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Interfund Lending in Mutual Fund Families: Role of Internal Capital Markets

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Abstract

Although the 1940 Act restricts interfund lending within a mutual fund family, families can apply for exemptions from the regulator to participate in interfund lending. We find that heterogeneity in portfolio liquidity and investor flows across funds, funds' investment restrictions, and governance mechanisms determine the applications for interfund lending. We document several costs and benefits of interfund lending after the application. Costs include lower sensitivity of managers' turnover to past performance and greater investor withdrawal for poorly governed funds. Benefits include funds holding more illiquid and concentrated portfolios, and being less susceptible to runs. Finally, well-governed funds perform better.

JEL Classification: G18, G23, G32

Keywords: Funding liquidity, fund families, internal capital markets, fund performance

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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 funds invest in illiquid securities, such liquidity provision can impose several types of costs on fund management. 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 cash holdings are associated with lower returns compared to those from illiquid investments. 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 by 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. However, Section 6(c), Section 12(d)(1)(J), and Section 17(b) of the 1940 Act state that an exemption 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 have become increasingly popular.[1] Under the ILP, the affiliated funds can borrow from each other for meeting their liquidity needs. In this paper, we address the following questions. First, what types of funds and family characteristics determine the application for interfund lending? Second, what are the consequences of interfund lending for fund's performance? Are the consequences different based on fund's and fund family's governance mechanisms? Finally, when do funds exercise the option to use interfund lending?

[1] The size of the families that file for exemption as a percentage of the size of all families grew from 7% in 1990 to around 50% in 2013. By the end of our sample period, almost half (14 of the largest 30 families) had applied for ILP.

There are reasons to believe that the ILP can benefit fund investors. First, the interfund loan 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, the fund may not hold enough cash for investor redemptions. The mismatch between funding liquidity and asset liquidity can be costly for funds (Edelen, 1999) and can 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 to satisfy investor redemptions. This in turn, provides funds more time to liquidate their 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 Mello, 2011). With the ILP, fund investors would be less concerned about the adverse effects of other investors' redemptions.

Offsetting the benefits, the ILP involves both direct and indirect costs. The direct costs are associated with the establishment of the internal control procedures to implement the ILP. For example, funds need to meet certain conditions related to the duration of the interfund loans, the upper limit for borrowing, the seniority of the loan, and the purpose of the loan.[2] In addition, the board has to periodically review the fund's compliance which will be assessed later on by the external auditors.[3] Funds also have to fully disclose material facts about the ILP and seek

[2] For example, funds can only borrow for a short period of time to meet investor redemptions but not to lever up their investments. If a fund has any outstanding secured loan from an 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.

[3] One example of failure in internal control is the Alger Large Cap Growth Fund that violated the terms outlined in its ILP application and its malpractice was identified by its auditor, Deloitte & Touche LLP. For more information, see the fund's 2001 NSAR filings.

shareholder approval to participate in interfund lending.[4] Therefore, funds with weaker governance mechanisms may find it more costly to set up and implement the ILP. The indirect costs of the ILP can be associated with continuing poor performance due to the reduction of managerial turnover subsequent to the ILP. Fund managers may use the ILP to mitigate the impact of investor outflows after poor performance. As a result, poorly performing managers are less likely to be fired especially in funds with worse governance. This allows the poor performance to persist and hurt the fund investors.

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 as measured by investor flows and asset liquidity as measured by the portfolio liquidity of their underlying funds, i.e., when there is both more supply of and more demand for liquidity within the fund family. We also observe a greater propensity to file for the ILP when the funds are restricted from external borrowing, are unrestricted from investing in illiquid securities, and do not charge load fees, i.e., when the funds are more likely to have funding and asset liquidity problems. In addition, we find the decision to apply for the ILP is positively related to the effectiveness of governance mechanisms 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; Almazan et al., 2004). Funds run 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 problems associated with teams (Holmstrom, 1982). Funds with younger managers (i.e., 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 benefits and costs of interfund lending. Starting with the benefits, we explore the changes in funds' portfolio choice after the ILP. Consistent with the ILP relieving

[4] Recently, the SEC investigated the inadequate disclosure of interfund loans by a private fund, Stilwell Value LLC. Although the loans were fully repaid, Stilwell paid $589,000 to settle the case due to the lack of disclosure about the conflicts of interest associated with interfund transactions. Such cases suggest that the failure of compliance and internal control on interfund loans can lead to litigation cost and reputation loss.

funds' need to maintain liquidity in their assets, we find that funds reduce their cash holdings, invest more in illiquid assets, and hold more concentrated portfolios. We then examine the investors' capital allocation decisions after funds' participation in the ILP. We observe weaker flow-performance sensitivity, especially after poor performance of funds that apply for the ILP. We also use the September 11 terrorist attacks as an exogenous shock and find that investors in funds with existing ILP redeem significantly less after the attacks.

Moving on to the costs of interfund lending, we find that the managers in funds with the ILP are less likely to be fired after poor performance. The weaker managerial turnover-performance sensitivity is consistent with our previous result of weaker flow-performance sensitivity, suggesting less punishment (in terms of outflows) for poorly performing managers. We also find that the weakening of managerial turnover-performance sensitivity is more pronounced for the funds with worse governance that are less likely to fire managers after poor performance. Moreover, we find that investors anticipate these adverse effects of the ILP and withdraw their capital from funds with worse governance after they apply for the ILP, but not from funds with better governance.

We next examine the effect of the ILP on fund performance. We posit that the funds with better governance mechanisms should exhibit superior performance after the ILP. There are two potential motivations for our hypothesis. First, poorly governed funds are likely to face higher costs associated with the establishment and implementation of the internal control procedures to use interfund lending. Second, in poorly governed funds, there can be agency problems associated with manager's access to more discretionary liquidity. This setting is analogous to the agency problem of free cash flows (Jensen, 1986) in the corporate finance literature. However, better governance can help mitigate the agency problem (e.g., Dittmar, Mahrt-Smith, and Servaes, 2003; Dittmar and Mahrt-Smith, 2007). We find that only the funds with better governance mechanisms exhibit superior performance after the ILP, supporting our hypothesis.

Since the families choose to apply for the ILP, we also explicitly control for this choice using two-stage models, and use the number of money market funds at the time of application as an instrumental variable (IV) for the family's decision to apply. We believe that our IV satisfies both the validity and the exclusion criteria. In terms of the validity criterion, the families with more money market funds should have a greater source of liquidity and therefore are more likely to apply. Our IV should also satisfy the exclusion criterion since the presence of money market mutual funds should not directly affect the attributes of affiliated funds in the second stage except through interfund lending. These attributes include portfolio liquidity, manager turnover, flows, and performance. The reason is that by law (e.g. Section 17 of the 1940 Act), the funds within the same family are legally independent entities and are restricted from transacting (e.g. borrowing, lending, and investing) with each other. Our results remain unchanged after controlling for the family's choice to apply for the ILP.

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

In addition to being the first to study the determinants and consequences of the interfund lending programs, our paper contributes to several strands of literature. First, our paper is related to the literature that studies the transactions between mutual funds within a fund family, e.g., favoritism in families as in Gaspar, Massa, and Matos (2006), the fund-of-funds' support to distressed funds in the same family as in Bhattacharya, Lee, and Pool (2013), and the cross-trading between family members.[5] In particular, we build on this literature by examining the costs and benefits of the ILP as a liquidity management tool available under the regulatory framework. More broadly, we contribute to the debate in the corporate finance literature on the

[5] See Goncalves-Pinto and Sotes-Paladino (2010), Goncalves-Pinto and Schmidt (2013), Eisele, Nefedova, and Parise (2014), and Casavecchia and Tiwari (2016) on cross-trading among funds within the family.

efficacy of internal capital markets.[6] Second, our paper is related to 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.[7] Specifically, our paper shows how the change in managers' incentives through the reduction of borrowing and liquidation costs is associated with riskier portfolio choices. Finally, our paper contributes to the literature on fund runs such as Chen, Goldstein, and Jiang (2010), Liu and Mello (2011), and Schmidt, Timmermann, and Wermers (2016). We build on this literature to show that when funds within a family have access to liquidity provision from fellow funds, investor flows are less responsive to past performance, and funds are less susceptible to runs.

