How Safe are Money Market Funds?

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Abstract

We examine the risk-taking behavior of money market funds during the financial crisis of 2007-10. We show that as a result of the crisis: (1) money market funds experienced an unprecedented expansion in their risk-taking opportunities; (2) funds had strong incentives to take on risk because fund inflows were highly responsive to fund returns; (3) funds sponsored by financial intermediaries that also offered non-money market mutual funds and other financial services took on less risk, consistent with their sponsors internalizing concerns over negative spillovers to the rest of their business in case of a run; (4) funds sponsored by financial intermediaries with limited financial resources took on less risk, consistent with their sponsors having limited ability to stop potential runs. These results suggest that money market funds' risk-taking decisions trade off the benefits of fund inflows with the risk of causing negative spillovers to other parts of fund sponsors' business.

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I Introduction

Money market funds have been at the center of attention during the financial crisis of 2007-2010. Following the bankruptcy of Lehman Brothers in 2008, a well-known fund—the Reserve Primary Fund—suffered a run due to its holdings of Lehman's commercial paper. This run quickly spread to other funds, triggering investors' redemptions of more than $300 billion within a few days of Lehman's bankruptcy. Its consequences appeared so dire to financial stability that the U.S. government decided to intervene by providing unlimited deposit insurance to all money market fund deposits. The intervention was successful in stopping the run but it transferred the entire risk of the $3 trillion money market fund industry to the government.

This turmoil in the money market fund industry came as a surprise to most market participants. Prior to the run, investors generally regarded money funds as a low-risk investment that was almost as safe as cash. Indeed, for most of their history, money market funds had invested in safe assets and had generated steady returns similar to those of U.S. Treasuries. However, during the early part of the financial crisis, some funds started to generate returns that were significantly higher than those of U.S. Treasuries. As shown in Figure I, the cross-sectional dispersion in fund returns was less than 30 basis points before August 2007, but increased to more than 150 basis points after August 2007. This sudden increase in the dispersion of money market funds' returns suggests that the underlying asset risk of money market funds changed fundamentally during the financial crisis.

In this paper, we ask two questions: Did the risk of money market funds increase during the financial crisis and, more importantly, what can explain the cross-sectional variation in risk taking across funds? The answers to these questions are important for at least two reasons. First, money market funds are large financial intermediaries that are crucial to financial stability in the United States. They are the largest provider of short-term financing in the U.S. economy, similar in size to the entire sector of equity mutual funds, and they are the largest provider of liquidity to U.S. corporations, issuing about the same amount of demand deposits as the entire U.S. commercial banking sector. Second, many money market funds are sponsored by large

financial companies that also offer other mutual funds and financial services. Understanding the risk-taking incentives of money market funds therefore also sheds light on the risk-taking incentives of other parts of the U.S. financial system.

Our analysis delivers three main results. First, we show that money market funds experienced an expansion in their risk-taking opportunities starting from August 2007. Money market fund regulation requires funds to invest exclusively in highly rated, short-term debt securities. As shown in Figure II, the spread between eligible money market instruments and U.S. Treasuries was at most 25 basis points prior to August 2007. Hence, there was little scope for risk taking before August 2007. However, starting from August 2007, the collateral and liquidation values underlying some money market instruments started to decline due to the U.S. subprime mortgage crisis. As a result, the spread between risky instruments, such as unsecured bank obligations, and safe instruments, such as U.S. Treasuries, increased from 25 basis points to 125 basis points. Hence, for the first time since the origin of money market funds in the 1970s, money market funds had a choice to invest in assets with a substantial risk premium relative to safe government securities.[1]

Second, we show that money market funds had strong incentives to take on risk. Estimating the flow-performance relationship between fund flows and returns, we find that fund flows are highly responsive to returns. A one-standard-deviation increase in fund returns increases fund assets by 42% on an annualized basis. This effect is economically large given that money market funds charge their investors a fixed share of assets under management and an increase in fund size directly leads to a proportionate increase in fund revenues. The relationship is robust to including standard controls such as fund age, fund expenses, fund size, fund-flow volatility, fund family size, and fund-fixed effects. Also, the flow-performance relationship is stronger after August 2007 and coincides with the expansion in risk-taking opportunities taking place after the start of the financial crisis.

Third, we find that observable fund characteristics predict funds' risk taking. To interpret

[1]Historically, there were other periods during which the returns on risky money fund instruments were elevated. However, none of the episodes lasted as long as the financial crisis that we analyze.

this result, it is important to understand the pricing of money market funds. Contrary to other mutual funds, money market funds use historical cost accounting, as opposed to market value pricing, to assess the value of their holdings. The benefit of using historical cost accounting is that money funds can always maintain a constant net asset value of $1 per share. This allows them to sell demand deposits that are considered almost as safe as bank deposits (or money) to outside investors. The downside of this valuation approach is that it exposes money market funds to runs. If the market value of a fund's holdings is expected to drop below its amortized cost, investors tend to redeem their shares at the same time, which can further reduce the market value due to forced liquidation at fire-sale prices.

To mitigate the threat of runs, money market funds rely on support from their sponsors. Sponsors of money market funds are large financial institutions that manage funds on behalf of their investors and lend credibility to the funds' stability. Importantly, many investors expect fund sponsors to provide financial support to their funds in case of a run. Even though fund sponsors have no contractual obligation to support their funds, they may find it optimal to do so because the costs of not providing support may be large. Such costs are typically reputational in nature, in that an individual fund's default could generate negative spillovers to the remaining operations of the fund sponsor, such as an outflow from other mutual funds managed by the same sponsor, or a loss of business for the sponsor's commercial banking, investment banking, or insurance operations.[2]

Our main hypothesis is that fund sponsors with higher expected costs from negative spillovers should take on less risk. These expected costs depend on two factors: the loss in sponsor business due to a run in case of a spillover (lost-business effect) and the likelihood of a spillover, which depends on the sponsor's ability to avoid a run through a bailout (financial strength). Specifically, we expect fund sponsors with greater concerns over their non-money fund business to reduce their funds' risk because a run imposes higher costs on them. In contrast, we expect

[2]This expectation is evident in an investor alert by the Financial Industry Regulatory Authority (FINRA), which states: 'Typically, there has been an expectation that when a money market fund reaches a point where it might break the buck, the investment management firm that sponsors the fund will take action to infuse the fund with cash so that the fund can maintain a stable NAV of $1.00 per share.' (FINRA (2010)).

fund sponsors with greater financial strength to take on more risk because financial strength provides the option to limit the costs of a run by bailing out funds.[3]

We note that our hypothesis requires that investors do not fully anticipate the importance of negative spillovers in fund risk choices and thus they do not completely risk adjust returns based on sponsor characteristics. There are several reasons why this assumption can be justified in the context of money market funds. First, until the recent financial crisis, fund investors had little experience with runs given the absence of such events in the past. Second, since fund investors are small relative to fund size in which they invest, they suffer from a free-rider problem in acquiring information about the fund safety. Third, rather than scrutinize sponsor's willingness and ability to support funds, investors that worry about the risks of money market funds are likely to choose other investment products, such as banks deposits.[4] Empirically, we find strong support for our assumption in the data. We show that the flow-performance relationship is independent of sponsor characteristics, consistent with a lack of risk adjustment. Moreover, we find no effect of sponsor characteristics on funds' management fees as would be expected if investors fully internalized sponsors' risk-taking incentives.

We use weekly data on the universe of U.S. money market funds to test whether negative expected spillovers affect funds' risk taking. At the outset, we restrict our sample to institutional prime money market funds, which are funds that invest in non-government securities and are sold exclusively to institutional investors. We focus on these funds because we do not expect the subprime crisis to have an economically meaningful effect on funds that invest solely in government securities and because, in contrast to retail investors, we expect institutional investors to react promptly to any yield differentials across funds. Notably, these funds represent the

[3]This test relies on the assumption that the fund sponsor can set the fund's risk taking. In doing so, we abstract from agency problems between the fund sponsor and fund manager. We believe this assumption is plausible in the money market fund industry because a fund's portfolio risk is observable and there is little scope for manager skill in portfolio choice.

[4]This evidence is consistent with theoretical models that show that the expected benefit of learning such information is low relative to the cost of acquiring such information (Dang, Gorton and Holmstrom (2009)). Alternatively, the evidence is also consistent with models in which investors neglect risks which are not salient to them given the absence of negative events from past data (Gennaioli and Shleifer (2010) and Gennaioli, Shleifer and Vishny (2011)).

majority of assets under management in the money market fund industry.

We use three empirical proxies for fund risk: (1) the share of risky assets holdings, proxied by fund investments in bank obligations, net of the share in safe assets holdings, proxied by holdings of Treasuries and repos (holdings risk); (2) the value-weighted maturity of fund holdings (maturity risk); and (3) the fund return relative to that of Treasury Bills (spread). We measure the sponsor's business concerns using proxies for the relative importance of a fund sponsor's mutual funds business and other non-fund financial business. Our proxies include (1) the sponsor's share of mutual fund assets other than institutional prime money market funds in total sponsor's assets (*Fund Business*) and (2) an indicator variable equal to one if the fund sponsor is part of a financial conglomerate that also includes a commercial bank, an investment bank, or an insurance company (*Non-Fund Business*). In addition, we measure the sponsor's financial strength using proxies for the fund sponsor's ease of access to capital markets. Our proxies include (1) an indicator variable equal to one if a fund sponsor has no credit rating and (2) the sponsor's credit default swap (CDS) price.[5]

We find strong evidence that an increase in a sponsor's business concerns mitigates its funds' risk taking. A one-standard-deviation increase in *Fund Business* reduces holdings risk by 3.6 percentage points, maturity risk by 2.3 days, and spread by 3.0 basis points. This result is economically significant in that each respective effect accounts for 14.5%, 18.9%, and 18.3% of the cross-sectional standard deviation of each risk measure. Also, *Non-Fund Business* further reduces risk by 27.1%, 13.9%, and 44.7% of the cross-sectional standard deviation of each risk measure. In contrast, we do not find any statistically or economically significant impact of these measures on fund risk before the start of the financial crisis. Moreover, the coefficients are stable and statistically significant if we control for sponsor-fixed or fund-fixed effects, which makes it unlikely that any unobserved fund or sponsor characteristics drive our results.

Next, we evaluate the impact of financial strength on risk taking. Since measures of financial

[5]We measure all explanatory variables before the start of the financial crisis, which makes it unlikely that observed risk choices were driven by changes in fund and sponsor characteristics induced by the expansion in risk-taking opportunities after the start of the financial crisis.

strength can be correlated with the affiliation of a money market fund with a financial conglomerate, we perform our tests separately for funds that are sponsored by financial conglomerates and funds that are sponsored by independent asset managers. This approach allows us to identify financial strength separately from *Non-Fund Business*. Since the notion of financial strength is generally different across the two types of sponsors, we use the sponsor's CDS price for funds sponsored by financial conglomerates and credit ratings for independent asset managers.

We find that greater financial strength increases funds' risk taking: A one-standard-deviation reduction in the natural logarithm of a sponsor's CDS price increases holdings risk by 6.6 percentage points, maturity risk by 4.9 days, and spread by 3.9 basis points. This result is statistically and economically significant in that each respective effect accounts for 26.6%, 40.1%, and 23.1% of the cross-sectional standard deviation of each risk measure. Likewise, independent asset managers with credit ratings have higher holdings risk by 8.2 percentage points, maturity risk by 1.7 days, and spread by 7.8 basis points. Though economically significant, some of the results are not statistically significant, which may be explained by a lack of sufficient variation in financial strength among independent asset managers. In sum, our results indicate that—controlling for the lost-business effect—the sponsor's financial strength increases a fund manager's risk taking.

Although our results on risk taking focus on the period before Lehman's bankruptcy, we also study the consequences of negative spillovers after Lehman's bankruptcy. First, we analyze the impact of business concerns on the likelihood that a fund sponsor provided financial support during the market-wide run in September 2008. We focus on the one-week period after Lehman's bankruptcy because the run stopped after the government provided unlimited deposit insurance to all funds. We expect sponsors with greater concerns over their business to provide more financial support and to suffer smaller redemptions. Indeed, we find that the existence of non-fund business increases the likelihood of financial support by 26.3 percentage points and a one-standard-deviation increase in *Fund Business* reduces redemptions by 2.8 percentage points. We also examine the likelihood that sponsors either exit the money market fund industry or change their funds' names in the period from Lehman's bankruptcy until October 2011. We find

that sponsors with non-fund business are 19.4 percentage points more likely to exit, consistent with the notion that negative expected spillovers are larger for this group. Among the funds that remain in business, we find that a one-standard-deviation increase in *Fund Business* raises the likelihood that a fund changes its name to incorporate the sponsor's name by 6.6 percentage points. These results suggest that—conditional on staying in the industry—sponsors aim to make their support more salient.

We conduct several robustness tests of our findings. One possible concern with our results is that, even if a sponsor's business concerns and financial strength were not chosen to accommodate risk taking, these measures might be correlated with other (unobserved) sponsor characteristics that directly affect risk taking. For example, they may be correlated with a sponsor's quality of risk management, risk aversion, investment style, or access to private information. These variables would explain our results to the extent that the unobserved sponsor characteristics affect risk taking after (but not before) August 2007. This may be the case if, for example, the quality of risk management matters for risk taking only in times of greater risk-taking opportunities.

To address this concern, we take advantage of the distinction between institutional and retail funds. Our analysis so far focuses on funds offered to institutional investors; yet, the same sponsors also offer other funds to retail investors. Retail funds constitute a useful placebo group because the flow-performance relationship for this group is weaker and thus their risk-taking incentives are smaller. This prediction is specific to our economic mechanism of business concerns and does not apply to other mechanisms that could explain risk taking, such as the quality of a sponsor's risk management. Indeed, we find that a sponsor's business concerns have no effect on the risk taking by retail funds.

In another robustness test, we exploit the time-series variation in the likelihood of negative spillovers. Following the run on money markets in September 2008, the government introduced unlimited deposit insurance for all money market fund deposits, which effectively replaced sponsors' role in providing support. Consequently, if the presence of negative spillovers causes the

differences in risk taking, we should expect no differences in risk taking after the government guarantee was announced. This is indeed what we find: After the announcement, the differences in risk taking across funds become smaller.

We further confirm the robustness of our results in a series of additional tests. First, we find that managerial compensation is similar across sponsors with different business concerns. Any differences in managers' quality or managerial compensation are thus unlikely to explain our results. Second, our results hold if we restrict our sample to funds whose sponsors have at least 50% of their fund assets invested in non-money market mutual funds, which suggests that our results are not driven by outliers without significant business concerns. Third, our effects are slightly stronger for larger fund companies, which shows that they are not driven by small funds. Last, we show that all our results are robust to excluding the Reserve Primary Fund.

Our paper makes contributions to several strands of the literature. From a theoretical perspective, it is related to studies about the impact of reputation on risk-taking incentives of financial institutions. Stiglitz and Weiss (1983) and Diamond (1989) have established that borrowers' concerns about maintaining good reputation restrain their tendency to behave opportunistically. Similarly, theoretical studies of financial strength have considered the role of so-called balance sheet amplifiers in generating distress. The main sources of variation in financial strength addressed by these studies are leverage, credit constraints, and limited capital. An excellent summary of the main ideas offers Krishnamurthy (2010). We extend this research by analyzing empirical implications of differences in business concerns and financial strength for risk-taking behavior.

Our work is also related to the literature on the provision of bailouts in the financial sector. A substantial empirical literature has focused on explicit and implicit guarantees provided by the government to the banking sector. Keeley (1990) finds that the combination of deposit insurance and lower bank charter values leads to risk shifting among commercial banks. Saunders, Strock and Travlos (1990) show that stockholder-controlled banks take on more risk than do manager-controlled banks. Esty (1997) finds that stock thrifts take on more risk than do mutual thrifts

because of limited monitoring by depositors. Kelly, Lustig and Van Nieuwerburgh (2011) show that during the financial crisis of 2008 the price of put options on individual member banks increased more than the price of a put option on a financial sector index, consistent with the idea that the provision of systemic guarantees is priced by investors. While all that literature emphasizes the role of moral hazard in the provision of bailouts by the government, we believe that the moral hazard problem is unlikely to explain risk taking in the money market fund industry. The reason is that a given security's asset class and its return—both being good measures of risk for most money market instruments—are readily observable outcomes. As a result, the provider of a guarantee (fund sponsor) can easily monitor a fund manager's risk taking and effectively mitigate the degree of risk-shifting behavior.[6] Moreover, fund sponsors are likely to lay off any fund manager contributing to a negative outcome such as a run, which effectively eliminates managers' downside protection.

