90 days. This regulation was introduced by the Securities and Exchange Commission (SEC) in 1991 in an effort to increase the stability of MMFs (Gorton & Pennacchi 1992). Unlike the US, there is no regulation concerning the average maturity of German MMFs.

Probably the most important difference between US and German money market funds is that US MMFs are subject to an implicit insurance. Issuers of

[4]Figures refer to the end of 2007. Sources: Investment Company Institute (ICI) Fact Book 2008 and Deutsche Bundesbank Capital Market Statistics (Kapitalmarktstatistik).

[5]For further details on the method and the magnitude of arbitrage see Lyon (1984).

money market fund promise to never "break the buck". This means that the fund issuer guarantees that the value will never fall below one dollar. Hence, an investor can be sure to get back at least the money invested. This is no legal obligation but, historically, the sponsoring organizations have bailed out troubled money market funds (Gup 1998). Bailouts of US money market funds also took place during the subprime mortgage crisis. In the course of the subprime crisis, at least 17 financial companies bought low-valued securities from their MMFs to avoid a negative return.[6] German issuers of money market funds do not provide insurance for their funds or at least do not announce it *a-priori*. The lack of an implicit insurance increases investor uncertainty which may ultimately contribute to runs.

4 Empirical Analysis

4.1 Data and Descriptive Statistics

Our sample contains a survivorship-bias free sample of all German retail money market funds.[7] In order to make funds comparable, we only consider MMFs which invest in €-denominated securities. Our main data source is the monthly capital market statistics (Kapitalmarktstatistik) of the Deutsche Bundesbank. Further, data on the monthly returns were obtained from Thomson Financial Datastream and data on the annual expense ratios, defined as operating expenses over total assets, originate from the German Federal Association of Investment Companies (*Bundesverband Deutscher Investmentgesellschaften, BVI*).

Returns are calculated on the assumption that dividends are reinvested immediately. Figure 1 displays the annualized returns of German MMFs in comparison to the return of a 3-month German treasury bill (Bubill) in the period 1996/01 - 2008/06. The returns of MMFs usually closely follow the returns of short-term government securities. During the subprime crisis, however, we observe a sharp drop in the mean return of MMFs.

[6] See *The New York Times*, July 11, 2008, p. 8

[7] There are a number of MMFs registered in Luxembourg and marketed in Germany. Unfortunately, we do not have any data on these funds.

[Insert Figure 1 about here]

Figure 1 highlights that the 3-month Bubill rate can serve as a natural benchmark to compare the performance of MMFs. Therefore, we calculate excess returns by subtracting the 3-month Bubill rate from the funds' net returns. Other studies (e.g. Dahlquist et al. 2000, Christoffersen & Musto 2002) use a relative benchmark (i.e. an index of all money market funds) to compare the performance of MMFs. Since the average performance of MMFs dropped sharply during the second half of 2007, using a relative benchmark is not adequate for our purposes.

The mean excess return is -46.3 basis points (see Table 1). A negative average excess return is, at first glance surprising but MMFs generally earn less than short-term treasury securities and more than insured bank deposits (Koppenhaver & Sapp 2005). This is due to management fees which are necessary to run the fund. The investor values these intermediary services, such as diversification, active maturity management and liquidity services, and is willing to pay the fees instead of directly investing in treasury securities.[8]

[Insert Table 1 about here]

Figure 2 displays the median, 25th and 75th percentile of MMFs' excess returns in the period 1996/01 - 2008/06. The figure shows that the median money market fund generally underperforms the 3-month Bubill. However, there are funds that outperformed and achieved a return above the treasury security return. Starting in the second half of 2007, we observe a marked drop in the median excess return. In fact, the majority of funds actually posted negative excess returns. However, all funds were not equally affected by the crisis. While the performance of some funds dropped considerably, other funds continued to achieve a return at or above the benchmark.

[Insert Figure 2 about here]

Money market funds report their holdings on a monthly basis to the Bundesbank. Summary statistics are displayed in Table 1 and the asset composition at the end of each calender year is displayed in Table 2. Commercial

[8]Koppenhaver & Sapp (2005) estimate the value for intermediary services to be around 43 basis points for an US sample of treasury money market funds in the period 1995-2001.

papers are defined as short-term securities issued at a discount by financial and non-financial issuers and *do not* include asset-backed securities. Treasury securities are all securities issued by European governments and play only a minor role in our sample. All securities which are neither commercial papers nor treasury securities are summarized under debt securities. This broad group of assets represents the majority of assets held by MMFs and consists mainly of fixed and floating rate securities but also asset-backed securities. Further, bank deposits play an important but declining role for MMFs.

[Insert Table 2 about here]

As can be seen in Table 2, MMFs increased their share of debt securities continuously until 2006 up to 81%. This is presumably due to the fact that these assets earned a higher return than alternative assets (i.e. bank deposits or commercial papers). With the start of the liquidity crisis in 2007, total net assets decreased by an amount of around €10 billion, accounting for a third of all MMFs assets under management (see also Figure 3). During the crisis, MMFs reduced their share of debt securities and increased the share of more secure assets such as commercial papers or bank deposits.

[Insert Figure 3 about here]

Note that MMFs also experienced outflows in earlier periods, for example in 2004. These outflows, however, did not have a negative impact on the returns, supposedly because the money market was relatively liquid at that time. Such outflows could have been motivated by the low absolute return of MMFs at that time or by other more attractive investment opportunities.

The capital market statistics enable us to directly observe inflows and outflows. We therefore calculate the relative net flows as follows:

$$(Rel.)\ Netflow_{i,t} = \frac{Inflow_{i,t} - Outflow_{i,t}}{Total\ Assets_{i,t-1}}. \tag{1}$$

We approximate aggregate money market liquidity by the spread between the 6-month Euribor (Euro Interbank Offered Rate) and the 6-month Bubill rate. The spread between interbank loans and government bonds can generally be assigned to both credit or liquidity risk. Grinblatt (2001) argues that

an interbank loan is essentially risk free and the spread between the two assets has to be attributed to their differences in liquidity. An interbank loan is rather illiquid because it cannot easily be converted back. A government bond, on the other hand, can more easily be sold before it matures. The difference in return between the interbank rate and government bonds is therefore referred to as convenience yield. Recent empirical studies (e.g. Fontaine & Garcia 2007, Feldhütter & Lando 2008) find that the majority of this money market spread can be attributed to a liquidity premium. During the financial market crisis, the Euribor-Bubill spread widened sharply. This rise was largely due to concerns about counterparty credit risk which resulted in liquidity in the interbank market drying up. Hence, while this spread predominantly reflects liquidity risk during normal market episodes, credit risk and liquidity risk become intrinsically intertwined during stress periods.

[Insert Figure 4 about here]

Figure 4 shows the spread between the 6-month Euribor and the 6-month Bubill rate for the period 1999/01 - 2008/06.[9] In the period 2001 until the first half of 2007, the money market experienced a time of relatively high liquidity. With the beginning of the second half of 2007 we observe an increase in money market spread of more than 60 basis points.

4.2 Persistence of Returns

Money market fund returns generally show a strong persistence, which has been documented in several studies (Domian & Reichenstein 1998, Christoffersen & Musto 2002, Dahlquist et al. 2000). As a starting point for our analysis of the causes of runs on money market funds, we estimate the first-order autocorrelation of annual returns using the Fama-MacBeth method. The autocorrelation coefficient is 0.54 and significantly different from zero (see Table 3).[10] We therefore reject the null hypothesis that past performance is unrelated to future performance. Persistence also holds for several sub-samples, however, in the sub-sample including the crisis year 2007, significance weakens.

[9]Since the Euribor was only established in 1999, we will only use the reduced sample in our further investigation.