2. Institutional background

The 1940 Act places several restrictions on interfund lending transactions. First, Section 17(a) of the Act prohibits 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.[8] 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 mitigate the conflicts of interest between funds and 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

[6] The subject of internal capital markets has been extensively studied in corporations (see Stein, 1997; Johnson et al., 2000; Bertrand, Mehta, and Mullainathan, 2002; Scharfstein and Stein, 2002; Khanna and Yafeh, 2005; Gopalan, Nanda and Seru, 2007; and Gopalan, Nanda, and Seru, 2014).
[7] See 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).
[8] Section 13(a) of the 1940 Act rules that under such circumstances, funds have to obtain shareholder approval to engage in interfund lending.

1940 Act recognizes this possibility and state that an exemptive order can be granted if it protects shareholder interests. The ILP is based on the premise of such exemptions. The ILP application is made by fund families, and subsequent to the SEC approval, each fund within the family is eligible to borrow from and lend to each other. Funds can borrow for a period up to 7 days for a given loan, but can roll over and extend the loan.

The tremendous growth in open-end funds during the late 1980s contributed to the demand for interfund lending. Fidelity Investment was the first to design an ILP and apply for an exemptive order from the SEC. Fidelity sought to establish a central credit facility that allows their funds to lend to and borrow money from each other to meet investor redemptions. The funds were allowed to only use a pre-determined formula to calculate the interfund loan rate, which is the average of the lender's overnight repurchase agreement rate and the borrower's lowest available bank loan rate.[9] The SEC granted the exemption in January 1990.[10]

Till the end of our sample period in 2013, most major fund families have filed and obtained the exemption from SEC, including Vanguard, T. Rowe Price, Dodge & Cox, Oppenheimer, John Hancock, Invesco, Janus, and Putnam. More recently, families such as BlackRock, Legg Mason, Allianz, and Third Avenue also applied for the ILP. Although we do not observe rejections of ILP applications by the SEC in our sample, there seems to be a screening mechanism. Our communications with the SEC suggest that fund families usually discuss the matter with the SEC staff, and the families with little chance to obtain an exemptive order may choose not to apply for the ILP.

[9] The optimality of the loan rate is not obvious. On one hand, the internal lenders may face greater risk when lending to affiliated funds that may be performing poorly or are liquidity constrained. On the other hand, internal lenders may face lower risk due to less information asymmetry about the affiliated borrowing funds.

[10] From Fidelity's SEC filings, we observe frequent interfund borrowing and lending activities through the ILP after approval.

3. Related literature and development of hypotheses

Our first hypothesis is related to the determinants of the interfund lending application. Even though fund families apply for the ILP, families are likely to consider both fund-level and family-level characteristics in making this decision. Starting with family-level characteristics, we hypothesize that a family is more likely to apply when its underlying funds have greater heterogeneity, e.g., when there is higher variability in terms of funding liquidity (i.e., investor flows) and asset liquidity (i.e., portfolio liquidity) across funds within the family. 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 liquidity problems at the same time. In other words, simultaneous existence of both demanders and suppliers of liquidity in the fund families should be associated with greater likelihood of families applying for the ILP.

We next turn to several fund-level characteristics that should 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 external borrowing restrictions, it is likely to benefit more from interfund lending that effectively relaxes those restrictions. That is, *internal* borrowing through the ILP should serve as a substitute for the *external* borrowing. Therefore, we hypothesize a positive relation between borrowing restrictions and the ILP application. In addition to the borrowing restrictions, funds may also be prohibited from investing in illiquid or restricted securities.[11] Funds with restriction on illiquid investments are less likely to be subject to greater fire-sale costs when investor outflows force them to sell assets. This would predict that restricted funds should have lesser need to rely on

[11] 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.

interfund lending as they face lower costs from funding liquidity shocks. Therefore, we expect a negative relation between the illiquidity restriction and the ILP application.

Finally, funds with better governance mechanisms should be more likely to apply for the ILP since the investors should be less concerned that the fund managers will misuse the program. Note that the families need to obtain approval from the investors to use 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.[12] 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 are likely to be more self-disciplined due to career concerns (Fama, 1980; Chevalier and Ellison, 1999). Finally, load fees discourage investor redemptions (Chordia, 1996) and therefore funds with load fees face less discipline from the investors. Based on these arguments, we expect that families with more funds, and funds 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 the ILP application can be classified into three broad categories: heterogeneity, restriction, and governance. The proxies we use to test the relation between the ILP application and each of these categories are not exclusive. For example, larger families that should have better governance are also likely to have greater heterogeneity among their funds. Both governance- and heterogeneity-based arguments would suggest that such families are more likely to apply for the ILP. Likewise, the load fee is related to less monitoring from investors, but is also related to the fund's redemption restrictions. Load fees charged by funds can discourage investor redemptions, and therefore mitigate the funding liquidity problems, making them less likely to apply for the ILP.

[12] In addition to the argument based on monitoring, the ILP requires the family to incur costs of investing in the related facility development and internal control procedures. Since larger families may find it more efficient to bear such costs, this rationale also suggests a positive relation between family size and the ILP application.

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

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

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

H1C (Governance)*: Better governance mechanisms are 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 two hypotheses relate to the consequences of the ILP for the borrowing funds. We focus on the equity mutual funds that are more likely to be on the borrowing side.[13] The benefits of the ILP for the borrowers can be through two channels. The first channel is reduction in funds' cash holdings, greater investment in illiquid assets, and holding of more concentrated portfolios. Since funds obtain more liquidity provision from affiliated funds after the ILP, they should face less investment restrictions and can increase their illiquid investments. The second channel is related to the reduction in the flow-performance sensitivity. Due to fire sale costs, investors who redeem their capital early will create negative externality for others who redeem late. Such strategic complementarities among investors can lead to runs on funds (Chen, Goldstein, and Jiang, 2010). Further, theoretical model of Liu and Mello (2011) predicts that funds need to hold excess cash to preempt future runs. If funds have access to additional liquidity from affiliated funds, investors are less likely to engage in strategic redemptions and therefore flows should be less sensitive to past performance. Since runs correspond to the events of investor outflows, this should be true especially after poor fund performance.

[13] The lending activities are usually processed and reported to a central cash facility that aggregates the unused cash from funds within the family.

H2: *Funds should choose more illiquid and concentrated portfolios subsequent to their application to the ILP*.

H3: *Funds should have weaker flow-performance sensitivity subsequent to their application to the ILP*, *especially after poor performance*.

Our next two hypotheses are related to the potential costs of the ILP application. We explore two channels, namely manager turnover and investor flows, that can shed light on the costs of the ILP.

First, interfund lending provides liquidity insurance that protects the managers from investor redemptions subsequent to poor performance. With the ILP, the managers can borrow from other funds within the family and mitigate the effect of the outflows. In addition, the funds with access to the ILP should have less capital withdrawal after poor performance due to weaker flow-performance sensitivity, and therefore face less discipline from the capital market. Such distortions in manager's incentives may be exacerbated in funds with worse governance that are less likely to fire managers after poor performance. This leads us to hypothesize that the managerial turnover-performance sensitivity should be lower for funds with the ILP, especially among funds with worse governance. Second, since poorly performing managers may face less punishment and lower turnover-performance sensitivity, we expect that at least some investors will anticipate such effects and withdraw their capital, especially for funds with weaker governance.

