Litigations and Mutual Fund Runs

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Abstract

This paper investigates whether anticipation of adverse events can trigger runs in mutual funds. Using the event of the 2003 and 2004 litigations filed in the U.S. over market-timing and late-trading practices, we find that runs start as early as four months before litigation announcements. The pre-event runs over a six-month window accumulate to 4.95% of total net assets and post-event runs last over two years and accumulate to 7.94% for the first six months window. Additionally, investors who run before litigation announcements earn significantly higher risk- and peer-adjusted returns as high as 1.16% more than those who run after. The difference in returns is particularly high for funds holding illiquid assets**.** Our analysis suggests that a pro-rata ownership design does not suffice to prevent runs in mutual funds.

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1. Introduction

The first-come-first-served principle governing deposit withdrawals motivates bank runs: every depositor wants to withdraw before others do because those at the back of the line may not recover their deposits (Diamond and Dybvig, 1983; Chari and Jagannathan, 1988). In contrast, mutual funds allocate the proceeds from asset sales on a pro-rata basis, a design that should shield them from runs. However, mutual funds may prove susceptible to runs on revelation of adverse information about the quality of management or underlying assets, even though a physical queue of withdrawers, as in bank runs, is absent. This paper provides direct evidence of pre- and post-event runs in the mutual fund industry and the motivation for why these runs may take place.

We define a *fund run* as an abnormally concerted redemption of mutual fund shares in anticipation or revelation of an adverse event. The adverse events we focus on are the 2003 and 2004 litigations in the U.S. alleging that certain mutual funds allowed some investors to engage in late trading and market timing,[1] thereby allowing them to enjoy profits at the expense of investors who did not engage in these practices. Upon the suspicion or revelation that fund managers do not serve the interests of all investors equally, disadvantaged investors may discipline the implicated funds by withdrawing existing investments and/or by withholding new investments.

We first document pre- and post- event runs around litigation announcements. To investigate the motivation for runs, we focus on the benefits of redeeming shares before

[1] Late trading is the purchase or sale of mutual fund shares after determination of the net asset value (NAV) at 4:00 PM. Market timing is the short-term trading of mutual fund shares to exploit price inefficiencies between the mutual fund shares and underlying securities in the funds' portfolios. A representative case of such practices is detailed in the Bank of America Nations Fund Securities Litigation Complaint available at http://securities.stanford.edu/1028/BAC03-01/20030905_f01c_Lin.htm.

the adverse information becomes public, i.e., the pre-event runs. Concerted redemption and the lack of new sales that follow litigation announcements force funds to liquidate assets quickly, and the large volume of trading may temporarily depress underlying asset prices.[2] Because shareholders who redeem shares at this time will suffer losses, investors who can anticipate litigations and the subsequent redemptions have incentives to redeem shares early. By exiting early, informed investors avoid the fire-sale costs caused by subsequent concerted withdrawals. Furthermore, the incentive for early runs will be greater for funds whose return differences from withdrawal timing are larger either because they hold illiquid assets or because they are likely to suffer larger outflows.

Our paper supports the above arguments by empirically answering three important questions: First, do runs occur both before (pre-event) and after (post-event) litigation announcements? Second, do investors who run prior to announcements avoid costs that investors who run post suffer from? Finally, is the return difference larger for funds with illiquid assets or large outflows? First, we find that fund runs occur both prior to and post litigation announcements, but that pre-event runs start as early as four months before such announcements. In the four months prior to litigations, monthly abnormal outflows from implicated funds range from .25% to .94% of total net assets (TNA). The abnormal outflows from implicated funds range from 1.03% to 2.03% of TNA in the six months following litigations. Second, investors who run before litigation announcements earn significantly higher risk- and peer-adjusted returns (as large as 1.16%) than those who run after. This difference in returns is more pronounced in funds holding illiquid

[2] We follow the approach in Coval and Stafford (2007) to verify this premise. We find that stocks sold by litigated funds and funds with net outflow underperform other stocks in the event month.

assets. Finally, not all funds prove equal in their vulnerability to runs. Funds holding illiquid assets experience more severe runs both prior to and post litigation announcements.

Our results indicate that mutual fund investors who anticipate negative flows motivated by litigations have incentives to withdraw early and avoid fire-sale costs. When the timing of the action (runs) matters for payoff (returns), strategic complementarities come into play that can amplify the impact of adverse events on fundamentals and generate financial fragility. Nonetheless, mutual fund runs may not occur unless there is a systematic liquidity shock to all fund investors (Chen, et al. 2010). In the absence of such a shock, other investors will purchase the assets at fire-sale prices and may thus correct the mispricing (Chen, et. al. 2008).[3]

This financial fragility of the mutual fund industry is underscored by the U.S. Treasury's decision to insure the holdings of eligible money-market mutual funds in the wake of the turmoil caused by the run on the Reserve Primary Fund in September 2008.[4] Our findings not only explain why runs can happen in mutual funds but also underscore how the events that led to the demise of Lehman Brothers reflect such fragility in the industry: The Reserve Primary Fund held debt securities of Lehman Brothers, whose redemptions following the Lehman Brothers bankruptcy totaled about two-thirds of its total net assets (*Wall Street Journal*, 2008; *New York Times*, 2008). Because of the

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[3] Chen *et al*. (2008) show that hedge funds that purchase mutual funds' underlying assets at the depressed price during fire-sale periods generate arbitrage profits similar to the profits of the short sellers.

[4] The Treasury expressed its concerns about the ensuing uncertainty in the mutual fund industry and justified its instatement of a guarantee program as follows: "…Maintaining confidence in the money market fund industry is critical to protecting the integrity and stability of the global financial system. …This action should enhance market confidence and alleviate investors' concerns about the ability for money market mutual funds to absorb a loss…" (U.S. Treasury Department press release, 19 September, 2008).

simultaneous liquidity crunch in the short-term credit market, to satisfy such redemptions, non-redeeming investors would have had to bear the fire-sale costs associated with asset sales.

The rest of the paper proceeds as follows: Section 2 develops the methodology, Section 3 describes the data, Section 4 outlines the empirical results, and Section 5 concludes the paper.