[10]For details on the estimation method, see Grinblatt & Titman (1992) or Horst & Verbeek (2000)

[Insert Table 3 about here]

In addition, we employ a non-parametric method, suggested by Brown et al. (1992) and Brown & Goetzmann (1995), to measure performance persistence. This method allows us to obtain a disaggregate view of persistence. In a first step, we separate the sample for each year into winning and losing funds. Winners are defined as funds which are above the median return and losers are smaller or equal to the median return. In a second step, we consider repeated winners and losers. Winner-Winner (WW) denotes funds that were winners in the previous year and are also winners in the current year. Further groups are established in the same way: Loser-Loser (LL), Winner-Loser (WL) and Loser-Winner (LW). Table 4 shows the contingency tables for each year. It also reports the number of new funds in the sample and the funds that drop out of the sample.[11] We also distinguish whether the fund was a winning fund the period before dropping out (Winner-Gone) or a losing fund (Loser-Gone). For each year we calculate the odds-ratio (OR):

$$\text{OR} = (WW \cdot LL)/(WL \cdot LW) \tag{2}$$

Under the null hypothesis that performance in the previous year is unrelated to the performance of the current year, the odds-ratio equals one. The logarithm of the odds-ratio is normally distributed under the null hypothesis:[12]

$$\frac{\ln(OR)}{\sigma_{\ln(OR)}} \sim N(0,1) \tag{3}$$

Table 4 summarizes the results. In seven out of eleven years, we reject the null hypothesis of independence on a 10% significance level. This means that in the majority of years, the winners of the previous year are also the winners of the current year.

[Insert Table 4 about here]

[11] The difference in the number of funds in comparison to Table 2 originates from the fact that a fund has to exist for two whole calender years.

[12] We follow Brown & Goetzmann (1995, p. 687) and approximate the standard error of the log odds-ratio as follows:

$$\sigma_{ln(OR)} = \left(\frac{1}{WW} + \frac{1}{LL} + \frac{1}{WL} + \frac{1}{LW}\right)^{(1/2)}$$

To assess the overall significance, we employ Pearson's p_λ-Test (e.g. Rao 1952, p. 44). Under the null hypothesis, the p-values p_i from the individual tests are equally distributed on the [0,1] interval. It follows that $\lambda = \sum_{i=1}^{k}(-2 \cdot \ln(p_i))$ has a χ^2 distribution with 2k degrees of freedom where k is the number of individual tests. The overall test rejects the null hypothesis of independence on conventional significance levels. This underpins the evidence for the persistence of money market fund returns found in the Fama-MacBeth regression (see Table 3).

Both the parametric and non-parametric method provide strong evidence for *overall* performance persistence. The advantage of contingency tables is that we are able to *disaggregate* the test and investigate persistence *period by period* (Brown et al. 1992). In the years of extremely high market liquidity (2002-2006) performance persistence is high. In 2005 there are 18 winning funds. 16 of these 18 winning funds are also winners in 2006. In contrast to this, we find a reversal in outperformance during the subprime crisis: most winners of 2006, a year of extremely high market liquidity, are losers in 2007, a year of extremely low market liquidity. This result suggests that outperformance of money market funds is related to market-wide liquidity. We thus proceed to investigate performance persistence in money market funds more closely.

4.3 Outperformance and Liquidity Risk

The persistence of fund returns has been attributed to the strong persistence of expense ratios (see e.g. Domian & Reichenstein 1998, Christoffersen & Musto 2002). Since investors face costs when switching from one fund to another fund, managers are able to charge higher fees without losing existing investors. For this reason, some funds can persistently underperform others without losing their investors.

The year-by-year inspection of performance persistence showed that persistence is not common in all years. There are years without persistence and, most notably, a pronounced reversal in the performance distribution from 2006 to 2007. More importantly, this happened without a change in expense ratios. Therefore, the expense ratio alone cannot be the sole explanation for perfor-

mance and persistence of MMFs.

Koppenhaver (1999) finds that, in addition to expenses, the portfolio composition also determines MMFs' returns. Fund managers can enhance their returns by increasing the riskiness of the portfolio. We incorporate this argument and condition the cross-sectional differences of money market fund returns on the liquidity of their portfolio. We run the following cross-sectional regression for each month:

$$\begin{aligned} Exc.\ Return_{it} &= \beta_0 + \beta_1 Liq.\ Assets_{i,t-1} + \\ &\quad \beta_2 Size_{i,t-1} + \beta_3 Expense\ Ratio_i + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where $Liq.\ Assets_{i,t-1}$ is the share of treasury securities, bank deposits and commercial papers. These traditional money market instruments are arguably the most liquid assets in the portfolio of a money market fund. More importantly, this variable does not include asset-backed securities, which bear a higher credit and liquidity risk. To account for possible economics of scale we include $Size_{i,t-1}$ measured by the logarithm of total assets of the fund (Domian & Reichenstein 1998, Chen et al. 2004). Further, we include the $Expense\ Ratio_i$ of the fund as a control, which is the average expense ratio of the fund.[13]

This regression is similar to the one of Koppenhaver (1999), but we extend this analysis by further investigating the relationship between portfolio composition and performance over time as a function of market-wide liquidity. Acharya & Pedersen (2005) report that liquid assets have superior performance in illiquid times and inferior performance in liquid times. We follow Massa & Phalippou (2005) who argue that the relationship of portfolio liquidity and performance varies over time as a function of market-wide liquidity. This leads to our first testable hypothesis:

Hypothesis 1: Funds that hold more illiquid assets outperform in liquid times and underperform in illiquid times.

[13]Taking the average for each fund is justified by the fact that expense ratios almost do not vary over time in our sample. The main part of the overall variation (standard deviation: 0.194) can be attributed to cross-sectional variation (standard deviation: 0.183).

To test this hypothesis, we run the cross-sectional regression displayed in equation 4 for each month. Next, we sort the months by market-wide liquidity into four quartiles and average the coefficients for each of the four groups. The results of this Fama-MacBeth regression are displayed in Table 5. The impact of liquid assets varies across the four quartiles. In line with our hypothesis, during the most liquid months (1st quartile), the share of liquid assets has a negative impact on performance. The negative impact of liquid assets on performance decreases for the less liquid assets (2nd and 3rd quartile). In times of extreme illiquidity (4th quartile), liquid assets even have a positive impact on excess return. We find no evidence for economics of scale.

[Insert Table 5 about here]

We further elaborate on how market illiquidity and portfolio liquidity interact by running a fixed effects regression displayed in equation 5. We explore how a specific money fund manager can enhance the return by changing the portfolio. Using fixed effects we account for possible endogeneity that might result from a correlation of unobserved fund-specific attributes with the regressors. The empirical model is specified as follows:

$$\begin{aligned} Exc.\ Return_{it} &= \alpha_i + \beta_1 Liq.\ Assets_{i,t-1} + \beta_2 Spread_t + \\ &\quad \beta_3 Liq.\ Assets_{i,t-1} * Spread_t + \beta_4 Size_{i,t-1} + \varepsilon_{i,t}, \end{aligned} \tag{5}$$

where $Liq.\ Assets_{i,t-1}$ is, as mentioned before, the share of traditional money market instruments (i.e. bank deposits, treasury securities and commercial papers). The share of liquid assets enters directly into the regression equation and in interaction with our measure for market illiquidity $Spread_t$. Hypothesis 1 suggests a negative β_1: in very liquid times, liquid assets should have a negative impact on performance. It also follows from hypothesis 1 that the coefficient of the interaction term β_3 should be positive: in illiquid times, liquid assets should have a positive effect on performance.

We again control for economics of scale by including the log of total assets $Size_{i,t-1}$. Unobservable fund characteristics are captured by the individual effect α_i. This also includes the expense ratio which is, as shown before, largely

invariant over time.

