Interfund lending in mutual fund families: Role of internal capital markets

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Abstract

Although the 1940 Act restricts interfund lending (i.e., a fund lending to other funds belonging to the same mutual fund family), fund families can obtain permission from the regulators to set up interfund lending programs. We analyze the determinants and consequences of such programs. We find that heterogeneity in portfolio liquidity and investor flows across funds, investment restrictions placed on funds, and monitoring mechanisms together determine the applications to the program. We document several consequences for funds after they participate in the program. First, funds with better governance perform better. Second, funds reduce their cash holdings, increase their investments in illiquid assets, and hold more concentrated portfolios. Third, investors in participating funds exhibit less run-like behavior.

JEL Classification: G18, G23, G32

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Interfund lending in mutual fund families: Role of internal capital markets

1. Introduction

Under the Investment Company Act of 1940 (1940 Act), open-end mutual funds in the United States have to provide daily liquidity to their investors. If these funds invest in illiquid securities, such liquidity provision can impose several types of costs on fund managers. First, the managers have to sell assets in a relatively short period of time, which can lead to costly fire sales (Coval and Stafford, 2007). Second, liquidity buffers such as holding cash are associated with lower returns compared to those from illiquid investments (Edelen, 1999). While funds can hold more cash to deter fund runs, it reduces investment efficiency (Liu and Mello, 2011). Third, there is evidence of predatory trading of hedge funds that can anticipate flow-induced trading of mutual funds (Chen, et al. 2008; Shive and Yun, 2013).

The 1940 Act prohibits direct transactions such as borrowing and lending between affiliated funds (i.e., funds belonging to the same family or using the same fund advisor) to prevent potential self-dealing behavior, although the fund family as an "internal capital market" can reduce the transaction costs of borrowing and lending, and thereby benefit investors. However, Section 6(c), Section 12(d)(1)(J), and Section 17(b) of the 1940 Act state that an exemptive order can be granted by the Securities and Exchange Commission (SEC) if it is "appropriate in the public interest and consistent with the protection of investors." The interfund lending program (henceforth ILP) is one of such exemptions that has become increasingly popular.[1] Under the ILP, the affiliated funds can borrow from each other for meeting their liquidity needs. In this paper, we

[1] The size of the equity holdings of funds that file for exemption as a percentage of the size of the equity holdings of all the funds in our sample grew from 2.4% in 1990 to around 40% in 2013. The total number of interfund lending applications approved by the SEC increased from 13 in the 1990s (1990–2000) to 30 after 2000 (2001–2013).

address the following questions. First, what types of funds and fund families are more likely to apply for interfund lending? Second, what are the consequences of these ILPs for funds' performance? Are these consequences different based on fund's and fund family's governance mechanisms? Third and finally, what are the managers' and investors' reaction to the ILPs? Specifically, how do the fund's portfolio choice and investors' capital allocation change after the application?

There are reasons to believe that the interfund lending practice can benefit fund investors. First, both the borrowing and lending funds enjoy better rates compared to those in the external capital markets. This is because the interfund rate is usually set to be the average of the external lending rate (i.e., lender's short term investment rate) and the external borrowing rate (e.g., borrower's bank loan rate). Since both the borrower and the lender save on transaction costs, there is *prima facie* less concern regarding cross-fund subsidizations within the family (Gaspar, Massa, and Matos, 2006; Bhattacharya, Lee, and Pool, 2013) that can hurt some fund investors. Second, at a given time, the fund may not hold enough cash for investor redemptions (Chernenko and Sunderam, 2015). The mismatch between funding liquidity and asset liquidity can be costly for mutual funds (Edelen, 1999) and lead to fire sale of assets (Shleifer and Vishny, 1992, 1997; Coval and Stafford, 2007). With the ILP, funds can borrow from member funds within the family up to seven days to satisfy investor redemptions.[2] This in turn, provides funds more time to liquidate their underlying investments and lower the price impact of their flow-induced trades. With the liquidity provision from member funds, managers can also have more flexibility to invest in illiquid securities, and hold more concentrated portfolios and less cash. Third, the ILP can mitigate the fund runs due to strategic investor redemptions (Chen, Goldstein, and Jiang, 2010; Liu and

[2] The borrowers can even roll over a loan and extend its duration.

Mello, 2011). With the ILP, fund investors would be less concerned about the adverse effects of other investors' redemptions.

Offsetting the benefits of the ILP, there can be several potential costs. The program involves direct costs to facilitate the operational and internal control procedures. Since the transactions in the interfund lending programs are exempted from several important restrictions in the 1940 Act, the SEC imposes stringent governance restrictions to ensure the participating funds satisfy certain internal control procedures and conditions for the fund families to use the ILP in order to protect fund investors. For example, funds can only borrow for a short period of time to meet investor redemptions but not to lever up their investments. Moreover, to prevent risk transfer from borrower to lender, there is an upper limit for borrowing. If a fund has any outstanding secured loan from the outside lender, the interfund loan has to be secured with at least an equal priority. The borrowers can only use excess cash that the lenders would otherwise invest in short-term instruments. The board has to periodically review the fund's participation in the ILP for compliance with such conditions in the exemptive orders. Fund's compliance will be considered by the external auditors as part of their internal accounting control procedures, and such examinations form the basis of the auditors' report in fund's Form N-SAR.[3] No fund is allowed to participate in the ILP unless it has fully disclosed in its registration statement all material facts about its intended participation, and funds have to seek shareholder approval to engage in transactions under the ILP. Therefore, funds with weaker monitoring mechanisms may find it more costly to set up the ILP.

[3] One example of failure in internal control is the Alger Large Cap Growth Fund that violated the terms outlined in its interfund lending application filed to the SEC and later its malpractice was identified by Deloitte & Touche LLP. For more details, see the NSAR filings of Alger Large Cap Growth Fund for the year 2001.

We document several findings that shed light on the economics of the ILP. We find the fund families are more likely to apply when they are more heterogeneous in terms of funding liquidity measured by investor flows and market liquidity measured by the portfolio liquidity of their underlying funds, i.e. when there is both supply and demand for liquidity in the internal capital market. We also observe a greater propensity to file for the ILP when fund families have funds that are restricted from borrowing, less restricted from investing in illiquid securities, and charge load fees, i.e. when the funds are more likely to have liquidity problems. In addition, we find the decision to apply for the ILP is positively related to the effectiveness of monitoring in the fund's contracting environment. Larger funds and families are more likely to apply since they are more likely to have better monitoring from peers (Arnott and Stiglitz, 1991; Armendariz de Aghion, 1999; Almazan et al., 2004). Funds managed by fewer managers display greater propensity to apply for the ILP since they are less likely to have a free-rider problem or moral hazard in teams (Holmstrom, 1982). Funds with younger managers (i.e., those with shorter tenure in the fund) are more likely to apply because they are more self-disciplined due to greater career concerns (Fama, 1980; Chevalier and Ellison, 1999).

We then examine the consequences of interfund lending after controlling for the family's choice to participate in the ILP. First, we use both returns-based and holdings-based performance measures to examine the fund's risk-adjusted performance subsequent to filing and participation in the ILP. We find that only the funds with better governance mechanisms exhibit superior performance after participating in the ILP. Second, we explore the changes in funds' portfolio choice after explicitly accounting for the endogenous choice to participate. Consistent with ILP relieving funds' need to maintain liquidity in their assets, we find that funds reduce their cash holdings, invest more in illiquid assets, and have more concentrated portfolios.

Third, we examine the investors' capital allocation decisions after funds' participation in the ILP. Since the investors are aware of the ILP from mandatory fund disclosure and the associated liquidity provision from member funds in a family, they are less concerned about the strategic redemptions from other investors. As a result, we observe lower flow-performance sensitivity, especially after poor performance in funds that apply for the ILP. This suggests that these funds are less exposed to fund runs resulting from strategic complementarities among investors (Chen, Goldstein, and Jiang, 2010). To address the concern that the ILP filing decision and flow-performance sensitivity are endogenous, we use the September 11 terrorist attacks as an exogenous shock to identify the causal effect of interfund lending on investors' redemption behavior.[4] We find that investors from funds with existing ILP redeem significantly less after the market reopened subsequent to the terrorist attacks in September 2001. The ILP reduces the total effect of the shock by around 10% in different specifications. These results are consistent with the prior theoretical literature on bank runs (Diamond and Dybvig, 1983) and fund runs (Chen, Goldstein, and Jiang, 2010; Liu and Mello, 2011).

Finally, we manually collect data on the funds' actual utilization of the ILP from the SEC filings to shed light on the ex-post borrowing behavior of ILP funds. We find that ILP funds are more likely to utilize the program when they experience outflows and perform poorly. These results suggest that the funds use ILP for intended purposes, i.e. to address funding liquidity problems rather than to simply lever up the funds' investment positions. In addition, funds with

[4] Immediately following the attacks, the SEC released an order (Release No. 25156) on September 14, 2001 that allows open-end mutual funds to borrow from non-bank financial institutions during the five business days after the reopening of the market. However, they still cannot borrow from affiliated funds that are registered investment companies, unless the fund family has an existing exemptive order on interfund lending.

better monitoring mechanisms are more likely to utilize the ILP. Such finding is consistent with our previous results that these funds are more likely to apply for and benefit from the ILP.

Our paper contributes to several strands of literature. First, there is a large literature on the cost and benefits of using internal capital market (Stein, 1997; Scharfstein and Stein, 2002), and specifically the intragroup loans in business groups (e.g. Johnson et al., 2000; Bertrand, Mehta, and Mullainathan, 2002; Khanna and Yafeh, 2005; Gopalan, Nanda and Seru, 2007, 2014). While previous literature documents the costs of internal capital market in fund families due to the agency problems,[5] we provide evidence on the benefits in the form of liquidity provision by member funds. Second, our study is consistent with the literature on government's liquidity provision to banks that can lead to greater risk-taking behavior due to government deposit insurance, bailout and monetary policies.[6] Our paper shows how the change in managers' incentives through the reduction of borrowing and liquidation costs is related to riskier portfolio choices. Third, our paper is related to the literature on the bank and fund runs. Chen, Goldstein, and Jiang (2010) show that the complementarities among investors lead to greater flow-performance sensitivity when funds hold more illiquid assets. Liu and Mello (2011) show that hedge funds hold cash to preempt investor runs. We build on this literature to show that when there is more liquidity provision from fellow fund members, fund flows are less responsive to past performance, and funds are less subject to runs.