2. Research method

Empirically, we address three questions: whether investors run implicated funds prior to and post litigation announcements, whether investors who run funds prior to litigations realize higher returns than those who run post and whether some types of funds are more susceptible to pre-event runs.

2.1. Detecting pre-event runs

To document pre-event runs, we need benchmarks of normal flow, the first of which are flows to peers not named in the 2003 and 2004 lawsuits. For this benchmark, we construct three groups of funds: first treatment group covers funds named in the litigations (investigated funds), second treatment group includes funds not named in the litigations themselves but whose management companies are named (other funds in families with investigated funds), and the control group covers funds whose management companies are not involved in these litigations (funds in families with no investigated fund)[5]. We then compute the fund flows as follows:

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[5] At the time of the first newspaper article (dated 1 September 2003), which funds will be named in the litigations is unclear. Hence, the control groups may also have experienced outflows due to the possibility

$$Flow_{i,t} = [TNA_{i,t} - TNA_{i,t-1} * (1+r_{i,t})] / TNA_{i,t-1}, \quad (1)$$

where $Flow_{i,t}$ is net flows of fund *i* in month *t*, $TNA_{i,t-1}$ and $TNA_{i,t}$ are total net assets of fund *i* in month *t-1*and *t*, respectively, and $r_{i,t}$ is the return of fund *i* in month *t*. To detect whether implicated funds have lower flows than non-implicated funds, we compare the net flows of the three groups around the litigation dates.

The second benchmark for normal flows is the estimated net flows from a model designed to capture the main determinants of fund flows. Because past returns predict future flows (Gruber, 1996; Chevalier and Ellison, 1997; Sirri and Tufano, 1998; Zheng, 2000; Del Guercio and Tkac, 2001, 2002) and industry-level and style-level flows explain individual fund-level flows (Qian, 2011), we develop a model that includes variables for fund characteristics, past returns, and industry- and style-level flows. To detect pre-litigation and post-litigation runs, we also construct thirteen event-window dummies, to produce the following model:

$$Flow_{i,t} = a + \sum b^j * fund\ characteristics_{i,t}{}^j + \sum c^j * past\ returns_i^j + \sum d^j * aggregate\ flows_t{}^j + \sum \gamma^j * Event\text{-}window\ dummies_{i,t}{}^j + \varepsilon_{i,t}, \quad (2)$$

where fund characteristics are s*ize,* the log of TNA; *age,* the log of days since the first offer date; *expense ratio,* fund's operating expenses as a ratio of total investment; *management fee*, the management fee as a ratio of average TNA. *Past returns* include compounded returns in the past one ($R_{i,t-1}$), three ($\prod_s(1+R_{i,t-s})-1,\ s=1,2,3$) and six months ($\prod_s(1+R_{i,t-s})-1,\ s=1,2,\text{---},6$). *Aggregate flows* include industry- and style-level flows, *industry-level flows* are the sum of flows in dollars ($\Sigma_i (TNA_{i,t} - TNA_{i,t-1}*(1+R_{i,t}))$)

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of future involvement in the litigations. As such, any outflows we observe in the investigated funds relative to the control group funds would understate the magnitude of the outflows.

to all funds in the sample divided by the sum of the lagged TNA (Σ_i ($TNA_{i,t-1}$)), and *style-level flows* are the sum of flows in dollars to all funds with the same investment style divided by the sum of lagged TNA. The event-window dummy (*n* month) equals 1 if it is the *n*th month from the date of the litigation filing and 0 otherwise (*n* = -6…-1, 0, 1…6).

2.2 Rationale for pre-event runs

What incentives exist for shareholders to run a mutual fund when proceeds from asset sales are determined by the prices of underlying assets and are distributed pro-rata? First, litigations may indicate how faithfully fund managers serve investors' best interests. Hence, investors may redeem shares as soon as they are informed, publicly or privately, that the funds invested in are engaging in abusive practices like market timing or late trading. If and when a sufficient number of investors learn of a fund's abusive behavior, a run may ensue. Consequently, because mutual funds must liquidate assets quickly to satisfy share redemption, if large selling volumes temporarily depress underlying asset prices, shareholders who redeem shares at this point will realize negative abnormal returns.

We examine whether investors who withdraw prior to the revelation of abusive behavior avoid costs using two approaches. The first approach benchmarks normal returns using five portfolio return models and introduces indicators for pre- and post-event months to identify return differences between investors who withdraw pre- and post-litigations. These five return models are the market model (Sharpe, 1964; Lintner, 1965), the market model with lagged market returns (Scholes and William, 1977), the Fama-French benchmark model (Fama and French, 1992, 1993), the Fama-French benchmark model with a fourth factor that captures momentum (Jegadeesh and Titman,

1993; Carhart, 1997), and the market model with a factor that captures liquidity (Pastor and Stambaugh, 2003):

$$r_{i,t} = \alpha + \beta * r_{m.t} + \sum \alpha^n * Dummy^n + \varepsilon_{i,t}, \quad (3)$$

$$r_{i,t} = \alpha + \beta_1 * r_{m.t} + \beta_2 * r_{m.t-1} + \sum \alpha^n * Dummy_t^n + \varepsilon_{i,t}, \quad (4)$$

$$r_{i,t} = \alpha + \sum \beta^j * FF_t^j + \sum \alpha^n * Dummy_t^n + \varepsilon_{i,t}, \quad (5)$$

$$r_{i,t} = \alpha + \sum \beta^j * FF_t^j + \gamma_1 * MOM_t + \sum \alpha^n * Dummy_t^n + \varepsilon_{i,t}, \quad (6)$$

$$r_{i,t} = \alpha + \beta * r_{m.t} + \gamma_2 * LIQ_t + \sum \alpha^n * Dummy_t^n + \varepsilon_{i,t}. \quad (7)$$

where $r_{i,t}$ is the excess returns (net of the risk-free rate) of fund *i* on month *t*, and $r_{m.t}$ is the excess market return on month *t*. FF^j includes market returns, size (SMB), and value (HML) factors; MOM is the momentum factor; and LIQ is the liquidity factor. The event-window dummy (*n* month) equals 1 if it is the *n*th month from the date of the litigation filing and 0 otherwise (*n* = -6…-1, 0, 1…6). We include year indicators in the return models. We also compute the cumulated returns to capture the return differences between redeeming in the *n*th month before and redeeming in the *n*th month after litigations.