A separate strand of literature examines the role of mutual funds within larger financial complexes. Ritter and Zhang (2007) show that lead underwriters allocate hot initial public offerings to affiliated funds. Massa and Rehman (2008) argue that information flows within financial conglomerates affect asset holdings of their equity mutual funds. Chen, Goldstein and Jiang (2010) examine runs in the context of equity mutual funds. More specific to our empirical context is a small literature on the workings of money market funds. Notable contributions in this group include Christoffersen (2001), Christoffersen and Musto (2002), Kacperczyk and Schnabl (2010), McCabe (2010), Squam Lake Group (2011), and Wermers (2011). Relative to these studies, we emphasize the role of business concerns and financial strength and their impact on risk taking.

Finally, our study parallels contemporaneous empirical literature on the impact of the recent financial crisis on money markets. Gorton (2009) and Gorton and Metrick (2009) analyze the impact of the crisis on the pricing of repo contracts. Brunnermeier (2009) studies the freeze

[6]Our multiple conversations with money market fund managers and their sponsors suggest that one of the specific characteristics of the money market fund industry is a high degree of transparency inside the organization in the process of information transmission between manager and fund sponsor.

in the market for asset-backed commercial paper. Kacperczyk and Schnabl (2010) study the relative role of demand and supply sources and their consequences for the commercial paper market. Krishnamurthy and Vissing-Jorgensen (2010) investigate the role of macroeconomic conditions in the pricing of Treasuries relative to corporate bonds. Cornett, McNutt, Strahan and Tehranian (2011) examine the impact of banks' funding liquidity on credit supply. Acharya, Schnabl and Suarez (2012) study the incentives for issuing asset-backed commercial paper.

The rest of the paper proceeds as follows. Section II describes our research setting, and Section III describes the data. In Section IV, we discuss our identification strategy and present main empirical results and in Section V we study their robustness to alternative explanations. Section VI concludes.

II Institutional Setting: Money Market Funds

II.1 Primer on money market funds

Money market funds emerged in the 1970s as an alternative to bank deposits. At that time, bank deposits were highly regulated and paid lower interest rates than did money market instruments, which made money funds attractive to investors as they paid higher interest for taking on comparable risks. Even though the regulation of bank deposits was eventually abolished, the size of money market fund industry grew steadily over time up to $2.4 trillion at the beginning of 2007 (see Federal Reserve Flow of Funds Data).

An important characteristic of money market funds is that, contrary to bank deposits, investments in money market funds are generally not insured by the government. Although money funds seek to preserve the value of their assets at $1 per share, fund investors might still realize losses on their investments. Such losses could result from changes in interest rates or from defaults of individual securities.

To limit risks of money market funds, their holdings have been regulated under Rule 2a-7 of the Investment Company Act of 1940. This regulation restricts fund holdings to short-term

assets and prevents funds from purchasing long-term assets such as mortgage-backed securities, corporate bonds, or equity. Moreover, it requires short-term debt to be of high credit quality. For example, it limits commercial paper holdings to those that carry either the highest or second-highest rating from at least two of the nationally recognized credit rating agencies. Also, the regulation requires portfolio diversification: Money market funds must not hold more than 5% of their assets in securities of any individual issuer with the highest rating and not more than 1% of their assets in securities of any other individual issuer.

To provide an overview of the various money market instruments held by money market funds, we use data provided by iMoneyNet. These data are the most comprehensive source of money market funds' holdings. We focus on taxable funds because non-taxable funds hold tax-exempt instruments issued by state and municipal governments, which are not the focus of our study. Taxable money market funds account for 84.5% of all assets under management in the money market fund industry.

As of January 2006, there were 485 taxable money market funds, sponsored by 148 companies, holding assets worth $1.67 trillion. About $396 billion, or 23.8% of total assets, were held by Treasury funds, which only hold government debt, government-backed agency debt, and repurchase agreements. The remaining $1.26 trillion, or 76.2% of total assets, were held by prime funds that also invest in non-government assets. Among the prime funds 57% were institutional funds and 43% were retail funds. The largest asset class held by prime funds was commercial paper, accounting for $325.3 billion, or 25.6% of total assets. The other asset classes were floating-rate notes ($265.9 billion)[7], bank obligations ($235.3 billion), asset-backed commercial paper ($186.3 billion), repurchase agreements ($151.1 billion), government debt and government-backed agency debt ($62.5 billion), and bank deposits ($39.4 billion) (Kacperczyk and Schnabl (2010)).

Most large money market funds are geared towards institutional investors. In Table I, we

[7]Floating-rate notes are also often referred to as variable-rate demand notes (VRDN). VRDNs are debt instruments that provide the purchaser the option to put the security back to the issuer. These securities are structured as such to satisfy the SEC eligibility criteria.

present summary information for the 20 largest institutional prime funds as of January 2006. At that time, these 20 funds accounted for a total of $429 billion worth of assets. The largest fund was the JPMorgan Prime Money Market Fund with assets under management equal to $68.1 billion, followed by Columbia Cash Reserves and BlackRock Liquidity funds, which were about half the size. The last fund on the list, Dreyfus Institutional Cash Fund still managed a considerable $12.6 billion worth of assets. On average, institutional prime funds were well diversified across asset classes but highly exposed to risks in the financial industry as a whole. Assets originated by the financial industry—measured as a total of financial commercial paper, structured securities, bank obligations, and repurchase agreements—accounted for 91.4% of money market fund assets.

In addition, Table I provides information regarding the fund sponsors' concerns about negative spillovers to other, non-money fund parts of their business, shortly named *Business Concerns*. *Fund Business* is the sponsor's share of mutual fund assets other than institutional prime money market funds in total sponsor's assets. *Non-Fund Business* is an indicator variable equal to one if a fund sponsor is affiliated with a commercial bank, investment bank, or insurance company, and equal to zero if it is affiliated with an independent asset manager. Among the largest 20 funds, an equal number was independent or had an affiliation. The sponsors with the largest values of *Fund Business* were Fidelity, followed by State Street, and Morgan Stanley.

II.2 Money market funds during the financial crisis

II.2.1 Change in risk-taking opportunities

Money market funds played an important role during the financial crisis of 2007–2010. Prior to August 2007, fund regulation effectively prevented the funds from investing in risky assets. As a result, since its origins in the 1970s, money market funds invested in similar assets and paid similar returns. However, starting from August 2007, a number of events changed the risk-taking opportunities of money market funds. On August 9, 2007, the French bank BNP Paribas halted withdrawals from its three funds invested in mortgage-backed securities and

suspended calculation of their net asset values. Even though defaults on mortgages had been rising throughout 2007, the suspension of withdrawals by BNP Paribas had a profoundly negative effect on money market assets. Within one day, the interest rate spread of overnight asset-backed commercial paper over the Fed funds rate rose from 10 basis points to 150 basis points, possibly because investors became concerned about the credit quality and liquidation values of collateral underlying money market instruments and stopped rolling over these instruments.

Even though money funds suffered almost no losses from impaired asset-backed commercial paper because these assets were effectively insured by commercial banks, going forward, it became clear that liquidation values of money market instruments were lower and that new issuances had to offer higher risk premia. Similar increases in risk premia also built up in other money market instruments that were perceived as risky—bank obligations, floating-rate notes, and commercial paper. At the same time, the rates of assets that were perceived as safe, such as Treasuries, repurchase agreements, and bank deposits, remained at much less elevated levels.

Figure II presents evidence of the sudden change in relative asset returns.[8] From January 2005 to July 2007, all asset classes had returns of about 15 to 25 basis points higher relative to those of Treasuries and agency debt, with no significant differences across asset classes. However, beginning with August 2007, the returns on risky asset classes started to increase rapidly with a peak in March 2008 when relative returns reached 125 basis points. After March 2008, the returns started to decline but still remained at a high 60 basis points as of August 2008. Over the same period, the returns on safe asset classes remained constant at around 20 basis points or even declined. In sum, starting in August 2007, we observed a clear divergence in returns across risky and safe asset classes.

Notably, the observed variation in returns on risky and safe asset classes coincided with key events during the financial crisis. First, the expansion in risk-taking opportunities occurred at the same time as did the run on asset-backed commercial paper in August 2007. Further, the

[8]The returns on individual asset classes are not directly observable to us, but we can impute them using fund-level data on returns and holdings. To this end, we regress fund returns on interaction terms of indicator variables for each asset class and month-fixed effects plus standard controls. For each asset class, the corresponding interaction term captures the monthly return relative to that of Treasuries and agency debt.

peak in returns to risky asset classes happened at the same time as the near-bankruptcy of the investment bank Bear Stearns. Finally, the decline in relative returns prior to August 2008 and the sudden spike in September 2008 (not shown in the Figures) matched market conditions around the Lehman's bankruptcy. Indeed, common indicators of market distress during the financial crisis, such as the LIBOR-OIS spread, exhibited similar time-series patterns as did the returns on risky asset classes of money market funds. Based on the above evidence, we conclude that the start of the financial crisis in August 2007 provided money market funds with the opportunity to invest in riskier assets.

II.2.2 Tale of two funds: Reserve Primary Fund and Fidelity Institutional Prime

We illustrate possible reactions to this change with an example of two funds: the Reserve Primary Fund (RPF) and the Fidelity Institutional Prime (FID). Between the two, RPF was particularly well known in the industry because of its owner, Bruce Bent, the founder of the first money market fund in the 1970s. Until July 2007, each fund managed about $25 billion in assets and charged similar management fees. In what follows, we present the evolution of each fund's returns, assets, and holdings over the period from August 2006 to August 2008.

In Figure III, we present the returns of both funds relative to the value-weighted industry average. Prior to August 2007, the relative returns of the two funds roughly matched the industry average. However, starting in August 2007, the relative returns diverged sharply: The return on RPF increased by about 50 basis points while the return on FID stayed at about the same level. The return differential triggered significant money flows: Relative to the average asset growth of all institutional prime funds, RPF increased its assets under management by 140%, while FID's asset value grew only by 40% by August 2008.

The observed differences in both returns and fund flows were largely a consequence of the differences in the underlying fund portfolios, especially after August 2007. Figure IV shows that RPF increased its holdings of risky assets from 0% to 60% while it reduced its exposure to safe Treasuries and repurchase agreements from 40% to 10%. In contrast, the share of risky assets

held by FID remained alike or even declined in 2008, and similarly the share of safe assets did not change significantly.

We argue that the difference in the risk taking between RPF and FID can be attributed to the differences of their sponsors in terms of their concerns over the remaining fund business. While RPF was managed by an independent mutual fund company with almost no other funds under management, FID was managed by Fidelity which sponsored a large share of other mutual funds and thus faced a significant concern of potential negative spillovers from FID to other funds managed by Fidelity. In fact, as of January 2006 the share of other fund business in Fidelity's operations equaled 93.9%. As it turns out, the underlying difference in the negative spillover risk was a crucial determinant of how each of the funds chose its own risk levels and how each of them absorbed the shocks related to the bankruptcy of Lehman Brothers.

II.2.3 Collapse of the Reserve Primary Fund and money market fund runs

One of the important assets among RPF's holdings was commercial paper issued by Lehman Brothers. According to quarterly SEC filings, RPF had no holdings of Lehman's commercial paper prior to August 2007, but by November 2007 the fund had purchased $375 million worth of the paper. By May 2008, the fund additionally increased its Lehman's holdings to $775 million, which at the time accounted for about 1% of its holdings.

On September 15, 2008, Lehman Brothers declared bankruptcy. Its failure triggered a panic in financial markets and led to a credit market freeze. As a result of the bankruptcy, the net asset value of RPF fell below $1 per share. The revelation of the fund's exposure to Lehman's risk triggered an immediate run on the fund. On September 16, 2008, the fund was forced to pay $10.8 billion in redemptions and faced about $28 billion of additional withdrawal requests. The fund's sponsor did not have sufficient financial resources to guarantee payments and was forced to halt redemptions. The run on RPF quickly spread to other money funds. Within a week, institutional investors reduced their investments in money funds by more than $172 billion.

Eventually, many funds got distressed and the consequences of the industry collapse became

dire. To stop the run on funds, on September 19, 2008, the U.S. Department of the Treasury announced an explicit deposit insurance covering all money market investments made prior to Lehman's bankruptcy. This announcement stopped the run and redemption requests receded shortly after. However, the announcement meant that the U.S. government had effectively insured the credit risk of $3 trillion in fund assets holdings.

III Data and Summary Statistics

Our study combines six data sources. First, we obtain data on the universe of taxable money market funds from iMoneyNet, which cover the period from January 2005 to September 2011 and include weekly fund-level data on returns, expense ratios (charged and incurred), holdings by asset class, average maturities of fund holdings, funds' name changes and exits. Second, we complement the data using information from CRSP Mutual Fund Survivorship Bias Free Mutual Fund Database, especially assets under management by family and different asset classes, which we use to construct one of our business concerns measures. Third, we use COMPUSTAT and companies' websites to collect information on fund sponsor characteristics. Fourth, we use S&P RatingsXpress, Lehman Brothers' Bond Database, COMPUSTAT, and companies' websites to gather data on credit ratings. Fifth, we obtain data on sponsors' CDS prices from Datastream. Sixth, we collect data on no-action letters issued by the SEC—an indication that a sponsor provided financial support to its fund. For funds with multiple share classes, we eliminate the duplicated funds and compute the fund-level variables by aggregating across the different share classes. In our data, some funds offer share classes to both retail and institutional investors. In most cases, institutional share classes are larger and we therefore define a fund as institutional if the fund offers at least one institutional share class. We define a fund as retail if the fund does not offer institutional share classes.[9] Altogether, we obtain a novel data set that, to the best of our knowledge, has not been used in academic research before. The details of how we matched

[9]For robustness, we also estimate all our results for funds that only offer institutional share classes. In general, the coefficients are stable and remain statistically significant (albeit standard errors slightly widen because of the reduction in observations).

the data sets are presented in Appendix A.

Column (1) of Table II provides summary statistics for all prime institutional money market funds (henceforth, prime funds) as of January 2006. Our sample includes 148 funds. The average fund size is $4.9 billion and the average fund age is 10.6 years. We compute the annualized spread as the fund return net of expenses minus the return on the three-month Treasury Bill. The average spread is 6.9 basis points and the average expense ratio is 32 basis points. In terms of assets holdings, prime funds hold 32.0% in commercial paper, 19.8% in floating-rate notes, 13.5% in repurchase agreements, 13.4% in asset-backed commercial paper, 12.2% in bank obligations, 6.0% in U.S. Treasuries and agency-backed debt, and 3.2% in deposits.

Next, we divide fund sponsors into two groups based on the size of their business concerns. Our primary measure of business concerns is *Fund Business*, defined as the sponsor's share of mutual fund assets other than institutional prime money market funds in total sponsor's assets. The idea behind this measure is that fund families with larger values of assets in other funds have more at stake in case their money market operations face distress.

Column (2) provides summary statistics for funds whose sponsors have *Fund Business* above the median value of 81.6% as of January 2006. Column (3) provides summary statistics for funds whose sponsors have the values below the median. We find that funds associated with sponsors of both high and low business concerns have similar fund characteristics and average assets holdings. The only difference is that funds sponsored by firms with high business concerns are on average more likely to be part of financial conglomerates. In fact, the affiliation with a conglomerate (i.e., commercial bank, investment bank, or insurance company) defines our second measure of business concerns (*Non-Fund Business*), which complements our first measure in that it captures the broader idea of a franchise value at stake, especially if the fund company is involved in operations other than asset management, as is the case for financial conglomerates. The downside of the measure is that it ignores the variation in business concerns within each sponsor type. In our remaining tests, we use both measures of business concerns bearing in mind that each of them captures a slightly different type of cross-sectional variation in the data.