[5] See Gaspar, Massa, and Matos, 2006 on the favoritism in fund families, Bhattacharya, Lee, and Pool, 2013 on the agency problem in fund of mutual funds, and Goncalves-Pinto and Sotes-Paladino, 2010; Goncalves-Pinto and Schmidt, 2013; Eisele, Nefedova, and Parise, 2014; and Casavecchia and Tiwari, 2015 on cross-trading among funds within the family.

[6] See Merton 1977, Wheelock and Wilson, 1995, Demirğuc-Kunt and Detragiache, 2002, Cordella and Yeyati, 2003, Gorton and Huang, 2004, Dam and Koetter, 2012, Duchin and Sosyura, 2014, and Jiménez et al., 2014.

2. Institutional background

Although interfund lending arrangements can potentially benefit fund investors, they would violate several restrictions placed on mutual funds under the 1940 Act. First, Section 17(a) of the Act prohibits transactions between affiliated persons, such as lending or borrowing activities between affiliated funds. Second, interfund lending creates a debt-like security for the borrowers, while Section 18(f) prohibits registered open-end investment companies from issuing senior securities except for bank loans.[7] Finally, Section 21(b) of the Act generally prohibits any registered management company from lending to any person who is under common control with such a company.

The initial purpose of the abovementioned regulatory restrictions is to address the conflicts of interest between funds and investors and protect the investors. Without these restrictions, the affiliated funds can transfer money using a higher or lower rate than that in an arm's length transaction, which can lead to cross-fund subsidization at the expense of some investors. However, the prohibition of interfund transactions also rules out the potential efficiency gains from the internal capital market. Section 6(c), Section 12(d)(1)(J), and Section 17(b) of the 1940 Act recognizes this possibility and state that an exemptive order can be granted if it is "appropriate in the public interest and consistent with the protection of investors". The interfund lending program (ILP) is based on the premise of such exemptions and has become increasingly popular. The ILP application is made by fund families, and upon approval, each fund within the family is eligible to borrow from and lend to each other. Over time, the SEC has granted a series of exemptive orders to mutual fund families.

[7] Section 13(a) of the 1940 Act rules that under such circumstances, funds have to obtain shareholder approval to engage in interfund lending.

Fidelity Investment was the first to design an ILP and file an order for exemption to the SEC. In its initial application on August 26, 1987 (amended on January 25, 1989, August 29, 1989, and November 13, 1989), Fidelity sought to establish a central credit facility that allows their funds to lend to and borrow money from each other to hedge unexpected investor redemptions. The main innovation of their proposal was that the funds only use a pre-determined formula to calculate the loan rate, which is the average of the lender's overnight repurchase agreement rate and the borrower's lowest available bank loan rate. This method alleviated the concern that the interfund rate is unfair to either the borrower or the lender. By construction, the interfund rate was more favorable than the best rate from the external capital markets available to both parties. Since Fidelity's peak short-term bank borrowing was as high as $900 million even in terms of the 1980 dollars, funds could use the un-invested cash from fellow funds to significantly lower the transaction costs. The SEC concluded that the proposed ILP is consistent with the public interest, without violating the intended purposes of investor protection in the 1940 Act. The SEC later granted the exemption in January 1990. Although participation in the ILP is voluntary, no Fidelity fund has ever chosen to opt out of the program.[8]

Following Fidelity, other fund families proposed similar terms and conditions in their applications for exemptive orders on interfund lending. Although the basic structure of the ILP is identical across fund families, there can be some differences. For example, the borrowing limit for Vanguard is 125% of the borrowing fund's net cash redemptions for the past seven calendar days, instead of 100% in the case of Fidelity. Lenders in Vanguard program cannot loan more than 5%, 7.5%, or 10% of their total assets for equity, taxable bond, or money market funds respectively,

[8] See http://www.sec.gov/Archives/edgar/data/24238/000003531512000325/exapp.htm for an example of Fidelity's filing in October 2012.

while in Fidelity they cannot loan more than 15% (later amended to 33% in 1999). The time period between filing date and approval date varies among different fund families, but all families who have filed for exemption eventually got approved by the SEC. This does not mean that any fund can apply and obtain an exemptive order from SEC. Our communications with the SEC suggest that fund managers usually discuss the matter with the SEC staff and the fund families with little chance to obtain an exemptive order may choose not to apply for the ILP.

3. Related literature and development of hypotheses

Our first hypothesis is related to the determinants of the interfund lending application. Even though mutual fund families apply for the ILP, families need to consider both fund-level and family-level characteristics in making this decision. Therefore, our hypothesis covers both fund and family attributes. Starting with family-level characteristics, we conjecture that a fund family is more likely to apply for the program when its underlying funds are more heterogeneous, e.g. when the funds have higher variability in terms of investor flows and portfolio liquidity. If funds in a family have similar characteristics, e.g. when the correlation of investor flows is high, there may be limited benefit to apply for the program since all the funds in the family are likely to have funding liquidity problems at the same time. In other words, existence of both demanders and suppliers of liquidity in the fund families should be associated with the families applying for the ILP.

We next consider several fund-level characteristics that influence the decision to apply for the ILP. Mutual funds face different investment restrictions that include constraints on borrowing (including margin purchases and short selling) and on investments in illiquid securities, among others (see Almazan et al., 2004 for details on restrictions). If a fund has borrowing restrictions, it

is likely to benefit more from interfund lending that effectively relaxes those restrictions. In other words, *internal* borrowing through the ILP serves as a substitute for the *external* borrowing involved in margin trading, short selling, etc. Therefore, we hypothesize a positive relation between borrowing restrictions and interfund lending application. In addition to the borrowing restrictions, funds may also be prohibited from investing in illiquid or restricted securities.[9] Funds with restriction on illiquid investments are less likely to be subject to fire-sale costs when investor outflows force them to sell assets. This would predict that restricted funds should have lesser need to rely on interfund lending as they face lower costs from funding liquidity shocks. Therefore, we expect a negative relation between the illiquidity restriction and interfund lending application.

Finally, the funds with better monitoring mechanisms in place should be more likely to apply for the ILP since the investors are less concerned that the fund managers will misuse the program. Note that the families need to obtain approval from the fund investors to apply for the ILP. Larger funds and families with more funds are likely to have better monitoring from peers (Arnott and Stiglitz, 1991; Armendariz de Aghion, 1999; Almazan et al., 2004) and better internal monitoring.[10] Funds with fewer managers (e.g., solo managed as opposed to team managed) are less likely to have a free-rider problem, and funds run by younger managers on average are more self-disciplined due to career concerns (Fama, 1980; Chevalier and Ellison, 1999). Finally, load fees discourage investor redemptions (Chordia, 1996) and therefore these funds face less discipline from the investors. Based on this evidence, we expect that families with more funds, and funds

[9] The 1940 Act explicitly defines a restricted security as one that involves an unregistered and private sale by the issuer. "Safe harbor" conditions of Rule 144A can potentially limit a fund manager's ability to resell the restricted security in a timely manner and at a fair market value. Therefore, following Almazan et al. (2004), we interpret the limitation on the use of restricted securities as an illiquidity restriction.

[10] In addition to the argument based on monitoring, it is also the case that the ILP requires the family to incur costs of investing in the related facility development and internal control procedures. Since larger fund families may find it more economically efficient to bear such costs and set up the program, this rationale further suggests a positive relation between family size and interfund lending application.

with larger size, fewer managers, younger managers, and without load fees are more likely to apply for interfund lending.

Taken together, our hypothesis regarding the determinants of interfund lending application can be classified into three broad categories: heterogeneity, restriction, and monitoring. The proxies we use to test the relation between the ILP and each of these categories is not exclusive. For example, larger fund families that should have better monitoring are also likely to have greater heterogeneity among their funds. Both monitoring and heterogeneity based arguments would in turn suggest that such families are more likely to file for interfund lending. Likewise, the load fee is related to worse monitoring from investors, but it is also related to the fund's restrictions. Load fees charged by funds can discourage investor redemptions, and therefore mitigate the funding liquidity problems for such funds, making them less likely candidates to apply for the ILP.

Above economic arguments lead to our first set of following hypotheses relating to the family-level and fund-level characteristics that determine the interfund lending application:

H1A (Heterogeneity): *Fund families with more heterogeneous flows and portfolio liquidity across the affiliated funds are more likely to apply for the ILP.*

H1B (Restriction)*: Funds that are more restricted from borrowing, and less restricted from investing in illiquid securities are more likely to apply for the ILP.*

H1C (Monitoring)*: Better monitoring is associated with a higher probability to apply for the ILP, including larger funds and families with more funds, funds run by fewer and younger managers, and funds that do not charge load fees.*

Our next three hypotheses relate to the consequences of the ILP. Funds participating in the program should benefit from better access to liquidity through internal capital market to satisfy investor redemptions. The potential benefits can be either direct or indirect, both of which predict better fund performance. The direct benefits include the lower interest expenses for borrowers and higher interest income for lenders. This is due to the fact that borrowers pay lower rate than the best available external rate while lenders receive higher rate than that on the external short-term investments. In addition, the funds can reduce the amount of credit lines from banks and thereby reduce the related fees.

The indirect benefits of the ILP can be through two channels. The first channel is the reduction in funds' cash holdings, greater investment in illiquid assets, and holding of more concentrated portfolios after their participation in the ILP. The second channel for changes in fund performance after the ILP relates to the changes in investors' capital allocation. Chen, Goldstein, and Jiang (2010) show that the flow-performance sensitivity is higher in funds that have lower liquidity. When fund managers invest in illiquid assets, investors who redeem their capital early will create larger negative externality for others who redeem late due to fire sale costs. Such strategic complementarities among investors can lead to "runs" on mutual funds. Further, theoretical model of Liu and Mello (2011) predicts that funds need to hold excess cash to preempt future runs on fund. If funds have access to additional liquidity provision from affiliated funds, it is less likely for their investors to engage in strategic redemptions and therefore investor flows should be less sensitive to poor performance. This, in turn, should lead to superior fund performance.

The ILP can be costly to maintain and operate since the SEC imposes strict rules that the fund families have to follow. These costs are related to the operational and internal control procedures of the funds. For example, the fund's board has to periodically review its participation in the ILP for compliance with terms and conditions in the exemptive orders. Fund's compliance is also considered by the external auditors as part of their internal control procedures, and is reported in fund's Form N-SAR. No fund is allowed to participate in the ILP unless it has fully disclosed in its registration statement all material facts about its intended participation, and funds have to seek shareholder approval to engage in transactions under the ILP.