2.3. Impact of fund characteristics and liquidity on fund flows and returns

Pre-event runs are motivated by suspicions of litigation and anticipation of the liquidation costs that would arise to satisfy post-litigation redemption. Hence, investor decisions to run before confirmation of the adverse event are influenced by their beliefs about or awareness of abusive behavior and by factors that would increase fire-sale costs. The likelihood that investors become suspicious of funds' abusive behavior may in turn be affected by the fund management's reputation and the investors' ability to collect and process information. We measure fund reputation using ownership structure and a history of SEC charges, investors may judge funds in conglomerate families as less likely to

engage in abusive behavior because loss of reputation would hurt both the abused fund and the other businesses in the conglomerate. Hence, the consequences of abusive behavior may be larger for conglomerates than for fund families that only focus on managing mutual funds. Likewise, past actions may predict future decisions; for example, investors may judge funds with no history of abusive behavior as less likely to engage in abusive behavior in the future.

To investigate whether fund and investor characteristics influence the susceptibility of funds to pre-event runs, we generate dummy variables for the following characteristics. *Conglomerate* and *charge history* indicators equal 1 if the fund is part of a conglomerate and had an SEC investigation in the past eight years, respectively; 0 otherwise.

The economic rationale for pre-event runs is the liquidation cost (price depression) that funds bear when they are forced to sell assets upon revelation of an adverse event. This liquidity cost increases with the illiquidity of underlying assets and with the volume of redemptions. Hence, investors in funds with illiquid assets, such as real estate investment trusts (REITs), international assets, or municipal funds, have stronger incentives to run because the benefits may be greater. We therefore investigate the impact of underlying asset liquidity on run incentives and investor benefits from running early by generating a dummy variable (liquid) for liquid funds. We then categorize funds as liquid or illiquid based on the assets they invest in as defined in the style classification. Whereas liquid funds invest in large-cap stock and treasury bills, illiquid funds invest in small-cap stocks, sector stocks, international equity and bonds, and asset-backed securities.

We conduct these analyses using a two-step fund-by-fund approach, and a panel approach. This latter is efficient in that it pools the information from all funds; however, it may also suffer from the problem that all fund coefficients must be the same[6]. In the fund-by-fund estimation, the first step estimates the flow model and the returns models for each fund using time series observations only. The control variables for flow models include accumulated returns in the past one, three, and six months, and industry- and style level flows, management fees, expense ratio, size, age and year indicators. The control variables for return models include year indicators and the relevant return factors in the five return models. The explanatory variables include the indicators for the thirteen months (six months pre and six months post) surrounding announcement dates. The second step compares the estimated flows and the risk-adjusted returns in the cross section. We investigate differences by fund groupings based on SEC charge history, ownership structure, and liquidity of underlying assets.

3. Data

To identify the funds and fund families implicated in the market-timing and late-trading litigations, we conduct a keyword search in the *Financial Times*[7] and the *Wall Street Journal*. We also search the SEC litigation filings on the EDGAR and in the Stanford Law School Securities Class Action Clearinghouse.[8] Table 1 summarizes the results of this search—including the names of the implicated fund families, the activities

[6] The results of the pooled panel regressions are qualitatively the same and are available upon request.
[7]We use three keywords---investigation, mutual fund, and Spitzer---to search the *Financial Times* and *Wall Street Journal* between September 3, 2003, and December 31, 2005.
[8]Stanford Law School Securities Class Action Clearinghouse (available online at http://securities.stanford.edu/index.html) compiles detailed information on the prosecution, defense, and settlement of federal class-action securities fraud litigations.

for which they are investigated, the litigation announcement dates and newspaper announcement dates, and the settlement amount in million dollars. We also use the Stanford clearinghouse database to identify funds within each implicated fund family explicitly named in the litigation.

The formal investigation into the trading practices of mutual fund companies began on September 3, 2003, when New York Attorney General Eliot Spitzer filed a complaint in the New York Supreme Court alleging that the mutual fund companies of Bank of America Corp., Bank One Corp., Janus Capital Group Inc., and Strong Capital Management Inc. had allowed certain hedge fund managers to trade illegally in their fund units. Subsequently, between September 2003 and August 2004, the SEC, the New York State Attorney General, and other regulatory authorities filed litigations involving funds in twenty-five mutual fund families[9].

Although the formal announcement of the first litigation was released on September 3, 2003, the first news article revealing the ongoing investigation is dated September 1, 2003, and other news articles on abusive trading practices by mutual funds even predate September 2003. In fact, the SEC was aware of the fair pricing problems in mutual funds as far back as 1997, and the probe into hedge fund trades that take advantage of such problems had been underway since 2002. The first article indicating the possible active involvement of mutual fund management is dated March 5, 2003, and by March 26, 2003, Congress had begun talking about strengthening mutual fund regulation. It is highly probable that investors had begun to suspect abusive behavior and

[9] For five mutual fund families, we cannot identify specific fund names that are investigated. Therefore Table 1 and the sample only covers twenty mutual fund families.

potential investigations by March 2003. We expect the pre-event indicators in our models to capture whether investors did indeed suspect abusive behavior and take corresponding action.

For the universe of mutual funds, we rely on the CRSP mutual funds database (from WRDS), which provides monthly observations of funds' total net assets (*TNA*) and returns (*R*). The sample covers the months from January 1999 to December 2007. We merge our own list of implicated funds with the CRSP universe of funds using ticker symbols to produce a sample in which implicated funds are differentiated from non-implicated funds. We exclude all funds with missing ticker symbols, funds in their incubation period, funds having fewer than 12 months of observations, and funds whose TNA is smaller than 5 million USD. We drop outliers based on flows: we drop funds with outflows greater than TNA and inflows greater than five times the TNA.