IV Empirical Strategy and Results

IV.1 Determinants of sponsors' business concerns

An important advantage of our setting is that money market funds played a negligible role in shaping most fund sponsors' structures prior to August 2007. In particular, they typically constituted a small part of larger mutual fund families and the choice regarding the fund family's organization profile was likely independent of money funds themselves. Since the inception of money funds in the 1970s, all funds paid similar returns and there was little scope for exploiting private information or superior managerial ability. Indeed, money funds were considered a low-fee, low-cost business that invested in safe assets and was offered in conjunction with other, more profitable funds. The degree of sponsor's business concerns was thus primarily driven by the characteristics of the entire mutual fund family of which money funds were only minor consideration. In support of this claim, Table II shows that funds sponsored by firms with low business concerns were similar to funds sponsored by firms with high business concerns.

Given that money funds look similar on an ex-ante basis, our empirical strategy relies on the differential response of each sponsor type to an exogenous change in risk-taking opportunities. Specifically, starting in August 2007, money market instruments became significantly riskier, which allowed more scope in funds' risk-taking choices. This change in riskiness of the instruments provided money funds, usually constrained in their risk choices, with an opportunity to take on more risk.[10] Even though money market instruments experienced episodes of increased relative spreads in the past, it is fair to say that the sustained expansion in risk-taking opportunities was unique in the history of money funds. Hence, it is unlikely that the fund sponsor's scope for business concerns was chosen in anticipation of the change in risk-taking opportunities.

We test whether differences among funds in their business concerns and financial strength affected the funds' risk choices after the start of the financial crisis. To test this hypothesis, we proceed in four steps. First, we estimate the change in risk-taking opportunities. Next, we

[10]More generally, other studies, including Brunnermeier (2009), Gorton (2009), and Kacperczyk and Schnabl (2010) have documented significant increases in the riskiness of other asset classes over the same period.

analyze the impact of fund returns on fund flows, the relationship which speaks to the incentives of funds to take on more risk. Further, we present evidence on the role of business concerns and financial strength in risk-taking behavior. Finally, we show that a fund sponsor's reputation cost was indeed a good predictor of which funds received support from their sponsors during the market-wide run in September 2008.

In all regressions, we pay particular attention to differences across sponsor types prior to August 2007. If a sponsor type were not chosen with regard to risk taking of money funds, then we should not observe any impact of business concerns prior to August 2007. Hence, we expect neither absolute differences nor differential trends by sponsor type before August 2007.

IV.2 Expansion of risk-taking opportunities

We document the change in risk-taking opportunities using weekly data on fund holdings and fund returns. Specifically, we estimate the following regression model:

$$Spread_{i,t+1} = \alpha_i + \mu_t + \beta_j Holdings_{i,j,t} + \gamma \mathbf{X_{i,t}} + \varepsilon_{i,t+1} \quad (1)$$

where $Spread_{i,t+1}$ is the annualized return (spread) of a fund i in week $t+1$, $Holdings_{i,j,t}$ denotes a fund i's fractional holdings of asset category j at the end of week t, α_i denotes fund-fixed effects, and μ_t denotes week-fixed effects. The asset categories include repurchase agreements, bank deposits, bank obligations, floating-rate notes, commercial paper, and asset-backed commercial paper. The omitted category is Treasuries and government agency debt. $X_{i,t}$ is a vector of fund-specific controls that includes the natural logarithm of fund size (*Log(Fund Size)*), fund expenses (*Expense Ratio*), fund age (*Age*), and the natural logarithm of the fund family size (*Log(Family Size)*). Our coefficients of interest are β_j, which measure the return on money market instrument j in week $t+1$ relative to that of Treasuries and agency assets.

We estimate the regression model separately for the *post* period from August 2007 to August 2008 and the *pre* period from January 2006 to July 2007. The post period starts with the beginning of the subprime crisis in August 2007 and ends immediately before the market-wide

run in September 2008. We do not include observations during the run and the period thereafter because subsequent government interventions significantly altered risk-taking incentives.

Our estimation strategy is akin to estimating a standard difference-in-differences regression model. Specifically, the difference in the coefficients of interest, β_j, between the post and pre period is identical to the coefficient one would obtain from estimating such a model. We choose to report our estimation results separately for the pre and post periods because the results help us to validate our identification strategy which asserts no difference in risk taking in the pre period. In all regression models, we allow for the flexible correlation of error terms within funds by clustering standard errors at the fund level.

Columns (1) and (2) of Table III report the pre-period and post-period results for the model without fund-fixed effects. We find that risky asset classes experience significantly larger returns in the post period relative to those in the pre period, whereas safe asset classes have similar returns during both periods. For example, in the post period, the return on a fund fully invested in (risky) bank obligations would have been 87 basis points higher than the return on a fund fully invested in (safe) Treasury and agency debt. The comparable differential in the pre period would have only been 15 basis points. We find similar effects for other risky asset classes, such as floating-rate notes, commercial paper, and asset-backed commercial paper. In contrast, the return on a fund fully invested in (safe) repurchase agreements would have been 13 to 17 basis points higher than the return on a fund fully invested in Treasury and agency assets, both in the pre and post periods. We obtain similar results for other safe asset classes.

One possible concern with the results is that funds with large holdings of risky asset classes might be also riskier along other unobserved dimensions. For example, these funds may choose the most risky assets within an asset class such that we would overestimate the average impact of holding riskier assets. To address this concern, we introduce fund-fixed effects, which account for any unobserved time-invariant fund characteristics within the pre or post periods.

We find quantitatively and qualitatively similar results, as reported in columns (3) and (4). For example, the return on a fund fully invested in bank obligations would have been 93 basis

points higher than the return on a fund fully invested in Treasury and agency assets. In contrast, the comparable differential would have only been 7 basis points in the pre period. Hence, our findings are unlikely to be driven by unobserved time-invariant fund characteristics.

Overall, these results suggest that money market funds did experience a large exogenous expansion in their risk-taking opportunities. The expansion was economically large in the sense that the returns on risky asset classes, relative to safe ones, were five folds larger after August 2007, compared to before. Moreover, the expansion was likely exogenous to money market funds as it was caused by financial distress among issuers of money market instruments and not by the funds themselves. The issuers were directly exposed to the subprime crisis and their instruments therefore commanded higher risk premia. Hence, starting in August 2007, funds were given a choice of whether to invest in risky or safe assets.[11]

IV.3 The flow-performance relationship

The main incentive for a fund to increase risk is to raise its income. This happens because risk taking increases fund returns, which in turn translates into greater fund inflows. Given that money market funds earn a fixed percentage of assets under management, fund inflows lead to a higher fund income. This model of competition has been widely documented in studies of equity mutual funds. These studies usually find that past performance is one of the strongest predictors of flows to equity funds (e.g., Chevalier and Ellison (1997)).

We therefore assess the benefits of investing in riskier asset classes by estimating the sensitivity of fund flows to past returns using the following regression model:

$$\textit{Fund Flow}_{i,t+1} = \alpha + \beta \textit{Spread}_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t+1} \tag{2}$$

where $\textit{Fund Flow}_{i,t+1}$ is the percentage increase in a fund's i size from week t to week $t+1$

[11] We note that the overall issuance of riskier asset classes declined over this period. For example, total asset-backed commercial paper outstanding dropped by almost 50%, from $1.3 trillion in August 2007 to $700 billion in August 2008. Our focus is on the variation in holdings *across* funds. While the majority of money funds decreased their holdings of risky asset classes, some funds, such as the Reserve Primary Fund, increased their holdings.

accounting for earned interest, $Spread_{i,t}$ and $X_{i,t}$ are defined as in (1). In addition, we include the volatility of fund flows, $Flow\ Volatility_{i,t}$, measured as a standard deviation of fund flows over the previous 13 weeks. Our coefficient of interest is β, which measures the sensitivity of fund flows to fund past returns. We allow for correlation of error terms within funds by clustering observations at the fund level.

Table IV reports the results. Columns (1) and (2) show the results separately for the pre and post periods for the model without fund-fixed effects. We find that during the post period a one-standard-deviation increase in fund returns increases subsequent fund flows by 0.6% per week, or equivalently a fund size by 42% per year. Conversely, we find no statistically significant effect of fund past returns on fund flows during the pre period. To rule out the possibility that our results are driven by unobserved time-invariant fund-specific attributes correlated with fund spreads, in columns (3) and (4), we additionally report the pre-period and post-period results for the model with fund-fixed effects. The flow-performance relationship is even larger: by 2.6 times in the post period; again, we observe no impact on flows during the pre period.

The incentives to take risk may be also shaped by differences in flows that funds with different levels of business concerns receive conditional on their performance. In particular, if funds sponsored by companies with a high degree of concerns receive more flows, one would expect them to be more willing to take relatively less risk since their compensation relies to a lesser extent on their performance. We test this hypothesis by estimating the flow-performance relationship while controlling for *Business Concerns*. If investors incorporate business concerns in their decisions, we should expect the coefficient of *Business Concerns* to be positive.

We find that—conditional on fund performance—the sponsor's business concerns do not affect fund flows. As before, we find a strong flow-performance relationship in the post period but not in the pre period. Hence, our results are unlikely to be driven by different responses of flows to the levels of business concerns.

We also examine whether the observed change in the sensitivity of flows to performance depends on the sponsor's willingness to provide implicit guarantee. To this end, we extend our

empirical model in (2) by including interaction terms of fund spread and business concerns. We present the results in columns (5)-(6). For both subperiods, we find that the coefficients of the interaction terms are statistically and economically insignificant for both measures of business concerns. Hence, the benefits to having a greater fund performance in terms of greater fund inflows do not differ significantly across the sponsor types.

In sum, the results support our premise that there was little scope to increase fund returns in the pre period, but a large incentive to take on more risk in the post period and the ability to attract flows was not driven by the underlying differences in funds' business concerns.

IV.4 Business concerns and risk taking

We now study the response of different fund sponsors to changes in risk-taking opportunities. In particular, we compare risk-taking behavior of funds sponsored by companies with high business concerns to that of funds sponsored by companies with low business concerns. Our hypothesis is that greater concerns over non-money fund business decrease the funds' incentives to take on risk. To this end, we estimate the following difference-in-differences regression model which estimates the differences between post-period and pre-period coefficients:

$$Risk_{i,t+1} = \alpha + \mu_t + \beta_1 Business\ Concerns_{i,2006} + \beta_2 Business\ Concerns_{i,2006} * Post_t + \gamma X_{i,2006} + \varepsilon_{i,t+1} \quad (3)$$

where $Business\ Concerns_{i,2006}$ is a generic name for either *Fund Business* or *Non-Fund Business*. *Post* is an indicator variable equal to one for the post period and equal to zero for the pre period. $X_{i,2006}$ is a vector of control variables that is identical to the one we use in equation (2). Both business concerns variables and other controls are measured as of January 2006, which mitigates the concern that fund risk choices are driven by changes in fund characteristics due to investment opportunity change. Our regression model also includes week-fixed effects (μ_t), which account for any time differences in aggregate fund flows or macroeconomic conditions driving the risk-taking decisions of different fund sponsors. Since $Non\text{-}Fund\ Business_i$ is a fund-sponsor attribute, it is

possible that risk taking within the same sponsor may be correlated across its funds. To address this concern, we cluster standard errors at the sponsor level. Our coefficient of interest is β, which measures the impact of sponsor's business concerns on risk taking.

We use three measures of risk ($Risk_{it}$), all measured at a weekly frequency. The first measure is *Spread*, which is the fund return, net of the Treasury Bill rate. In the context of money market funds, spreads are a good measure of risk because there is little scope for managerial skill, which makes fund returns largely reflect fund portfolio risk. One potential problem with using this measure, however, is that it may vary over time even though managers may not make any active changes in the risk profile of their portfolios, only because the returns on individual assets in the portfolio change. This could also happen in our setting since the relative returns on individual assets changed significantly between the pre and post periods.

To account for such mechanical changes in portfolio riskiness, we propose two other measures. Our second measure is *Holdings Risk*, defined as a fraction of obligations net of repurchase agreements and Treasuries in a fund portfolio. As reported in Table II, repos and U.S. Treasuries are the safest asset classes and bank obligations are the riskiest asset class.

Our third measure, *Maturity Risk*, is the average maturity of assets in a fund portfolio. In general, funds with longer maturities of their assets would be considered riskier. We also studied implications of using the sensitivity of fund returns to changes in Treasury Bill rates (akin to duration risk). The measure is obtained from the fund-level time-series regression model in which the estimation is performed separately for the pre and post periods. The results are qualitatively similar to the ones we report below.

We begin with a nonparametric analysis of the observed effects. For each month between January 2006 and August 2008, we estimate the coefficient β from the cross-sectional regression model (3) for *Fund Business*. Panel A of Figure V presents the time series of estimates βs for *Holdings Risk*. We find no visible differences in the impact of *Fund Business* on portfolios' risk prior to August 2007, but starting from August 2007, we observe a large negative effect of *Fund Business* on *Holdings Risk*. Panel B reports the results for *Maturity Risk*, and Panel C for

Spread. Again, we observe similar patterns in loadings on *Fund Business* as for *Holdings Risk*.

Next, we present the results from the difference-in-differences regression model corresponding to the nonparametric analysis. In columns (1), (4), and (7) of Table V, we show the results for the base-case model. For the post period, we find that a one-standard-deviation increase in *Fund Business* reduces *Holdings Risk* by 3.6 percentage points, *Maturity Risk* by 2.3 days, and *Spread* by 3.0 basis points. The results are statistically significant. They are also economically significant: A one-standard-deviation increase in *Fund Business* corresponds to a 14.5% drop in *Holdings Risk* relative to the cross-sectional standard deviation of fund *Holdings Risk*. The respective quantities for *Maturity Risk* and *Spread* account for 18.9% and 18.3%. Similar results obtain for *Non-Fund Business*. In contrast, we do not find any statistically significant impact of business concerns on any of the risk measures in the pre period, as evidenced from the lack of statistical significance for coefficients of *Fund Business* and *Non-Fund Business*.

In addition, our results might be driven by unobserved time-invariant differences among funds or fund sponsors that are correlated with business concerns. We address this issue by including sponsor-fixed effects, in columns (2), (5), and (8), and fund-fixed effects, in columns (3), (6), and (9). In all these specifications, we find no difference in the quality of our results.

IV.5 The role of financial strength

Our empirical analysis so far reveals the importance of business concerns as a driver of risk-taking decisions of money market funds. This result should be particularly strong if the bailout by fund sponsor is ex post optimal. However, the willingness to bail out the fund needs to be also contrasted with the sponsor's ability to do so. In particular, conditional on a given level of business concerns, one would expect funds with greater financial strength to take on more risk. In our setting, however, financial strength is likely correlated with business concerns and thus introducing each factor in separation would not help to establish the role of financial strength.

To allow for such a separation we refine our empirical design. To this end, we analyze risk choices separately for funds sponsored by financial conglomerates and for those sponsored

by independent asset managers. By analyzing cross-sectional variation in risk within financial conglomerates, we can fix the business-concerns margin while varying the financial-strength margin. Likewise, by looking into independent asset managers, we can fix the financial-strength margin while varying the business-concerns margin.

Our measure of financial strength for financial conglomerates is the price of CDS contract of the sponsor. We argue that higher CDS price indicates weaker financial situation of the sponsor. Panel A of Table VI presents the results from estimating the following difference-in-differences regression model for financial conglomerates:

$$Risk_{i,t+1} = \alpha + \mu_t + \beta_1 CDS_{i,2006} + \beta_2 CDS_{i,2006} * Post_t + \gamma X_{i,2006} + \varepsilon_{i,t+1} \quad (4)$$

Columns (1), (3), and (5) present the results for the model with CDS prices. For each measure of risk the coefficient of the interaction term between *CDS* and *Post* is negative and statistically significant. In columns (2), (4), and (6), we report results from estimating the same model in which we additionally include *Fund Business* and its interaction with *Post* as control variables. Including this measure is supposed to account for any additional degree of variation in business concerns that is unexplained by *Non-Fund Business*. The results show that for the two out of three risk measures the coefficient of *Fund Business*Post* is negative, but it is statistically significant only for *Spread*. The relatively weak power of our results is consistent with the notion that business concerns in financial conglomerates do not stem from asset management business only. At the same time, including the effect of *Fund Business* does not alter the results related to financial strength: The coefficient of *CDS* retains its sign and statistical significance.