For funds and families with better monitoring mechanisms, the benefits of the ILP should outweigh the costs, and help them improve their performance. As mentioned before, fund families need to obtain shareholder approval to apply for the ILP, as is the case for investment restrictions (Almazan et al., 2004). The decision to apply for the ILP can be viewed as a contracting equilibrium, where the families will choose to apply only when the benefits outweigh the costs. On average, the filing action itself may not generate superior performance because otherwise every fund family should apply for the ILP. We conjecture that funds with better governance mechanisms can monitor the operations of the ILP more efficiently and generate better performance afterwards.

Based on above discussion, the hypotheses related to the consequences of the ILP are as follows.

H2: *Funds should have better (worse) performance after they apply for the ILP when the funds have better (worse) monitoring mechanism.*

H3: *Funds should exhibit more illiquidity in their portfolio choices subsequent to their application to the ILP.*

H4: *Funds should have lower flow-performance sensitivity especially after poor performance subsequent to their application to the ILP.*

4. Data and variable construction

4.1 Interfund lending data

The data on the SEC exemptive orders are not available from standard mutual fund datasets such as the Center for Research in Security Prices (CRSP) and Morningstar. We build a comprehensive data on the interfund lending programs for mutual funds from multiple sources. Mutual fund families who seek to obtain exemptive orders from the SEC have to file Form 40-APP, the *Application for Exemption and Other Relief* under the Investment Company Act of 1940. The applicants have to demonstrate why the proposed program is beneficial to investors while preserving the integrity of the 1940 Act on investor protection. For the ILP, the Form 40-APP usually contains the name of the filer, the filing date, the purpose of the ILP, and some details of the proposed program such as the calculation of the loan rate and the internal control procedures. After the SEC reviews the application and considers issuing the exemption, it will issue a Notice (Form APP NTC) that the application has been received and the Notice has to be posted on Federal Register for public comments.[11] The Notice usually contains a summary of the application, the legal analysis of the case, and the SEC's discussions and conclusions. Both the SEC and interested persons may request a public hearing on the application. If no hearing takes place before the deadline specified in the Notice, the SEC will issue a final ORDER (APP ORDR) with its ruling decisions within one month.

[11] See Section 40(a) of the 1940 Act.

We construct our sample of interfund applications by searching on Federal Register using keywords "interfund", "Notice of Application", and "Exemptive Order".[12] In each Notice, the SEC discusses the application and mentions the names of the funds and their initial filing date. We include all interfund lending applications that are filed before December 2013 in our sample. We check all the filings and use the family's first filing date as our event date for interfund lending application.

Over time, mutual funds may change their names, merge with other funds, or liquidate and disappear. If a fund family only changes the name without significant change of fund operations, then the family may still be able to use the previously granted exemptive orders. For example, AMR Investment obtained an SEC exemptive order for interfund lending on May 04, 2004. On February 21, 2005 the company announces that it will change the name to American Beacon Advisors, effective March 1, 2005 although the products and services remain the same.[13] Later the funds can still rely on the previous SEC exemptive order since we observe various interfund lending activities in the company's N-CSR filings. In contrast, the Marshall Funds changed the name to BMO after their acquisition by the Bank of Montreal in 2011. Although Marshall Funds obtained an SEC exemptive order on October 5, 2005, the BMO Funds file and obtain another exemptive order on July 30, 20014 to engage in interfund lending activities. Unlike the case of AMR Investment, the acquisition of Marshall Funds involves significant changes of the firm, such

[12] The natural source of interfund lending data comes from the Form 40-APP, APP NTC, and APP ORDR from the EDGAR website. However, this data has limitations. First, not all the forms are available for our sample period. There is no Form 40-APP before 2002, and no APP ORDR data before 2009. Second, the Form 40-APP is not electronically available from 2002 to 2008. Therefore, we use Federal Register to identify the ILP applications. Since the Federal Register data is only available since 1993, we cross check with the news articles on LexisNexis to confirm that prior to 1993, only Fidelity obtained the exemptive order for ILP.

[13] See http://www.prnewswire.com/news-releases/amr-investments-changing-its-name-to-american-beacon-advisors-to-simplify-its-brand-54111557.html.

as change of advisor and the fee structure.[14] We manually check the history of each company in our sample of exemptive orders to make sure that such events are properly adjusted for on a case by case basis. We search news articles, funds' shareholder reports, and the SEC filings to confirm that the exemptive orders indeed apply to the funds we have identified during our sample period.

Table 1 shows the total number of interfund lending applications and the number of SEC approvals. We observe that the number of applications and SEC grants increase over time. There is some evidence of an increase in the filings for the ILP after crisis in the financial markets in 1998 (Long Term Capital Management and Russian sovereign default) and the recent 2007-2008 financial crisis. Note that the numbers of filings and approvals do not always match in every year due to the time taken by the SEC to review the ILP applications and make approval decisions.

4.2 Mutual fund data

We use the Center for Research in Security Prices (CRSP) mutual fund data from 1990 to 2013 and merge the monthly return and assets under management data with fund characteristics (e.g. cash holdings, load fees, etc.). We then add the mutual fund portfolio holdings data from Thomson Reuters S12 database using the MFLINKS table from WRDS. We focus on domestic equity mutual funds (CRSP style code='E' and 'D') because the holdings data for bond funds and money market funds are not available in S12 database.

4.3 Construction of variables

4.3.1 Measures of heterogeneity in investor flows and portfolio liquidity

To construct our family-level measures of heterogeneity in investor flows and portfolio liquidity, we start by estimating flows and liquidity for each fund each quarter for every fund

[14] See http://www.sec.gov/Archives/edgar/data/889366/000119312511297602/d250552d497.htm.

family in our sample. We estimate the net quarterly flows for each fund using its quarterly return and assets under management (AUM) as follows:

$$Flow_{i,t} = \frac{AUM_{i,t} - AUM_{i,t-1}\left(1 + R_{i,t}\right)}{AUM_{i,t-1}} \tag{1}$$

where *t* denotes the quarter and *i* denotes the fund. We next estimate a fund's stock portfolio liquidity by using two measures: the Amihud (2002) measure and the relative bid-ask spread.[15] The Amihud (2002) measure is defined as follows:

$$Amihud = \frac{1}{\mathrm{N}} \sum_{t=1}^{\mathrm{N}} \frac{\left|Ret_{k,t}\right|}{P_{k,t} \times Vol_{k,t}} \tag{2}$$

where *t* is the index for days, N is the number of days in the month, $Ret_{k,t}$ is the daily return of stock *k*, $P_{k,t}$ is the stock's closing price and $Vol_{k,t}$ is the trading volume. We take the weighted average of the Amihud measure of all the stocks in a given mutual fund's portfolio, weighted by the dollar amount of holdings in these stocks to compute the fund's stock portfolio liquidity. Similarly, we take a weighted average of the stock-level relative spread measure for all stocks held by the fund, defined as

$$Rspread = \frac{1}{\mathrm{N}} \sum_{t=1}^{\mathrm{N}} \frac{Ask_{k,t} - Bid_{k,t}}{0.5\left(Ask_{k,t} + Bid_{k,t}\right)} \tag{3}$$

We estimate a fund-level illiquidity measure by taking a weighted average of fund's stock portfolio illiquidity, and fund's cash position that has an illiquidity value of zero.

[15] These two measures capture different aspects of liquidity. The Amihud (2002) measure is related to the price pressure generated by a given amount of trading volume. The relative bid-ask spread measure captures the transaction cost for a round-trip trade on the stock as a percentage of the price of the stock. We acknowledge that the liquidity of other funds in the family such as bond funds affect the decision to apply for ILP. However our analysis focuses on equity funds since we lack data on the liquidity measures for the non-equity funds.

Finally, we construct our family-level measures of heterogeneity in investor flows and portfolio liquidity across all funds within each family by estimating the standard deviations of flows (*flowdif*) and liquidity (*portliq1dif* and *portliq2dif* using Amihud (2002) and relative spread, respectively) at the fund level each quarter.

4.3.2 Measures of borrowing and illiquidity restrictions and bank loan usage at the fund level

We construct the measures of external borrowing and illiquidity restrictions using funds' annual and semi-annual N-SAR filings following the procedure outlined in Almazan et al. (2004). Specifically, to measure a fund's external borrowing restriction, we take the average of two indicator variables, margin and short selling, which take a value of one if the fund is restricted from margin purchasing and short selling during a semiannual period, respectively, and zero otherwise (question #70.Q and #70.R in N-SAR filings). Similarly, to measure a fund's illiquidity restriction, we use an indicator variable that takes a value of one if the fund is restricted from investing in illiquid securities during a semiannual period, and zero otherwise (question #70.J in N-SAR filings). Finally, we measure the use of bank loans through an indicator variable *bankloan*, which equals one if the fund borrows in excess of 1% of their assets either through a bank loan or through an overdraft during a semiannual period, and zero otherwise (question #55.A and #55.B in N-SAR filings).

4.3.3 Measures of fund monitoring and governance

We use five variables as proxies for fund monitoring. To proxy for fund size, we use *numfund*, which is the number of funds in the family that the fund belongs to, and *size*, which is the logarithm of fund size at the end of current quarter. To proxy for fund manager's career concerns, we use *tenure*, which is the tenure of the fund manager in months for solo-managed funds, and the average tenure of the managers for funds with multiple managers. As a proxy for

the free-rider problem, we use *nummgr*, which is an indicator variable that is equal to one if the fund has more than two managers, and zero otherwise. To proxy for the monitoring from investor flows, we use *loadfee*, which is an indicator variable that is equal to one if any share class of the fund charges back-end load fees, and zero otherwise.

Based on these five variables, we construct a fund-level governance measure by take the summation of five indicator variables:

$$gov_{i,t} = numfund^{+}_{j,t} + size^{+}_{i,t} + tenure^{-}_{i,t} + nummgr^{-}_{i,t} + loadfee^{-}_{i,t} \quad (4)$$

where $gov_{i,t}$ is the governance measure for fund *i* in quarter *t*, $numfund^{+}_{j,t}$ is an indicator variable that is equal to one if the number of funds in family *j* in quarter *t* is greater than the median and zero otherwise, $size^{+}_{i,t}$ is an indicator variable that is equal to one if the size of fund *i* in quarter *t* is greater than the median and zero otherwise, $tenure^{-}_{i,t}$ is an indicator variable that is equal to one if the average tenure of managers in fund *i* in quarter *t* is smaller than the median and zero otherwise, $nummg^{-}_{i,t}$ is an indicator variable that is equal to one if the fund is solo managed and zero otherwise, and $loadfee^{-}_{i,t}$ is an indicator variable that is equal to one if the fund doesn't charge back-end load fees and zero otherwise.