Panels A, B and C of Table 2 provide a snap-shot of sample funds three months before, in the month of, and three months after the first litigation announcement. Specifically, the panels show the number of funds, the mean, and the aggregated TNA in the subsample: of investigated funds, other funds in families with investigated funds, and funds in families with no investigated fund. First, average flow of investigated funds decreased from 1% to -0.20% from June of 2003 to September of 2003. Similarly, average flow of other funds in investigated families decreased from 0.80% to -0.70%. Furthermore, the negative flows persisted in December of 2003 for both groups. The descriptive statistics indicate that investigated funds suffered outflows in the event month and beyond. Surprisingly, the spill-over effect of the event in the other funds in the same family is of a larger magnitude than that of the investigated funds themselves. However,

the control group (the funds in families with no investigated funds) does not show such strong spill-over effects.

WRDS database provides information on fund characteristics like expense structure (*management fees and expense ratio*), investment style, and age (*age*). We also hand collect data on certain fund characteristics; for example, we use SEC EDGAR filings and firm websites to determine whether the parent company is a conglomerate or an asset management company, and SEC litigation filings to check whether funds have a prior history of SEC charges. To estimate fund performance, we compile monthly data on market returns (r_m); risk-free rate (r_f); and value (SMB), size (HML), momentum (MOM), and liquidity (LIQ) factors using WRDS's Fama-French, momentum, and liquidity databases.

4. Empirical Results

We arrange our findings around the three research questions. First, we investigate whether investors run implicated funds prior to and post litigation announcements and determine whether the size of pre-event runs is statistically and economically significant. Second, we examine whether investors who run prior to litigation announcements earn higher risk-adjusted returns than do investors who run post announcements. Third, we analyze how fund and investor characteristics and liquidity of underlying assets may affect the timing and size of runs and the returns investors reap.

4.1 Detecting pre-event runs

We detect pre-event runs using two benchmarks: a univariate analysis to benchmark the flows of investigated funds and other funds in the same family against the flows of funds in families with no investigated funds, and a multivariate analysis to

benchmark the flows of investigated funds against the flows estimated using the normal-flow model. The average monthly flows of three subsample funds from September 2002 to September 2004 are plotted in Figure 1. As the figure shows, before June 2003, the flows of investigated funds are either higher than or no different from the flows of funds in families with no investigated funds, but they are consistently lower afterwards. That is, a shift occurred three months before the first litigation filing, suggesting that investors ran funds both before and after the announcement of the first litigation.

The results in Table 3 confirm the visual trend of Figure 1. Table 3 shows average monthly flows for the two treatment groups and control group from September 2002 to September 2004.Uptill three months prior to the first litigation announcement, the flows to investigated funds are larger (or smaller but insignificant) than the flows to funds in families with no investigated funds. However, this trend reverses in the three months prior to September 2003. Investigated funds that enjoyed large flows up to one year before the onset of the litigations begin to experience runs before September 2003 and continue to do so after September 2003.[10] In most of the twelve months following September 2003, the flows of the second treatment group (other funds in families with investigated funds) are also significantly lower than the flows of the control group (funds in families with no investigated funds). These results suggest that investors may see involvement in lawsuits as an indicator of fund family managers' failure to serve investor interests. As a result, they punish all funds in implicated families regardless of whether the fund in question allowed abusive practices or not.

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[10] This pattern of lower flows persists more than 2 years after the event month in untabulated results.

Table 4 provides estimation results of the model for flows described in Equation (2). Here, monthly flows are regressed on four sets of controls—fund characteristics, past returns, fee structures, and aggregate flows—and on dummy variables for event-window months that extend six months before and after litigation announcements. Table 4 includes four specifications: one that controls for fund characteristics and historic returns; a second that introduces controls for fee structure and flow characteristics; three and four that add fund and year fixed effects. The observation unit is monthly flows from January 1999 to December 2007, and the regressions use cluster-robust variance/covariance estimators in which the clusters are funds.

The results in Table 4 confirm the presence of the runs (pre- and post-event) previously indicated in Figure 1 and Table 3. The table shows a significant outflow in implicated funds starting as early as four months prior to litigation announcements in the first specification and as late as one month in the third specification. These significant outflows continue during the six months following litigation announcements[11]. The size of the runs ranges from -51 to -94 basis points in the month before the litigation announcements and from -107 to -129 in the month after. Such significant outflows indicate that investors run implicated funds as soon as they suspect oncoming litigations in the case of pre-litigation outflows and as soon as litigations are filed in the case of post-litigation outflows.

The controls produce significant results. First, younger and larger firms enjoy significantly higher flows than do their older and smaller counterparts. Second, investors

[11] Other specifications that extended the post-event window showed outflows to persist for two years.

chase past returns. Third, funds with high expense ratios and lower management fees realize lower flows. Fourth, fund-level flows significantly increase with style-level flows.

4.2 Costs associated with running early versus late

We also investigate what benefits exist for investors who run implicated funds prior to litigation announcements. We estimate models of normal returns to identify the return differences to investigated funds in the months surrounding litigation announcements. Monthly returns from January 1999 to December 2007 are regressed on risk factors and dummy variables for event-window months as described in Equations (3) through (7).[12] To detect return differences, we also test for differences in the coefficients of the event-window dummies. All regressions use cluster-robust variance-covariance estimators in which the clusters are mutual funds.

As Panel A of Table 5 shows, investors who run investigated funds after litigation announcements put up with low returns. Indeed, the estimates from the market model indicate that the cost of exiting investigated funds in the month following litigation announcements is 37 basis points. In contrast, investors benefit from exiting investigated funds in the month prior to litigation announcements 34 basis points. The results of the other four returns models are qualitatively similar.

Consistent with Coval and Stafford's (2007) argument that prices of underlying assets become depressed when there is a large volume of asset sales, our results indicate that investors who exit implicated funds before other investors do avoid the lower returns. As Table 4 shows, mutual funds face large outflows following litigation announcements

[12] We estimate Equations (3) through (7) using fund fixed effects. The results are available upon request and remain qualitatively the same.

and may thus suffer fire-sale costs when they try to liquidate their portfolios to satisfy the high redemption volume. These fire-sale costs would explain the lower returns observed following litigation announcements.