In Panel B, we report the results from estimating the risk regression model for independent managers only. The key assumption underlying this test is that independent managers exhibit similar financial weakness. In columns (1), (3), and (5) we control for *Fund Business* and its interaction with *Post*. Consistent with our hypothesis, we find that all three measures of risk are negatively correlated with business concerns. While the premise of our test is similarity in financial strength, in columns (2), (4), and (6), we additionally allow for any unexplained

variation in sponsors' financial strength that is not captured by the affiliation with independent asset manager. Our measure of financial strength is a fund sponsor's credit rating. The reason why credit rating might be a good proxy for our purpose is that fund sponsors with a good credit standing may be more able to access short-term funding markets and as such they may have more capacity to provide support. We measure rating quality with an indicator variable (*No Rating*) equal to one if the fund sponsor has no rating and equal to zero otherwise, that is, funds with no rating are deemed to have lower financial strength. We predict that the coefficient of the interaction term of *No Rating* and *Post* should be negative.

The results are consistent with our hypothesis in that the coefficient of the interaction term is negative for all risk measures. However, it is statistically significant only for one out of three measures. This result might not be entirely surprising since our test was designed to eliminate as much as possible of a cross-sectional variation in financial strength and thus any unexplained variation in financial strength is likely to have low statistical power to explain variation in risk. On the other hand, allowing for credit ratings does not take away from the coefficient of interaction term between *Fund Business* and *Post*. It remains negative and statistically significant.

Overall, the results strengthen our interpretation that—conditional on financial strength—the degree of business concerns negatively affects risk taking and—conditional on similar business concerns—financial strength positively affects risk taking.

IV.6 Post-Lehman analysis

In this section, we assess the cross-sectional variation in the response of fund investors and sponsors after Lehman's bankruptcy. In our first test, we examine the effect of business concerns on financial support provided by fund sponsors during the one-week period after the start of the run in September 2008 but prior to the introduction of the Federal Deposit Insurance of money market fund assets. To illustrate the scale and scope of the support, in Table A.1 of Appendix A, we provide detailed information about support arrangements established in the aftermath

of Lehman's collapse. It is apparent that the support was not limited to a few funds but was rather a common incidence during that period. In brief, we observe 28 support events in the week following Lehman's default. Importantly, the scope of support by funds can be even larger since one event can denote a support to more than one fund.

Formally, we estimate the following regression model:

$$Support_{i,10/2008} = \alpha + \beta Business\ Concerns_{i,2006} + \gamma X_{i,2006} + \varepsilon_{i,10/2008} \tag{5}$$

where *Support* takes a value of one if the fund sponsor offered support to its fund, and zero, otherwise. *Business Concerns* is measured using either *Fund Business* or *Non-Fund Business*. X is a vector of control variables that includes *Log(Fund Size)*, *Age*, *Expense Ratio*, and *Log(Family Size)*. All independent variables are measured as of January 2006.

We present the estimation results in column (1) of Table VII. We find a positive and statistically significant effect of *Non-Fund Business* on the probability of receiving financial support: Funds affiliated with financial conglomerates are 26.3% percentage points more likely to receive financial support in the week after Lehman's bankruptcy. At the same time, we find no effect of *Fund Business* on support. These results suggest that business concerns of fund sponsors associated with financial conglomerates might be of greater importance to fund sponsors, which makes the sponsors more likely to respond to any distress in their money market funds.

Subsequently, we assess the impact of business concerns on fund redemptions. To this end, we estimate the following regression model:

$$Redemptions_{i,09/2008} = \alpha + \beta Business\ Concerns_{i,2006} + \gamma X_{i,2006} + \varepsilon_{i,09/2008} \tag{6}$$

where *Redemptions* is the change in a fund size between September 18 and September 25, 2008. *Business Concerns* and X are defined as before and measured as of January 2006.

We present the estimation results in column (2). We find that funds whose sponsors have larger business concerns suffer smaller redemptions: A one-standard deviation increase in *Fund*

Business reduces redemptions by 3.0 percentage points, or by 30.2% of the average redemption. At the same time, we find a weaker effect of *Non-Fund Business* on the degree of redemptions.

Next, we evaluate the impact of business concerns on fund exit in the two years following October 1, 2009, which is the expiration date of the government guarantee program. We identify 16 instances of fund closures during that period, which we want to relate to reputation effects. We estimate the following regression model:

$$Exit_{i,2009/2011} = \alpha + \beta Business\ Concerns_{i,2006} + \gamma X_{i,2006} + \varepsilon_{i,2009/2011} \tag{7}$$

where *Exit* is an indicator variable equal to one if a fund exited the market between October 1, 2009 and September 30, 2011, and zero otherwise. *Business Concerns* and X are defined as before. The results in column (3) show that funds associated with conglomerates are more likely to exit the market following the run on the industry. In contrast, we find no evidence of such effect for *Fund Business*. The results suggest that, in response to adverse conditions in the industry, sponsors with greater business concerns at stake exit the market to shield themselves from possible negative spillovers to other businesses.

Finally, we analyze the effect of business concerns on fund naming strategies. We begin with the observation that prior to the run on money market funds some fund companies held names that were distinctly different from the names of their fund sponsors. However, in the aftermath of the run, some funds decided to change their names in a way that would closely reflect the underlying sponsor name. For example, prior to the run, Bank of America offered a fund named Columbia Cash Reserves, but this fund changed its name to Bank of America Cash Reserves in November 2009. We posit that funds with greater business concerns might be more likely to change their names because they want to signal to their investors the potential safety of their operations. Our sample includes eight such name changes over the period of two years.

To evaluate the hypothesis, we estimate the following regression model:

$$NameChange_{i,2009/2011} = \alpha + \beta Business\ Concerns_{i,2009} + \gamma X_{i,2009} + \varepsilon_{i,2009/2011} \tag{8}$$

where *Name Change* is an indicator variable equal to one if a fund changed its name to mimic its sponsor's name between October 1, 2009 and September 30, 2011, equal to minus one if the fund changed its name away from that of its sponsor,[12] and zero otherwise. *Business Concerns* and X are defined as before and measured as of October 2009. The results in column (4) show that funds with greater business concerns are more likely to change their names following the run on the industry. The effect is estimated with good precision for *Fund Business* but is significantly weaker for *Non-Fund Business*.

Overall, we find some evidence that concerns over possible loss of business might have played an important role in the way fund investors and fund sponsors evaluated their funds in the aftermath of the run on money market fund industry.

IV.7 Do unobserved sponsors' characteristics explain risk choices?

In our conceptual framework, we posit that a sponsor's business concerns and financial strength have a significant impact on its funds' risk taking. However, our effects might be driven not by differences in the sponsor's business concerns and/or financial strength, but rather by unobserved differences in investment styles or manager ability across fund families, which in turn might be correlated with business concerns and financial strength. For example, a fund sponsored by BlackRock, a small-concern company, might be willing to take more risk than a fund sponsored, by Bank of America, a large-concern company, due to its superior financial expertise or greater risk tolerance. To the extent that the variation in style or risk aversion among funds is permanent, our difference-in-differences estimator would account for any such differences. But our empirical approach might fail if the variation differentially affects risk taking in the pre and post periods. For example, fund sponsors may differ in their reactions to any changes in the quantity of risk, or in their propensities to take risk when risk-taking opportunities arise.

[12] We observe only one instance of such a reverse name change.

IV.7.1 Evidence from retail money market funds

Although we believe such differences are *a priori* not obvious, we conduct a more direct test, in which we identify the coefficients of interest off the differences between institutional and retail funds. To the extent that fund sponsors offer both retail and institutional fund portfolios to their investors, one would imagine that both types of portfolios, within the same fund sponsor, should have similar levels of risk as long as their risk-taking behavior is governed by sponsor-specific characteristics. However, retail investors react much less to differences in return differentials across funds; therefore, we expect a much smaller effect for retail funds even though sponsors of retail and institutional funds have the same unobserved characteristics. Given that retail funds have different asset base, we alter our previously used measure of business concerns and introduce a new measure, *Retail Fund Business*, calculated as the sponsor's share of mutual fund assets other than retail prime money market funds in total sponsor's assets.

We begin our analysis with estimating the flow-performance relationship for retail funds, separately for the pre and post periods, with and without fund-fixed effects. Panel A of Table VIII presents the results. Although we observe some effect of spread on fund flows in the pre period, we find that the flow-performance relationship is quite weak for the sample of retail funds in the post period, which is crucial for our analysis of risk taking. The effect is also not driven by business concerns of fund sponsors as evidenced from columns (5) and (6). Hence, the risk-taking incentives for retail funds are smaller than those of institutional funds.[13]

Building on this result, we further compare risk taking across fund sponsors, separately for institutional and retail funds using the setting of Table V. We present the results in Panel B of Table VIII. The results for the two groups of funds are quite striking. While we observe statistically and economically significant differences for institutional funds, these differences are insignificant for retail funds. If anything, the results go in the opposite direction.

Overall, the observed patterns in risk taking across funds with different business concerns are unlikely to be driven by differences among fund management companies along some unobserved

[13]This result has been also established in a concurrent unpublished work by Wermers (2011).

characteristics, such as managerial information quality, style, or risk aversion, that are correlated with sponsors' business concerns.

IV.7.2 Evidence from the government's post-Lehman intervention

Our second identification strategy relies on yet another, exogenous change in the importance of business concerns and financial strength. In particular, following the default of Lehman Brothers in September 2008, money market funds experienced a run. Since the likely consequences of this run were severe, the government decided to save the entire money market fund industry and extend explicit guarantees to all money market funds and their investors. Effectively, for the duration of the guarantee, which lasted over a year, this intervention largely eliminated the risk of fund failure. Notably, given that the government did not rescue the Reserve Primary Fund this guarantee was likely unexpected. Consequently, if the presence of implicit guarantees drives the observed differences in risk taking, we should expect that any pre-existing differences in risk-taking behavior among funds should be attenuated afterwards.

To evaluate this hypothesis, we revisit the regression model in Table V and extend our analysis to December 2010. We now consider three periods: January 2006–July 2007, August 2007–August 2008, and April 2009–December 2010. We do not include the data for the two quarters immediately following Lehman's default because the process of implementing explicit guarantees really did not take place until the end of 2008.[14] Also, many financial markets were very illiquid right after the default, so any adjustment of risk on the side of the funds was quite difficult to accomplish. Our empirical strategy involves estimating the risk-taking regression model using a difference-in-differences approach, in which *Business Concerns* is interacted with two indicator variables: *Post*, equal to one for the period August 2007–August 2008, and equal to zero, otherwise; and *Post-Lehman* equal to one for the period April 2009–December 2010, and zero, otherwise. In line with our hypothesis, we expect a zero effect of *Business Concerns* in the pre period, a negative effect in the post period, and again a zero effect in the post-Lehman

[14] Duygan-Bump, Parkinson, Rosengren, Suarez and Willen (2010) and Kacperczyk and Schnabl (2010) discuss the workings and exact timing of different government interventions.

period.

We report the results in Table IX. Consistent with our hypothesis, the coefficient of *Post-Lehman* is close to zero for two out of three risk measures. This result suggests that the importance of business concerns has become negligible once the government rolled out an explicit support for all funds. Hence, concerns over lost business might have played an important role in the August 2007-August 2008 period.

V Additional Evidence

In this section, we provide additional results that offer support to our main hypothesis.

V.1 Do differences in managerial compensation explain risk choices?

A possible explanation for our results could be that fund managers or fund management companies with greater business concerns differ in their compensation levels; hence, they have different incentives to take on risk. For example, if managers of funds sponsored by high-concern companies had lower compensation levels, one could imagine that such managers would have greater incentives to take risk to increase their funds' assets under management. We evaluate this hypothesis formally by relating the value of a fund's compensation to *Business Concerns*. We use two different measures of compensation: *Total Compensation*, calculated as a product of fund size and its expense ratio, *Expense Ratio* which is a percentage fee charged by the fund on its assets.

The results of this estimation, presented in Panel A of Table X, do not support the hypothesis that differences in risk can be attributed to differences in managerial compensation. If anything, we observe the opposite effect: High-concern funds on average have higher compensation levels, though this result is statistically insignificant and economically small. More generally, this result suggests that firms with an ability to extend support do not charge additional fees for providing guarantees to their fund investors, which is consistent with our view that fund flows are fairly unresponsive to the guarantee provision.

V.2 Are the results due to outliers in business concerns?

The money funds in our sample exhibit a significant cross-sectional dispersion in their business concerns levels. In fact, quite a few funds display particularly low levels, largely because they specialize in the money market fund management. The presence of such cases raises the possibility that our results might be driven by a few extreme observations. We inspected the data using various scattered plots and have found no good reason to believe that the outliers drive our results. As an additional robustness, we exclude all fund observations with *Fund Business* below 50% and re-estimate the regression model in Table V. The results remain qualitatively unchanged and if anything become quantitatively stronger. Thus, it is unlikely that funds with extremely low business concerns drive our results.

V.3 Does fund size explain the business-concerns effects?

The workings of money market funds often depend on the size of the fund company. Anecdotally, large funds are often considered to be more involved in active risk choices, while smaller funds are often considered to be simple cash-parking vehicles that do not engage in active risk-management strategies. Hence, one would expect our results to be stronger for large funds. To this end, we estimate the regression model in Table V for the subsample of funds with assets under management over $1 billion, the value which is anecdotally treated as a cutoff for the fund to be considered large and important. Panel C of Table X presents the results for the post period. We find that the risk effect indeed becomes stronger, though not by much.

V.4 The significance of the Reserve Primary Fund

One of the possible concerns with our results relates to our motivating example. In particular, the case of the Reserve Primary Fund constitutes one of the most extreme risk-shifting behaviors among all fund sponsors. To the extent that RPF is sponsored by a company with small business concerns, our results might be driven by just one observation: the Reserve Primary Fund. To ensure the robustness of our results, we exclude the fund from our sample and re-estimate the

regression model in Table V on the restricted sample. Panel D of Table X presents the results for the post period. We find no significant difference in magnitude of the coefficients of *Business Concerns*, which suggests that our results are not merely driven by the RPF observation.

VI Concluding Remarks

We study the determinants of risk-taking decisions by money market funds. Using the change in relative risks of money market instruments as an exogenous shock to the funds' risk-taking opportunities, we find that funds sponsored by companies with small concerns over their remaining business and significant financial ability to provide support took on more risk relative to funds sponsored by companies with greater business concerns and lower ability to provide such support starting August 2007, but not before. In support of our explanation, we further show that funds whose sponsors had greater business concerns experienced smaller outflows, were more likely to provide financial support during a market-wide run in September 2008, and were more likely to exit the industry or change their names.

More broadly, we view our setting as a unique laboratory in which to study the microeconomic foundations of financial bailouts. Recent financial literature (e.g., Freixas, Loranth and Morrison (2007); Panageas (2010)) investigates the impact of government guarantees on risk-taking incentives. We argue that some of the macro effects may also have their counterparts at the individual firm level though the direction of the effects may actually reverse.

We want to emphasize one possible difference between ours and previous studies. While prior settings largely focused on interventions in which guarantors do not have a direct stake in the company (e.g., government), in our study, guarantors have a stake in the company. What makes such a setting potentially interesting and novel is that incentive problems related to asymmetric information and moral hazard, typically present in the context of external guarantors, might be significantly altered in the presence of internal guarantors. We especially highlight the role of business concerns as a significant mitigating factor in risk-taking behavior.

Finally, although our explanation of risk taking mostly emphasizes the role of business con-

cerns and financial strength, one could imagine other explanations of our findings, such as "conglomerate bureaucracy".[15] In particular, it is well known that stand-alone firms respond more aggressively to changes in industry Q than do the divisions of a conglomerate. By the same token, an independent money fund may respond more strongly to an opportunity to rapidly grow its assets. While the lack of precise data on internal decision making inside fund organization makes it difficult to test this theory directly, one could also argue that the bureaucracy effect is related to business concerns and arises endogenously to protect fund sponsor's reputation from wild behavior in one division. Given the conflicting explanations, relating the risk-taking behavior in the context of internal capital markets appears a fruitful area for future research.