4.3.4 Measures of fund performance

We use both returns-based and holdings-based fund performance measures. As our first set of returns-based measures, we follow the standard practice in the literature and use monthly fund returns to compute the alphas. Specifically, we estimate factor loadings for the three, four, and five factor alphas from the previous 24 months of returns as the three-factor model in Fama and French

(1993), the four-factor model as in Carhart (1997), and the five-factor model as in Pastor and Stambaugh (2003) with the liquidity factor added to the four-factor model. We compute the out-of-sample monthly alphas during the next quarter by subtracting the corresponding risk premium from the excess return of the fund. The out-of-sample monthly alphas in each quarter are then aggregated to the quarterly level.[16] For the holdings-based performance measure, we use Daniel, Grinblatt, Titman, and Wermers (1997) (DGTW) benchmark-adjusted returns, which are computed for each fund-quarter by value-weighting the benchmark-adjusted returns for all stocks held in a fund's portfolio each quarter. The benchmark for each stock in a fund's portfolio is constructed using the size, book-to-market, and momentum characteristics.

4.3.5 Measures of funds' portfolio liquidity choices

We use different measures of fund's portfolio liquidity choices. Our first measure is the portfolio illiquidity measure, which captures the illiquidity risk of fund's portfolio. We compute it as described above using equations (2) and (3) for the Amihud (2002) measure (*portliq1*) and relative spread measure (*portliq2*). Our second measure is fund's portfolio concentration that is computed as the Herfindahl index from the fund's portfolio holdings each quarter. Our final measure of risk is the fund's cash position as a percentage of fund's total assets computed each quarter for every fund in our sample. Greater cash is associated with lower liquidity risk for a fund.

We winsorize all continuous variables at the 1% and 99% levels to make sure that our results are not driven by outliers. Table 2 reports the summary statistics of the different family- and fund-level variables discussed above.

[16] Funds' factor loadings may change during the 24-month estimation period. For robustness, we estimate fund alphas using daily returns within each fund-quarter to mitigate this concern. Our inferences are unchanged using these alphas as performance measures.

5. Determinants and consequences of interfund lending

5.1 Determinants of interfund lending

We first investigate the determinants of interfund lending applications using fund-quarter observations. In each quarter, we check whether a fund's family files for an original exemptive order with the SEC. Specifically, we estimate the following regression to examine the determinants of filing:

$$\text{Prob}(Filing_{i,j,t}=1)=\Phi\left(\alpha+\psi\chi_{j,t}+\eta\phi_{i,t}+\kappa_t+\varepsilon_{i,j,t}\right) \quad (5)$$

where $Filing_{i,j,t}$ is an indicator variable that is equal to one if the fund *i* in family *j* files for an exemptive order in quarter *t*, and zero otherwise; $\Phi(\bullet)$ indicates the logistic cumulative distribution function; $\chi_{j,t}$ are family-specific variables including number of funds in the family, standard deviation of the portfolio liquidity of all funds within a family, and standard deviation of investor flows across all funds within a family; $\phi_{i,t}$ are fund-specific variables including load fee, turnover, flow, size, usage of bank loans, and investment (borrowing and illiquidity) restrictions; and κ_t are the year fixed effects to control for any time trend in interfund lending.

Panel A of Table 3 reports the results of the conditional logistic regression in equation (5). First, the decision to file for the ILP is related to the heterogeneity of funding and portfolio liquidity among family members, suggesting that the ILP is valuable for the family when there are both supply and demand for liquidity in the internal capital market. Consistent with the predicted sign, the filing decision has a significant and positive relation with the intra-family variability in the portfolio liquidity across funds (*portliq1dif* and *portliq2dif*). In addition, the slope coefficient on the intra-family variability of investor flows (*flowdif*) is positive and significant, although its

significance is reduced when we include the number of funds in the last two columns since the two variables are highly correlated. Second, we find that the fund's borrowing and illiquidity restrictions show significant positive and negative relation, respectively, with the probability of filing. These results are consistent with our hypothesis on how the fund-level restrictions affect the filing decision. Finally, we observe that the variables related to monitoring determine the choice of filing. All the proxies for monitoring, i.e., family size (*numfund*), manager's career concern (*tenure*), free rider problem (*nummgr*), and investors' incentive to discipline through outflows (*loadfee*) have the expected signs. The result for the load fees is also consistent with alternative explanation if the ILP and the load fees are substitutes for the funds to address the funding liquidity problems. Having established that the five variables for investor monitoring explain the decision of filing for ILP, in Panel B we use the governance measure defined in equation (4) as our comprehensive governance measure (*gov*). The results lend further support for the monitoring hypothesis as the coefficient on *gov* is positive and significant. We use *gov* as our main measure for monitoring for all subsequent analysis to conserve space.

In our analysis, we control for funds use of bank loans that are external borrowing options for the funds. On one hand, funds using loans are likely to have more demand for liquidity, which would predict that these funds are more likely to apply for the ILP ("demand effect"). On the other hand, funds that rely on external borrowing have limited benefit from internal borrowing through the ILP ("substitution effect"). We find that the substitution effect dominates the demand effect as funds that use bank loans are less likely to apply for ILP.

For robustness, in Panel C we use family-quarter observations and repeat our analysis. Although we see a significant drop in sample size compared to the fund-level regressions, our main results on heterogeneity and investor monitoring still hold. The coefficients on the restriction

variables have the expected signs, yet they are insignificant at 5% due to the smaller sample size and the weaker test power. Finally, we use the Cox proportional hazard model instead of the conditional logistic model as robustness tests and our results are unchanged, suggesting that our findings are not sensitive to the choice of the model. The results on Cox proportional hazard model are not reported and are available upon request. Taken together, our findings in this section are consistent with our first set of hypotheses related to the determinants of the ILP.

5.2 Consequences of interfund lending for fund performance

We now analyze the effect of the ILP on fund performance. We first estimate a set of difference-in-difference regressions:

$$DID: Perf_{i,j,t} = \alpha + \varsigma Filing_{i,j,t} + \eta \phi_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \quad (6)$$

where $Perf_{i,j,t}$ is the performance of fund i in family j during quarter t; $Filing_{i,j,t}$ is an indicator variable of ILP filing by fund i in family j during quarter t; and ω_i are fund fixed effects to absorb the effects of time-invariant fund characteristics driving fund performance. Other variables are as defined earlier in equation (5). Table 4, Panel A shows the effect of the ILP application on fund performance and Panel B shows the decomposition of the effect of the application for funds with different levels of governance measures. The coefficients on *filing* in different models (1) to (4) in Panel A are not significant, suggesting that the choice of filing itself does not generate superior performance, on average. However, when we separate the funds who file for the ILP based on their governance measures, the results in Panel B suggest that the funds with good governance practice have better performance than those without. Funds with best governance (those for which *gov* equals five), the improvement in quarterly alphas ranges from 0.1% to 0.6% (depending on the specification) after the filing of ILP. In contrast, for funds with

worst governance (those for which *gov* equals zero), the decline in quarterly alphas ranges from 0.2% to 0.5%.

Since the decision to file for the program is endogenous, we follow the previous literature (Chen et al. 2013; Ramadorai, 2012; Teo, 2011) and use the family size at fund's inception as an instrumental variable for the decision to file. We conjecture that family size at inception is positively correlated with the probability of filing, but there is no economic reason to believe that it directly affects the fund performance much later after fund's inception. In Panel A of Table 5, we report the results of the first-stage regressions as in equation (4). As in Chen et al. (2013), for the funds that file for the ILP, we keep all the observations after the filing date to estimate the predicted values of filing probability for the second stage.

Consistent with the results on the determinants of interfund lending in Table 3, the family- and fund-level variables such as the number of funds in the family and the portfolio liquidity difference among family funds continue to significantly explain the funds' filing for the ILP. In addition, the family size at fund's inception is strongly related to the filing status. Since our first-stage regression is nonlinear, we estimate the regressions using both the two-stage residual inclusion (2SRI) method following Chen et al. (2013), and the Heckman treatment effect model:

$$\begin{aligned} 2SRI &: Perf_{i,j,t} = \alpha + \varsigma Filing_{i,j,t} + \vartheta Residual_{i,j,t} + \boldsymbol{\psi\chi}_{j,t} + \boldsymbol{\eta\phi}_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \\ Heckman &: Perf_{i,j,t} = \alpha + \varsigma InvFiling_{i,j,t} + \boldsymbol{\eta\phi}_{i,t} + \kappa_t + \varepsilon_{i,j,t} \end{aligned} \tag{7}$$

where $Perf_{i,j,t}$ is the performance of fund *i* in family *j* during quarter *t*; $Filing_{i,j,t}$ is an indicator variable of ILP filing by fund *i* in family *j* during quarter *t*; $Residual_{i,j,t}$ is the regression residual from the first stage; and $InvFiling_{i,j,t}$ is the inverse Mills Ratio from the first-stage regression. Other variables are as defined earlier in equations (5) and (6).

The second-stage regression results for 2SRI method using the residual from the first stage of model (1) and (2) in Panel A are reported in Panels B and C of Table 5, respectively. The first stage regressions for Panels B and C are different since we include fund governance as an additional control variable in model (2) of Panel A. In Panel B, we find some performance improvement after funds file for the ILP using monthly fund returns. In Panel C, we interact the filing variable with the governance measure to separately analyze the effect of the ILP on fund performance in case of funds with better and worse governance. We observe in Panel C that any performance improvement is concentrated in the funds with good governance. The interaction terms between filing and governance are significant for both the return-based performance measures and holdings-based performance measure. We repeat the analysis using the Heckman treatment regressions and report the results in Panels D and E using the same first-stage regressions in Panel A. We continue to find that the performance improvement is explained by funds with better monitoring.

We conduct several robustness checks for the performance results. First, there is a brief waiting period (around one year) between the filing date and the date when the SEC grants the exemption to fund families. During this period, the funds cannot engage in interfund lending since they have not yet received the exemption. Therefore, we remove 2,473 fund-quarter observations during the waiting period and repeat our analysis. We find that none of our results change qualitatively.[17] Second, Bhattacharya, Lee, and Pool (2013) show that funds of mutual funds (FoMFs) within fund families, i.e., affiliated FoMFs, provide liquidity insurance to poorly performing funds experiencing outflows. To account for this possibility, we include flows into the

[17] This is not surprising as our analysis is ex ante. So it should not matter whether we use the filing date or the approval date as our event date since all the applications are eventually approved.

funds as one of the control variables in all our empirical tests. Moreover, we also repeat our analysis after excluding the funds in the bottom decile of flows since Bhattacharya, Lee, and Pool (2013) show that these funds are more likely to receive support from affiliated FoMFs. We continue to find similar results with this adjusted sample. In sum, these results support our second hypothesis that interfund lending is associated with superior fund performance, especially for the funds with better governance practice.