Panel B of Table 5 shows our assessment of whether investors benefit from exiting implicated funds prior to litigation announcements. Specifically, in the first rows we list the differences between the accumulated coefficients of event-month dummies before and after litigation announcements, to show the economic benefits of early exit, which is avoiding fire sales. In the second rows, we report the F-statistics for the test in which the difference is equal to 0. For the one-month window, the difference in coefficients pre- and post- announcement is about 71 basis points, and significant at the 1% level. For the two-month window, the accumulated differences remain positive and significant. However, for three-month window, the accumulated difference is negative and mostly insignificant, suggesting that investors can avoid fire sale losses by holding through the fire sale period as well as by exiting early.

This evidence on pre-event runs and return differences suggests that the timing of redemption matters for returns despite the pro-rata distribution of proceeds from asset sales in mutual funds. Furthermore, if investors want to penalize management, it is rational for them to do so before the adverse information becomes public.

4.3 Cross-sectional difference in runs and returns

We also conduct fund-by-fund estimations of the cross-sectional differences in fund runs and returns before and after litigation announcements. Specifically, we add indicators into the flow and returns models (Equations 2 to 7), for the six months in the pre-event window and the six months post-event window. We then summarize these

fund-level estimates and compare them across different fund groups. The results are given in Table 6.

Panel A of Table 6 summarizes the coefficients estimates on the indicators of the six-month pre- and post-event runs, with the cross-sectional mean and *t*-statistics of the runs for all investigated funds listed in column 1. As the column shows, not only are the abnormal flows in both event windows significantly negative, which implies the existence of fund runs both before and after litigations, but post-event runs are larger than pre-event runs (-7.4% vs. -4.95%). The remaining columns present the differences in pre and post runs across different fund groups. The effects of SEC charge history and fund-parent identity prove statistically insignificant. However, both pre- and post-event runs are significantly larger (10.92 and 6.47 %, respectively) in funds holding illiquid assets than those with liquid assets. These results are consistent with our hypothesis on the effects of reputation and liquidity on fund runs.

Panel B of Table 6 provides a comparison of the coefficient estimates on the six months pre- and post-event indicators from the returns models; that is, the estimates of the return benefits of pre-event runs relative to those of post-event runs. The first column presents the return benefits for all investigated funds, while the remaining columns list the average return differences and *t*-statistics across fund groups. The risk-adjusted returns (alpha) are significantly higher in the pre-event window than in the post-event window, especially for funds holding illiquid assets. However, because there are fund runs both pre- and post- event, there are also cases where alpha is higher in post-event window.

Not only can liquidity of underlying assets affect runs and return differences, so can fund reputation. In fact, fund reputation can also alleviate investors' suspicion of mismanagement and reduce runs, which in turn may decrease the probability of financial contagion. Untabulated results show that the runs on investigated funds are smaller for those with conglomerate parents and those without prior litigation history with the SEC. To sum up, consistent with the argument on penalizing mismanagement and fire-sale costs, pre-event runs are more pronounced in funds with bad reputation and holding illiquid assets, because these funds are likely to incur large outflows and return differences after litigation announcements.

5. Conclusion

This paper directly documents runs in mutual funds. We find not only that pre-event runs start as early as four months prior to the announcement of litigations but that the size of pre-event runs is one-fourth that of post-event runs. The timing and size of runs are also affected by fund and investor characteristics such as reputation and liquidity of underlying assets. Furthermore, because concerted runs trigger fire sales that result in significant costs, investors who run funds prior to litigation announcements realize higher returns than those who run after, especially in the less-liquid funds. These results suggest that the pro-rata distribution of proceeds from asset sales is not sufficient to prevent fund runs.

This rationale for exiting early has a critical implication for the stability of fundindustry: once the timing of an action matters for payoff, strategic complementarities prevails. In such a situation, investors may run funds in the expectation that other investors will do so, which can amplify the impact of adverse events or random shocks on

financial market fundamentals. Nonetheless, because depressed prices during fire sales can soon be recovered as long as the liquidity shock does not embrace all sectors, the self-fulfilling mechanism and devastating consequences of a bank run are not likely to manifest in the fund industry. Rather, fund runs if caused by fund mispricing, will cease when the price is reset at a fair value; or if caused by mismanagement will stop when the management restores its reputation or a new client profile equilibrium is reached.

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Table 1

List of fund families involved in the trading scandals

Table lists the fund families named in the litigations on market timing and late trading. Hedge funds, brokerage firms, and investment banking services are excluded. Information on litigations is collected from Stanford Law School Securities Clearing House and SEC litigations news.

Fund family	Newspaper date	Litigation date	Settlement (in mil $)	Practice under investigation
Nations Funds Trust Family	1-Sep-03	5-Sep-03	535	Market timing/ Late trading
One Group Family	1-Sep-03	9-Sep-03	90	Market timing/ Late trading
Janus Family	1-Sep-03	5-Sep-03	226	Market timing/ Late trading
Strong Family	1-Sep-03	5-Sep-03	175	Market timing
INVESCO Family	3-Sep-03	31-Oct-03	415	Market timing/ Late trading
Putnam Family	3-Sep-03	21-Oct-03	194	Market Timing
MFS Family	8-Sep-03	11-Dec-03	350	Market timing/ Late trading
Alliance Bernstein Family	8-Sep-03	2-Oct-03	250	Market timing/ Late trading
Federated Family	9-Sep-03	24-Oct-03	100	Market timing/ Late trading
Franklin Family	8-Oct-03	6-Feb-04	49	Market timing
Alger Funds Family	16-Oct-03	31-Oct-03	45	Market timing
Salomon Smith Barney Family	22-Oct-03	9-Aug-04		Market timing
Scudder Family	5-Nov-03	22-Jan-04	208	Market timing
PBHG Family	13-Nov-03	14-Nov-03	90	Market timing
Excelsior Family	14-Nov-03	20-Nov-03	1	Market timing
Columbia Family	14-Nov-03	13-Feb-04	460	Market timing
Fremont Family	21-Nov-03	12-Mar-04	4	Market timing
PIMCO Family	13-Feb-04	20-Feb-04	90	Market timing
RS Growth and Value	3-Mar-04	12-Nov-04	30	Market timing
American Family	24-Mar-04	24-Mar-04		Market timing

Sources: Money Management Executive Compilation, January 31, 2004.
Fund Scandal Scorecard, *Wall Street Journal*, April 27, 2004.
SEC press releases from September 2003 to December 2004.
Financial Times, 2003–2005.
Stanford Law School Library Securities Class Action Clearing House.