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Appendix A: Data Construction

The main source of our data on money market funds is iMoneyNet. The iMoneyNet database covers the universe of money market funds. Every week all funds submit data on total assets, returns, expense ratios, and holdings by asset class. We confirm the full coverage by comparing the iMoneyNet data with the list of all funds based on SEC data. We also aggregate total assets and compare asset holdings to official asset holdings by the SEC. Both tests confirm that iMoneyNet covers the universe of money market funds. This finding is consistent with our understanding that the data are widely used across the money market fund industry and represent the primary source of information on money market funds. Most detailed and accurate information is available for the period from January 2005 to September 2011, which is the period of our analysis.

The data we obtain are reported at the share-class level. We have 236,335 total observations on prime money market funds for the period of our analysis. To ensure precision of our tests, we first check that all share classes are reported consistently throughout the data set (i.e., after a share class enters the data set and before a share class exists from the data set). We find that only 17 out of 1820 share classes have some missing data. Almost all missing data are from funds that report monthly for the first few months of their existence and later switch to weekly reporting. We use linear interpolation to generate weekly data for these funds. However, all results are robust to dropping these observations.

Since our main analysis is at the fund level, we need to aggregate the data across all share classes into one fund portfolio. For that reason, we use information about total fund assets that is provided next to share-class specific information and an indicator variable equal to one if a given share class is the fund's main share class and equal to zero for other share classes. We perform several data checks to ensure that our aggregation process is accurate. First, we verify the fund identifier by comparing total weekly fund assets with the number obtained from adding weekly assets by share class. Second, we test whether reported asset holding add up to 100%. We find 217 out of 236,335 observations for which asset holdings do not add up. But the value of the deviation is almost always below 4%, which suggests that these are rounding errors. All results are robust to rescaling asset holdings such that holdings add up to 100%.

We construct fund-level investor categories by aggregating all institutional and retail share classes at the fund-week level using the unique fund identifier. We obtain a total of 104,409 observations at the week-fund level. We label a fund as institutional if the fund has at least one institutional share class (47,959 observations). We label a fund as retail if there is no institutional share class (56,490 observations). Most of our analysis focuses on institutional funds over the period from January 2006 to August 2008 (19,998 observations). The main analysis is restricted to funds that remain in the data set throughout this period (19,097 observations).

Subsequently, we merge the iMoneyNet data to the CRSP Survivorship Bias Free Mutual Fund Database. The CRSP Mutual Fund data are at the monthly level and we therefore match at that frequency (any within-month variation is assumed constant). To perform the match, we use the share class NASDAQ identifier provided by iMoneyNet as our primary identifying variable. If the NASDAQ identifier matches to more than one observation in CRSP, we use the share class with the most assets in CRSP. For a small number of observations, iMoneyNet does not provide a NASDAQ identifier or the NASDAQ identifier is not reported by CRSP. In that case, we assign the same NASDAQ identifier based on other share classes of the same fund. If no other share classes have a valid NASDAQ identifier, we match the funds based on fund name. If there is no entry in CRSP, we match directly to the sponsor name based on fund's SEC filings in EDGAR. We are able to match all fund observations.

To calculate fund spread, we obtain data on weekly risk-free rate from Ken French's website. We also collect data on weekly Fed Funds rate from the Federal Reserve website. We match both data sets to iMoneyNet data.

We assign the sponsor based on CRSP data. CRSP data provides detailed information about asset management companies that sponsor the respective funds. Most funds have a fixed sponsor during our data period. However, in a few cases, fund sponsors might change, for example due to mergers. If the sponsor changes over the lifetime of a fund we assign to the fund the sponsor that was in charge of the fund as of the first week of January 2006. For all sponsors, we collect information on whether the sponsor is affiliated with commercial banks, investment banks, insurance companies, or is managed by an independent asset manager. We collect the information from COMPUSTAT, company websites, EDGAR, SEC filings, and press reports. We use at least two sources to ensure validity of this information. We ensure that all data are as of January 2006.

We obtain sponsor ratings from several data sources. We first match sponsor names to S&P RatingsXpress as of January 2006. Next, we match any unmatched sponsors to the Lehman Brothers' Bond Database. We ensure that both data sets provide the same information. We also double-check the information with the company website and press releases.

We gather sponsor CDS prices from Datastream. For that purpose, we search for each sponsor's name in Datastream and assign the corresponding CDS. We also consult other academic work on CDS to ensure that we find all sponsors with traded CDS.

Finally, we collect information on financial support from the SEC website. We collect all no-action letters posted in September 2008 or thereafter. We check with Peter Crane's industry blog to ensure that we cover all sponsors that provided bailouts. We collect information on the specifics of the bailouts based on the no-action letter and press releases. We report detailed information on sponsor bailouts in Table A.1.

Table A.1: Detailed Information on the Post-Lehman Support Arrangements

The columns include the fund company offered support, the sponsor company providing support, the support date, the reason for support, the values of distressed securities, the value of support, and additional remarks.

Fund Company	Sponsor	Support Date	Distress reason	Value of distressed assets	Support Value	Remarks
Dreyfus Cash Mgmt. Plus Inc.	BNY Mellon	10/20/2008	Lehman Brothers notes	$97.2M		Cash contribution necessary to maintain the fund value at 0.995
All Dreyfus Funds	BNY Mellon	10/20/2008	Distress of eligible assets			CSA (Cash contribution necessary to maintain the fund value at 0.995)
All Citizens Funds	BNY Mellon	10/20/2008	Distress of eligible assets			CSA (Cash contribution necessary to maintain the fund value at 0.995)
All General Funds	BNY Mellon	10/20/2008	Distress of eligible assets			CSA (Cash contribution necessary to maintain the fund value at 0.995)
Dreyfus Basic MMF	BNY Mellon	10/20/2008	Lehman Brothers notes	$45M		Cash contribution necessary to maintain the fund value at 0.995
Dreyfus LAP	BNY Mellon	10/20/2008	Lehman Brothers notes	$100M		Cash contribution necessary to maintain the fund value at 0.995
Dreyfus Worldwide Dollar MMF	BNY Mellon	10/20/2008	Lehman Brothers notes	$20M		Cash contribution necessary to maintain the fund value at 0.995
Russell MMF	Northwestern Mutual Life Ins.	10/20/2008	The entire fund			CSA (Cash contribution necessary to maintain the fund value at 0.995)
USAA MMF	USAA	10/22/2008	AIG notes	$81.96M		CSA USAA (Cash contribution necessary to maintain the fund value at 0.995)
Touchstone Invest. Trust Instit. MMF	Touchstone Advisors	10/22/2008	Morgan Stanley, Southtrust Bank, Wachovia notes	MS ($5.06M), ST ($1.4M), Wach. ($6.08M)		Cash contribution necessary to maintain the fund value at 0.995 (LOC by Western and Southern Life Insurance Company)
Touchstone Invest. Trust MMF	Touchstone Advisors	10/22/2008	Morgan Stanley, Southtrust Bank, Wachovia notes	MS ($5.1M), ST ($1.6M), Wach. ($4.07M)		Cash contribution necessary to maintain the fund value at 0.995 (LOC by Western and Southern Life Insurance Company)
Touchstone Variable Series MMF	Touchstone Advisors	10/22/2008	Morgan Stanley, Southtrust Bank, Wachovia notes	MS ($2.25M), Wach. ($1.5M)		Cash contribution necessary to maintain the fund value at 0.995 (LOC by Western and Southern Life Insurance Company)
Tamarack Prime MMF	Voyageur Asset Management	10/22/2008	The entire fund			Cash contribution necessary to maintain the fund value at 0.995 (LOC by RBC)
Tamarack Instit. Prime MMF	Voyageur Asset Management	10/22/2008	The entire fund			Cash contribution necessary to maintain the fund value at 0.995 (LOC by RBC)
RidgeWorth Prime Quality MMF	SunTrust Banks	10/22/2008	Lehman Brothers notes	$70M	$70M	Exchange of SunTrust Note for the Lehman note in the amount of $70M
Principal MMF	Principal Financial Group	10/22/2008	AIG notes			CSA (Cash contribution necessary to maintain the fund value at 0.995)
Principal Variable Contracts MMF	Principal Financial Group	10/22/2008	AIG notes			CSA (Cash contribution necessary to maintain the fund value at 0.995)
Morgan Stanley Funds	Morgan Stanley	10/22/2008	The entire fund			CSA (Cash contribution necessary to maintain the fund value at 0.995)
Active Assets Funds	Morgan Stanley	10/22/2008	The entire fund			CSA (Cash contribution necessary to maintain the fund value at 0.995)
Columbia MM Reserves	Bank of America	10/22/2008	The entire fund			CSA (Cash contribution necessary to maintain the fund value at 0.995)
ING LAP	ING Groep N.V.	10/22/2008	AIG notes	$46M		CSA (Cash contribution necessary to maintain the fund value at 0.995)
ING Classic MMF	ING Groep N.V.	10/22/2008	AIG notes	$28M		CSA (Cash contribution necessary to maintain the fund value at 0.995)
ING Instit. Prime MMF	ING Groep N.V.	10/22/2008	AIG notes	$46M		CSA (Cash contribution necessary to maintain the fund value at 0.995)
ING MMF	ING Groep N.V.	10/22/2008	AIG notes; Lehman notes	AIG ($8.5M), Lehman Brothers ($2M)		CSA (Cash contribution necessary to maintain the fund value at 0.995)
ING Brokerage Cash Reserves	ING Groep N.V.	10/22/2008	AIG notes	$8M		CSA (Cash contribution necessary to maintain the fund value at 0.995)
Western Asset Instit. MMF	Legg Mason	10/22/2008	Orion Financ. LLC notes (SIV)	$75M	$20M	CSA
Western Asset Instit. MMF	Legg Mason	10/22/2008	The fraction of fund	$452M		CSA (Cash contribution necessary to maintain the fund value at 0.9975)
Russell MMF	Northwestern Mutual Life Ins.	10/24/2008	Lehman Brothers notes	$403M		CSA (Cash contribution necessary to maintain the fund value at 0.995)

Footnote: 1) owned in 93% by Comerica, but support was not officially ceded; CSA- Capital Support Agreement; POF- Prime Obligations Fund; DAP- Diversified Assets Portfolio; LAP- Liquid Assets Portfolio; LRP- Liquid Reserves Portfolio; POP- Prime Obligations Portfolio

Appendix B: Summary of All Variables

Variable Category	Variable Name	Variable Definition
Business Concerns		
	Fund Business	Non-institutional-money fund assets/Total sponsor fund assets
	Non-Fund Business	Indicator variable equal to one if fund sponsor is affiliated with financial conglomerate and equal to zero if sponsor is affiliated with independent asset manager
	Retail Fund Business	Non-retail-money fund assets/Total sponsor fund assets
Financial Strength		
	CDS	Price of a CDS contract of fund sponsor
	No Rating	Indicator variable equal to one if sponsor has no credit rating and equal to zero if sponsor has a valid credit rating
Risk		
	Spread	Annualized weekly fund return net of 3-month Treasury Bill (spread)
	Holdings Risk	Share of a fund portfolio in Bank Obligations minus share of the portfolio in Treasuries and Repurchase Agreements
	Maturity Risk	Average maturity of fund assets
Other Dependent Variables		
	Fund Flow	Percentage increase in fund size from week *t* to week *t+1* accounting for earned interest
	Support	Indicator variable equal to one if the fund sponsor offered support to its fund, and zero o/w
	Redemptions	Change in Fund Size between Sep. 18 and Sep. 25, 2008
	Exit	Indicator variable equal to one if fund exited the market between Oct. 1, 2009 and Sep. 30, 2011, and zero o/w
	Name Change	Indicator variable equal to one if a fund changed its name to mimic its sponsor's name between Oct. 1, 2009 and Sep. 30, 2011, equal to minus one if the fund changed its name away from that of its sponsor, and zero o/w
	Expense Ratio	Total fund expense ratio
	Total Compensation	A product of Fund Size and Expense Ratio
Holdings Categories		
	U.S. Treasuries & Agency	Share of U.S Treasuries and Agency-backed debt
	Repurchase Agreements	Share of repurchase agreements
	Bank Deposits	Share of bank deposits
	Bank Obligations	Share of bank obligations
	Floating-Rate Notes	Share of floating-rate notes (variable rate demand notes)
	Commercial Paper (CP)	Share of (unsecured) commercial paper
	Asset-Backed CP	Share of asset-backed commercial paper
Other Independent Variables		
	Fund Size	Total Net Assets of a fund portfolio
	Age	Fund age
	Flow Volatility	Standard deviation of fund flows based on 13 weeks of data
	Family Size	Total Net Assets of fund family (sponsor)

Table I: Summary Statistics of Institutional Prime Money Market Funds

This table provides information for the 20 largest institutional money market funds ranked by assets under management as of January 2006. *Fund Name* is the name of the fund, *Assets* is Assets under Management (in $ Billion), *Sponsor Name* is the name of the fund sponsor, *Fund Business* is the sponsor's share of mutual fund assets other than institutional prime money market funds in total sponsor's assets, and *Non-Fund Business* indicates whether the fund sponsor is affiliated with a financial conglomerate.

Fund			Sponsor	
Fund Name	Assets	Sponsor Name	Fund Business	Non-Fund Business
JPMorgan Prime Fund	68.1	JPMorgan	63.2%	Y
Columbia Cash Reserves Fund	42.4	Bank of America	71.8%	Y
BlackRock Liquidity Temp Fund	36.5	BlackRock	62.0%	N
Goldman Sachs FS Prime Fund	26.6	Goldman Sachs	61.1%	Y
Federated Prime Fund	21.8	Federated	62.8%	N
Citi Institutional Liquid Reserves Fund	21.8	Legg Mason	81.7%	N
Merrill Lynch Premier Fund	19.8	BlackRock	62.0%	N
AIM STIT Liquid Assets Fund	18.7	Invesco	74.1%	N
Morgan Stanley Institutional Liquidity Fund	17.3	Morgan Stanley	82.9%	Y
Fidelity Institutional Money Market Fund	16.5	Fidelity	93.9%	N
Reserve Primary Fund	16.1	Reserve Dividends	39.1%	N
Fidelity MMT Fund	16.0	Fidelity	93.9%	N
Columbia Money Market Reserves Fund	14.7	Bank of America	71.8%	Y
Dryden Core Investment Fund	13.8	Prudential	66.9%	Y
Evergreen Institutional Money Market Fund	13.3	Wachovia	82.8%	Y
Fidelity Institutional Prime Money Market Fund	13.3	Fidelity	93.9%	N
Dreyfus Cash Management Fund	13.2	Bank of New York Mellon	67.4%	Y
Fidelity Prime Fund	13.1	Fidelity	93.9%	N
State Street Global Advisors Money Fund	12.9	State Streets Bank	87.4%	Y
Dreyfus Institutional Cash Fund	12.6	Bank of New York Mellon	67.4%	Y

Table II: Summary Statistics of Institutional Prime Money Market Funds

Our sample covers all U.S. institutional prime money market funds as of 1/1/2006. *Fund Business* (*FB*) is the sponsor's share of mutual fund assets other than institutional prime money market funds in total sponsor's assets. High (Low) FB includes all funds with *Fund Business* above (below) the median value of *Fund Business* (81.6%). Fund characteristics are spread, expenses, fund size, average portfolio maturity, age, family size, and a fraction of funds associated with financial conglomerates (in %). Holdings are the share of assets invested in Treasuries and agency paper, repurchase agreements, bank deposits, bank obligations, floating-rate notes, commercial paper, and asset-backed commercial paper. Cross-sectional standard deviations of the given characteristics are presented in parentheses.