H4: *Funds with weaker governance mechanisms should have lower managerial turnover-performance sensitivity after their application to the ILP*.

H5: *Funds with weaker governance mechanisms should have lower flows after their application to the ILP*.

Our last hypothesis is related to the effect of ILP on fund performance. The performance implications should be different for funds with different levels of governance. First, fund governance may affect the direct cost of implementing the ILP. Poorly governed funds are likely to face higher costs associated with the proper operational and internal control procedures. Second, managers' access to more discretionary liquidity can lead to more agency problems. The corporate finance literature has well documented the agency problem of free cash flows (Jensen, 1986). Previous studies document that better firm- or country-level governance help increase the value of cash (Dittmar, Mahrt-Smith, and Servaes, 2003; Pinkowitz, Stulz, and Williamson, 2006; Dittmar and Mahrt-Smith, 2007; Harford, Mansi, and Maxwell, 2008). Motivated by these findings, we hypothesize that the value of additional access to liquidity through the ILP should also depend on the fund governance. We posit that funds with better governance mechanisms can effectively implement the ILP and generate better performance.

H6: *Funds should have better performance after their application to the ILP when the funds have stronger governance mechanisms.*

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 ILP for funds from multiple sources. 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. 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. In accordance with Section 40(a) of the 1940 Act, the Notice has to be posted on Federal Register for public comments.[14]

We construct our sample of the ILP applications by searching on Federal Register using keywords "interfund", "Notice of Application", and "Exemptive Order".[15] In each Notice, the SEC discusses the application and mentions the names of the funds and their filing date. We include all the ILP applications 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 the ILP application.

Over time, funds may change their names, merge with other funds, or be liquidated and disappear. If a fund family only changes the name without significant change of fund operations, then it may still be able to use the previously granted exemptive orders. For example, AMR Investment obtained an SEC exemptive order for the ILP 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.[16] 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 another case, the Marshall Funds changed the name to BMO after being acquired by the Bank of Montreal in 2011. Although Marshall Funds obtained an SEC exemptive order on October 5, 2005, the BMO Funds filed and obtained another exemptive order to engage in interfund lending activities. In contrast to the case of AMR Investment, the acquisition of

[14] Both the SEC and interested persons may request a public hearing on the application. If no hearing takes place, the SEC will issue an ORDER (APP ORDR) with its ruling decisions within one month.

[15] 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 the ILP.

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

Marshall Funds involved significant changes of the firm, such as change of advisor and the fee structure.[17] 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 ILP applications and the number of SEC approvals. We observe that the number of applications and SEC approvals increase over time. There is some evidence of an increase in the applications after crisis in 1998 (Long Term Capital Management and Russian sovereign default) and the recent 2007-2008 financial crisis. Note that the numbers of applications 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) equity 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 add the mutual fund portfolio holdings data from Thomson Reuters S12 database using the MFLINKS table from the Wharton Research Data Services (WRDS). We focus on domestic equity funds (CRSP style code='E' and 'D') since the holdings data for bond and money market funds are not available in the S12 database.

4.3 Construction of variables

4.3.1 Measures of heterogeneity in investor flows and portfolio liquidity

To construct the family-level measures of heterogeneity in investor flows and portfolio liquidity, we estimate flows and liquidity for each fund each quarter for every family in our sample. We estimate the net quarterly flows for each fund using its quarterly return and assets under management (AUM) as follows:

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

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

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. The Amihud (2002) measure is defined as follows:

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

where t is the index for days, N is the number of trading days in the quarter, $R_{k,t}$ 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 stocks in a given 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.

Finally, we construct the 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 measure and relative spread, respectively) across all funds within a family each quarter.

4.3.2 Measures of fund's restrictions and bank loan usage

We construct the measures of external borrowing and illiquidity restrictions using funds' 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, 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, 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's governance mechanisms

We use five variables as proxies for fund's governance mechanism. Our first two proxies are family size, for which we use *numfund*, i.e., the number of funds in the family that the fund belongs to, and *size*, i.e., the logarithm of fund size. Our third proxy is fund manager's career concerns, for which we use *tenure*, i.e., tenure of the fund manager in months for solo-managed funds, and the average tenure of the managers for funds with multiple managers. Our fourth proxy is the free-rider problem, for which we use *nummgr*, i.e., the number of managers for the corresponding fund. Our fifth and final proxy is the monitoring from investor flows, for which we use *loadfee*, i.e., an indicator variable that is equal to one if the fund has a share class that charges back-end load fees, and zero otherwise.

We construct a fund-level governance measure by converting the continuous measures into indicator variables, and taking the sum of the five indicator variables:

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

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 shorter than the median and zero otherwise, $nummgr^{-}_{i,t}$ 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.[18]

4.3.4 Measures of fund performance

We use both returns-based and holdings-based fund performance measures. For the returns-based measures, we estimate alphas from different multi-factor models using monthly net-of-fee returns over 24-month windows. Specifically, we estimate the three-, four-, and five-factor alphas using the three-factor model in Fama and French (1993), the four-factor model as in Carhart (1997), and the five-factor model as in Pástor and Stambaugh (2003) with the liquidity factor added to the four-factor model. Our alphas are computed out of sample each quarter using the factor loadings from the previous 24 months.[19] For the holdings-based measure, we use Daniel et al. (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 and concentration

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

[18] Note that + and – signs as superscripts denote the positive and negative relation between the proxies and governance. For example, absence of load fees is associated with better governance, hence the superscript with a negative sign. The correlations between our governance measure and Morningstar's board quality index and fund stewardship grade are both over 30% at the end of our sample period; however we rely on our measure since the Morningstar measures are only available for less than 30% of the funds with limited time-series coverage.

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

relative spread measure (*portliq2*), respectively. Our second measure is fund's portfolio concentration that is computed as the Herfindahl index from the fund's portfolio holdings each quarter. Our last measure is the fund's cash position as a percentage of fund's total assets computed each quarter for every fund in our sample. Table 2 reports the summary statistics of the family- and fund-level variables discussed above.

5. Determinants and consequences of interfund lending

5.1 Determinants of interfund lending applications

We first investigate the determinants of interfund lending applications by estimating the following regression using fund-quarter observations:

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

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-varying determinants in interfund lending such as changes in macroeconomic conditions.

Panel A of Table 3 reports the results of the 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 when there are both supply of and demand for liquidity within the family. 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. 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 the governance mechanisms determine the choice of filing. All the proxies for governance, i.e., family size (*numfund*), fund size (*size*), manager's career concern (*tenure*), free riding concerns (*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 governance mechanisms explain the decision of filing for the ILP, in Panel B we use the measure defined in equation (4) as our comprehensive governance measure (*gov*). The results lend further support to the governance hypothesis as the coefficient on *gov* is positive and significant. We use *gov* as our main composite measure for all subsequent analysis.

We control for funds' use of bank loans as an external borrowing option for the funds. On one hand, funds using bank 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 the ILP.

For robustness, we use the Cox proportional hazard model and model the time to application instead of the logistic model. 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. Finally, in Panel C we use family-quarter observations and repeat our analysis where all the variables are aggregated at the family level. Although we observe a significant drop in sample size compared to the fund-level regressions,

our main results on heterogeneity and governance still hold. The coefficients on the restriction variables have the expected signs, yet they are insignificant due to smaller sample size and less test power. Taken together, our findings in this section are consistent with our first set of hypotheses related to the determinants of the ILP.

5.2 Changes in funds' portfolio choice and investor behavior

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.