Table 2: Summary statistics: overview of sample funds

Panels A and B present snapshots as of December 2002 and December 2004, respectively, for funds in non-implicated families and for implicated and non-implicated funds in implicated families. The table lists total number of funds, average TNA of each fund, and aggregated TNA of funds in the three groups.

	Treatment Group 1: Investigated Funds	**Treatment Group 2: Funds in Families with Investigated Funds**	**Control Group: Funds in Families with no Investigated Fund**
Panel A: Snap shot on June 2003			
Total # of funds	1,496	1,492	5,265
Average TNA of each fund (million USD)	788	700	645
Aggregated TNA (million USD)	1,178,552	1,044,697	3,396,012
Average flow of each fund (%)	1.0	0.8	1.0
Total flow (million USD)	4,806	9,873	23,498
Panel B: Snap shot on September 2003			
Total # of funds	1,496	1,503	5,324
Average TNA of each fund (million USD)	811	688	650
Aggregated TNA (million USD)	1,213,404	1,034,356	3,459,612
Average flow of each fund (%)	-0.2	-0.7	0.5
Total flow (million USD)	-1,400	-13,571	-7,114
Panel C: Snap shot on December 2003			
Total # of funds	1,497	1,545	5,393
Average TNA of each fund (million USD)	873	683	691
Aggregated TNA (million USD)	1,306,969	1,055,788	3,724,689
Average flow of each fund (%)	-0.8	0.3	1.2
Total flow (million USD)	-6,572	-2,943	-2,558

Figure 1: Time series trend of fund flows

The figure plots flows from September 2002 to September 2004 in three fund subsamples: treatment group one covering instigated funds, treatment group two covering other funds in in families with investigated funds, control group covering funds in families with no investigated fund. $Flow_{i,t}$ is calculated as $[TNA_{i,t} - TNA_{i,t-1} *(1+R_{i,t})] / TNA_{i,t-1}$.

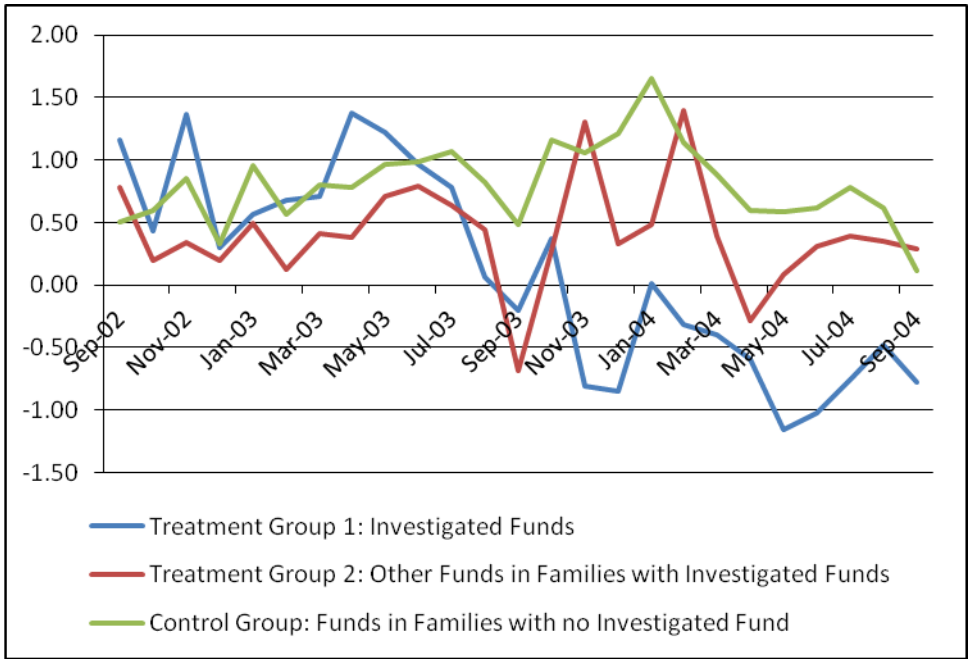

Table 3: Comparison of fund flows between groups over time

This table shows average monthly flows for the three funds groups: investigated funds, other funds in families with investigated funds, and funds in families with no investigated funds from September 2002 to September 2004. The event month is the first month in which litigation was announced (i.e., September 2003). Funds in the families with no investigated funds are used as benchmarks to test for flow differences against investigated funds and other funds in families with investigated funds. ** and * denote significance at the 1% and 5% levels, respectively.

Months from September 2003	Date	Treatment Group 1: Investigated Funds	Treatment Group 2: Other Funds in Families with Investigated Funds	Control Group: Funds in Families with no Investigated Fund	Difference in means test	
					T-test	
		(1)	(2)	(3)	(1)=(3)	(2)=(3)
-12	Sep-02	1.16	0.78	0.50	1.96	0.81
-11	Oct-02	0.43	0.19	0.59	-0.59	-1.22
-10	Nov-02	1.36	0.34	0.85	1.52	-1.60
-9	Dec-02	0.30	0.19	0.33	-0.08	-0.40
-8	Jan-03	0.56	0.50	0.96	-1.31	-1.31
-7	Feb-03	0.68	0.13	0.56	0.59	-1.80
-6	Mar-03	0.71	0.41	0.80	-0.27	-1.10
-5	Apr-03	1.38	0.38	0.78	1.97	-1.35
-4	May-03	1.22	0.71	0.96	0.89	-0.83
-3	Jun-03	0.97	0.79	0.99	-0.06	-0.64
-2	Jul-03	0.78	0.64	1.07	-0.78	-1.14
-1	Aug-03	0.07	0.45	0.83	-2.46	-1.20
0	Sep-03	-0.20	-0.68	0.48	-2.79	-4.52
1	Oct-03	0.37	0.28	1.16	-2.12	-2.47
2	Nov-03	-0.81	1.30	1.06	-8.40	0.78
3	Dec-03	-0.84	0.33	1.21	-5.78	-2.30
4	Jan-04	0.01	0.48	1.65	-4.82	-3.34
5	Feb-04	-0.32	1.40	1.14	-5.87	0.82
6	Mar-04	-0.40	0.40	0.89	-3.58	-1.30
7	Apr-04	-0.59	-0.28	0.60	-4.07	-2.90
8	May-04	-1.16	0.09	0.58	-6.45	-1.69
9	Jun-04	-1.02	0.30	0.62	-5.10	-0.85
10	Jul-04	-0.76	0.39	0.78	-5.08	-1.17
11	Aug-04	-0.48	0.35	0.62	-3.52	-0.80
12	Sep-04	-0.78	0.28	0.11	-4.26	0.55