[Insert Table 6 about here]

The results are displayed in Table 6. First, we estimate equation 5 without considering market illiquidity for two different samples: the sample before the liquidity crisis on the money market (1999-2006) and the full sample (1999-2008). Results can be found in columns (1) and (3). In the first sample period, liquid assets have a negative impact on returns. This first period was characterized by relatively high market liquidity, as can be seen in Figure 4. In contrast, for the full sample period, liquid assets obtain a positive sign. This is a further indication that the extreme market illiquidity since the middle of 2007 had a differential impact on performance through the portfolio composition. Controlling for market liquidity thus appears paramount.

In light of this evidence, we show the results of the fully specified model in column (2) and (4). The coefficient of *Liq. Assets*$_{i,t-1}$ β_1 is, as hypothesized, negative across the two periods indicating that funds with liquid assets underperform. The interaction coefficient with market illiquidity β_3 is significantly different from zero and positive. This underlines that liquid funds outperform during illiquid market episodes thus further corroborating our hypothesis. Including market-wide liquidity directly and as an interaction term also improves the model's explanatory power considerably measured by the within R^2. The pre-crisis sample (1999-2006) shows that this result is not driven by the crisis only.

Since money market liquidity was persistently high from 2001 until the first half of 2007, illiquid MMFs persistently outperformed liquid MMFs. Persistence of MMF returns is therefore not only the result of *persistence in the expense ratios* but also due to the portfolio structure and the *persistence of market-wide liquidity.*

For robustness, we also consider a dynamic setting where the share of liquid assets is modeled as an endogenous variable. We therefore instrument Liq. Assets by its first and second lag. The results presented in Table 8 remain robust, i.e. liquid funds underperform in liquid times but outperform in illiquid times. It should be noted that the dynamic fixed effects estimator is consistent

in panels with long time series such as ours given that the Nickell bias vanishes as the time dimension increases (Nickell 1981).

This evidence shows that enhancing returns by investing in more risky and thus less liquid assets comes at a cost. If market-wide liquidity drops, i.e. due to heightened counterparty risk, managers face problems when investors redeem their shares. They have to sell relatively illiquid assets at fire sale prices, which results in a reduction of returns. This in turn might lead to further outflows. An illiquidity shock can therefore trigger a self-fulfilling run. For this reason, we assess the flows in and out of MMFs conditional on market and portfolio liquidity in the next section.

4.4 Market Illiquidity and Fund Flows

Having established that money market fund managers raised their portfolio risk prior to the financial crisis to enhance their performance, we investigate the investors' reaction to the deterioration of market liquidity.[14] A market-wide liquidity shock can *a priori* have two effects on investors (See Gorton & Pennacchi 1992, Pennacchi 2006, Miles 2001). On the one hand, investors can see money market funds as a safe haven, which would lead to inflows into money market funds. On the other hand, a sudden drop in liquidity can cause investors to withdraw their money because they are concerned about a value reduction. If other investors fear a reduction in value caused by the initial redemptions, the liquidity shock can lead to a self-fulfilling run.

The likelihood of a run crucially depends on the liquidity of the portfolio. A withdrawal in illiquid times results in costs when the fund manager has to liquidate assets at depressed market prices.[15] Since it usually takes some days for the fund manager to restore the cash balance, these costs mainly affect the remaining investors in the fund. Therefore, redemptions impose a negative externality on the remaining investors. If this externality becomes sizeable, the

[14] A number of events may have further impacted money market funds during the financial crisis. The increase in deposit insurance ceilings and the dropping of coinsurance elements in the second half of 2008 potentially present such events. With regard to the US, the default of Lehman Brothers and the subsequent decline in the share value below USD1 of the Primary Reserve Fund also marked such an event. Both events are not included in the present analysis given that the data end in June 2008.

[15] This externality may be compounded when a large volume of assets is sold into the market causing prices to decline further (see Coval & Stafford (2007)).

expectation of other investors withdrawing their money can cause the remaining investors to withdraw their money as well, resulting in a self-fulfilling run. The negative externality, and consequently the likelihood of a run, increases with market illiquidity and the illiquidity of the portfolio. Our second testable hypothesis therefore is:

Hypothesis 2: In illiquid times, funds that hold illiquid assets are more likely to experience a run than funds that hold liquid assets.

We define a run on a money market fund as a significant withdrawal by investors. We thus first test our second hypothesis by examining the cumulative net flows of German MMFs during the subprime crisis (2007/07 - 2008/06) in Figure 5. Money market funds in 2007/06 are sorted into four groups according to their share of liquid assets.[16] Overall, money market funds lost €10.8 billion in the crisis period (compare also Figure 3). The quartile of funds with the most illiquid portfolio lost around €7.2 billion, which accounts for the majority of all outflows. In relation to their total assets before the crisis (2007/06), the quartile of the most illiquid funds lost around 60% of their assets, which indicates that a run on these funds took place. This clearly shows that the intensity of outflows decreases with portfolio liquidity. The most liquid funds only experienced outflows of around 5%.

[Insert Figure 5 about here]

We evaluate the impact of market liquidity on MMFs' flows more closely with the following empirical model:

$$\begin{aligned} Netflow_{it} &= \alpha_i + \beta_1 Liq.\ Assets_{i,t-1} + \beta_2 Exc.\ Return_{i,t-1} + \beta_3 Spread_t \\ &\quad + \beta_4 Spread_t * Liq.\ Assets_{i,t-1} + \beta_5 Spread_t * Exc.\ Return_{i,t-1} \\ &\quad + \beta_6 Size_{i,t-1} + \beta_7 Age_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

where $Netflow_{it}$ is the relative net flow of fund i in period t. The flow is measured relative to total assets of the previous month. $Liq.\ Assets_{i,t-1}$ is our

[16] Share of liquid assets by quartile (valuation date 2007/06): Q_{25}: 0.04, Q_{50}: 0.10, Q_{75}: 0.16, Q_{100} : 0.65

previously used proxy for portfolio liquidity. We include past excess return $Exc.\ Return_{i,t-1}$ because investors of mutual funds typically react to good or bad performance of the fund (e.g. Sirri & Tufano 1998). More recently, a performance flow relationship has also been documented for MMFs (Koppenhaver & Sapp 2005). Market illiquidity $Spread_t$ is again measured by the spread between the Euribor and the Bubill rate, both maturing in 6 months.

The money market spread enters into the regression equation individually and as an interaction term with portfolio liquidity. Hypothesis 2 suggests that investors react differently to a market-wide liquidity shock depending on the liquidity of the portfolio. An increase in the money market spread alone should lead to outflows, which should result in a negative β_3. Liquid funds, on the other hand, should experience less outflows when facing market illiquidity. We therefore expect the coefficient of the interaction term β_4 to be positive. The regression equation also includes an interaction term of market illiquidity with past excess return to test whether the performance flow relationship changes in liquid and illiquid times.

Again, the log of total net assets is added as a control variable to capture the fact that smaller funds typically grow faster than large funds. Similarly, we include the age in years as a control variable into the regression. Older funds are also associated with less inflows (Sirri & Tufano 1998). Recently established funds usually experience very large inflows in relative terms. This can lead to an outlier problem and skew the results (Berk & Tonks 2007). We thus only include funds which have existed for at least two years.

The results are displayed in Table 7. We estimate equation 6 first using fund fixed effects (Panel A) and second using fund and time fixed effects (Panel B). The control variables $Size_{i,t-1}$ and $Age_{i,t-1}$ have the expected negative sign. We find a positive performance flow relationship. An increase in excess return leads to a higher net flow into money market funds. The performance sensitivity of investors is likely to be behind the reason why fund managers increased the risk of their portfolio and enhanced their funds in the first place. Similarly, we find some evidence that liquid assets lead to lower net flows in liquid times. This is in line with the positive performance flow relationship. Liquid assets earn a lower return in good times and investors respond by withdrawing their money.