5.2.1 Changes in funds' portfolio liquidity

We hypothesize that funds will increase their portfolio liquidity subsequent to filing for the ILP as they need to be less concerned about meeting investor redemptions. We estimate the following difference-in-differences regressions (DID) to examine the change in fund liquidity for the funds in the treatment group (funds that apply for the ILP) compared to the funds in the control group (funds that do not apply)[20]:

$$Liq_{i,j,t} = \alpha + \varsigma Filing_{i,j,t} + \psi\chi_{j,t} + \eta\phi_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \quad (6)$$

where $Liq_{i,j,t}$ denotes the different proxies of liquidity of fund *i* in family *j* during quarter *t*; ω_i denotes fund fixed effects; and the other variables are as defined earlier in equation (5).

The results are reported in Table 4. We observe a significant change in fund's portfolio liquidity choices after its family files for the ILP. Specifically, we find an increase in the portfolio illiquidity, portfolio concentration, and a reduction of the funds' cash holdings. Filing for the ILP leads to changes of portfolio liquidity that are economically significant. For example, the changes in funds' cash and the relative spread after the ILP filing range from 5.6% to 15.4% of the standard deviations of the corresponding liquidity measures. We check the robustness of

[20] Note that for a fund to be included in the control group, its family should not have applied for the ILP at time *t*, but it may or may not apply at a future date.

our results by removing observations during the waiting period between the filing date and the approval date, and find that the results are robust. [21]

Since the family's decision to file for the ILP is endogenous, we use the two-stage residual inclusion (2SRI) method and the Heckman treatment effect model to examine the determinants of the ILP in the first stage, and then investigate the consequences in the second stage.[22] For identification, we use the number of money market funds at the time of application as an instrumental variable (IV). Our IV should satisfy both the validity and the exclusion criteria. The families with more money market funds should have a greater source of liquidity and therefore are more likely to apply for the ILP. This argument forms the basis for the validity of the IV. Our IV should also satisfy the exclusion criterion since it should not directly affect the fund attributes (such as fund liquidity, manager turnover, flows, and fund performance) in the second stage, except through interfund lending. The rationale for this argument is that the funds within the same family are legally independent entities. Section 17 of the 1940 Act restricts borrowing, lending, and investing between funds belonging to the same family, unless the family obtains the exemptive order for interfund lending.

We report the results of the first-stage regressions in Panel A of Table A1 in the Appendix. The number of money market funds in the family at the time of the ILP application is strongly related to the filing, suggesting that we do not have a weak instrument problem. We examine the effect of the ILP on fund's portfolio liquidity in the second stage by estimating the following regressions:

$$\begin{aligned} 2SRI &: Liq_{i,j,t} = \alpha + \varsigma Filing_{i,j,t} + \vartheta Residual_{i,j,t} + \psi\chi_{j,t} + \eta\phi_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \\ Heckman &: Liq_{i,j,t} = \alpha + \varsigma InvFiling_{i,j,t} + \psi\chi_{j,t} + \eta\phi_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \end{aligned} \tag{7}$$

[21] We repeat this robustness check for all of our subsequent analysis.
[22] Since the first stage regression is nonlinear, we follow Chen et al. (2013) and use the 2SRI instead of the two-stage least squares (2SLS) method.

where $Residual_{i,j,t}$ is the regression residual from the first stage; and $InvFiling_{i,j,t}$ is the inverse Mills Ratio from the first stage. Other variables are as defined earlier. The second-stage regression results for 2SRI method and the Heckman model are reported in Panels B and Panel C of Table A1 in the Appendix, respectively. We find both $Filing_{i,j,t}$ in the 2SRI method and $InvFiling_{i,j,t}$ in the Heckman model are significant. This result supports our hypothesis that the funds choose to increase their portfolio illiquidity when faced with lower cost of providing liquidity to their investors due to access to interfund lending.

5.2.2 Changes in investors' capital allocation

We hypothesize that if the funds have access to liquidity provision from affiliated funds, it is less likely for investors to run on the fund as they need to worry less about the strategic redemption from others. This hypothesis suggests that there should be weaker flow-performance sensitivity after a fund's participation in the ILP. We test our 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 DID regression:

$$Flow_{i,j,t+1} = \alpha + \beta Perf_{i,j,t} + \gamma\, participate_{i,j,t} + \delta P\_Perf_{i,j,t} + \eta\phi_{i,t} + \kappa_t + \varepsilon_{i,j,t} \qquad (8)$$

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 $P\_Perf_{i,j,t}$ is the interaction term between $participate_{i,j,t}$ and fund's past performance. Other variables are as defined previously. We use fund participation instead of filing since investors should be aware of the existence of the program after fund participation.[23]

Panel A of Table 5 reports the results of the regression in equation (8). To conserve space, we use three measures of past performance: lagged return (*lagret*), three-factor alpha (*lagalpha3*),

[23] Note that the investors are aware of the fund's access to the ILP since they need to vote for it and can observe its existence through fund's financial statement, prospectus, and statement of additional information (SAI).

and four-factor alpha (*lagalpha4*). For the sake of brevity, we do not report the results using five-factor alpha, which are similar to those with other performance measures. Our main variables of interest are the interaction terms between the three measures of past performance and *participate*, labeled as *p_lagret*, *p_lagalpha3*, and *p_lagalpha4*. We observe that the slope coefficients on these terms are uniformly negative and statistically significant. This finding indicates 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 terms are roughly one-half of the coefficients on past performance, which is economically significant. This evidence provides support to our hypothesis that funds benefit from reducing the exposure to run-like phenomenon.

In the last three columns, we also include fund's portfolio liquidity using the Amihud (2002) measure and the interaction term between portfolio liquidity and different past performance measures as additional control variables. Adding the level of portfolio liquidity allows us to control for the decrease in fund's liquidity after the ILP (as we find earlier). The signs on the interaction terms between past performance and liquidity are positive, suggesting that investor flows react more strongly to past performance when the portfolio assets are more illiquid. These findings resonate well with Chen, Goldstein, and Jiang (2010).[24] 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 after controlling for the change in portfolio liquidity.

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 should especially apply to poor performance. Therefore, in Panel B of Table 5, we report the flow-performance sensitivities for positive and negative performance separately. We use

[24] 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

lagretpos, *laga3pos*, and *laga4pos* to denote positive fund performance, and *lagretneg*, *laga3neg*, and *laga4neg* to denote negative performance, using returns, three-factor alphas, and four-factor alphas, respectively. All the interaction terms between *participate* and negative performance are significantly negative, while the interactions between *participate* and positive performance are insignificant. Together, these results support our hypothesis that fund's participation in the ILP should reduce its flow-performance sensitivity, especially when past performance is poor.

One potential concern with these results can be the endogeneity in the relation between the flow-performance sensitivity and the ILP filing decision. We repeat flow-performance analysis using 2SRI and the Heckman treatment regressions, and find the results to be robust (results not reported to conserve space). We further address this endogeneity concern using an exogenous shock related to September 11 attacks in 2001. There is no reason to believe that fund managers knew about this event in advance, and filed for the ILP in anticipation.

When the attacks occurred, we expect that investors of treated funds (those that had participated in the ILP before the event) will be less concerned about the run-like behavior from other investors and therefore redeem less. We test this conjecture as follows. First, we use daily mutual fund return and assets to compute fund's daily net flows, *dflow*.[25] 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 days after. We exclude the event day because of the unavailability of the fund's NAV at the end of the trading on 9/11 since the markets closed early. Similarly, we use an indicator variable *dummy2* for five trading days before and after the event as a robustness check.[26] We interact *dummy1* and *dummy2* with *participate* as defined earlier. We denote these interaction terms as *p_dummy1* and *p_dummy2*. We conduct a standard DID

[25] Since daily fund assets are not available in the CRSP mutual fund database, we use the net asset values (NAVs) to estimate the flows. We repeat the analysis using daily fund flow data from TrimTabs instead of the imputed flows, and find that the results (not tabulated) continue to hold.