5.3 Changes in fund portfolio choice and investor behavior after participation in the ILP

Following our result of funds' performance after their participation in the ILP, we next explore if funds choose more illiquid and concentrated portfolios, and hold less cash after having access to liquidity from member funds in the family. We then investigate how the investors respond to the funds' ILP application by altering their capital allocation decisions.

5.3.1 Changes in funds' portfolio liquidity

Our third hypothesis is regarding the increase in funds' portfolio liquidity subsequent to filing for the ILP. To test this hypothesis, we again use the two-stage residual inclusion (2SRI) and the Heckman treatment effect models:

$$\begin{aligned} 2SRI &: Liq_{i,j,t} = \alpha + \varsigma Filing_{i,j,t} + \vartheta Residual_{i,j,t} + \boldsymbol{\psi\chi}_{j,t} + \boldsymbol{\eta\phi}_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \\ Heckman &: Liq_{i,j,t} = \alpha + \varsigma InvFiling_{i,j,t} + \boldsymbol{\eta\phi}_{i,t} + \kappa_t + \varepsilon_{i,j,t} \end{aligned} \quad (8)$$

The variable definitions are the same as in equations (5) to (7) before except for the dependent variable, $Liq_{i,j,t}$, which denotes the different proxies of liquidity of fund *i* in family *j* during quarter *t*. Panels A and B of Table 6 report the results. We observe a significant change in fund's portfolio liquidity choices after the fund files for the ILP. Specifically, we find an increase in the portfolio illiquidity, portfolio concentration, and a reduction of the funds' cash holdings.

These results are not sensitive to the choice of the 2SRI method (Panel A) or the Heckman treatment effect model (Panel B). As before, we check the robustness of our results by removing observations during the waiting period between the filing date and the order date, and find that none of our results change. Overall, these findings are consistent with our hypothesis that the managers rationally choose to increase their portfolio illiquidity when faced with lower cost of providing liquidity to fund investors.

One potential concern is that the liquidity provision from affiliated funds can exacerbate funds' risk-shifting behavior, i.e., funds may be more likely to *strategically* increase their risk exposure after poor prior performance (Brown, Harlow, and Starks, 1996; Chevalier and Ellison, 1997). Such risk-shifting behavior has been shown to be associated with worse fund performance (Huang, Sialm, and Zhang, 2011). We following Brown, Harlow, and Starks (1996) to compute the risk-shifting measures, and test whether the ILP funds are more likely to engage in risk shifting, i.e., whether the mid-year losers are more likely to increase their volatility in the latter part of the year. We do not find the ILP funds are more likely to engage in risk shifting, suggesting that on average these funds are not using the ILP to manipulate their risk exposures.

5.3.2 Changes in investors' capital allocation

Chen, Goldstein, and Jiang (2010) show both theoretically and empirically that the flow-performance sensitivity is higher when portfolio liquidity is lower.[18] The intuition is that when fund managers invest in illiquid assets, investors who redeem their shares early will create negative externality (due to fire sales) for other investors who redeem late. Similarly, the theoretical model of Liu and Mello (2011) predicts that funds need to hold excess cash in order to preempt fund runs.

[18] Goldstein, Jiang, and Ng (2015) find concavity in flow-performance relation for corporate bond mutual funds since they hold relatively illiquid assets, i.e., outflows are more sensitive to poor performance compared to the sensitivity of inflows to good performance.

If the funds have access to liquidity provision from affiliated funds, it is less likely that investors will run on the fund as they need to vote for ILP and can observe whether a fund has the ILP through fund's financial statement, prospectus, and statement of additional information (SAI). This argument suggests that there should be lower flow-performance sensitivity after a fund's participation in the ILP.

We test our fourth and final hypothesis by comparing the flow-performance sensitivity for the funds who participate in the ILP with that for funds that do not participate. Specifically, we estimate the following regression:

$$Flow_{i,j,t+1} = \alpha + \beta Perf_{i,j,t} + \gamma Participate_{i,j,t} + \delta Perf_{i,j,t} \times Participate_{i,j,t} + \boldsymbol{\eta}\boldsymbol{\phi}_{i,t} + \kappa_t + \varepsilon_{i,j,t} \qquad (9)$$

where $Flow_{i,j,t+1}$ denotes the investor flows in fund *i* in family *j* during quarter *t*+1, $Participate_{i,j,t}$ is an indicator variable that is set to one if fund *i* in family *j* participates in the ILP during quarter *t*, and zero otherwise; and the other variables are as defined in equations (5) and (6).

Panel A of Table 7 reports the results of the regression in equation (9). Following prior literature (e.g., Sirri and Tufano, 1998), we use three different measures of past performance: lagged return (*lagret*), one-factor alpha (*lagalpha1*), and three-factor alpha (*lagalpha3*). Our main variables of interest are the interaction terms between the three measures of past performance and *participate*, labeled as *p_lagret*, *p_lagalpha1*, and *p_lagalpha3*. From Table 7, we observe that the slope coefficients on these interaction terms are uniformly negative and statistically significant. This finding suggests that investor flows react less strongly to the past performance for the funds participating in the ILP. Further, the magnitudes of the slope coefficients on the interaction term are roughly one-half of the coefficients on past performance. This indicates that funds after applying to the ILP are able to reduce their flow-performance sensitivity by about one half, which

is economically significant. This evidence provides support to our fourth hypothesis that funds benefit from reducing the risk of strategic investor redemptions and exposure to run-like phenomenon.

Not surprisingly, the coefficients on the lagged performance measures are all positive and significant, consistent with flows chasing past performance as has been documented in the prior literature (e.g., Chevalier and Ellison, 1997; and Sirri and Tufano, 1998). Moreover, we observe strong persistence in flows as the coefficient on lagged flow, *lagflow*, is significantly positive in all specifications. All regressions control for fund and year fixed effects and the standard errors are clustered at the fund level.

In the last three columns, we also include fund portfolio liquidity using the Amihud (2002) measure and the interaction term between portfolio liquidity and the different past performance measures as additional control variables.[19] The signs on these interaction terms are positive in general, suggesting that the investor flows react more strongly to past performance when the portfolio assets are more illiquid. These findings resonate well with the theory and empirical evidence in Chen, Goldstein, and Jiang (2010). More importantly, our main result on the negative relation between investor flows and interaction of fund's ILP participation and past performance continues to hold even after controlling for the effect of portfolio liquidity.

Overall, these results suggest that the anticipated price impact from flow-induced asset sales by funds is lower when funds participate in the ILP, because funds can borrow from other member funds in the family. Investors therefore worry less about the redemptions from other

[19] We also repeat the same analysis using the other portfolio liquidity measure of relative bid-ask spread, and find the same results (not tabulated for the sake of brevity).

investors and exhibit less run-like behavior. This is reflected in the reduction in the flow-performance sensitivity after funds' participation in the ILP.

Next, following prior literature, we allow for nonlinearity in the flow-performance relation as investors can have asymmetric responses to good and bad fund performance. This asymmetry is important in the context of fund runs as the strategic redemptions of investors ahead of others should be especially applicable to poor fund performance. Therefore, in Panel B of Table 7, we report the flow-performance sensitivities for positive and negative fund performance separately. We use *lagretpos*, *laga1pos*, and *laga3pos* to denote positive fund performance using returns, one-factor alphas, and three-factor alphas, and *lagretneg*, *laga1neg*, and *laga3neg* to denote negative performance. All the interaction terms between *participate* and fund's negative performance are negative, while the interactions between *participate* and fund's positive performance are insignificant. Together, these results support our fourth hypothesis that fund's participation in the ILP should reduce its flow-performance sensitivity, especially when fund's past performance is poor.

So far we have shown that the ILP can reduce run-like behavior from fund investors. One potential concern can be the endogeneity in the relation between the flow-performance sensitivity and the filing decision due to either reverse causality or both variables being driven by unobservable fund characteristics. We address this concern using an exogenous shock related to September 11 attacks in 2001. We choose this event to investigate the effect of the ILP for several reasons. First, the attacks created panic among fund investors and had a large impact on both the stock market and the economy. Second, there is no realistic reason to believe that mutual fund managers knew about this event in advance, and filed for the ILP in anticipation of this event. Third, although the borrowing restrictions for the open-end funds were relaxed per SEC Release

No. 25156 on September 14, 2001, funds that had access to the ILP before the event had more flexibility to borrow.[20]

When the attacks occurred, we expect that the investors of treated funds (those that had applied for the ILP before the event) will be less concerned about the run-like behavior from other investors, and therefore redeem less from the funds with the ILP. We test this conjecture as follows. First, we use CRSP daily mutual fund return and assets to compute fund's daily net flows, *dflow*.[21] For each fund, we use an indicator variable *dummy1* that is equal to zero for two trading days before the September 11 event, and is equal to one for two trading days after the event. We exclude the event day because of the unavailability of the fund's NAV at the end of the trading on that day since the markets closed earlier. Similarly, we use an indicator variable *dummy2* for five trading days before and after the event as a robustness check.[22] We interact *dummy1* and *dummy2* with another indicator variable, *participate* that is equal to one if the fund's family has obtained an exemptive order for the ILP before the event date, and zero otherwise. We denote these interaction terms as *p_dummy1* and *p_dummy2*. We conduct a standard difference-in-differences (DiD) analysis where our main variables of interest are the interaction terms, which measure the marginal effect of the ILP after the exogenous shock of terrorist attacks. We cluster standard errors at the

[20] Specifically, funds were allowed to borrow from non-bank institutions and even affiliated persons (excluding those that are themselves registered investment companies) for the five business days after the market reopened. However, funds with ILP could also borrow from affiliated funds, and the amount could be as high as 25% of the fund's net assets, regardless of the borrowing limit set in the ILP application. Access to internal capital market together with the relaxed borrowing limit provided an added advantage to the funds with the ILP.

[21] Since daily fund assets are not available in the CRSP mutual fund database, we use the net asset values (NAVs) for flow computation. This adjustment should not have a material effect since the number of fund shares is unlikely to change significantly over a short period around the September 2001 event.