Table 4 : Detecting runs: multivariate analysis of monthly flows

The table runs four specifications of the flow model: Flow = a + ∑bj * fund characteristicsj + ∑cj * past returnsj + ∑dj * aggregate flowsj + ∑γj * Event-window dummiesj + ε. The dependent variable is computed as Flowi,t = [TNAi,t –TNAi,t-1 *(1+Ri,t)] / TNAi,t-1. Fund characteristics include size (log of TNA in million USD), age (log of days since first offer date), expense ratio (fund's operating expenses as a ratio of total investment), management fee (management fee as a ratio of average investment). Past returns include cumulative returns in the past one, three, and six months. Aggregate flows include industry- and style-level flows. Industry-level flows are the sum of flows in dollars (TNAi,t –TNAi,t-1 *(1+Ri,t)) to all funds in the sample divided by the sum of lagged TNA (TNAi,t-1). Style-level flows are the sum of flows in dollars to all the funds with the same investment style divided by the sum of lagged TNA. Event-window dummy (n month) equals 1 if it is the nth month to the date of first litigation news (for the investigated funds in the first two columns and for the investigated family in the last two columns) and 0 otherwise (n = -1, -2, .. -6, 0, 1, 2,.. 6). Observations are monthly and cover the years from January 1999 to December 2007. Robust t statistics are in brackets. * indicates significance at 5% and ** significance at 1%.

	Pooled regressions		**Regressions with fund and year fixed-effects**	
	(1)	**(2)**	**(3)**	**(4)**
Month Dummy	0.47	0.45	0.86**	0.61*
(-6 months)	[1.60]	[1.52]	[2.95]	[2.08]
Month Dummy	0.6	0.53	0.93*	0.63
(-5 months)	[1.56]	[1.36]	[2.43]	[1.63]
Month Dummy	-0.25*	-0.19	0.04	-0.16
(-4 months)	[2.09]	[1.68]	[0.30]	[1.29]
Month Dummy	-0.26	-0.26*	-0.02	-0.27*
(-3 months)	[1.18]	[2.19]	[0.10]	[2.20]
Month Dummy	-0.47	-0.3	-0.25	-0.29
(-2 months)	[1.71]	[1.57]	[0.92]	[1.52]
Month Dummy	-0.94**	-0.54**	-0.71**	-0.51**
(-1 month)	[5.96]	[3.73]	[4.40]	[3.52]
Event month	-1.12**	-0.83**	-0.89**	-0.80**
(0 month)	[6.66]	[4.91]	[5.24]	[4.72]
Month Dummy	-1.29**	-1.08**	-1.07**	-1.07**
(+1 month)	[12.07]	[10.15]	[9.76]	[9.82]
Month Dummy	-2.03**	-1.74**	-1.75**	-1.69**
(+2 month)	[14.98]	[12.86]	[12.90]	[12.44]
Month Dummy	-1.52**	-1.26**	-1.18**	-1.16**
(+3 month)	[8.51]	[7.10]	[6.72]	[6.57]
Month Dummy	-1.03**	-1.22**	-0.62**	-1.04**
(+4 month)	[4.39]	[9.76]	[2.73]	[8.29]
Month Dummy	-1.32**	-1.14**	-0.91**	-0.95**
(+5 month)	[12.70]	[10.99]	[8.57]	[8.95]
Month Dummy	-1.12**	-0.83**	-0.68**	-0.61**
(+6 month)	[10.27]	[8.11]	[6.17]	[5.92]

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Age	-1.69**	-1.65**	-2.72**	-2.62**
	[54.85]	[52.83]	[51.61]	[48.92]
Size	0.34**	0.22**	0.81**	0.70**
	[33.40]	[20.77]	[31.37]	[24.44]
Return	0.03**	0.02**	0.02**	0.01**
(1-month lagged)	[7.11]	[4.83]	[4.84]	[2.94]
Cumulative Return	0.01**	0.01*	0.02**	0.01**
(3-months)	[4.31]	[2.20]	[6.84]	[4.31]
Cumulative Return	0.06**	0.05**	0.07**	0.06**
(6-months)	[31.35]	[25.91]	[35.63]	[28.60]
Expense ratio		-0.81**		-0.96**
		[21.61]		[13.27]
Management fee		0.36**		0.79**
		[4.81]		[6.21]
Industry-Normalized Flow		-0.03		0.04
		[0.88]		[1.05]
Style-Normalized Flow		0.78**		0.76**
		[31.67]		[29.96]
Observations	816,848	799,992	816,848	799,992
R-squared	2.10%	2.77%		
Number of Funds			11,398	11,177

Table 5: Fund returns before and after litigation announcements

Pooled regressions (with fund and year fixed-effects) using market model, Fama-French 4-factor, Cahart 4-factor, and market models with lagged returns and liquidity factors are run. Observations are from January 1999 to December 2007. The dependent variable is monthly fund returns (in %). A dummy (n month) equals 1 if it is the nth month before (-n) or after (+n) litigations are filed. For other months and non-indicted funds, the dummy takes on the value 0, n = -1, -2, - - - -6, 0 , 1, 2, - - - 6. Panel A presents the regression results. Robust t statistics are in brackets. * indicates significance at 5% and ** significance at 1%. Panel B tests for differences in the accumulated abnormal returns between Dummy (-n months) and D (+n months).