A sudden increase in market illiquidity has a negative effect on flows, which confirms our second hypothesis for a run on illiquid funds. An increase in liquid assets limits outflows and counteracts this first effect. Funds with a large amount of liquid assets are less prone to a decline in market liquidity and thus less vulnerable to a sudden rise in withdrawals. Figure 6 plots the marginal effect of market illiquidity on net flows as a function of portfolio liquidity.[17] Money market funds with less than 30% of liquid assets experience significant outflows after an illiquidity shock (at the 5% significance level). In contrast, there are no significant outflows after an illiquidity shock for funds with a share of above 30%.

[Insert Table 7 about here]

[Insert Figure 6 about here]

These results show the crucial importance of portfolio liquidity in preventing runs. MMFs that are truly narrow are immune to runs and are thus less likely to need investor insurance such as that currently under consideration in the US. By contrast, MMFs that enhance their returns by deviating from the narrow to a wider portfolio structure expose themselves to the risk of a run.

One caveat is that there might be a reverse causality between flows and some of the explanatory variables. Investor flows might also affect the liquidity of the fund, its return and size. To address this issue, we run a two-stage least squares regression instrumenting these variables by their first and second lags. The results are displayed in Table 9 and show that our main findings stay unchanged.

[17] The marginal effect and its variance is calculated as follows (for details, see e.g. Greene 2003, 123-124):

$$\begin{aligned} \frac{\partial Netflow}{\partial Spread} &= \beta_3 + Liq.Assets \cdot \beta_4 \\ \text{Var}\left[\frac{\partial Netflow}{\partial Spread}\right] &= \text{Var}[\beta_3] + Liq.\ Assets^2 \cdot \text{Var}[\beta_4] + 2 \cdot Liq.\ Assets\ \cdot \text{Cov}[\beta_3, \beta_4] \end{aligned}$$

5 Conclusion

This paper shows that in liquid times some MMF managers enhanced their returns by investing in less liquid assets. We provide evidence that this pursuit of higher returns is motivated by investors reacting to bad performance by withdrawing their money. By investing in illiquid assets, funds can outperform other funds as long as liquidity in the market is high. Investing in less liquid assets, however, widens the narrow structure of money market funds and makes them vulnerable to runs. During the liquidity crisis of 2007/2008, we observe runs on money market funds with enhanced and illiquid portfolios. Money market funds with more liquid portfolios, in contrast, had no significant outflows and functioned as a safe haven.

The study shows the risk involved in investing in illiquid assets when an open-ended structure is involved. Most importantly, this paper provides evidence that runs are even possible in the, usually highly liquid, money market segment.

The possibility of a run on these financial intermediaries has led to recent reforms of the regulation of money market funds in Europe and the US which aim to ensure the stability of money market funds. Common to the reforms in both jurisdictions are the more stringent requirements on liquidity and credit risk but also with regard to disclosure. As a consequence, this should already help private investors to gain a better insight into the risks they are taking when investing in money market funds. Before the financial crisis, only limited information on the asset composition of German MMFs was available to the public and not standardized. Greater transparency should allow investors to select funds based on their liquidity and risk preferences. The two-tier separation introduced in Europe is a further step in this direction.

Further, insurance provided by the fund issuer might play an important role in the stability of MMFs. During the course of the subprime crisis, MMF assets largely remained stable in the US where an implicit insurance is provided. Gorton & Pennacchi (1992) argue that an implicit insurance can reduce the risk of a run on MMFs in two ways: from the investor's perspective, insurance can establish trust in the money market fund and thus avoid a self-fulfilling run. From the manager's perspective, insurance paid by the fund issuer gives

an incentive to reduce the riskiness of the portfolio. The current discussion in the US on the establishment of a liquidity facility for money market funds may thus present a valid instrument to quell runs.

References

Acharya, V. & Pedersen, L. (2005), 'Asset Pricing with Liquidity Risk', *Journal of Financial Economics* **77**(2), 375–410.

Berk, J. B. & Tonks, I. (2007), 'Return persistence and fund flows in the worst performing mutual funds', *NBER Working Papers* (13042).

Brown, S. & Goetzmann, W. (1995), 'Performance persistence', *The Journal of Finance* **50**(2), 679–698.

Brown, S., Goetzmann, W., Ibbotson, R. & Ross, S. (1992), 'Survivorship Bias in Performance Studies', *Review of Financial Studies* **5**(4), 553–580.

Carlsson, H. & van Damme, E. (1993), 'Global Games and Equilibrium Selection', *Econometrica* **61**(5), 989–1018.

Chen, J. S., Hong, H. G., Huang, M. & Kubik, J. D. (2004), 'Does Fund Size Erode Mutual Fund Performance? The Role of Liquidity and Organization', *American Economic Review* **94**(5), 1276–1302.

Chen, Q., Goldstein, I. & Jiang, W. (2010), 'Payoff Complementarities and Financial Fragility: Evidence from Mutual Fund Outflows', *Journal of Financial Economics* **97**, 239–262.

Chordia, T. (1996), 'The Structure of Mutual Fund Charges', *Journal of Financial Economics* **41**(1), 3–39.

Christoffersen, S. & Musto, D. (2002), 'Demand Curves and the Pricing of Money Management', *Review of Financial Studies* **15**(5), 1499–1524.

Coval, J. & Stafford, E. (2007), 'Asset fire sales (and purchases) in equity markets', *Journal of Financial Economics* **86**, 479–512.

Dahlquist, M., Engström, S. & Söderlind, P. (2000), 'Performance and Characteristics of Swedish Mutual Funds', *Journal of Financial and Quantitative Analysis* **35**(3), 409–423.

Diamond, D. W. & Dybvig, P. H. (1983), 'Bank Runs, Deposit Insurance, and Liquidity', *Journal of Political Economy* **91**(3), 401–19.

Domian, D. & Reichenstein, W. (1998), 'Performance and Persistence in Money Market Fund Returns', *Financial Services Review* **6**(3), 169–183.

Edelen, R. (1999), 'Investor Flows and the Assessed Performance of Open-End Mutual Funds', *Journal of Financial Economics* **53**(3), 439–466.

Fama, E. & MacBeth, J. (1973), 'Risk, Return, and Equilibrium: Empirical Tests', *Journal of Political Economy* **81**(3), 607.

Feldhütter, P. & Lando, D. (2008), 'Decomposing Swap Spreads', *Journal of Financial Economics* **88**, 375–405.

Fontaine, J. & Garcia, R. (2007), 'Bond Liquidity Premia', *Unpublished Working Paper* .

Gatev, E. & Strahan, P. (2006), 'Banks' Advantage in Hedging Liquidity Risk: Theory and Evidence from the Commercial Paper Market', *The Journal of Finance* **61**(2), 867–892.

Goldstein, I. & Pauzner, A. (2005), 'Demand-Deposit Contracts and the Probability of Bank Runs', *The Journal of Finance* **60**(3), 1293–1327.

Gorton, G. & Pennacchi, G. (1992), Money Market Funds and Finance Companies: Are they the Banks of the Future?, *in* M. Klausner & L. White, eds, 'Structural Change in Banking', Irwin Publishing, pp. 173–214.

Greene, W. (2003), *Econometric Analysis*, 5 edn, Prentice Hall, Upper Saddle River, NJ.

Grinblatt, M. (2001), 'An Analytic Solution for Interest Rate Swap Spreads', *International Review of Finance* **2**(3), 113–149.

Grinblatt, M. & Titman, S. (1992), 'The Persistence of Mutual Fund Performance', *Journal of Finance* **47**(5), 1977–1984.