[22] Rule 22(e) of the 1940 Act allows funds to suspend the withdrawal requests if the market is closed such as in the case after 9/11. Therefore, while constructing the two indicator variables *dummy1* and *dummy2*, we exclude the days when the market was closed.

share class level and as in all the other regressions, we winsorize the daily return and flow data at 1% and 99% to ensure that our results are not driven by outliers.

We report the results from the DiD analysis in Table 8. First, we observe that the coefficients on the dummy variables *dummy1* and *dummy2* are significantly negative. After the attacks, investors withdrew heavily from the funds, on average. Second, the coefficients on the interaction terms *p_dummy1* and *p_dummy2* are significantly positive. This indicates that after the attacks, investors withdrew *less* from the funds that participated in the ILP prior to the attacks. The effects of the ILP to deter investor redemptions are economically large as we observe a reduction of around 10% of the total effect of shock in different specifications.

5.4 Analysis of the borrowing behavior

Our previous analysis is based on the availability of ILP, rather than the utilization of the program. However, it is important to understand whether the funds with ILP actually use it for the intended purpose. In this section, we evaluate the borrowing activities for the funds that have the ILP in place.

In general, the material information on the interfund lending facility is disclosed in the financial statements according to the US GAAP (Generally Accepted Accounting Principles). After the mutual funds obtain exemptive orders from the SEC, they usually describe the purpose of this facility and disclose the lending and borrowing activities in N-30D, N-Q, N-CSR, N-CSRS, N-SAR forms filed at annual, semi-annual, and quarterly frequencies. We use a web-crawling PERL program to download these forms that are electronically available starting from January 1994 to the end of our sample period in December 2013 from the SEC EDGAR website. Within each filing, we search for the keyword strings “interfund”, “SEC Exempt”, and “Exemptive Order”

to identify the interfund lending facility. If a filing contains any one of these keywords, we manually go through the filing and collect the activities in the interfund lending facility. We construct an indicator variable *borrow* that is equal to one if a fund engages in any borrowing activity during the period, and zero otherwise. After merging with the CRSP mutual fund database, we find that on average ILP is used in 7.1% of the entire fund-quarter observations.

Table 9 reports the results on the funds' utilization of the ILP. We find that the ILP funds are more likely to borrow when they experience investor outflows. This suggests that the funds in general use the ILP for its intended purpose as a tool for liquidity provision when faced with investor outflows. In addition to the outflows, several other variables explain the funds' use of the ILP. Funds with better governance mechanism are more likely to borrow ex-post. These funds should have lower cost for compliance, which is consistent with our previous results on the ex-ante determinants to apply for the ILP. Finally, bad performance is likely to trigger borrowing, suggesting that the utilization of ILP takes place when funds perform poorly and experience outflows, rather than when funds perform well to lever up their investments. This finding is also consistent with the idea that poorly performing funds face higher borrowing cost and have greater benefit from the utilization of the ILP.

6. Conclusion

In this paper, we evaluate the determinants and consequences of the interfund lending programs in the mutual fund industry. Our results show that fund families that stand to benefit the most tend to apply for the interfund lending program, such as the families with more heterogeneity in portfolio liquidity and investor flows across funds, having funds with less investment restrictions, and having funds with better monitoring mechanisms. We then document several

consequences after funds apply for the interfund lending program. First, we find that interfund lending generates value for fund investors in terms of better fund performance only when the funds have good governance practice in place. Second, we observe that the funds tilt their portfolios to more illiquid and fewer securities, and hold less cash. Finally, the participating funds are less likely to be exposed to a run-like behavior that enables them to hold less cash and avoid value-decreasing flow-induced sale of assets. We also find that funds use the interfund lending program subsequent to outflows and poor performance when they are likely to face greater liquidity needs. This evidence suggests that funds are using the program for its intended purpose. Taken together, these findings from our study inform the debate on the use of internal capital markets in the mutual fund industry.

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Table 1: Interfund lending applications and grants

This table reports statistics on the trend in the interfund lending program. *Filings* is the number of fund families that file for the exemptive order for interfund lending to the SEC. *Approvals* is the number of SEC approvals. Note that there are no applications for the 1991–1994 period.

Year	*Filings*	*Approvals*
1990	1	1
1995	2	0
1996	1	2
1997	1	1
1998	2	1
1999	8	7
2000	3	1
2001	5	1
2002	7	7
2003	3	4
2004	1	2
2005	1	3
2006	0	5
2007	1	0
2008	5	2
2009	1	2
2010	0	1
2011	1	3
2012	0	0
2013	3	0

Table 2: Summary statistics

This table reports the summary statistics of the data. Panel A reports the family-quarter variables. *numfund* and *familysize* are the number of funds in the family and the logarithm of the total family assets; *portliq1dif* and *portliq2dif* are the differences (standard deviation) of the portfolio liquidity for the underlying funds in the family, measured by *Amihud* and the *relative spread*, respectively; *flowdif* is the standard deviations of the investor flows of the underlying funds in the family. Panel B reports the fund-quarter summary statistics. *portliq1* and *portliq2* are fund portfolio liquidity measured by *Amihud* and *relative spread*, multiplied by 10^8 and 10^4, respectively for expositional convenience; *hhi* is the portfolio concentration measured by the Herfindahl index; *cash* is the cash holdings of the fund; *alpha3m*, *alpha4m* and *alpha5m* are the out-of-sample three, four and five factors alpha using monthly fund returns; *dgtw_alpha* is DGTW-adjusted alpha in percentage; *borrestrict and illiqrestrict* are the fund's self-imposed investment restrictions, including whether the fund is allowed to short sell and use margins, and invest in restricted securities, respectively; *bankloan* is an indicator variable which equals one if the fund borrows in excess of 1% of their assets either through a bank loan or through an overdraft, and zero otherwise; *nummgr* is an indicator variable that is equal to one if the fund has more than two managers; *tenure* is the average tenure of fund manager(s) in months; *vwflow* is the fund's quarterly flows; *loadfee* is an indicator variable that is equal to one if the fund charges back-end load fees and zero otherwise; *turn_ratio* is the turnover ratio of the fund; *size* is the logarithm of fund size; and *gov* is the fund-level governance measure as defined in equation (4).

Panel A: Family Characteristics

	N	Mean	STD	25%	Median	75%
numfund	34472	5.74	9.53	1.00	2.00	6.00
familysize	34470	19.57	2.52	17.79	19.53	21.39
portliq1dif	30828	0.30	0.64	0.00	0.01	0.23
portliq2dif	30750	1.17	2.50	0.00	0.15	0.79
flowdif	32869	0.07	0.11	0.00	0.03	0.10

Table 2 (contd.): Summary statistics

Panel B: Fund Characteristics

	N	Mean	STD	25%	Median	75%
portliq1	177404	0.31	0.93	0.01	0.02	0.13
portliq2	177059	2.50	4.60	0.42	0.85	2.01
hhi	217459	0.02	0.01	0.01	0.02	0.03
cash	216618	3.78	5.45	0.55	2.20	4.72
alpha3m	204270	0.00	0.04	–0.02	0.00	0.01
alpha4m	204270	0.00	0.04	–0.02	0.00	0.02
alpha5m	201196	0.00	0.04	–0.02	0.00	0.02
dgtw_alpha	110377	0.00	0.04	–0.01	0.00	0.01
borrestrict	188019	0.63	0.28	0.50	0.50	0.88
illiqrestrict	188019	0.09	0.21	0.00	0.00	0.00
bankloan	188019	0.36	0.38	0.00	0.33	0.60
nummgr	175510	0.40	0.49	0.00	0.00	1.00
tenure	175510	56.46	43.12	27.00	45.00	73.50
vwflow	209028	0.03	0.17	–0.04	0.01	0.09
loadfee	121371	0.64	0.47	0.00	1.00	1.00
turn_ratio	118776	0.90	0.95	0.36	0.67	1.11
size	217459	18.64	2.12	17.27	18.76	20.15
gov	198307	1.89	1.14	0.00	2.00	5.00

Table 3: Determinants of interfund lending programs

This table reports the determinants of the ILP applications using logistic models. Panel A uses fund-quarter observations and the standard errors are clustered at the fund level. Panel B uses fund-quarter observations and the composite governance measure *gov*, and the standard errors are clustered at the fund level. Panel C uses family-quarter observations and the standard errors are clustered at the family level. The variables are as defined in Table 2.

Panel A

	Pred. Sign	(1) *filing*	(2) *filing*	(3) *filing*	(4) *filing*
Heterogeneity					
portliq1dif	+	0.213***		0.190**	
		(2.60)		(2.33)	
portliq2dif	+		0.100***		0.095***
			(4.11)		(3.91)
flowdif	+	1.790***	1.752***	1.618***	1.580***
		(4.46)	(4.34)	(3.97)	(3.85)
Monitoring					
numfund	+	0.020***	0.020***	0.032***	0.032***
		(4.45)	(4.49)	(5.97)	(6.03)
size	+	0.255***	0.252***	0.209***	0.207***
		(6.82)	(6.73)	(5.56)	(5.50)
tenure	–	–0.003*	–0.003*	–0.003*	–0.003*
		(–1.78)	(–1.78)	(–1.82)	(–1.81)
nummgr	–	–0.306**	–0.313**	–0.329**	–0.338**
		(–2.17)	(–2.23)	(–2.34)	(–2.41)
loadfee	–	–0.298**	–0.317**	–0.335**	–0.350***
		(–2.30)	(–2.44)	(–2.55)	(–2.67)
Restrictions					
borrestrict	+			0.620***	0.616***
				(2.92)	(2.89)
illiqrestrict	–			–0.983***	–0.965***
				(–2.99)	(–2.91)
Controls					
bankloan				–0.502**	–0.514**
				(–2.27)	(–2.33)
turn_ratio		0.090	0.087	0.090	0.088
		(1.62)	(1.57)	(1.57)	(1.54)
vwflow		0.012	0.048	–0.072	–0.036
		(0.04)	(0.14)	(–0.21)	(–0.10)
Year FE		Yes	Yes	Yes	Yes
Observations		66,464	66,372	57,443	57,363
Pseudo R^2		0.042	0.045	0.053	0.055