	All	High FB	Low FB
	(1)	(2)	(3)
Fund Characteristics			
Spread (bp)	6.93	6.60	7.28
	(6.44)	(7.54)	(5.00)
Expense Ratio (bp)	31.64	32.40	30.81
	(19.10)	(18.43)	(19.90)
Fund Size ($mil)	4886	2981	6951
	(8685)	(4833)	(11,169)
Maturity (days)	34.32	35.12	33.45
	(11.02)	(12.48)	(9.17)
Age (years)	10.61	10.43	10.81
	(4.75)	(5.53)	(3.75)
Family Size ($bil)	72.8	97.5	45.9
	(149.1)	(200.9)	(39.2)
Fund Business	0.764	0.897	0.619
	(0.198)	(0.064)	(0.192)
Non-Fund Business (in %)	39.9	44.2	35.2
	(49.1)	(50.0)	(48.1)
Portfolio Holdings			
U.S. Treasuries & Agency	0.060	0.072	0.048
	(0.109)	(0.120)	(0.095)
Repurchase Agreements	0.135	0.142	0.126
	(0.150)	(0.169)	(0.128)
Bank Deposits	0.032	0.021	0.044
	(0.057)	(0.039)	(0.069)
Bank Obligations	0.122	0.111	0.135
	(0.126)	(0.120)	(0.132)
Floating-Rate Notes	0.198	0.192	0.204
	(0.162)	(0.168)	(0.156)
Commercial Paper	0.320	0.356	0.280
	(0.224)	(0.252)	(0.182)
Asset-backed CP	0.134	0.106	0.164
	(0.155)	(0.151)	(0.154)
Funds	148	77	71

Table III: Returns by Asset Class

The sample is all U.S. institutional prime money market funds. The dependent variable *Spread* is computed as the annualized return minus the Treasury Bill rate. Holdings variables are the share of assets invested in repurchase agreements, bank deposits, bank obligations, floating-rate notes, commercial paper (CP), and asset-backed CP (omitted category is U.S. Treasury and agency). Fund Characteristics are natural logarithm of fund size, expense ratio, fund age, and natural logarithm of fund family size. All regressions are at the weekly level and include week-fixed effects. Columns (3) and (4) include fund-fixed effects. Columns (1) to (3) cover the period 8/1/2007-8/31/2008 (*Post* period). Columns (2) and (4) cover the period 1/1/2006-7/31/2007 (*Pre* period). Standard errors are clustered at the fund level. ***, **, * represent 1%, 5%, and 10% significance, respectively.

	$Spread_{i,t+1}$			
Period	Post	Pre	Post	Pre
	(1)	(2)	(3)	(4)
Holdings				
$Repurchase\ Agreements_{i,t}$	13.015	17.762***	41.099**	11.652**
	(8.168)	(3.428)	(16.124)	(5.659)
$Bank\ Deposits_{i,t}$	1.990	17.040***	12.030	18.555***
	(26.656)	(3.936)	(25.266)	(6.913)
$Bank\ Obligations_{i,t}$	86.983***	15.382***	92.672***	6.994
	(8.035)	(3.494)	(17.672)	(4.931)
$Floating\text{-}Rate\ Notes_{i,t}$	81.602***	22.414***	87.255***	10.287
	(7.989)	(3.470)	(21.674)	(6.553)
$Commercial\ Paper_{t}$	58.502***	16.182***	70.678***	16.400***
	(8.002)	(3.274)	(23.470)	(5.745)
$Asset\text{-}backed\ CP_{i,t}$	75.565***	20.573***	82.345***	15.966**
	(8.402)	(3.155)	(18.917)	(6.233)
Fund Characteristics				
$Log(Fund\ Size)_{i,t}$	0.628	0.197**	3.790**	0.532
	(0.418)	(0.100)	(1.615)	(0.483)
$Expense\ Ratio_{i,t}$	10.020***	1.637*	82.207***	53.555***
	(2.967)	(0.956)	(26.479)	(11.616)
$Age_{i,t}$	-1.957	-0.47	-0.666	-0.601
	(1.470)	(0.491)	(0.551)	(0.453)
$Log(Family\ Size)_{i,t}$	0.553	0.174	6.863	0.261*
	(0.500)	(0.131)	(5.623)	(0.134)
Constant	65.190***	5.441	-43.076	-12.149
	(10.546)	(4.148)	(78.309)	(8.947)
Week-Fixed Effects	Y	Y	Y	Y
Fund-Fixed Effects	N	N	Y	Y
Observations	7756	11,927	7756	11,927
R-squared	0.94	0.79	0.95	0.80

Table IV: Flow-Performance Relationship

The sample is all U.S. institutional prime money market funds. Columns (1), (3), and (5) cover the period from 8/1/2007 to 8/31/2008 (*Post* period). Columns (2), (4), and (6) cover the period from 1/1/2006-7/31/2007 (*Pre*-period). The dependent variable is *Fund Flow*, computed as the percentage change in total net assets from time *t* to time *t+1*, adjusted for market appreciation. Independent variables are the weekly annualized spread from *t* to *t-1*, natural logarithm of fund size, fund expense ratio, fund age, volatility of fund flows based on past 13-week fund flows, and natural logarithm of fund family size. In columns (5) and (6), additional independent variables are the interactions of *Spread* with *Fund Business* and *Non-Fund Business*. *Fund Business* is the sponsor's share of mutual fund assets other than institutional prime money market funds in total sponsor's assets. *Non-Fund Business* is an indicator variable equal to one if the fund sponsor is affiliated with a financial conglomerate, and zero, otherwise. All regressions are at the weekly level and include week-fixed effects. Columns (3) to (6) also include fund-fixed effects. Standard errors are clustered at the fund level. ***, **, * represent 1%, 5%, and 10% significance, respectively.

	Fund Flow$_{i,t+1}$					
Period	Post	Pre	Post	Pre	Post	Pre
	(1)	(2)	(3)	(4)	(5)	(6)
Spread$_{i,t}$	0.013***	0.003	0.024***	0.000	0.026***	0.009
	(0.005)	(0.005)	(0.008)	(0.004)	(0.009)	(0.010)
Fund Business$_{i,2006}$*Spread$_{i,t}$					-0.003	-0.009
					(0.006)	(0.009)
Non-Fund Business$_{i,2006}$*Spread$_{i,t}$					0.000	-0.003
					(0.003)	(0.005)
Log(Fund Size)$_{i,t}$	-0.120**	-0.077***	-7.659***	-4.146***	-7.656***	-4.148***
	(0.051)	(0.029)	(1.341)	(0.720)	(1.344)	(0.720)
Expense Ratio$_{i,t}$	-0.551*	-1.276***	-2.720	-1.365	-2.737	-1.475
	(0.320)	(0.354)	(5.899)	(3.703)	(5.853)	(3.704)
Age$_{i,t}$	0.159	-0.078	0.015	0.715**	0.013	0.713**
	(0.180)	(0.149)	(0.322)	(0.323)	(0.322)	(0.323)
Flow Volatility$_{i,t}$	4.239*	2.476**	1.378	-0.213	1.328	-0.230
	(2.323)	(1.243)	(3.177)	(2.152)	(3.168)	(2.146)
Log(Family Size)$_{i,t}$	0.025	0.032**	0.530	0.042	0.523	0.045
	(0.023)	(0.014)	(1.239)	(0.126)	(1.246)	(0.127)
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Fund-Fixed Effects	N	N	Y	Y	Y	Y
Observations	7808	11,984	7808	11,984	7808	11,984
R-squared	0.022	0.017	0.085	0.052	0.085	0.052

Table V: Sponsor's Business Concerns and Risk Taking

The sample is all U.S. institutional prime money market funds for the period from 1/1/2006 to 8/31/2008. The dependent variables are: the fraction of assets held in risky assets, net of the riskless assets (*Holdings Risk*) in Columns (1)-(3), average portfolio maturity (*Maturity Risk*) in Columns (4)-(6); and the weekly annualized spread (*Spread*) in Columns (7)-(9). *Fund Business* is the sponsor's share of mutual fund assets other than institutional prime money market funds in total sponsor's assets. *Non-Fund Business* is an indicator variable equal to one if the fund sponsor is affiliated with a financial conglomerate, and zero, otherwise. Other independent variables are fund assets, expense ratio, fund age, and fund family size (coefficients not shown). *Post* is an indicator variable equal one for the period from 8/1/2007-8/31/2008, and zero, otherwise. All regressions are at the weekly level and include week-fixed effects. Columns (2), (5), (8) include sponsor-fixed effects and Columns (3), (6), and (9) include fund-fixed effects. Standard errors are clustered at the sponsor level. ***, **, * represent 1%, 5%, and 10% significance, respectively.

	Holdings Risk$_{i,t+1}$			Maturity Risk$_{i,t+1}$			Spread$_{i,t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fund Business$_{i,2006}$*Post$_t$	-18.271*	-21.216**	-19.562**	-11.436**	-12.572**	-11.886**	-15.040**	-15.473**	-14.218*
	(9.296)	(8.705)	(8.941)	(5.334)	(5.782)	(5.911)	(7.470)	(7.443)	(7.419)
Non-Fund Business$_{i,2006}$*Post$_t$	-6.774**	-5.573*	-6.319**	-1.664	-1.519	-1.701	-7.263***	-7.215***	-7.321***
	(3.018)	(2.885)	(2.962)	(1.722)	(1.750)	(1.762)	(2.429)	(2.424)	(2.428)
Fund Business$_{i,2006}$	-18.126			5.398			-2.764		
	(13.540)			(5.310)			(1.929)		
Non-Fund Business$_{i,2006}$	-6.539			-1.698			-1.212*		
	(4.233)			(1.938)			(0.655)		
Controls$_{i,2006}$	Y	Y	Y	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sponsor-Fixed Effects	N	Y	N	N	Y	N	N	Y	N
Fund-Fixed Effects	N	N	Y	N	N	Y	N	N	Y
Observations	19,097	19,097	19,097	19,097	19,097	19,097	19,097	19,097	19,097
R-squared	0.209	0.624	0.780	0.142	0.482	0.587	0.952	0.957	0.959

Table VI: Sponsor's Capital and Risk Taking

The sample is all U.S. institutional prime money market funds for the period from 1/1/2006 to 8/31/2008. The dependent variables, *Fund Business*, and *Post* are defined in Table V. All regressions include the same control variables as in Table V (coefficients not shown). They are at the weekly level and include week-fixed effects and fund-fixed effects. Standard errors are clustered at the sponsor level. **Panel A** is restricted to funds that are affiliated with financial conglomerates. *Log(CDS)* is the natural logarithm of the sponsor's credit default swap (CDS) price. **Panel B** is restricted to funds that are affiliated with an independent asset manager. *No Rating* is an indicator variable equal one if the sponsor has a credit rating, and zero, otherwise. ***, **, * represent 1%, 5%, and 10% significance, respectively.

Panel A: Conglomerates						
	Holdings $Risk_{i,t+1}$		Maturity $Risk_{i,t+1}$		$Spread_{i,t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$Log(CDS)_{i,2006}$*$Post_t$	-7.766***	-7.996***	-5.694*	-5.284**	-4.415*	-3.635*
	(1.977)	(1.914)	(2.758)	(2.295)	(2.711)	(2.037)
Fund $Business_{i,2006}$*$Post_t$		8.947		-15.941		-30.319***
		(11.985)		(12.203)		(8.736)
$Controls_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Fund-Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	7587	7587	7587	7587	7587	7587
R-squared	0.696	0.696	0.530	0.534	0.969	0.970
Panel B: Independent Asset Managers						
	Holdings $Risk_{i,t+1}$		Maturity $Risk_{i,t+1}$		$Spread_{i,t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Fund $Business_{i,2006}$*$Post_t$	-38.602***	-38.616***	-10.003**	-10.006**	-22.394***	-22.413***
	(13.602)	(12.660)	(4.436)	(4.409)	(7.198)	(7.470)
No $Rating_{i,2006}$*$Post_t$		-8.249		-1.684		-7.777**
		(5.410)		(1.356)		(3.065)
$Controls_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Fund-Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	7646	7646	7646	7646	7645	7645
R-squared	0.715	0.968	0.670	0.671	0.968	0.968

Table VII: Post-Lehman Results

The sample is all U.S. institutional prime money market funds that were active from 1/1/2006 until 10/1/2009. In Column (1) the dependent variable is *Support*, an indicator variable equal to one if the fund's sponsor filed a no-action letter with the SEC in the week after the Lehman's bankruptcy (9/18/2008-9/25/2008), and zero, otherwise (20 funds declared support). In Column (2) the dependent variable is *Redemptions* defined as total value of redemptions (fund outflows) in the week after the Lehman's bankruptcy (9/18/2008-9/25/2008). In Column (3) the dependent variable is *Exit*, an indicator variable equal to one if the fund was closed in the two years after the expiration of the government guarantee (10/1/2009), and zero, otherwise (16 out of 105 fund closures). In Column (4) the dependent variable is *Name* an indicator variable equal to one if the fund name was changed to match the sponsor name, equal to zero if the name was unchanged, and equal to minus one if the fund name was changed to be different from the sponsor name (8 name changes out of 89 funds). All independent variables are defined in Table V. In Columns (1) to (3), the independent variables are defined as of January 2006 (as in Table V). In Column (4), the independent variables are defined as of end of the government guarantee (10/1/2009). Standard errors are clustered at the sponsor level. ***, **, * represent 1%, 5%, and 10% significance, respectively.

	Support	Redemptions	Exit	Name Change
	(1)	(2)	(3)	(4)
Fund Business$_i$	-0.277	-0.143*	-0.213	0.335*
	(0.450)	(0.085)	(0.246)	(0.173)
Non-Fund Business$_i$	0.263**	-0.015	0.194***	-0.018
	(0.129)	(0.028)	(0.067)	(0.101)
Log(Fund Size)$_i$	-0.008	0.024***	-0.045**	0.023
	(0.019)	(0.008)	(0.022)	(0.017)
Expense Ratio$_i$	-0.065	-0.183***	-0.033	-0.233
	(0.176)	(0.060)	(0.214)	(0.315)
Age$_i$	-0.279	-0.060	-0.063	0.011
	(0.192)	(0.062)	(0.116)	(0.071)
Log(Family Size)$_i$	0.050	0.018**	0.032*	-0.002
	(0.035)	(0.007)	(0.019)	(0.007)
Constant	1.485	0.199	0.735	-0.117
	(0.934)	(0.326)	(0.569)	(0.482)
Observations	105	105	105	89
R-squared	0.219	0.383	0.098	0.039

Table VIII: Evidence from Retail Funds

The sample is all U.S. retail prime money market funds for the period from 1/1/2006 to 8/31/2008. **In Panel A**, we examine the flow-performance relationship for retail prime money market funds (similar to Table IV). **In Panel B**, we examine the relationship between business concerns and risk for retail prime money market funds (similar to Table V).

Panel A: Flow-Performance Relationship

	Fund Flow$_{i,t+1}$					
Period	Post	Pre	Post	Pre	Post	Pre
	(1)	(2)	(3)	(4)	(5)	(6)
Spread$_{i,t}$	0.002	0.006**	0.005*	0.004*	0.008	0.021***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.005)	(0.005)
Retail Fund Business$_{i,2006}$*Spread$_{i,t}$					-0.007	-0.015**
					(0.005)	(0.007)
Non-Fund Business$_{i,2006}$*Spread$_{i,t}$					0.001	-0.002
					(0.002)	(0.004)
Controls$_{i,t}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Fund-Fixed Effects	N	N	Y	Y	Y	Y
Observations	5925	9333	5925	9333	3724	6004
R-squared	0.043	0.022	0.093	0.072	0.110	0.076

Panel B: Business Concerns and Risk Taking

	Holdings Risk$_{i,t+1}$		Maturity Risk$_{i,t+1}$		Spread$_{i,t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Retail Fund Business$_{i,2006}$*Post$_t$	15.071	15.712	3.482	2.682	-8.992	-8.850
	(13.917)	(14.104)	(6.465)	(6.323)	(14.178)	(14.405)
Non-Fund Business$_{i,2006}$*Post$_t$	7.108	7.219	-4.050	-3.920	-4.131	-4.238
	(5.913)	(5.970)	(2.535)	(2.635)	(5.305)	(5.403)
Controls$_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Sponsor-Fixed Effects	Y	N	Y	N	Y	N
Fund-Fixed Effects	N	Y	N	Y	N	Y
Observations	9740	9740	9740	9740	9744	9744
R-squared	0.74	0.77	0.60	0.63	0.91	0.91

Table IX: Risk Taking After Government Guarantee

The sample is all U.S. institutional prime money market funds for the period from 1/1/2006 to 12/31/2010. We estimate the same regression models as in Table V for the period from July 2006 to December 2010. We drop the month of the Lehman's bankruptcy and the quarter immediately after the Lehman's bankruptcy to focus on risk taking after a short adjustment period. We interact our main variables of interest with an indicator variable for the Post period (July 2007 to August 2008) and the Post-Lehman period (April 2009 to December 2010). All regressions include the control variables specified in Table V (coefficients not shown). They are at the weekly level and include week-fixed effects. Columns (1), (3), and (5) include sponsor-fixed effects and Columns (2), (4), and (6) include fund-fixed effects. Standard errors are clustered at the sponsor-level. ***, **, * represent 1%, 5%, and 10% significance, respectively.