Gup, B. (1998), 'Mutual Funds as an Alternative Banking System: Comment', *Journal of Institutional and Theoretical Economics* **154**, 97–104.

Horst, J. & Verbeek, M. (2000), 'Estimating Short-Run Persistence in Mutual Fund Performance', *Review of Economics and Statistics* **82**(4), 646–655.

Koppenhaver, G. (1999), Circle unbroken: Bank-affiliated money market mutual funds, *in* 'Proceedings of the 35th Annual Conference on Bank Structure and Competition May 1999, Federal Reserve Bank of Chicago', pp. 430–447.

Koppenhaver, G. & Sapp, T. (2005), 'Money Funds or Markets? Valuing Intermediary Services', *Journal of Financial Services Research* **27**(1), 51–76.

Lyon, A. (1984), 'Money Market Funds and Shareholder Dilution', *The Journal of Finance* **39**(4), 1011–1020.

Massa, M. & Phalippou, L. (2005), 'Mutual Funds and the Market for Liquidity', *Unpublished Working Paper* .

Miles, W. (2001), 'Can Money Market Mutual Funds Provide Sufficient Liquidity to Replace Deposit Insurance?', *Journal of Economics and Finance* **25**(3), 328–342.

Miller, G. (1998), 'On the Obsolescence of Commercial Banking', *Journal of Institutional and Theoretical Economics* **154**(1), 61–73.

Nanda, V., Narayanan, M. & Warther, V. (2000), 'Liquidity, Investment Ability, and Mutual Fund Structure', *Journal of Financial Economics* **57**(3), 417–443.

Nickell, S. (1981), 'Biases in dynamic models with fixed effects', *Econometrica* **49**(6), 1417–1426.

Pennacchi, G. (2006), 'Deposit Insurance, Bank Regulation, and Financial System Risks', *Journal of Monetary Economics* **53**(1), 1–30.

Rao, C. (1952), *Advanced Statistical Methods in Biometric Research*, Wiley, New York, NY.

Sirri, E. & Tufano, P. (1998), 'Costly Search and Mutual Fund Flows', *The Journal of Finance* **53**(5), 1589–1622.

6 Tables and Figures

Table 1: Summary Statistics

This table shows summary statistics for the fund-specific variables. Excess return is the annualized net return minus the 3-month Bubill rate in percentage points. Relative net flows are inflows minus outflows in relation to total assets (in percent). Commercial papers are defined as short-term securities issued at a discount from financial and non-financial issuers. Treasury bills include all European government securities. Debt securities are all securities that are neither commercial papers nor treasury securities. Debt securities include floating and fixed rate securities but also asset-backed securities. All asset classes are measured as a share of total assets. Age is measured in years since inception. Size is the log of total net assets. Expense ratio is the operating expenses divided by the average assets under management (measured in percent). Data sources are Thomson Financial Datastream, the capital market statistics of the Deutsche Bundesbank (BBK) and the German Federal Association of Investment Companies (*Bundesverband Deutscher Investmentgesellschaften, BVI*)

	Mean	Variance	25th Percentile	75th Percentile	Source
Excess Return	-0.463	2.641	-0.651	0.055	Datastream
Rel. Net Flow	0.967	422.84	-2.894	3.240	BBK
Debt Securities	0.736	0.056	0.621	0.919	BBK
Commercial Papers	0.067	0.018	0.000	0.068	BBK
Treasury Securities	0.004	0.001	0.000	0.000	BBK
Other Assets	0.025	0.005	0.005	0.014	BBK
Bank Deposits	0.167	0.040	0.038	0.208	BBK
Age	7.07	12.19	4.58	9.92	BBK
Size	18.84	3.63	17.44	20.17	BBK
Expense Ratio	0.546	0.038	0.400	0.650	BVI

Table 2: Asset Composition of German Retail Money Market Funds

This table shows the aggregate portfolio positions in millions of €. The sample includes all German retail money market funds investing in €denominated assets. All positions are end of year except for 2008. The percentage to total net assets is given in parentheses. Commercial papers are defined as short-term securities issued at a discount from financial and non-financial issuers. Treasury bills include all European government securities. Debt securities are all securities that are neither commercial papers nor treasury securities. Debt securities include floating and fixed rate securities but also asset-backed securities.

Year	No. of Obs.	Total Net Assets	Debt Securites		Commercial Papers		Treasury Bills		Other Assets		Bank Deposits		Liabilities	
1996	30	16.895	8.360	(49.5 %)	1.423	(8.4 %)	0.047	(0.3 %)	1.251	(7.4 %)	5.829	(34.5 %)	0.016	(0.1 %)
1997	31	14.258	8.284	(58.1 %)	1.079	(7.6 %)	0.012	(0.1 %)	0.609	(4.3 %)	4.286	(30.1 %)	0.012	(0.1 %)
1998	32	17.291	10.247	(59.3 %)	1.553	(9.0 %)	0.006	(0.0 %)	0.467	(2.7 %)	5.069	(29.3 %)	0.050	(0.3 %)
1999	30	20.781	13.239	(63.7 %)	2.694	(13.0 %)	0.052	(0.2 %)	0.811	(3.9 %)	4.026	(19.4 %)	0.041	(0.2 %)
2000	33	19.208	13.500	(70.3 %)	1.595	(8.3 %)	0.098	(0.5 %)	0.315	(1.6 %)	3.707	(19.3 %)	0.008	(0.0 %)
2001	39	29.186	21.110	(72.3 %)	2.706	(9.3 %)	0.171	(0.6 %)	0.674	(2.3 %)	4.846	(16.6 %)	0.320	(1.1 %)
2002	36	35.519	25.265	(71.1 %)	2.173	(6.1 %)	0.241	(0.7 %)	0.589	(1.7 %)	7.272	(20.5 %)	0.021	(0.1 %)
2003	38	35.129	24.456	(69.6 %)	3.415	(9.7 %)	0.001	(0.0 %)	0.621	(1.8 %)	6.695	(19.1 %)	0.059	(0.2 %)
2004	37	27.144	19.213	(70.8 %)	2.923	(10.8 %)	0.043	(0.2 %)	0.427	(1.6 %)	4.590	(16.9 %)	0.054	(0.2 %)
2005	37	28.612	22.082	(77.2 %)	3.168	(11.1 %)	0.000	(0.0 %)	0.164	(0.6 %)	3.237	(11.3 %)	0.038	(0.1 %)
2006	38	29.398	23.929	(81.4 %)	3.634	(12.4 %)	0.039	(0.1 %)	0.242	(0.8 %)	1.829	(6.2 %)	0.275	(0.9 %)
2007	38	24.350	16.912	(69.5 %)	5.351	(22.0 %)	0.018	(0.1 %)	0.242	(1.0 %)	2.017	(8.3 %)	0.189	(0.8 %)
2008 (June)	39	19.763	13.073	(66.1 %)	5.262	(26.6 %)	0.000	(0.0 %)	0.235	(1.2 %)	1.391	(7.0 %)	0.199	(1.0 %)

Table 3: Performance Persistence of Money Market Funds: First-Order Autocorrelation

This table shows the first-order autocorrelation of MMFs' annual returns. We estimate the first-order autocorrelation using the Fama-MacBeth method. For each year we run a cross-sectional regression of lagged return on return and average the coefficients over time. The results are displayed for the whole sample and two sub-samples. Fama-MacBeth standard errors are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

Sample Period:	1996 - 2007	1996-2001	2002-2007
Exc. Return$_{t-1}$	0.537***	0.564***	0.510*
	(0.11)	(0.11)	(0.21)
Constant	-0.977**	-1.030*	-0.925
	(0.37)	(0.51)	(0.58)
No. of Obs.	359	152	207
No. of Years	12	6	6
R^2	0.348	0.335	0.362