Table 3 (contd.): Determinants of interfund lending programs

Panel B

	Pred. Sign	(1) *filing*	(2) *filing*	(3) *filing*	(4) *filing*
Heterogeneity					
portliq1dif	+	0.203**		0.190**	
		(2.57)		(2.45)	
portliq2dif	+		0.099***		0.094***
			(4.11)		(3.91)
flowdif	+	1.853***	1.819***	1.923***	1.892***
		(4.86)	(4.74)	(5.06)	(4.95)
Monitoring					
gov	+	0.504***	0.505***	0.510***	0.513***
		(8.72)	(8.76)	(8.73)	(8.81)
Restrictions					
borrestrict	+			0.627***	0.625***
				(2.98)	(2.96)
illiqrestrict	–			–1.014***	–0.998***
				(–3.17)	(–3.11)
Controls					
bankloan				–0.555**	–0.564**
				(–2.52)	(–2.56)
turn_ratio		0.013	0.012	0.032	0.031
		(0.24)	(0.22)	(0.59)	(0.57)
vwflow		0.005	0.048	–0.089	–0.051
		(0.02)	(0.15)	(–0.27)	(–0.15)
Year FE		Yes	Yes	Yes	Yes
Observations		68,680	68,587	59,272	59,192
Pseudo R^2		0.037	0.041	0.047	0.049

Table 3 (contd.): Determinants of interfund lending programs

Panel C

	Pred. Sign	(1) *filing*	(2) *filing*	(3) *filing*	(4) *filing*
Heterogeneity					
portliq1dif	+	0.374**		0.354**	
		(2.49)		(2.24)	
portliq2dif	+		0.118***		0.109***
			(3.48)		(3.05)
flowdif	+	3.665*	3.448*	3.599*	3.467*
		(1.94)	(1.76)	(1.81)	(1.69)
Monitoring					
gov	+	0.736***	0.718***	0.723***	0.713***
		(3.73)	(3.69)	(3.77)	(3.71)
Restrictions					
borrestrict	+			0.913	0.911
				(1.37)	(1.36)
illiqrestrict	–			–1.052	–1.024
				(–1.46)	(–1.38)
Controls					
bankloan				–0.525	–0.561
				(–1.03)	(–1.12)
turn_ratio		0.127	0.111	0.146	0.133
		(1.08)	(0.92)	(1.16)	(1.05)
vwflow		0.000	0.000	0.000	0.000
		(0.32)	(0.26)	(0.64)	(0.56)
Year FE		Yes	Yes	Yes	Yes
Observations		15,736	15,702	14,222	14,191
Pseudo R^2		0.108	0.114	0.115	0.119

Table 4: Fund performance after interfund filing

This table reports the performance consequences after the funds apply for the exemptive orders from the SEC for interfund lending. Panel A and B show the performance results without and with the controls for fund-level governance. The regressions control for year and fund fixed effects and the standard errors are clustered at the fund level.

Panel A

	(1) *alpha3m*	(2) *alpha4m*	(3) *alpha5m*	(4) *dgtw_alpha*
filing	–0.001	0.001	0.000	0.001
	(–0.73)	(0.63)	(0.34)	(1.07)
gov	0.000*	0.000*	0.000	–0.000
	(1.80)	(1.67)	(1.07)	(–0.24)
vwflow	0.008***	–0.001	0.006***	–0.007***
	(8.63)	(–1.33)	(5.81)	(–6.92)
turn_ratio	0.000	0.001**	0.001**	0.001***
	(0.94)	(2.05)	(2.23)	(3.73)
loadfee	0.001	0.000	0.000	–0.001**
	(1.10)	(0.17)	(0.78)	(–2.33)
size	–0.004***	–0.005***	–0.005***	–0.004***
	(–21.30)	(–25.11)	(–23.42)	(–20.03)
Constant	0.060***	0.079***	0.076***	0.073***
	(16.36)	(20.39)	(18.74)	(19.47)
Year and Fund FE	Yes	Yes	Yes	Yes
Observations	100,073	100,073	100,073	96,278
Adj. R^2	0.088	0.090	0.081	0.074

Panel B

	(1) *alpha3m*	(2) *alpha4m*	(3) *alpha5m*	(4) *dgtw_alpha*
filing	–0.004**	–0.004***	–0.005***	–0.002
	(–2.29)	(–2.69)	(–2.97)	(–1.51)
filing_gov	0.001**	0.002***	0.002***	0.001**
	(2.33)	(3.94)	(4.07)	(2.51)
gov	0.000	–0.000	–0.000	–0.000
	(0.72)	(–0.07)	(–0.68)	(–1.19)
vwflow	0.008***	–0.001	0.006***	–0.007***
	(8.59)	(–1.38)	(5.77)	(–6.94)
turn_ratio	0.000	0.001**	0.001**	0.001***
	(0.90)	(2.03)	(2.23)	(3.77)
loadfee	0.001	0.000	0.001	–0.001**
	(1.56)	(0.56)	(0.88)	(–2.34)
size	–0.004***	–0.005***	–0.005***	–0.004***
	(–21.26)	(–25.01)	(–23.24)	(–19.67)
Constant	0.060***	0.080***	0.076***	0.074***
	(16.45)	(20.59)	(18.96)	(19.57)
Year and Fund FE	Yes	Yes	Yes	Yes
Observations	100,073	100,073	100,073	96,278
Adj. R^2	0.088	0.090	0.081	0.074

Table 5: Choice of filing for the interfund lending program and fund performance

This table reports the performance consequences after the funds receive the exemptive orders from the SEC for interfund lending, after controlling for the choice of filing for the ILP. Panel A shows the first stage estimation of the probability of filing using conditional logistic model with year fixed effects and family size at inception (*familysize_incpt*) as instrument. The standard errors are clustered on the fund level. Panels B and C show the second stage results of two-stage residual inclusion method, using Models (1) and (2) in Panel A as the first stage, respectively. *residual* is the residual from the first stage. The regressions control for fund and year fixed effects, and the standard errors are clustered at the fund level. Panels D and E show the second stage results of Heckman treatment regressions, using Models (1) and (2) in Panel A as the first stage, respectively. *inv_filing* is the inverse Mills Ratio from the first stage. The regressions control for year fixed effects and the standard errors are clustered at the fund level. Other variables are defined earlier in Table 2.

Panel A

	(1) *filing*	(2) *filing*
familysize_inpt	0.405***	0.231**
	(13.43)	(2.18)
portliq1dif	0.530***	0.319*
	(13.67)	(1.83)
flowdif	–1.196***	3.220
	(–8.80)	(1.54)
gov	0.589***	0.427**
	(16.15)	(2.05)
turn_ratio	0.010	0.214*
	(0.29)	(1.80)
vwflow	0.320***	0.000
	(3.00)	(0.15)
borrestrict	0.741***	0.565
	(6.38)	(0.75)
illiqrestrict	–2.334***	–0.595
	(–8.24)	(–0.88)
bankloan	–1.471***	–0.369
	(–11.38)	(–0.77)
Constant	–14.892***	–13.724***
	(–17.27)	(–6.74)
Year FE	Yes	Yes
Observations	91,337	14,984
Adj. R^2	0.247	0.117

Table 5 (contd.): Choice of filing for the interfund lending program and fund performance

Panel B

	(1) *alpha3m*	(2) *alpha4m*	(3) *alpha5m*	(4) *dgtw_alpha*
filing	0.001	0.007***	0.006***	0.005***
	(0.52)	(3.34)	(2.87)	(2.83)
gov	–0.001**	–0.001***	–0.001***	–0.001***
	(–2.57)	(–4.32)	(–4.43)	(–3.98)
vwflow	0.009***	–0.002**	0.005***	–0.008***
	(8.37)	(–1.98)	(4.48)	(–7.07)
turn_ratio	0.001***	0.001***	0.002***	0.002***
	(2.84)	(4.24)	(4.31)	(5.59)
portliq1dif	–0.000	0.001***	0.000	0.000
	(–0.57)	(2.88)	(1.55)	(1.51)
flowdif	–0.003***	0.004***	0.004***	–0.002*
	(–2.62)	(3.30)	(3.10)	(–1.67)
borrestrict	–0.003***	–0.003***	–0.003***	–0.002**
	(–3.33)	(–3.66)	(–3.37)	(–2.50)
illiqrestrict	0.001	0.001	0.000	0.002**
	(0.58)	(0.72)	(0.29)	(2.14)
bankloan	0.002**	0.002***	0.002***	0.001
	(2.16)	(2.85)	(2.80)	(1.01)
residual	–0.001	–0.002***	–0.002***	–0.001**
	(–1.48)	(–3.70)	(–3.38)	(–2.50)
Constant	–0.006**	–0.003	–0.004	0.007***
	(–2.38)	(–1.21)	(–1.52)	(3.92)
Year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Observations	87,955	87,955	87,955	84,447
R–squared	0.080	0.079	0.073	0.069

Table 5 (contd.): Choice of filing for the interfund lending program and fund performance

	(1) *alpha3m*	(2) *alpha4m*	(3) *alpha5m*	(4) *dgtw_alpha*
		Panel C		
filing	–0.002	0.002	0.000	0.001
	(–0.85)	(0.61)	(0.07)	(0.26)
filing_gov	0.001*	0.001**	0.001***	0.001**
	(1.70)	(2.44)	(2.73)	(2.09)
gov	–0.001***	–0.001***	–0.001***	–0.001***
	(–2.89)	(–4.79)	(–4.96)	(–4.39)
Controls and FE	Yes	Yes	Yes	Yes
Observations	87,955	87,955	87,955	84,447
R–squared	0.080	0.079	0.073	0.069
		Panel D		
inv_filing	0.007***	0.008***	0.008***	0.002
	(3.47)	(3.45)	(3.41)	(1.43)
gov	–0.001**	–0.001***	–0.001***	–0.001**
	(–2.56)	(–3.43)	(–3.17)	(–2.54)
Controls and FE	Yes	Yes	Yes	Yes
Observations	87,955	87,955	87,955	84,447
		Panel E		
inv_filing	0.004	0.004	0.005	–0.002
	(1.44)	(1.49)	(1.51)	(–0.69)
filing_gov	0.000	0.001**	0.001**	0.001**
	(1.14)	(1.98)	(1.99)	(2.49)
gov	–0.001**	–0.001***	–0.001***	–0.001***
	(–2.22)	(–3.70)	(–3.40)	(–2.72)
Controls and FE	Yes	Yes	Yes	Yes
Observations	87,955	87,955	87,955	84,447

Table 6: Consequences of interfund lending on the portfolio choice of funds

This table reports the post-ILP changes in funds' portfolio choices. Panel A shows the results using the two-stage residual inclusion (2SRI) method where *residual* is the residual from the first stage. Panel B shows the results using the Heckman treatment effect model where *inv_filing* is the inverse Mill's Ratio from the first stage. In both panels, the first-stage regression uses model (2) of Panel A in Table 5. Other variables are defined earlier in Table 2. Standard errors are clustered at the fund level.