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

analysis where our main variables of interest are the interaction terms, which measure the marginal effect of the ILP after the terrorist attacks.

We report the results from the DID analysis in Table 6. First, we observe that the coefficients on the indicator variables *dummy1* and *dummy2* are significantly negative. After the attacks, investors withdrew heavily from the funds. 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 significant as we observe a reduction of around 10% of the total effect of shock in different specifications.

5.3 Manager turnover and investor withdrawal

So far we have focused on the different benefits of the ILP. We now switch to examining the costs of ILP in terms of manager turnover and investor withdrawal. We first test whether the ILP can cause any distortion in manager replacement. As shown earlier, there is a reduction in the flow-performance sensitivity especially after bad performance for the funds participating in the ILP. As a result, poorly performing managers may face less discipline due to lower investor redemptions, which can reduce the incidence of manager replacement. Continuing poor performance imposes a cost on the fund investors. This cost is likely to be higher among funds with weaker governance mechanisms since the poorly performing managers are less likely to be fired in such funds. To test this hypothesis of reduced sensitivity of managerial turnover to past performance for poorly governed funds after the ILP, we estimate the following regression:

$$\begin{aligned} Forced_{i,j,t+1} = {} & \alpha + \beta Perf_{i,j,t} + \gamma Filing_{i,j,t} + \delta F\_Perf_{i,j,t} + \lambda Gov\_Perf_{i,j,t} \\ & + \sigma F\_Gov_{i,j,t} + \pi F\_Gov\_Perf_{i,j,t} + \psi \chi_{j,t} + \eta \phi_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \end{aligned} \quad (9)$$

where $F\_Perf_{i,j,t}$, $Gov\_Perf_{i,j,t}$ and $F\_Gov_{i,j,t}$ are the interaction terms between the ILP filing and performance, governance and performance, and filing and governance, respectively. $F\_Gov\_Perf_{i,j,t}$ is the triple interaction of filing, governance, and performance. The dependent

variable $Forced_{i,j,t+1}$ is an indicator variable that is equal to one if the fund has a forced turnover event during that quarter, and zero otherwise.[27] Other variables are defined in previous equations.

We report our results in Table 7. Before showing the results for the DID specification in equation (9), we confirm the validity of the forced manager turnover measure. The first column in Table 7 presents the results. Using 3-factor alpha as our performance measure, we find the coefficient on past performance (*perf*) is negative and highly significant. This confirms that our dependent variable captures the turnover of poorly performing managers, who are more likely to be forced out. We then move on to analyze how the ILP and governance mechanism change the managerial turnover-performance sensitivity. We use all the performance measures in the next four DID specifications, including 3-factor alpha, 4-factor alpha, 5-factor alpha, and DGTW alpha in columns (2) to (5), respectively. We document several findings that are consistent with our hypothesis.

First, we observe that the interaction between the ILP filing and fund performance is positive, i.e., worse fund performance is associated with lower managerial turnover subsequent to filing. This finding suggests that the ILP reduces the managerial turnover-performance sensitivity. Second, the triple interaction between filing, governance, and performance is negative, which indicates that better governance helps restore the managerial turnover-performance sensitivity after the ILP. Third, the interaction between governance and performance is negative, suggesting that better governance helps strengthen the managerial turnover-performance sensitivity. For robustness, we also repeat the analysis using the 2SRI method to control for the endogenous choice of the ILP application, and find similar results reported in Table A2 in the Appendix.[28]

[27] Since the managers may leave the fund voluntarily, we require the past year's performance to be below the median for the turnover event to be considered as forced. In other words, the turnover events where the manager's performance is above median are considered to be voluntary (e.g., managers moving to hedge funds, promotions to other larger mutual funds, or retirement).

[28] The results using Heckman treatment regressions are not reported due to convergence issues.

Given our finding on poorly governed funds having weaker managerial turnover-performance sensitivity after the ILP, we hypothesize that the investors should rationally anticipate such distortion in managers' incentives and withdraw their capital from such funds after filing. We investigate this possibility by modeling the effect of ILP on fund flows, and allowing it to differ for funds with better and worse governance. We report the results in Table 8. Consistent with our hypothesis, we observe that the poorly governed funds lose more capital after the ILP application after controlling for the past performance. We repeat the analysis using 2SRI and Heckman treatment regressions. The results reported in Table A3 in the Appendix are qualitatively similar. Taken together, the results in this section show that there can be significant costs associated with the ILP.

5.4 Consequences of interfund lending for fund performance

We finally analyze the effect of the ILP on fund performance. We hypothesize that for funds with better governance mechanisms, the benefits should outweigh the costs associated with the ILP, which should be reflected in better fund performance. Before examining the impact of the ILP on the performance of funds with different governance levels, we start with investigating the overall effect of the ILP on fund performance by estimating a DID specification similar to equation (6). We report the results in Panel A of Table 9. The coefficients on $Filing_{i,j,t}$ in all models are insignificant, suggesting that the choice of filing itself does not have an effect on fund performance.

We next examine the effect of the ILP on the performance of funds with different levels of governance by estimating the following regression:

$$Perf_{i,j,t} = \alpha + \varsigma Filing_{i,j,t} + \delta F\_Gov_{i,j,t} + \sigma Gov_{i,j,t} + \psi \chi_{j,t} + \eta \phi_{i,t} + \omega_i + \kappa_t + \varepsilon_{i,j,t} \qquad (10)$$

All variables are defined in earlier equations. The results in Panel B of Table 9 support our hypothesis. Specifically, we find that the funds with better governance mechanisms have superior performance after the ILP. For the funds with the best governance (those for which *gov*

equals 5), the improvement in quarterly alphas ranges from 0.1% to 0.6% (depending on the specification) after the filing for the 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%. The interaction between filing and governance is significant for all performance measures. Since the alphas are calculated from net-of-fee returns and the DGTW is based on before-fee returns, these results also suggest that our inference is robust on both before- and after-fee basis.

We next control for the choice of filing by estimating regressions using the 2SRI method and the Heckman treatment effect model. The results are reported in Panels A and B of Table A4 in the Appendix, respectively. In both panels, we continue to observe that any performance improvement associated with the ILP is concentrated in the funds with stronger governance mechanisms. Moreover, the finding is also economically significant. For example, based on the results in Panel A for the 2SRI method, the difference in performance between funds with the best and worse governance is around 0.5% after filing.

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 funds as one of the control variables in all our empirical tests. Moreover, we repeat our analysis after excluding the funds in the bottom decile of flows since they 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 hypothesis that the ILP is associated with superior fund performance for the funds with better governance mechanisms.

5.5 Analysis of the borrowing behavior

Our analysis so far is based on the funds' access to interfund lending programs, rather than the utilization of the program. It is also important to understand whether the funds with the

ILP actually use it for the intended purpose. Therefore in this section, we evaluate the ex-post borrowing activities for the funds that have access to the ILP.

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 funds obtain exemptive orders from the SEC, they usually describe the purpose of this facility and disclose the related activities in forms N-30D, N-Q, N-CSR, N-CSRS, and N-SAR. 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 use of interfund lending facility. If a filing contains any one of these keywords, we manually go through the filing and collect information on the interfund lending activity. 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. Interestingly, we do not see more borrowing activities during the recent crisis, probably because the liquidity shock was systemic and affected all the funds within the family. We also collect information on the borrowing period and the borrowing amount, whenever such information is available. The average and median length of the borrowing period are 4.0 and 8.4 days, respectively. The median borrowing amount is $9.24 million, while the 25th and the 75th percentile of borrowing are $5.16 million and $15.66 million, respectively.[29] The borrowing amount can be significantly large. For example, Fidelity Europe Fund reported $176 million interfund loans in April 2009, which is around 7.3% of its NAV at the end of the period.