Table 4: Performance Persistence of Money Market Funds: Repeat Winners and Losers

Note: Funds are classified into winners (annual return above median) and losers (annual return below median) for each year. Winner-Winner indicates that a fund is a winner in the current year (t) and was also a winner the previous year (t-1). New fund indicates the number of new funds in t. Winner-Gone (Loser-Gone) shows the number of funds that were Winners (Losers) the previous year (t-1), but are not observed in the current year (t). We test the null hypothesis that past winners are unrelated to present winners by calculating the odds-ratio: (Winner-Winner · Loser-Loser)/(Winner-Loser · Loser-Winner). An odds-ratio of 1 corresponds to independence. To evaluate the overall rejection/acceptance of the null hypothesis we report Pearson's p_λ-Test

Year	Total	Winner-Winner	Winner-Loser	Loser-Winner	Loser-Loser	New Funds	Winner-Gone	Loser-Gone	Odds-Ratio	z	p-value
1996	24	.	.	.	.	24	.	.	.	.	
1997	30	6	6	6	6	6	0	0	1.0	0.00	1.000
1998	31	8	7	6	9	1	0	0	1.7	0.73	0.466
1999	30	10	3	5	11	1	2	0	7.3	2.34	0.019
2000	30	12	3	3	12	0	0	0	16.0	3.04	0.002
2001	33	7	8	7	8	3	0	0	1.0	0.00	1.000
2002	36	9	5	5	11	6	2	1	4.0	1.77	0.076
2003	35	12	6	5	12	0	0	1	4.8	2.15	0.032
2004	37	13	4	4	13	3	0	1	10.6	2.92	0.004
2005	37	13	5	5	14	0	0	0	7.3	2.68	0.007
2006	37	16	2	2	17	0	0	0	68.0	3.98	0.000
2007	34	7	10	10	7	0	1	2	0.5	-1.02	0.306
Total	**394**	**113**	**59**	**58**	**120**	**44**	**5**	**5**			
Pearson's p_λTest:											
$\lambda \sim \chi^2(22)$:		76.2									
p-value:		0.000									

Table 5: The Influence of Portfolio Liquidity on Returns: Cross-Sectional Regressions

Note: All observations are sorted by money market illiquidity (spread between 6-month Euribor and 6-month Bubill rate) and grouped into four quartiles. The table reports average coefficients of monthly cross-sectional regressions. Liquid assets include short-term government securities, commercial papers and bank deposits. Size is measured as the log of total assets. Expense ratio is the ratio of annual expenses divided by average assets. Fama-MacBeth standard errors are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	Money Market Liquidity			
	(liquid)			(illiquid)
	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
Liq. Assets$_{t-1}$	-0.444***	-0.268**	-0.194*	2.043***
	(0.08)	(0.12)	(0.10)	(0.69)
Size$_{t-1}$	0.020	0.000	-0.007	-0.050
	(0.01)	(0.01)	(0.02)	(0.04)
Expense Ratio	-0.627***	-0.937***	-1.018***	0.245
	(0.14)	(0.17)	(0.14)	(0.44)
Constant	-0.00766	0.361	0.319	-0.591
	(0.30)	(0.27)	(0.33)	(0.88)
No. of Obs.	895	1000	980	949
No. of Funds	27	28	28	30
R^2	0.189	0.241	0.287	0.202

Table 6: The Influence of Portfolio Liquidity on Returns: Fixed Effects Regression

The table shows the fixed effects regression of explanatory variables on excess return. Size is measured in log of total assets, Liq. Assets is the share of traditional money market instruments (government securities, commercial papers and bank deposits). Spread is the spread between the 6-month Euribor and the 6-month Bubill rate. The regression is performed for two sample periods: the time before the liquidity crisis (1999-2006) and the full sample (1999-2008). Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	(1)	(2)	(3)	(4)
	1999-2006		1999-2008	
Liq. Assets$_{t-1}$	-0.217**	-0.402***	0.655**	-0.861**
	(0.11)	(0.13)	(0.29)	(0.34)
Spread$_t$		-1.799***		-3.361***
		(0.19)		(0.83)
Spread$_t$* Liq. Assets$_{t-1}$		1.323***		5.378***
		(0.44)		(1.75)
Size$_{t-1}$	0.0767**	0.0724**	0.155*	0.09
	(0.03)	(0.03)	(0.08)	(0.06)
Constant	-1.677**	-1.274**	-3.537**	-1.37
	(0.65)	(0.61)	(1.61)	(1.18)
No. of Obs.	3358	3355	4050	4046
No. of Funds	45	45	49	49
Within R^2	0.011	0.058	0.008	0.118

Table 7: The Influence of Market Illiquidity on Fund Flows

Note: The table shows a fixed effects regression of fund net flows (measured in relation to total assets). Liquid Assets is the portfolio share of treasury securities, bank deposits and commercial papers. Excess return denotes the annualized return in excess of the 3-month Bubill rate, spread is the spread between the 6-month Euribor and the 6-month Bubill rate and serves as a proxy for money market illiquidity. Size measured as the log of total assets and age in years are added as control variables. In Panel A we control for fund fixed effects and in Panel B we additionally control for time fixed effects. The sample contains money market funds from 1999/01 - 2008/06. We only include funds with an age above two years so that the large growth rates of young funds do not skew the results. Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

Panel A: Fund Fixed Effects

	(1)	(2)	(3)
Liq. Assets$_{t-1}$	-2.742	-5.036*	-5.052*
	(2.23)	(2.83)	(2.85)
Exc. Return$_{t-1}$	0.744***	0.538***	1.170**
	(0.16)	(0.16)	(0.46)
Spread$_t$		-6.224***	-6.579***
		(1.77)	(1.74)
Spread$_t$ * Liq. Assets$_{t-1}$		11.75**	12.18**
		(4.70)	(4.70)
Spread$_t$ * Exc. Return$_{t-1}$			-0.74
			(0.45)
Size$_{t-1}$	-1.058*	-1.297**	-1.309**
	(0.57)	(0.57)	(0.57)
Age$_{t-1}$	-0.478***	-0.315**	-0.310**
	(0.13)	(0.13)	(0.13)
Constant	25.02**	29.70***	30.08***
	(10.88)	(10.87)	(10.95)
Fund Dummies	Yes	Yes	Yes
Time Dummies	No	No	No
No. of Obs.	3687	3687	3687
No. of Funds	44	44	44
Within R^2	0.027	0.033	0.033

(continued)

Table 7 -Continued

Panel B: Fund and Time Fixed Effects

	(1)	(2)	(3)
Liq. Assets$_{t-1}$	-2.248	-5.585*	-5.495*
	(2.39)	(2.78)	(2.79)
Exc. Return$_{t-1}$	0.569***	0.500***	1.100**
	(0.17)	(0.16)	(0.49)
Spread$_t$		-	-
Spread$_t$ * Liq. Assets$_{t-1}$		13.19**	13.30**
		(5.08)	(5.06)
Spread$_t$ * Exc. Return$_{t-1}$			-0.699
			(0.48)
Size$_{t-1}$	-1.044*	-1.157*	-1.159*
	(0.60)	(0.59)	(0.60)
Age$_{t-1}$	-0.873***	-1.099***	-1.108***
	(0.23)	(0.26)	(0.26)
Constant	28.00**	31.30***	31.41***
	(10.85)	(10.85)	(10.90)
Fund Dummies	Yes	Yes	Yes
Time Dummies	Yes	Yes	Yes
No. of Obs.	3687	3687	3687
No. of Funds	44	44	44
Within R^2	0.086	0.088	0.089