	Market model	**Fama-French 4-factor Model**	**Carhart 4-factor Model**	**Market model with lagged returns**	**Market model with liquidity factor**
Panel A: Regression results					
Month Dummy	-0.10	-0.04	-0.03	-0.06	-0.06
(-6 months)	[1.44]	[0.60]	[0.46]	[0.98]	[0.98]
Month Dummy	-0.02	-0.05	-0.02	-0.06	-0.02
(-5 months)	[0.19]	[0.60]	[0.22]	[0.67]	[0.24]
Month Dummy	-0.03	-0.23	-0.19	-0.14	-0.07
(-4 months)	[0.37]	[3.07]**	[2.62]**	[1.85]	[0.96]
Month Dummy	-0.38	-0.46	-0.46	-0.43	-0.40
(-3 months)	[6.66]**	[8.05]**	[8.05]**	[7.60]**	[7.10]**
Month Dummy	-0.51	-0.68	-0.68	-0.51	-0.52
(-2 months)	[6.66]**	[8.72]**	[8.70]**	[6.62]**	[6.74]**
Month Dummy	0.34	0.23	0.22	0.34	0.33
(-1 month)	[5.57]**	[3.70]**	[3.53]**	[5.60]**	[5.43]**
Event month	0.53	0.50	0.49	0.53	0.58
(0 month)	[8.51]**	[7.86]**	[7.61]**	[8.53]**	[9.13]**
Month Dummy	-0.37	-0.43	-0.46	-0.35	-0.36
(+1 month)	[5.11]**	[5.96]**	[6.32]**	[4.87]**	[4.92]**
Month Dummy	-0.08	-0.08	-0.09	-0.13	-0.06
(+2 month)	[1.88]	[1.86]	[2.08]*	[3.18]**	[1.45]
Month Dummy	-0.09	0.02	0.02	-0.11	-0.08
(+3 month)	[1.80]	[0.43]	[0.39]	[2.16]*	[1.48]
Month Dummy	0.05	-0.05	-0.06	-0.01	0.10
(+4 month)	[1.13]	[1.21]	[1.34]	[0.28]	[2.34]*
Month Dummy	-0.13	0.01	0.02	-0.13	-0.12
(+5 month)	[3.08]**	[0.18]	[0.47]	[3.19]**	[2.94]**
Month Dummy	-0.10	-0.04	-0.03	-0.07	-0.11
(+6 month)	[2.15]*	[0.91]	[0.62]	[1.47]	[2.24]*

(Continued)

Market Returns	0.58	0.58	0.58	0.58	0.58
	[100.29]**	[108.05]**	[110.92]**	[100.22]**	[95.93]**
SMB		0.10	0.09		
		[34.22]**	[35.31]**		
HML		0.05	0.05		
		[14.31]**	[14.40]**		
Momentum			0.01		
			[6.06]**		
Lagged market returns					
				0.03	
				[30.23]**	
Liquidity factor					0.01
					[20.68]**
Observations	834,438	834,438	834,438	822,505	734,928
Number of groups	11,620	11,620	11,620	11,574	11,120
Panel B: Performance Difference					
Dummy (-1 months)	0.71	0.66	0.68	0.69	0.69
- Dummy (+1 month)	[111.69]	[96.44]	[100.41]	[107.46]	[106.14]
Accumulated (-1 to -2)	0.27	0.06	0.09	0.31	0.23
- Accumulated (+1 to +2)	[14.17]	[0.74]	[1.54]	[18.80]	[9.71]
Accumulated (-1 to -3)	-0.01	-0.42	-0.39	-0.01	-0.10
- Accumulated (+1 to +3)	[0.01]	[18.52]	[16.38]	[0.00]	[0.90]

Table 6: Cross sectional differences in runs and in returns

This table summarizes results of the individual fund estimates. In a two-step analysis, we first run time series regressions of flows as in Equation (2) (see Panel A) and of returns as in Equations (3) to (7) (see Panel B) for each fund. We then compare these fund-level estimates across fund groups classified according to SEC charge history, whether management belongs to a financial conglomerate, whether the underlying assets in the portfolio are liquid. Panel A and B present the cross sectional means and t-statistics of the coefficients on the pre-and post-event indicators from the individual fund flow and returns models, respectively.

Panel A: Means and t-tests of the pre-event runs and post-event runs for the full sample and subsamples

Abnormal flows	Full sample	Charge history (Yes-No)	Parent company (Stand-alone - conglomerate)	Portfolio liquidity (illiquid - liquid)
Pre-event runs, (-6, -1) months	-4.95***	-0.22	0.83	-10.92***
	[-5.09]	[-0.11]	[0.35]	[-5.55]
Post-event runs, (+1, 6) months	-7.94***	1.68	-2.66	-6.47***
	[-11.12]	[0.90]	[-1.22]	[-4.48]

Panel B: Means and t-tests of the pre-event alpha and post-event alpha for the full sample and subsamples

Alpha differences (-6,-1) -(+1,6) months	Full sample	Charge history (Yes-No)	Parent company (Stand-alone - conglomerate)	Portfolio liquidity (illiquid - liquid)
Market model	1.16***	0.08	-1.93***	1.72***
	[6.14]	[0.14]	[-3.08]	[4.49]
Fama-French	-0.34***	0.09	-1.19***	-0.10
	[-2.33]	[0.24]	[-2.65]	[-0.33]
Carhart 4-factor Model	-0.08	-0.08	-0.69	-0.23
	[-0.54]	[-0.20]	[-1.50]	[-0.77]
Market model with lagged market returns	0.62***	0.25	-1.84***	0.94***
	[3.54]	[0.50]	[-3.19]	[2.63]
Market model with liquidity factor	0.98***	0.07	-1.87***	1.81***
	[5.31]	[0.14]	[-3.14]	[4.84]