Table 10 reports the results on the funds' utilization of the ILP. We find that the funds with access to the ILP are more likely to borrow when they experience investor outflows. This

[29] In the future, this information may become more widely available. SEC recently proposed that mutual funds have to disclose the average amount and the number of days that the interfund loan is outstanding in Item 44 on Form N-CEN (SEC Release No. 33-9922).

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 the ILP takes place when funds perform poorly and experience outflows, rather than when funds perform well and use the ILP to lever up their investments. This finding is also consistent with the idea that poorly performing funds may face higher external borrowing cost and have greater benefit from using the ILP.

6. Conclusion

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 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 governance mechanisms. We then document several consequences after funds apply for interfund lending that shed light on the costs and benefits of the program. First, we observe that the funds shift to more illiquid and concentrated portfolios, and hold less cash. Second, the participating funds are less likely to be exposed to a run-like behavior. Third, we find reduced sensitivity of the manager's turnover to past performance after the ILP application, especially for the funds with worse governance mechanisms. Investors respond less favorably to the ILP application by poorly governed funds and withdraw their capital. Finally, we find that interfund lending generates value for fund investors in terms of better fund performance only when the funds have strong governance mechanisms. We also find that funds use interfund lending subsequent to outflows and poor performance when they are likely to face greater liquidity needs. This evidence suggests that funds use the program for its intended purpose.

Recently, there has been growing concerns about the liquidity management issues in open-end mutual funds. For example, the SEC recently proposed the implementation of mandatory liquidity management programs for open-end mutual funds, and cited the interfund lending programs as a tool for liquidity management (Release Nos. 33-9922). The findings from our study have important policy implications, and should help inform the debate on the use of internal fund lending as a tool for liquidity management 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 (ILP). *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* is the number of funds in the family; *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 a fund's 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 a 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 a fund has more than two managers; *tenure* is the average tenure of fund manager(s) in months; *vwflow* is a fund's quarterly flows; *loadfee* is an indicator variable that is equal to one if a fund charges back-end load fees and zero otherwise; *turn_ratio* is the turnover ratio of a 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
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

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)
Governance					
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		66,372	66,372	57, 363	57,363
Pseudo R^2		0.042	0.045	0.053	0.055

Panel B

	Pred. Sign	(1) *filing*	(2) *filing*	(3) *filing*	(4) *filing*
Heterogeneity					
portliq1dif	+	0.205**		0.194**	
		(2.57)		(2.48)	
portliq2dif	+		0.097***		0.093***
			(3.98)		(3.86)
flowdif	+	1.982***	1.949***	2.029***	1.999***
		(5.22)	(5.10)	(5.35)	(5.24)
Governance					
gov	+	0.410***	0.415***	0.436***	0.441***
		(6.72)	(6.81)	(7.10)	(7.21)
Restrictions					
borrestrict	+			0.596***	0.592***
				(2.82)	(2.80)
illiqrestrict	–			–0.979***	–0.963***
				(–3.04)	(–2.98)
Controls					
bankloan				–0.525**	–0.537**
				(–2.39)	(–2.45)
turn_ratio		0.084	0.081	0.090	0.088
		(1.53)	(1.48)	(1.61)	(1.56)
vwflow		–0.001	0.039	–0.087	–0.051
		(–0.00)	(0.11)	(–0.26)	(–0.15)
size		0.188***	0.184***	0.150***	0.147***
		(5.01)	(4.90)	(3.97)	(3.90)
Year FE		Yes	Yes	Yes	Yes
Observations		66,372	66,372	57, 363	57, 363
Pseudo R^2		0.037	0.041	0.047	0.049

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)
Governance					
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		15,702	15,702	14,191	14,191
Pseudo R^2		0.108	0.114	0.115	0.119

Table 4: Consequences of interfund lending on the portfolio choice of funds

This table reports the post-ILP changes in funds' portfolio choices. The variables are as defined in Table 2. The regressions control for fund and year fixed effects, and the standard errors are clustered at the fund level.

	(1) *portliq1*	(2) *portliq2*	(3) *hhi*	(4) *cash*
filing	0.078***	0.709***	0.001***	–0.307***
	(3.14)	(5.80)	(4.59)	(–3.61)
gov	–0.037***	–0.062***	–0.000***	–0.086***
	(–8.07)	(–2.88)	(–4.65)	(–4.01)
vwflow	–0.074***	–0.537***	–0.001***	2.536***
	(–3.86)	(–6.68)	(–10.46)	(22.66)
turn_ratio	–0.007	–0.007	–0.001***	0.025
	(–1.23)	(–0.26)	(–17.59)	(0.59)
portliq1dif	0.421***	0.526***	–0.000**	–0.101***
	(44.23)	(36.90)	(–2.27)	(–3.85)
flowdif	–0.062***	–0.077	0.000**	0.430***
	(–2.67)	(–0.81)	(2.56)	(3.39)
borrestrict	0.065***	0.328***	0.000***	–0.182**
	(3.42)	(3.52)	(5.09)	(–2.02)
illiqrestrict	–0.005	0.044	0.000*	0.120
	(–0.16)	(0.30)	(1.65)	(0.88)
bankloan	–0.020	–0.195**	0.000	0.152**
	(–1.30)	(–2.39)	(1.27)	(2.01)
Constant	2.089***	17.848***	0.026***	1.817***
	(16.47)	(34.48)	(42.26)	(4.54)
Fund and Year FE	Yes	Yes	Yes	Yes
Observations	96,278	96,278	96,278	96,278
Adj. R^2	0.512	0.617	0.830	0.503

Table 5: Flow-performance sensitivity after the ILP filing

This table reports the results of the flow-performance regressions using investor flows (*vwflow*) as dependent variable. In Panel A, *lagflow*, *lagret*, *lagalpha3*, *lagalpha4* are flows, returns, 3-factor alphas, and 4-factor alphas from prior quarter. *participate* is an indicator variable that equals one if a fund participates in the ILP during a quarter, and zero otherwise. Variables preceded by "*p_*" denote the interaction between *participate* and flow or performance variables. Variables preceded by "*portliq_*" denote the interaction between portfolio liquidity and performance measures. In Panel B, *lagretpos*, *laga3pos*, and *laga4pos* (*lagretneg*, *laga3neg*, and *laga4neg*) are equal to the positive (negative) values of *lagret*, *lagalpha3* and *lagalpha4* when performance is positive (negative) and zero otherwise. The regressions control for the fund and year fixed effects, and the 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)		
lagalpha3		0.0052***			0.0050***	
		(6.12)			(5.22)	
p_lagalpha3		–0.0027***			–0.0032***	
		(–5.28)			(–5.55)	
lagalpha4			0.0059***			0.0056***
			(6.90)			(5.70)
p_lagalpha4			–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_a3					0.0006*	
					(1.94)	
portliq_a4						–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)
Fund and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	140,761	140,761	140,761	140,761	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)		
laga3pos		0.1092***			0.1012***	
		(7.72)			(5.70)	
p_laga3pos		–0.0254			–0.0337	
		(–0.92)			(–0.99)	
laga3neg		0.0042***			0.0042***	
		(4.84)			(4.31)	
p_laga3neg		–0.0025***			–0.0029***	
		(–4.80)			(–5.10)	
laga4pos			0.1127***			0.1458***
			(7.39)			(7.60)
p_laga4pos			–0.0210			–0.0402
			(–0.74)			(–1.09)
laga4neg			0.0048***			0.0044***
			(5.59)			(4.49)
p_laga4neg			–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_a3					0.0006*	
					(1.86)	
portliq_a4						–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)
Fund and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	140,761	140,761	140,761	140,761	140,761	140,761
Adj. R^2	0.135	0.133	0.133	0.125	0.122	0.122

Table 6: 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 ILP at that time. The dependent variable is the daily investor flows from investors (*dflow*). *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. The other variables are defined in previous tables.