	(1) *portliq1*	(2) *portliq2*	(3) *hhi*	(4) *cash*
		Panel A		
filing	0.172***	0.501**	0.001***	–1.823***
	(3.67)	(2.21)	(2.84)	(–10.34)
gov	–0.051***	–0.124***	–0.000***	–0.005
	(–9.86)	(–4.83)	(–8.56)	(–0.21)
vwflow	–0.084***	–0.672***	–0.001***	2.573***
	(–4.37)	(–8.14)	(–10.59)	(23.02)
turn_ratio	–0.000	0.042	–0.001***	0.039
	(–0.07)	(1.49)	(–17.07)	(0.92)
portliq1dif	0.420***	0.937***	–0.000	–0.011
	(41.94)	(25.44)	(–1.47)	(–0.41)
flowdif	–0.045*	0.343***	0.000***	0.255**
	(–1.89)	(3.40)	(3.04)	(1.99)
restrict1	0.047**	0.373***	0.000***	–0.077
	(2.46)	(3.83)	(5.07)	(–0.85)
restrict2	0.019	–0.118	0.000	–0.171
	(0.63)	(–0.77)	(0.72)	(–1.22)
restrict3	–0.007	–0.223**	0.000	–0.079
	(–0.43)	(–2.46)	(1.24)	(–0.99)
residual	–0.036**	–0.029	–0.000***	0.610***
	(–2.16)	(–0.37)	(–4.51)	(9.74)
Constant	1.043***	13.314***	0.024***	0.014
	(11.29)	(38.69)	(67.77)	(0.09)
Year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Observations	78,407	78,204	91,330	91,294
R–squared	0.511	0.591	0.830	0.503
		Panel B		
inv_filing	1.135***	4.462***	0.009***	–2.016***
	(16.33)	(21.02)	(8.30)	(–8.41)
Controls and FE	Yes	Yes	Yes	Yes
Observations	87,989	87,745	101,558	101,504

Table 7: Flow-performance sensitivity after filing

This table reports the results of the flow-performance regressions using investor flows (*vwflow*) as dependent variable. In Panel A, *lagflow*, *lagret*, *lagalpha1*, *lagalpha3* are flows, returns, one-factor alphas, and three-factor alphas from prior quarter. *participate* is an indicator variable that equals one if a fund participates in the interfund lending program during a quarter, and zero otherwise. Variables preceded by "*p_*" denote the interaction between *participate* and flow or performance variables. *portliq1* is Amihud (2002) measure of fund's portfolio liquidity and variables preceded by "*portliq_*" denote the interaction between *portliq1* and performance measures. In Panel B, *lagretpos*, *laga1pos*, and *laga3pos* (*lagretneg*, *laga1neg*, and *laga3neg*) are equal to the positive (negative) values of *lagret*, *lagalpha1* and *lagalpha3* when performance is positive (negative) and zero otherwise. Standard errors are clustered at the fund level.

Panel A

	(1) *vwflow*	(2) *vwflow*	(3) *vwflow*	(4) *vwflow*	(5) *vwflow*	(6) *vwflow*
lagret	0.0011***			0.0011***		
	(8.08)			(7.77)		
p_lagret	–0.0006**			–0.0006**		
	(–2.34)			(–2.32)		
lagalpha1		0.0052***			0.0050***	
		(6.12)			(5.22)	
p_lagalpha1		–0.0027***			–0.0032***	
		(–5.28)			(–5.55)	
lagalpha3			0.0059***			0.0056***
			(6.90)			(5.70)
p_lagalpha3			–0.0027***			–0.0032***
			(–5.27)			(–5.58)
portliq1				–0.0007	0.0008	–0.0005
				(–1.33)	(0.98)	(–0.63)
portliq_ret				0.0005***		
				(4.25)		
portliq_a1					0.0006*	
					(1.94)	
portliq_a3						–0.0001
						(–0.44)
participate	–0.0011	–0.0061***	–0.0061***	–0.0006	–0.0068***	–0.0068***
	(–0.95)	(–4.10)	(–4.09)	(–0.49)	(–4.09)	(–4.09)
lagflow	0.2441***	0.2329***	0.2332***	0.2375***	0.2253***	0.2256***
	(33.66)	(31.12)	(31.22)	(27.61)	(25.12)	(25.20)
p_lagflow	0.0827***	0.0849***	0.0846***	0.0952***	0.0999***	0.0996***
	(6.79)	(6.69)	(6.68)	(6.71)	(6.66)	(6.65)
Constant	0.0396***	0.0651***	0.0653***	0.0415***	0.0369***	0.0382***
	(6.76)	(6.46)	(6.48)	(6.71)	(6.60)	(6.76)
Year and fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	189,345	177,263	177,263	153,018	140,761	140,761
Adj. R^2	0.135	0.132	0.133	0.124	0.122	0.122

Panel B

	(1) *vwflow*	(2) *vwflow*	(3) *vwflow*	(4) *vwflow*	(5) *vwflow*	(6) *vwflow*
lagretpos	0.0002			0.0003		
	(0.93)			(1.09)		
p_lagretpos	0.0002			0.0001		
	(0.42)			(0.27)		
lagretneg	0.0025***			0.0023***		
	(10.18)			(9.24)		
p_lagretneg	–0.0015***			–0.0015***		
	(–3.54)			(–3.28)		
laga1pos		0.1092***			0.1012***	
		(7.72)			(5.70)	
p_laga1pos		–0.0254			–0.0337	
		(–0.92)			(–0.99)	
laga1neg		0.0042***			0.0042***	
		(4.84)			(4.31)	
p_laga1neg		–0.0025***			–0.0029***	
		(–4.80)			(–5.10)	
laga3pos			0.1127***			0.1458***
			(7.39)			(7.60)
p_laga3pos			–0.0210			–0.0402
			(–0.74)			(–1.09)
laga3neg			0.0048***			0.0044***
			(5.59)			(4.49)
p_laga3neg			–0.0026***			–0.0029***
			(–4.88)			(–5.07)
portliq1				–0.0007	0.0007	–0.0008
				(–1.30)	(0.88)	(–0.90)
portliq_ret				0.0005***		
				(4.28)		
portliq_a1					0.0006*	
					(1.86)	
portliq_a3						–0.0002
						(–0.63)
participate	–0.0022*	–0.0055***	–0.0056***	–0.0019	–0.0061***	–0.0059***
	(–1.65)	(–3.46)	(–3.53)	(–1.22)	(–3.45)	(–3.38)
lagflow	0.2437***	0.2293***	0.2299***	0.2371***	0.2225***	0.2221***
	(33.56)	(30.41)	(30.62)	(27.53)	(24.71)	(24.77)
p_lagflow	0.0829***	0.0858***	0.0854***	0.0954***	0.1007***	0.1004***
	(6.80)	(6.67)	(6.64)	(6.72)	(6.64)	(6.61)
Constant	0.0415***	0.0633***	0.0635***	0.0434***	0.0333***	0.0332***
	(7.09)	(6.28)	(6.30)	(7.00)	(5.91)	(5.83)
Year and fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	189,345	177,263	177,263	153,018	140,761	140,761
Adj. R^2	0.135	0.133	0.133	0.125	0.122	0.122

Table 8: Investor flows before and after September 11 Attacks

This table reports the results of the difference-in-differences analysis of the investor flows before and after the September 11 attacks for the funds with and without the interfund lending program at that time. The dependent variable is the daily investor flows from investors (*dflow*). *participate* is an indicator variable that is equal to one if the fund participates in the interfund lending program at that time, and zero otherwise; *dummy1* is an indicator variable that is equal to zero on two trading days before the September 11 attacks and equal to one on two trading days after; *p_dummy1* is the interaction term between *participate* and *dummy1*. Similarly, *dummy2* is an indicator variable that is equal to zero on five trading days before the September 11 attacks and equal to one on five trading days after, and *p_dummy2* is the corresponding interaction term. *lagdflow* and *dret* are the lagged one day flow and the daily return, respectively.

	(1) *dflow*	(2) *dflow*	(3) *dflow*	(4) *dflow*
p_dummy1	0.072*		0.093**	
	(1.74)		(1.99)	
dummy1	–0.891***		–0.575***	
	(–42.58)		(–28.02)	
p_dummy2		0.035*		0.044**
		(1.86)		(2.20)
dummy2		–0.390***		–0.146***
		(–42.09)		(–17.28)
participate	–0.014	0.004	–0.003	0.005
	(–1.63)	(0.69)	(–0.20)	(0.56)
lagdflow			–0.195***	–0.039***
			(–20.04)	(–5.25)
dret			0.365***	0.256***
			(50.36)	(44.63)
Constant	–0.004***	–0.020***	0.277***	0.235***
	(–2.96)	(–7.12)	(37.86)	(37.97)
Observations	9,867	24,663	9,866	22,192
Adj. R^2	0.149	0.0592	0.370	0.181

Table 9 Utilization of the ILP

This Table reports on the borrowing activities in ILP. *Borrow* is an indicator variable that is equal to one if the fund engages in interfund borrowing during the period, and zero otherwise. Other variables are defined in Table 2. Standard errors are clustered at the fund level.

	(1) *borrow*	(2) *borrow*	(3) *borrow*	(4) *borrow*
vwflow	–0.037***	–0.038***	–0.037***	–0.037***
	(–4.94)	(–5.10)	(–5.04)	(–4.95)
gov	0.010***	0.010***	0.010***	0.008***
	(5.44)	(5.43)	(5.42)	(4.77)
alpha3m	–0.081***			
	(–3.08)			
alpha4m		–0.054*		
		(–1.85)		
alpha5m			–0.043	
			(–1.54)	
dgtw_alpha				–0.074***
				(–3.19)
Controls				
turn_ratio	0.020***	0.020***	0.020***	0.019***
	(8.19)	(8.20)	(8.20)	(8.05)
loadfee	0.006	0.006	0.006	0.007
	(0.96)	(0.95)	(0.95)	(1.19)
size	0.006***	0.006***	0.006***	0.006***
	(4.25)	(4.27)	(4.31)	(3.73)
Constant	–0.130***	–0.129***	–0.131***	–0.106***
	(–3.88)	(–3.88)	(–3.91)	(–3.49)
Fund FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	24,441	24,441	24,441	23,971
R–squared	0.600	0.599	0.599	0.609