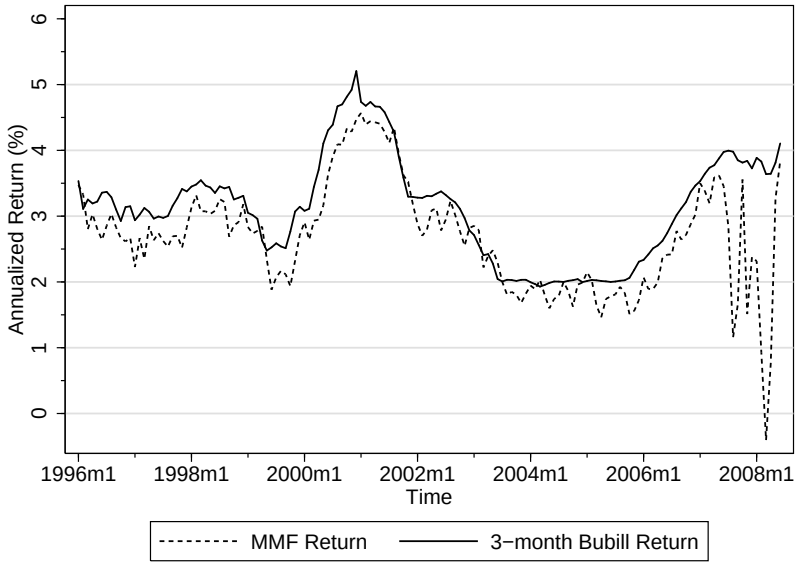


Figure 1: Return of Money Market Funds and 3-month Bubill Return

The figure shows the monthly (annualized) return of an equally weighted portfolio of German retail money market funds (MMFs) in comparison to a German government bill (Bubill) maturing in 3 months.

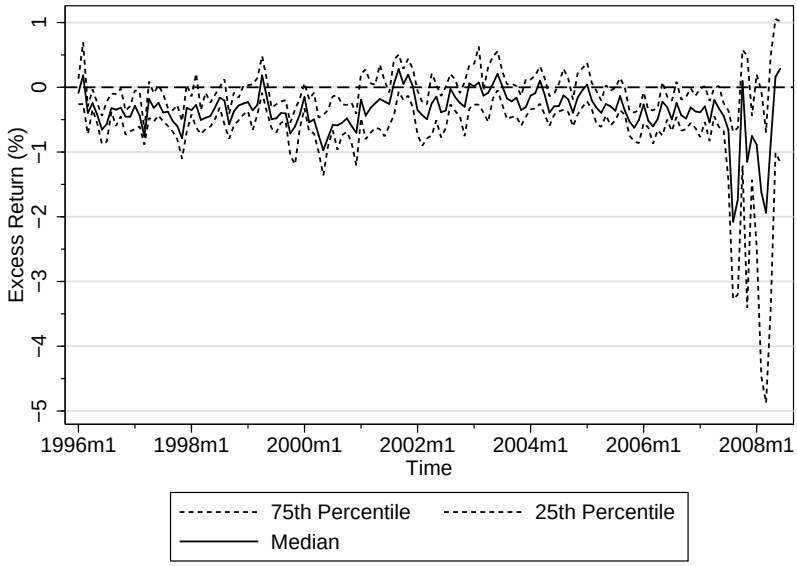


Figure 2: Excess Returns of Money Market Funds

This figure shows the distribution of annualized excess returns (in percentage points) of German retail money market funds. The graph displays median, 25th and 75th percentile.

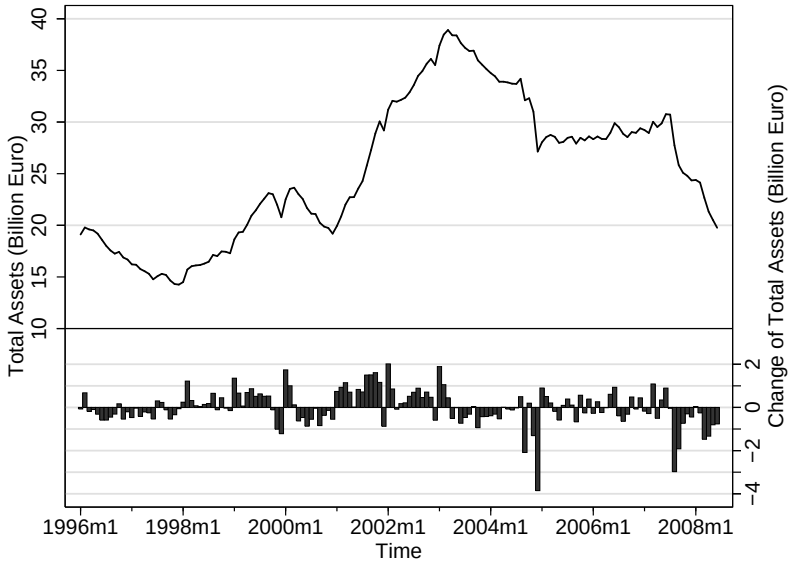


Figure 3: Total Net Assets of Money Market Funds
The figure displays the total net assets of German retail money market funds (left-hand side) and the monthly change in total net assets (right-hand side).

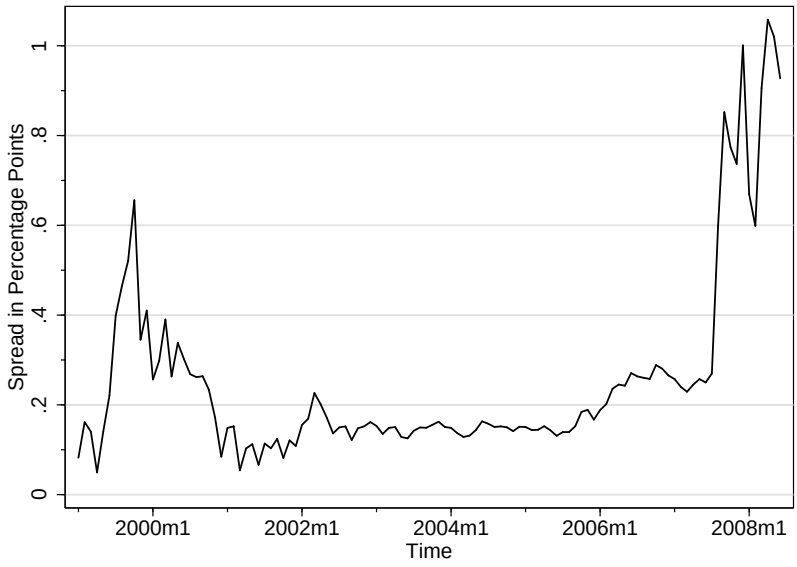
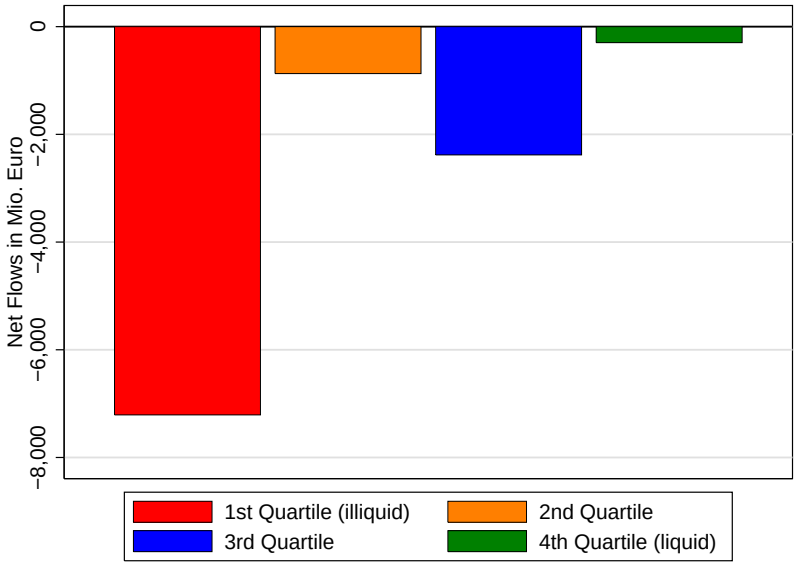
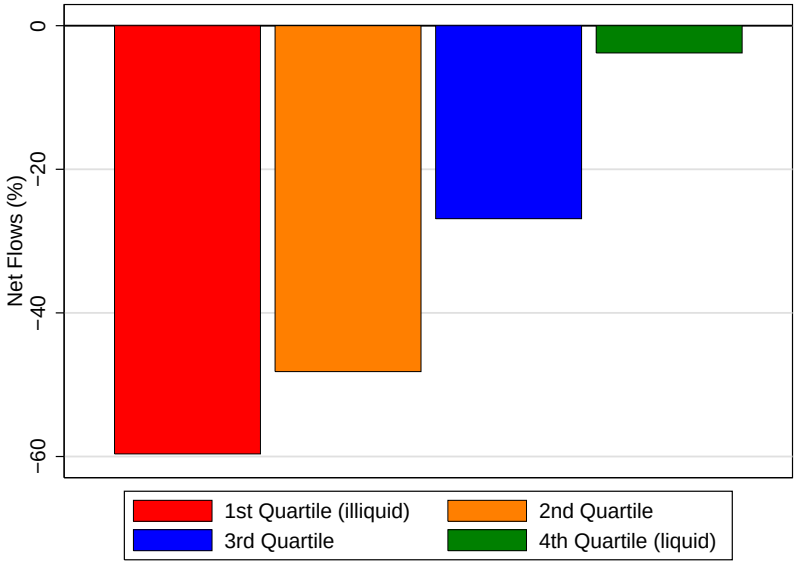