	(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	9,866	22,192	9,866	22,192
Adj. R^2	0.149	0.0592	0.370	0.181

Table 7: Managerial turnover-performance sensitivity and the ILP

This table reports the effect of the ILP on the managerial turnover-performance sensitivity for funds with different levels of governance. The dependent variable *forced* is an indicator variable that is equal to one if a fund has a managerial turnover during the corresponding quarter and the fund's risk-adjusted performance is below the median performance of all funds, and zero otherwise. The other variables are defined previously. Columns (1) and (2) report the results using 3-factor alphas as the performance measure while columns (3), (4), and (5) present the findings using 4-factor, 5-factor, and DGTW alphas, respectively. The regressions control for fund and year fixed effects and the standard errors are clustered at the fund level.

	(1) *forced*	(2) *forced*	(3) *forced*	(4) *forced*	(5) *forced*
filing		–0.029***	–0.024***	–0.031***	–0.029***
		(–3.80)	(–3.21)	(–4.23)	(–3.54)
f_perf		0.129***	0.144***	0.172***	0.122**
		(2.84)	(3.45)	(4.68)	(2.11)
filing_gov_perf		–0.031*	–0.048***	–0.056***	–0.027
		(–1.80)	(–2.99)	(–3.83)	(–1.25)
gov_perf		–0.063***	–0.055***	–0.048***	–0.066***
		(–7.71)	(–7.35)	(–7.34)	(–7.41)
filing_gov		0.005*	0.003	0.005**	0.004
		(1.95)	(1.13)	(2.09)	(1.44)
gov	0.012***	0.011***	0.012***	0.011***	0.012***
	(10.55)	(8.94)	(9.78)	(9.27)	(10.01)
perf	–0.164***	–0.030*	–0.024*	–0.022*	–0.051***
	(–20.23)	(–1.84)	(–1.68)	(–1.75)	(–2.95)
vwflow	–0.009**	–0.009**	–0.015***	–0.015***	–0.013***
	(–2.27)	(–2.41)	(–4.17)	(–4.25)	(–3.33)
turn_ratio	0.003**	0.003**	0.002	0.002	0.003**
	(2.10)	(2.04)	(1.04)	(1.62)	(2.01)
size	–0.005***	–0.005***	–0.005***	–0.005***	–0.008***
	(–5.63)	(–5.76)	(–5.73)	(–5.51)	(–8.60)
Controls	Yes	Yes	Yes	Yes	Yes
Fund and year FE	Yes	Yes	Yes	Yes	Yes
Observations	83,051	83,051	83,051	83,051	83,051
Adj. R^2	0.074	0.076	0.073	0.074	0.073

Table 8: Investor withdrawal and the ILP

This table reports the effect of the ILP on the withdrawal behavior of fund investors for funds with different levels of governance. The dependent variable *vwflow1* is the next quarter's fund flows. The other variables are defined previously. The regressions control for fund and year fixed effects and the standard errors are clustered at the fund level.

	(1) *vwflow1*	(2) *vwflow1*	(3) *vwflow1*	(4) *vwflow1*
filing	–0.022***	–0.022***	–0.023***	–0.021***
	(–3.35)	(–3.43)	(–3.48)	(–3.43)
filing gov	0.004**	0.004*	0.004**	0.004**
	(2.01)	(1.90)	(2.02)	(2.15)
gov	–0.002*	–0.002	–0.001	–0.001
	(–1.67)	(–1.54)	(–1.50)	(–1.17)
alpha3m	0.633***			
	(37.11)			
alpha4m		0.485***		
		(29.01)		
alpha5m			0.300***	
			(18.80)	
dgtw alpha				0.779***
				(45.61)
portliq1dif	0.003***	0.002**	0.002**	0.002*
	(2.95)	(2.20)	(2.50)	(1.85)
flowdif	–0.001	–0.004	–0.004	0.001
	(–0.24)	(–0.73)	(–0.73)	(0.26)
borrestrict	0.002	0.001	0.001	0.004
	(0.48)	(0.39)	(0.28)	(1.22)
illiqrestrict	0.019***	0.019***	0.019***	0.020***
	(4.04)	(4.11)	(4.10)	(4.56)
bankloan	–0.011***	–0.011***	–0.011***	–0.011***
	(–4.08)	(–4.02)	(–3.91)	(–4.30)
turn ratio	0.005***	0.005***	0.005***	0.004***
	(3.16)	(3.07)	(3.13)	(2.70)
size	–0.035***	–0.035***	–0.036***	–0.035***
	(–36.96)	(–36.94)	(–37.75)	(–35.83)
Constant	0.697***	0.698***	0.713***	0.660***
	(31.43)	(31.19)	(31.73)	(34.90)
Fund and year FE	Yes	Yes	Yes	Yes
Observations	87,268	87,268	87,268	83,973
Adj. R^2	0.276	0.269	0.263	0.279

Table 9: Fund performance after interfund filing

This table reports the performance consequences after the funds apply for interfund lending. Panels A and B show the performance results without and with the interactions for fund-level governance. The control variables are the same as in Table 4 and are not reported for brevity. The regressions control for fund and year 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)
Controls	Yes	Yes	Yes	Yes
Fund and Year FE	Yes	Yes	Yes	Yes
Observations	96,278	96,278	96,278	96,278
Adj. R^2	0.088	0.090	0.081	0.074

Panel B

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)
Controls	Yes	Yes	Yes	Yes
Fund and Year FE	Yes	Yes	Yes	Yes
Observations	96,278	96,278	96,278	96,278
Adj. R^2	0.088	0.090	0.081	0.074

Table 10: Utilization of the ILP

This table reports the determinants of the funds choosing to borrow through the ILP. *Borrow* is an indicator variable that is equal to one if a fund engages in interfund borrowing during the period, and zero otherwise. Other variables are defined in Table 2. The regressions control for the fund and year fixed effects and the 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)
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 and Year FE	Yes	Yes	Yes	Yes
Observations	24,441	24,441	24,441	23,971
Adj. R^2	0.600	0.599	0.599	0.609

Appendix

Table A1: Consequences of interfund lending on the portfolio choice of funds

This table reports the post-ILP changes in funds' portfolio choices after controlling for the choice of filing for the ILP. Panel A shows the first-stage estimation of the probability of filing using the logistic model with year fixed effects and the number of money market funds at the time of application (*num_mmf*) as instrument. The standard errors are clustered at the fund level. Panel B shows the results using the two-stage residual inclusion (2SRI) method where *residual* is the residual from the first stage. Panel C shows the results using the Heckman treatment effect model where *inv_filing* is the inverse Mill's Ratio from the first stage. Panel C includes the same control variables and fixed effects as in Panel A. The control variables are not presented for the sake of brevity. The standard errors are clustered at the fund level.