	Holdings Risk$_{i,t+1}$		Maturity Risk$_{i,t+1}$		Spread$_{i,t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Business$_{i,2006}$*Post$_t$	-22.140**	-19.507**	-12.419**	-11.856*	-14.629*	-13.566*
	(8.499)	(8.847)	(5.669)	(5.952)	(7.662)	(7.676)
Fund Business$_{i,2006}$*Post-Lehman$_t$	-23.677	-10.254	-10.171	-6.012	-3.341	-1.448
	(18.806)	(19.439)	(6.643)	(6.468)	(7.261)	(7.673)
Non-Fund Business $_{i,2006}$*Post$_t$	-5.439*	-6.447**	-1.391	-1.697	-7.391***	-7.555***
	(2.939)	(2.993)	(1.779)	(1.805)	(2.452)	(2.475)
Non-Fund Business $_{i,2006}$*Post-Lehman$_t$	-0.357	-3.156	-3.967	-4.901**	-3.270	-3.851
	(6.069)	(5.793)	(2.188)	(2.153)	(2.285)	(2.348)
Controls$_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Sponsor-Fixed Effects	Y	N	Y	N	Y	N
Fund-Fixed Effects	N	Y	N	Y	N	Y
Observations	28,449	28,449	28,449	28,449	28,409	28,409
R-squared	0.579	0.692	0.452	0.532	0.953	0.954

Table X: Alternative Explanations – Robustness

In Panel A, the dependent variable is the weekly managerial compensation, defined as a product of fund size and its expenses (total compensation) or as a percentage value of fund assets charged as expenses. The independent variables are defined in Table V. **In Panel B**, we repeat the estimation in Table V for all funds with *Fund Business* of at least 50 percent. **In Panel C**, we repeat the estimation in Table V for funds with assets under management over $1 billion. **In Panel D**, we eliminate the Reserve Primary Fund in the estimation of Table V.

Panel A: Managerial Compensation

	Expense Ratio$_{i,t+1}$			Total Compensation$_{i,t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Business$_{i,2006}$*Post$_t$	-0.052*	-0.033	-0.015	-0.382	-0.326	-0.293
	(0.029)	(0.021)	(0.018)	(0.329)	(0.294)	(0.258)
Non-Fund Business $_{i,2006}$*Post$_t$	-0.009	-0.005	-0.007	-0.222	-0.157	-0.197
	(0.006)	(0.005)	(0.005)	(0.172)	(0.164)	(0.154)
Controls$_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Sponsor-Fixed Effects	N	Y	Y	N	Y	Y
Fund-Fixed Effects	N	Y	N	Y	N	Y
Observations	19,119	19,119	19,119	19,119	19,119	19,119
R-squared	0.206	0.583	0.978	0.430	0.645	0.964

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Panel B: Fund Business >50%

	Holdings Risk$_{i,t+1}$		Maturity Risk$_{i,t+1}$		Spread$_{i,t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Business$_{i,2006}$*Post$_t$	-28.748**	-27.485*	-19.989***	-19.348**	-17.869*	-16.568*
	(13.612)	(13.855)	(7.145)	(7.344)	(9.014)	(9.029)
Non-Fund Business $_{i,2006}$*Post$_t$	-6.426*	-7.199**	-1.419	-1.578	-6.879**	-6.916**
	(3.294)	(3.386)	(1.784)	(1.789)	(2.648)	(2.671)
Controls$_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Sponsor-Fixed Effects	Y	N	Y	N	Y	N
Fund-Fixed Effects	N	Y	N	Y	N	Y
Observations	17,731	17,731	17,731	17,731	17,731	17,731
R-squared	0.606	0.767	0.486	0.595	0.958	0.959

Panel C: Large Funds (>$1 billion)

	Holdings Risk$_{i,t+1}$		Maturity Risk$_{i,t+1}$		Spread$_{i,t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Business$_{i,2006}$*Post$_t$	-36.566***	-38.890***	-27.333**	-26.767**	-25.873**	-23.195**
	(13.307)	(13.312)	(10.615)	(11.720)	(10.239)	(9.746)
Non-Fund Business $_{i,2006}$*Post$_t$	-8.021**	-6.828**	-1.465	-1.407	-7.676**	-7.414**
	(3.158)	(3.117)	(2.912)	(3.108)	(3.106)	(3.145)
Controls$_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Sponsor-Fixed Effects	Y	N	Y	N	Y	N
Fund-Fixed Effects	N	Y	N	Y	N	Y
Observations	11,864	11,864	11,864	11,864	11,864	11,864
R-squared	0.65	0.74	0.50	0.57	0.97	0.97

Panel D: Excluding Reserve Primary Fund

	Holdings Risk$_{i,t+1}$		Maturity Risk$_{i,t+1}$		Spread$_{i,t+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Business$_{i,2006}$*Post$_t$	-21.158**	-19.641**	-12.477**	-11.803*	-14.596*	-13.438*
	(8.689)	(8.828)	(5.773)	(5.944)	(7.754)	(7.758)
Non-Fund Business $_{i,2006}$*Post$_t$	-5.836*	-6.506**	-1.421	-1.597	-7.185***	-7.258***
	(2.945)	(3.012)	(1.777)	(1.790)	(2.444)	(2.457)
Controls$_{i,2006}$	Y	Y	Y	Y	Y	Y
Week-Fixed Effects	Y	Y	Y	Y	Y	Y
Sponsor-Fixed Effects	Y	N	Y	N	Y	N
Fund-Fixed Effects	N	Y	N	Y	N	Y
Observations	18,958	18,958	18,958	18,958	18,958	18,958
R-squared	0.627	0.780	0.483	0.588	0.957	0.958

Figure I: Dispersion in Money Market Fund Yields

This figure plots the 5th and the 95th percentile of monthly money market yields for the period January 2002 to August 2008 for the universe of U.S. money market funds.

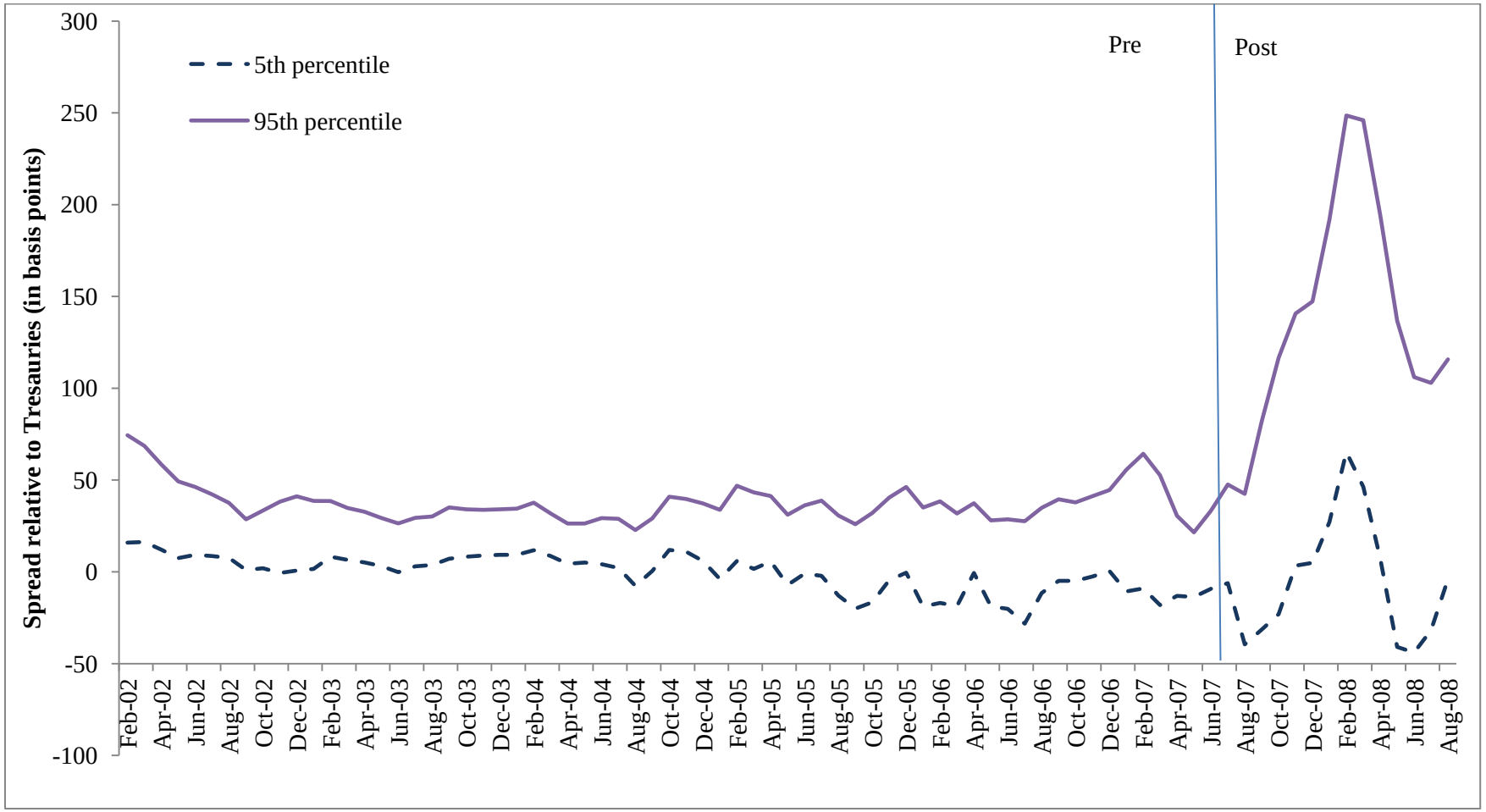


Figure II: Assets Holdings and Spread

We implement the regression model in Table III for the period from January 2005 to August 2008. Each point represents the three-month average of coefficients on the interaction between month-fixed effects and an indicator variable for repurchase agreements (*Repo*), bank deposits (*Deposits*), bank obligation (*Obligation*), floating rates notes (*FRNS*), commercial paper (*CP*), and asset-backed commercial paper (*ABCP*), respectively. Each point represents the return relative to the omitted category (*Treasuries and agency debt*) measured in percentage points.

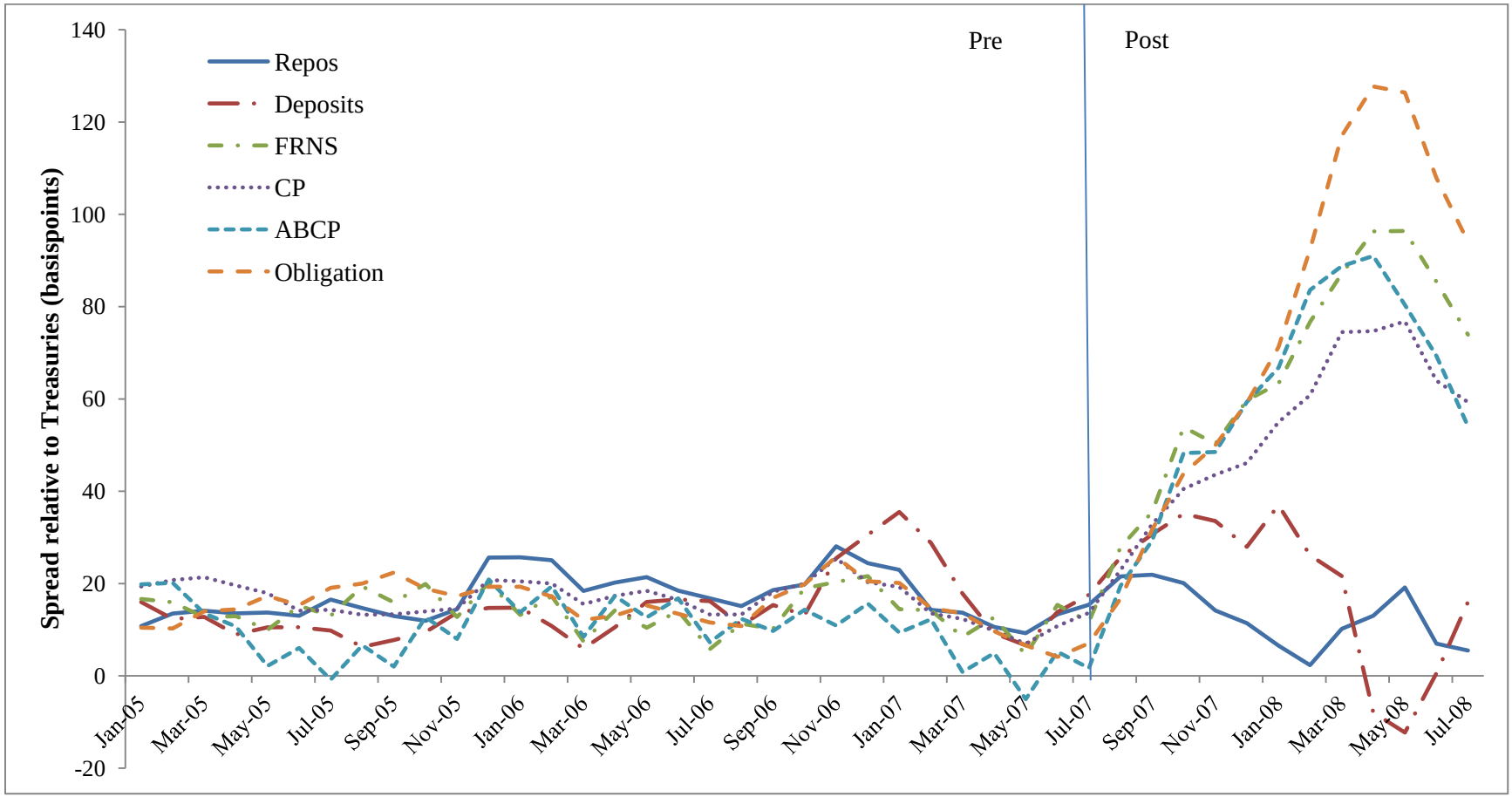
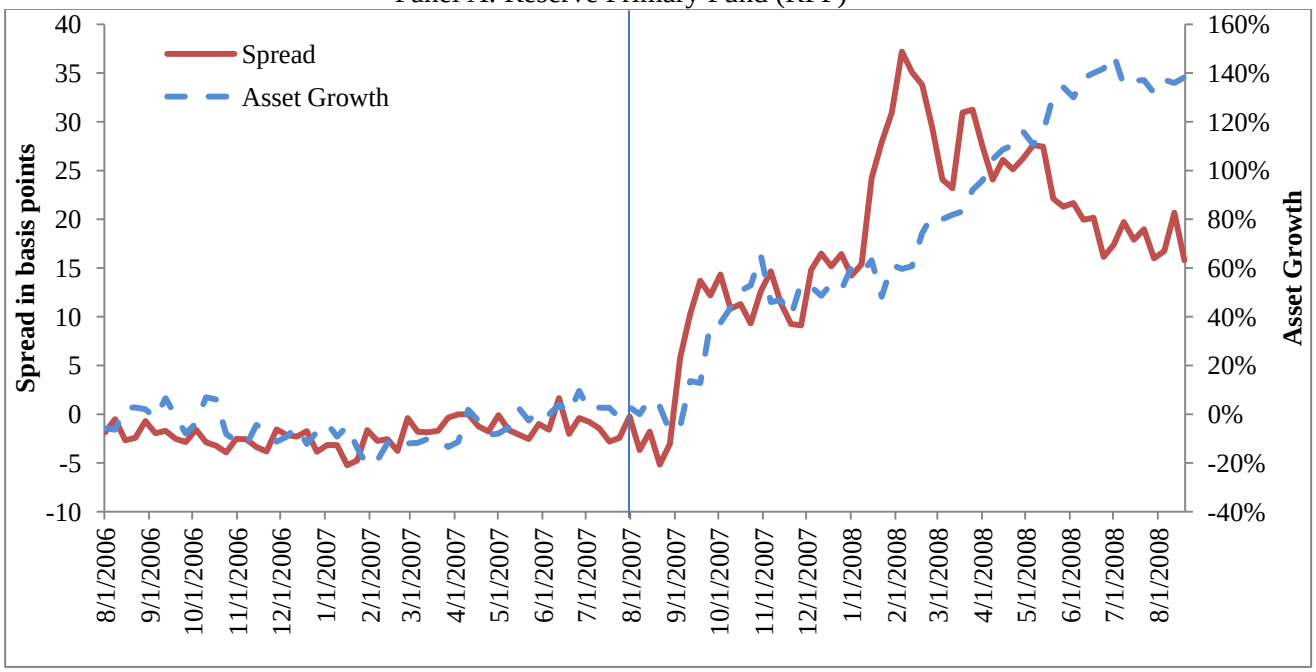


Figure III: Relative Performance and Assets: Reserve Primary vs. Fidelity Institutional Prime

This figure plots weekly industry-adjusted spread and industry-adjusted asset growth of the Reserve Primary Fund (Panel A) and the Fidelity Institutional Prime Money Market Fund (Panel B) from August 2006 to August 2008. The industry-adjusted spread is computed as a difference between each individual fund's spread and the value-weighted average spread of all institutional prime funds. The industry-adjusted asset growth is each individual fund's asset growth deflated by total asset growth of all institutional prime funds. We normalize asset growth to zero as of August 1st, 2008.