Figure 4: Euribor-Bubill Spread
This figure shows the monthly average spread between the 6-month Euribor and a German government bond maturing in 6 months.



(a) Net Flows 2007/07 - 2008/06



(b) Relative Net Flows 2007/07 - 2008/06

Figure 5: Net Flows by Portfolio Liquidity

Money market funds in 2007/06 are grouped into four quartiles according to their liquidity. We use the share of treasury securities, bank deposits and commercial papers as proxy for liquidity. Figure 5(a) shows the cumulated net flows (inflows minus outflows) for the four groups of funds in million €. Figure 5(b) shows the net flows in relation to total net assets of 2007/06.

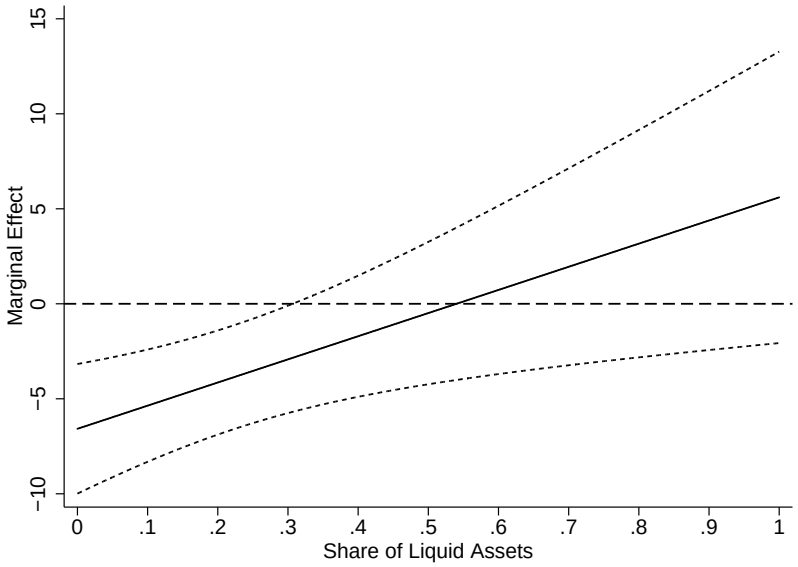


Figure 6: Marginal Effect of Market Illiquidity on Net Flows

This figure displays the marginal effect of market illiquidity on net flows as a function of portfolio liquidity (solid line). 95% confidence intervals are also provided (dotted lines). Estimates are taken from Table 7, Panel A, Column (3). Market illiquidity is measured by the Euribor-Bubill spread and portfolio liquidity is approximated by the share of traditional money market instruments.

Table 8: Robustness Check: The Influence of Portfolio Liquidity on Returns: Dynamic Specification (2SLS)

The table shows a two-stage least squares (2SLS) fixed effects regression of explanatory variables on excess return, where Liq. Assets is assumed to be endogenous and is instrumented by its first and second lag. Size is measured in log of total assets, Liq. Assets is the share of traditional money market instruments (government securities, commercial papers and bank deposits). Spread is the spread between the 6-month Euribor and the 6-month Bubill rate. The regression is performed for two sample periods: the time before the liquidity crisis (1999-2006) and the full sample (1999-2008). Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	(1)	(2)	(3)	(4)
	1999-2006		1999-2008	
Liq. Assets$_t$	-0.242**	-0.581***	0.474***	-0.581**
	(0.112)	(0.212)	(0.177)	(0.288)
Spread$_t$		-1.923***		-2.158***
		(0.279)		(0.500)
Spread$_t$* Liq. Assets$_t$		1.925***		3.541***
		(0.683)		(1.140)
Exc. Return$_{t-1}$	0.110**	0.0684	0.389***	0.302***
	(0.0427)	(0.0452)	(0.0970)	(0.0952)
Size$_t$	0.0735**	0.0704**	0.114**	0.0802*
	(0.0310)	(0.0297)	(0.0546)	(0.0486)
No. of Obs.	3310	3310	3996	3996
No. of Funds	45	45	49	49

Table 9: Robustness Check: The Influence of Market Illiquidity on Fund Flows (2SLS)

Note: The table shows a two-stage least squares (2SLS) fixed effects regression of fund net flows (measured in relation to total assets). Liquid assets, excess return and fund size are assumed to be endogenous and are instrumented by their first and second lag. Liquid Assets is the portfolio share of treasury securities, bank deposits and commercial papers. Excess return denotes the annualized return in excess of the 3-month Bubill rate, spread is the spread between the 6-month Euribor and the 6-month Bubill rate and serves as a proxy for money market illiquidity. Size measured as the log of total assets and age in years are added as control variables. In column (1) and (2) we control for fund fixed effects and in column (3) we additionally control for time fixed effects. The sample contains money market funds from 1999/01 - 2008/06. We only include funds with an age above two years so that the large growth rates of young funds do not skew the results. Robust standard errors clustered at the fund level are given in parentheses. *, **, and *** indicate significance at the 10%, 5% and 1% level respectively.

	(1)	(2)	(3)
Flow_{t-1}	0.0873	0.0906*	0.0748
	(0.0542)	(0.0539)	(0.0564)
Liq. Assets_t	-12.51**	-12.55*	-12.64*
	(5.127)	(6.563)	(6.465)
Exc. Return_t	1.005**	2.557	3.647
	(0.488)	(8.281)	(5.886)
Spread_t	-11.28***	-12.75***	-
	(3.460)	(3.068)	
Spread_t * Liq. Assets_t	40.39***	41.88**	42.98**
	(14.87)	(17.47)	(18.74)
Spread_t * Exc. Return_t		-2.199	-3.342
		(9.015)	(6.348)
Size_t	-2.140***	-2.143***	-1.992***
	(0.565)	(0.510)	(0.522)
Age_t	-0.163	-0.147	30.23*
	(0.112)	(0.180)	(15.76)
Fund Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	No	No	Yes
No. of Obs.	3639	3639	3639
No. of Funds	44	44	44

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