Panel A

	filing
num_mmf	0.032***
	(8.73)
portliq1dif	0.458***
	(13.29)
flowdif	–0.015***
	(–5.36)
gov	0.600***
	(16.58)
borrestrict	0.803***
	(6.98)
illiqrestrict	–2.425***
	(–8.68)
bankloan	–1.218***
	(–9.35)
turn_ratio	0.032
	(0.90)
vwflow	0.259**
	(2.43)
size	0.166***
	(7.32)
Constant	–9.464***
	(–13.63)
Year FE	Yes
Observations	91,330
Pseudo R^2	0.296

	(1) *portliq1*	(2) *portliq2*	(3) *hhi*	(4) *cash*
		Panel B		
filing	0.115***	1.227***	0.001***	–1.704***
	(3.12)	(6.40)	(4.17)	(–9.46)
gov	–0.034***	–0.051**	–0.000***	–0.096***
	(–7.12)	(–2.29)	(–8.43)	(–4.42)
portliq1dif	0.393***	0.476***	–0.000**	0.073***
	(41.84)	(35.32)	(–2.29)	(2.70)
flowdif	0.000	0.001	0.000	0.001
	(0.61)	(1.24)	(0.45)	(0.53)
borrestrict	0.061***	0.276***	0.000***	–0.022
	(3.21)	(2.87)	(4.63)	(–0.25)
illiqrestrict	0.006	0.211	0.000*	–0.318**
	(0.19)	(1.35)	(1.73)	(–2.27)
bankloan	–0.012	–0.116	0.000*	–0.053
	(–0.71)	(–1.36)	(1.66)	(–0.67)
vwflow	–0.086***	–0.584***	–0.001***	2.645***
	(–4.50)	(–7.27)	(–10.33)	(23.75)
turn_ratio	–0.008	–0.012	–0.001***	0.036
	(–1.33)	(–0.46)	(–17.49)	(0.86)
size	–0.063***	–0.335***	–0.000***	–0.029
	(–12.77)	(–15.05)	(–4.30)	(–1.24)
residual	–0.016	–0.216***	–0.000***	0.547***
	(–1.40)	(–3.60)	(–7.09)	(8.83)
Constant	2.128***	18.404***	0.026***	0.595
	(16.60)	(34.84)	(42.37)	(1.39)
Fund and Year FE	Yes	Yes	Yes	Yes
Observations	91,330	91,330	91,330	91,330
Adj. R^2	0.512	0.616	0.830	0.503
		Panel C		
inv_filing	0.053*	5.220***	0.001**	–1.538***
	(1.74)	(15.35)	(2.05)	(–7.75)
Controls and FE	Yes	Yes	Yes	Yes
Observations	91,330	91,330	91,330	91,330

Table A2: Managerial turnover-performance sensitivity and the ILP

This table reports on the effect of the ILP on the managerial turnover-performance sensitivity choices for funds with different levels of governance, after controlling for the choice of filing for the ILP using two-stage residual inclusion (2SRI) method. The first stage is reported in Panel A of Table A1 and the other variables are defined previously. The regressions control for fund and year fixed effects, and the standard errors are clustered at the fund level.

	(1) *forced*	(2) *forced*	(3) *forced*	(4) *forced*	(5) *forced*
filing		–0.049***	–0.054***	–0.056***	–0.037***
		(–4.07)	(–4.32)	(–4.53)	(–2.85)
f_perf		0.127***	0.152***	0.165***	0.122**
		(2.68)	(3.51)	(4.44)	(2.01)
filing_gov_perf		–0.032*	–0.048***	–0.054***	–0.029
		(–1.77)	(–2.93)	(–3.65)	(–1.34)
gov_perf		–0.057***	–0.051***	–0.042***	–0.061***
		(–6.72)	(–6.57)	(–6.33)	(–6.78)
filing_gov		0.007***	0.006**	0.008***	0.005*
		(2.64)	(2.20)	(2.92)	(1.78)
gov	0.011***	0.011***	0.013***	0.011***	0.012***
	(10.44)	(8.07)	(9.03)	(8.41)	(8.91)
perf	–0.157***	–0.036**	–0.036**	–0.029**	–0.060***
	(–20.00)	(–2.05)	(–2.32)	(–2.16)	(–3.40)
vwflow	–0.009**	–0.010**	–0.016***	–0.016***	–0.013***
	(–2.41)	(–2.47)	(–4.27)	(–4.33)	(–3.30)
turn_ratio	0.003**	0.003*	0.002	0.002	0.003**
	(2.31)	(1.83)	(1.15)	(1.58)	(2.07)
size	–0.005***	–0.005***	–0.005***	–0.004***	–0.007***
	(–5.53)	(–5.05)	(–5.06)	(–4.37)	(–7.66)
residual		0.005*	0.008***	0.007**	0.002
		(1.93)	(2.78)	(2.34)	(0.91)
Constant	0.063***	0.059***	0.055***	0.045***	0.105***
	(3.70)	(3.29)	(3.16)	(2.67)	(6.13)
Controls and FE	Yes	Yes	Yes	Yes	Yes
Observations	73,717	73,717	73,717	73,717	73,717
Adj. R^2	0.074	0.071	0.069	0.069	0.070

Table A3: Investor withdrawal and the ILP

This table reports the effect of the ILP on the withdrawal behavior of fund investors for funds with different levels of governance, after controlling for the choice of filing for the ILP. Panel A shows the results two-stage residual inclusion (2SRI) method, and Panel B shows the results using the Heckman treatment regression. Control variables are the same as in Panel B of Table A1 and not presented for brevity. The regressions control for fund and year fixed effects, and the standard errors are clustered at the fund level.

	(1) *vwflow1*	(2) *vwflow1*	(3) *vwflow1*	(4) *vwflow1*
		Panel A		
filing	–0.027***	–0.029***	–0.028***	–0.025**
	(–2.58)	(–2.76)	(–2.65)	(–2.53)
filing_gov	0.004**	0.004**	0.004**	0.004**
	(2.28)	(2.23)	(2.26)	(2.33)
gov	–0.001	–0.001	–0.001	–0.001
	(–1.20)	(–1.03)	(–1.04)	(–0.88)
Controls and FE	Yes	Yes	Yes	Yes
Observations	91,330	91,330	91,330	91,330
Adj. R^2	0.299	0.292	0.284	0.300
		Panel B		
filing	–0.107***	–0.112***	–0.110***	–0.108***
	(–6.69)	(–7.14)	(–6.82)	(–6.72)
filing_gov	0.009***	0.009***	0.009***	0.009***
	(4.47)	(4.61)	(4.56)	(4.19)
gov	0.010***	0.010***	0.010***	0.011***
	(6.76)	(7.14)	(6.89)	(7.15)
Controls and FE	Yes	Yes	Yes	Yes
Observations	91,330	91,330	91,330	91,330

Table A4: Interfund lending and fund performance

This table reports the performance consequences of the ILP. Panels A and B show the second stage results of the 2SRI method and the Heckman treatment effect model, respectively. The control variables are the same as in Panel B of Table A1, and are not reported for brevity. The regressions control for fund and year fixed effects, and the standard errors are clustered at the fund level.

	(1) *alpha3m*	(2) *alpha4m*	(3) *alpha5m*	(4) *dgtw_alpha*
		Panel A		
filing	–0.003	0.000	–0.000	–0.001
	(–1.32)	(0.19)	(–0.04)	(–0.43)
filing_gov	0.001*	0.001**	0.001**	0.001**
	(1.67)	(2.24)	(2.39)	(2.14)
gov	0.000	–0.000	–0.000	–0.000
	(1.25)	(–0.55)	(–1.28)	(–0.82)
Controls and FE	Yes	Yes	Yes	Yes
Observations	91,330	91,330	91,330	91,330
Adj. R^2	0.085	0.086	0.079	0.075
		Panel B		
inv_filing	–0.001	0.002	0.001	–0.000
	(–0.25)	(0.66)	(0.36)	(–0.09)
invfiling_gov	0.001**	0.001**	0.001**	0.001*
	(2.17)	(2.08)	(2.36)	(1.81)
gov	0.000	–0.000	–0.000	–0.001***
	(0.23)	(–0.83)	(–0.73)	(–2.58)
Controls and FE	Yes	Yes	Yes	Yes
Observations	91,330	91,330	91,330	91,330

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