Panel A: Reserve Primary Fund (RPF)



Panel B: Fidelity Institutional Prime (FID)

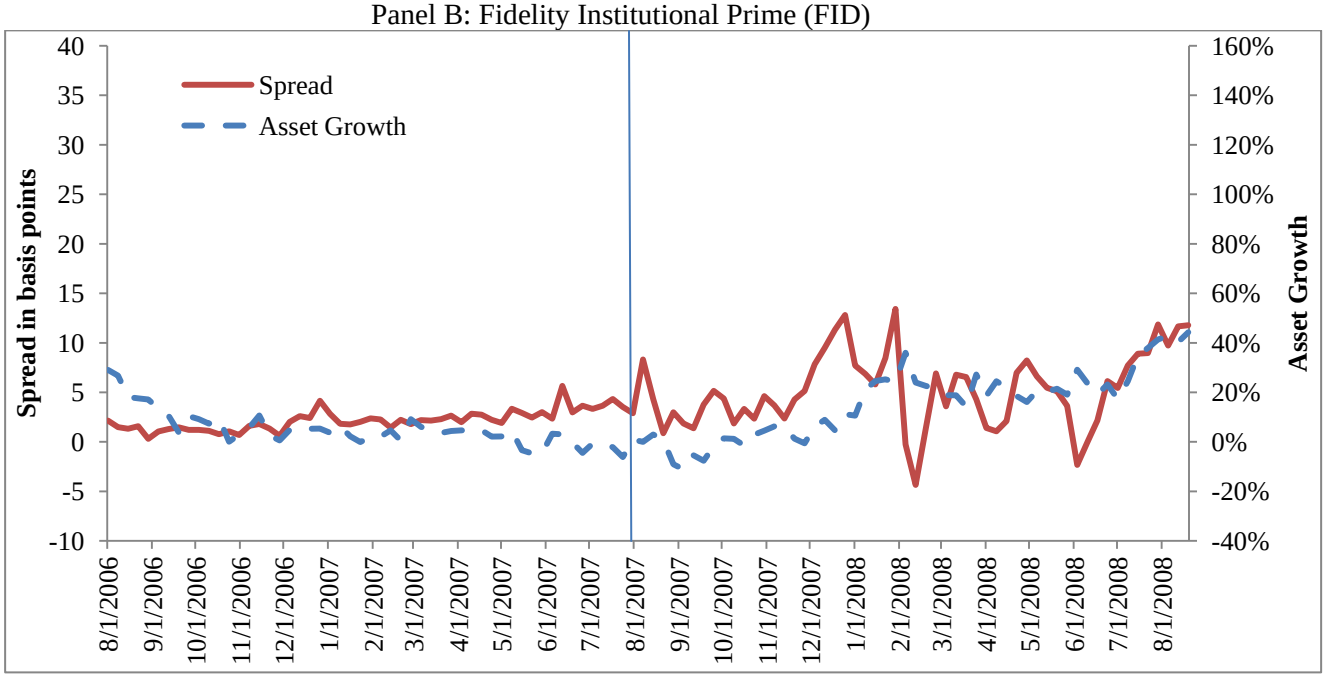


Figure IV: Assets Holdings: Reserve Primary vs. Fidelity Institutional Prime

This figure plots weekly holdings of the Reserve Primary Fund (Panel A) and the Fidelity Institutional Prime Money Market Fund (Panel B) from August 2006 to August 2008. U.S. + Repos is the share of assets invested in U.S. Treasures, agency-debt, and repurchase agreements. ABCP is the share invested in asset-backed commercial paper. Other is the share invested in other securities.

Panel A: Reserve Primary Fund (RPF)

Panel B: Fidelity Institutional Prime (FID)

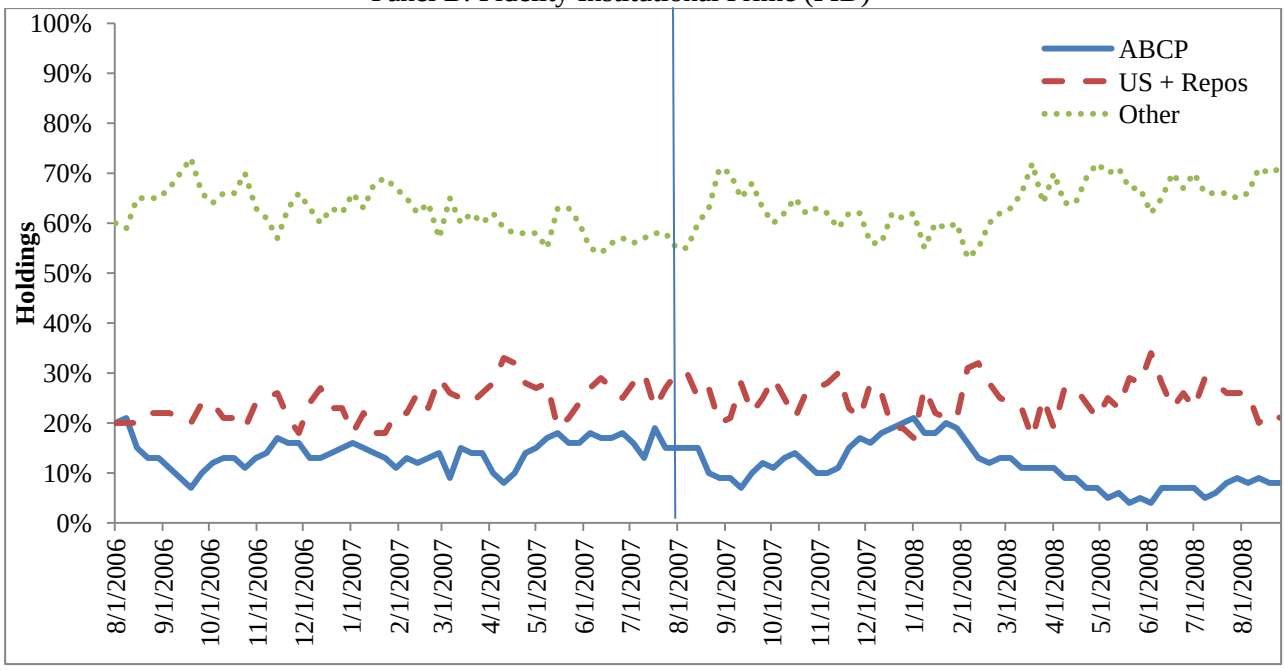
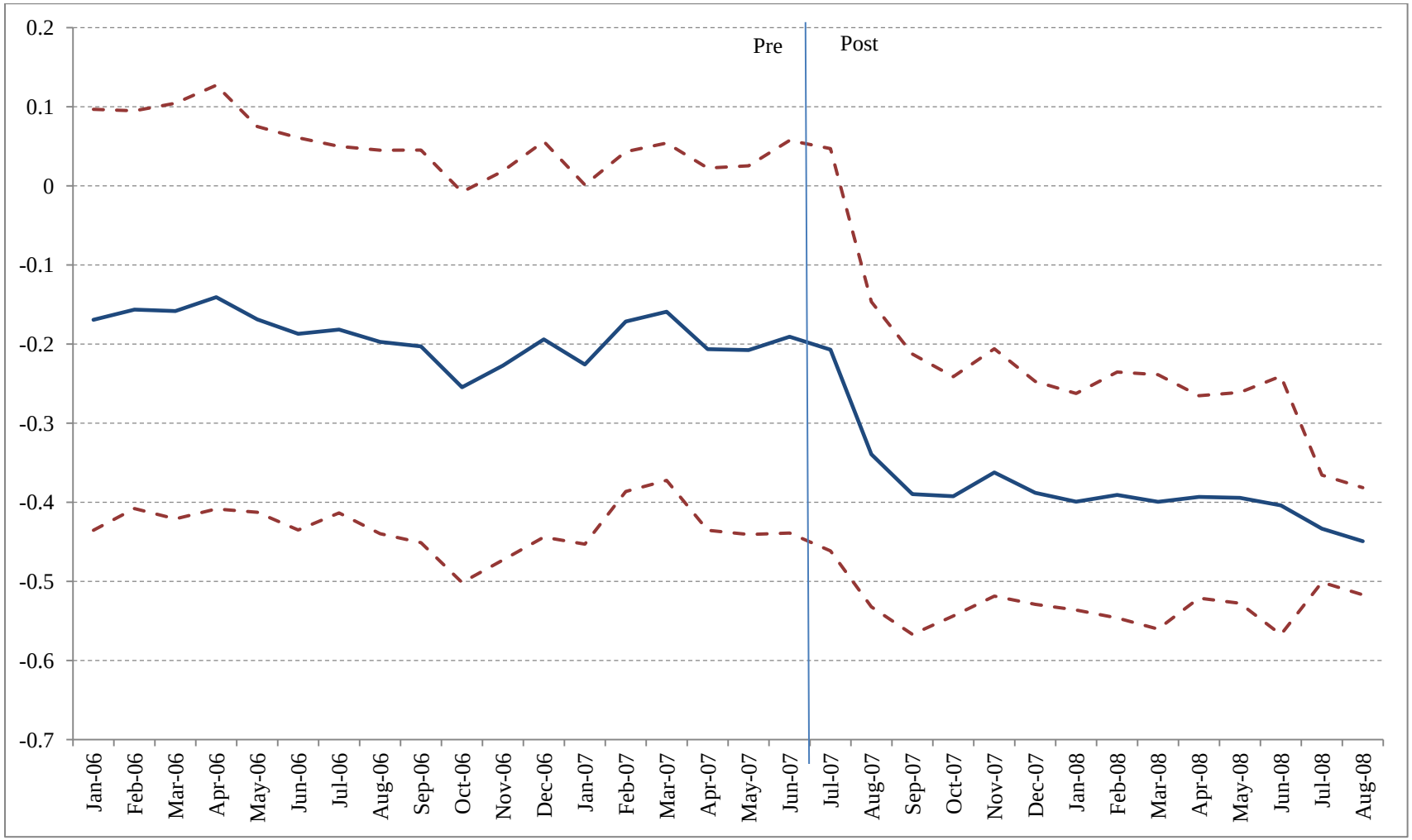


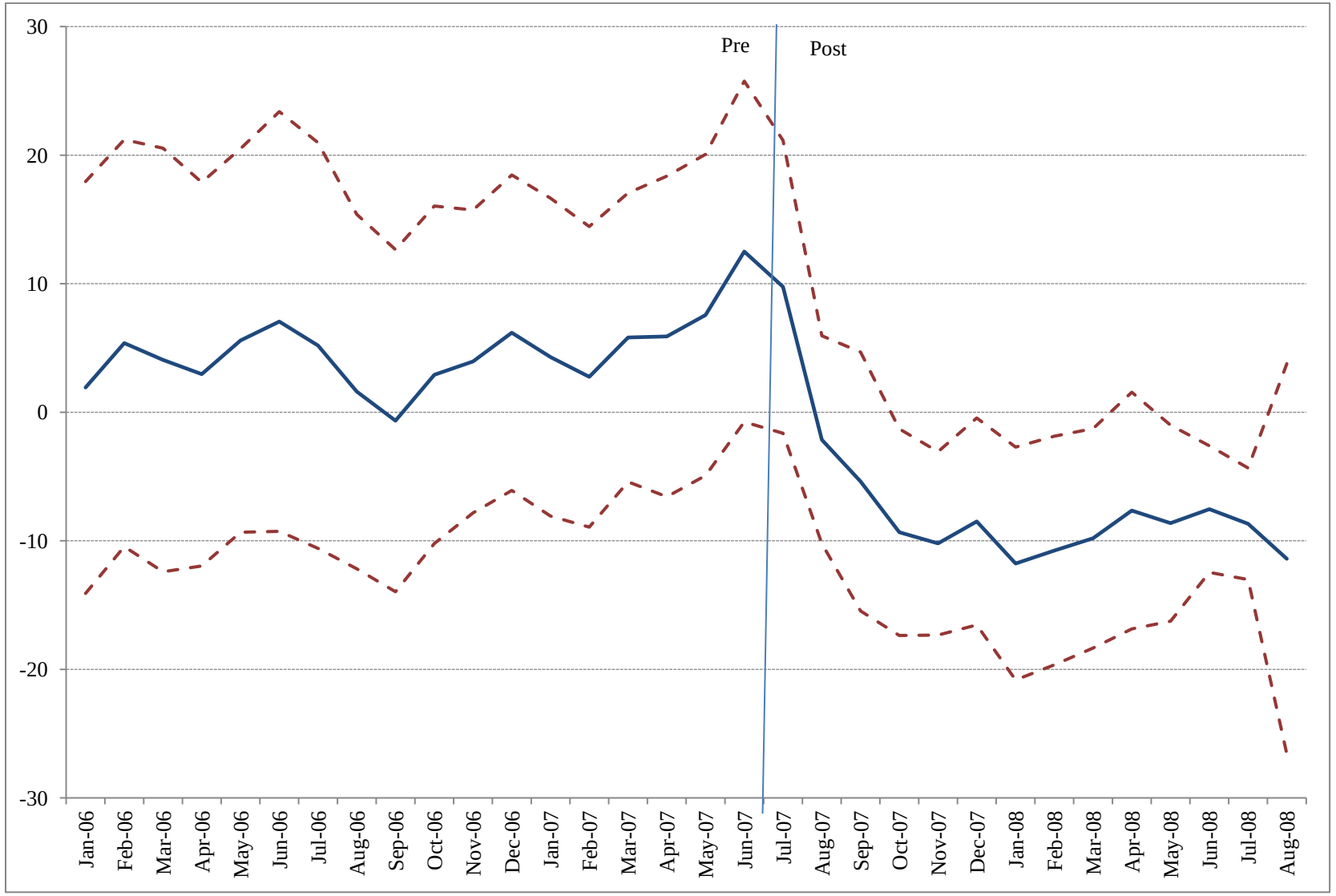
Figure V: Sponsor's Fund Business Concerns and Risk Taking

Each of the four panels below plots interaction coefficients from an OLS regression. The dependent variable is one of the three risk measures: holdings risk, maturity, and spread. The main independent variable is the interaction of the fund sponsor's share of other mutual fund assets relative to all total fund assets and monthly indicator variables. We include all control variables defined in Table V.

Panel A: Holdings Risk



Panel B: Maturity Risk



Panel C: Spread