

# Discretionary liquidity: Hedge funds, side pockets, and gates<sup>1</sup>

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**Abstract:** During the recent financial crisis, more than 30% of hedge fund managers used their discretion to restrict investor liquidity through the use of “gates” or “side pockets.” Using a database of hedge fund investor interests, this paper is the first to empirically examine the determinants of these discretionary liquidity restrictions (DLRs) and their consequences for hedge fund investors. We find that funds enacted DLRs following poor performance and when their portfolio assets were more illiquid. However, despite claims from managers that DLRs protected investor interests by preventing fire-sales, funds that enacted DLRs continued to underperform comparable funds. Consistent with DLRs reflecting agency problems, we find that restricting investor liquidity during the crisis had a negative impact on fund reputation that spilled over across the hedge fund family. DLR funds and their family affiliates had a more difficult time raising capital and were more likely to cut their fees in the post crisis era.

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# Discretionary liquidity: Hedge funds, side pockets, and gates

Abstract: During the recent financial crisis, more than 30% of hedge fund managers used their discretion to restrict investor liquidity through the use of “gates” or “side pockets.” Using a database of hedge fund investor interests, this paper is the first to empirically examine the determinants of these discretionary liquidity restrictions (DLRs) and their consequences for hedge fund investors. We find that funds enacted DLRs following poor performance and when their portfolio assets were more illiquid. However, despite claims from managers that DLRs protected investor interests by preventing fire-sales, funds that enacted DLRs continued to underperform comparable funds. Consistent with DLRs reflecting agency problems, we find that restricting investor liquidity during the crisis had a negative impact on fund reputation that spilled over across the hedge fund family. DLR funds and their family affiliates had a more difficult time raising capital and were more likely to cut their fees in the post crisis era.

Hedge funds invest in complex and illiquid assets. Because they offer redeemable claims to investors, however, their strategies and survival are constrained by their ability to retain outside financing (Shleifer and Vishny, 1997). Hedge funds, therefore, typically maintain withdrawal restrictions, such as lockups, to slow down the flow of capital from their funds. These contractual restrictions ensure that, under normal market conditions, the funds can invest in illiquid assets and have the flexibility to meet redemptions without resorting to selling illiquid portfolio assets at “fire-sale” prices. However, market conditions during the financial crisis of 2007-2009 were anything but normal. As market liquidity dried up and performance suffered, many funds found themselves subject to substantial withdrawal requests that overwhelmed ordinary redemption restrictions, creating the potential for the funding liquidity spiral discussed in Brunnermeier and Pedersen (2009). In order to combat the run on their assets, some hedge fund managers enacted “gates” or “side pockets” which served to prevent investor withdrawals from illiquid hedge fund portfolios. These restrictions were imposed ex-post at the discretion of fund managers and were in addition to the ordinary withdrawal restrictions (e.g. lockups and redemption notice periods) present ex-ante in the partnership agreements. In this paper, we study the causes and consequences of these discretionary liquidity restrictions (DLRs) for hedge fund managers and their investors.

The majority of DLRs can be broadly classified as either gates or side pockets. When invoking a gate, the manager temporarily suspends redemptions from the fund. When a side pocket is created, the fund segregates a portion of its assets into a separate illiquid investment vehicle. DLRs can also be viewed as a liquidity restriction option from the viewpoint of the hedge fund manager (Ang and Bollen, 2010). Most hedge fund agreements afford the manager

the option to restrict investor liquidity by invoking DLRs when redemptions would force the fund to liquidate assets too quickly in illiquid markets at unfavorable prices.

The value of DLRs for hedge funds and investors remains a contentious issue, especially given their prevalence in the recent financial crisis. Managers argue that by initiating DLRs the fund can protect investors from themselves and ensure that assets can be sold at fair values after asset markets stabilize. However, restricting redemptions is costly for investors as it removes their option to “vote with their feet” by removing capital from poorly performing funds (Fama and Jensen, 1983). In addition, because of their discretionary nature, it could be tempting for some hedge fund managers to abuse side pockets and gates as a means of preserving fund capital and earning excess fees. The notoriety of DLRs in the press is partly due to investor outrage over being unable to access their capital.<sup>2</sup> Despite the attention these DLRs received from the media, there have been no empirical studies of DLRs, and thus we know little about their economic importance or relevance to investors.

In this paper, we utilize a hand-collected dataset of hedge fund holdings from a sample of institutional investors to provide the first, large-scale empirical study of discretionary liquidity restrictions (DLRs) and their impact on investors. We begin by documenting the incidence of DLRs over the period 2006-2011 and find them to be especially prevalent during the crisis period. Though most partnership agreements allow for managers to enact DLRs in extreme circumstances, few hedge funds had ever exercised that right prior to the financial crisis. For instance, in 2006 only 4% of the funds in our sample had enacted a gate or side pocket. Strikingly, by the end of 2009 over 30% of funds in our sample had enacted some form of DLR, restricting investor redemptions beyond their ordinary contract terms. This is consistent with reports in the popular press that the widespread use of DLRs came as a surprise to many

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<sup>2</sup> For example, "Side-Pocket Solution to Illiquidity", The Financial Times 1/21/2008.

investors.<sup>3</sup> We find these restrictions tend to last several quarters after being enacted, and were created by some of the largest and most well-known hedge funds. Motivated by the prevalence of DLRs during the financial crisis, we seek to understand their economic determinants, costs, and benefits for hedge funds and their investors. The primary question we ask is whether DLRs ultimately served the interests of investors by protecting them from themselves, or instead served the interest of managers by protecting them from investors voting with their feet.

We start by examining the characteristics of funds that restrict investor liquidity to better understand why funds enact DLRs. We find these funds had poor performance prior to enacting DLRs and that DLRs are more concentrated among funds that face greater liquidity risk. These results are consistent with the notion that funds at greater risk of a liquidity spiral suspended redemptions in order to avert a potentially damaging run on the fund's capital and that DLRs potentially serve the interests of investors. However, we also find that DLRs were more common among funds that charged higher fees, suggesting a possible agency problem inherent in the decision to suspend redemption rights. Ultimately, the question of whether investors were better served by having their redemption rights suspended hinges on how the funds performed afterwards.

When we examine the performance of funds after they enact DLRs, we find no evidence that investors benefited from sacrificing their ability to redeem capital. Controlling for the endogenous nature of the decision to enact a DLR, we find that DLR funds continue to underperform comparable funds after the event date. For example, DLR funds both economically and statistically underperform a control sample of funds in 6 out of 8 quarters following the event. We find that a buy and hold portfolio of funds enacting DLRs underperforms a control portfolio by 27.86% ( $t$ -stat = 4.56) over the eight quarters following the DLR. This poor relative

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<sup>3</sup> For example, "Hedge-Fund Investor Goal: An Exit Plan", Wall Street Journal 9/9/2009.

performance appears contrary to managers' rationale for DLRs, which was to remove funding risk and allow hedge fund managers to maintain illiquid investments with high risk-adjusted expected returns. If fund managers restricted investor liquidity to enhance performance, our evidence suggests those efforts failed.

Given the relatively poor subsequent performance of funds that enacted side pockets or gates, we also examine whether funds and their family affiliates face a reputational cost for locking up investor capital outside the terms of ordinary redemption restrictions. We find that hedge fund families in which a fund enacted a DLR during the crisis had a more difficult time raising capital after the crisis. We find this effect to be stronger when reputation plays a more prominent role in investor decisions, such as when the family's flagship fund enacted a DLR. These findings indicate that on average, investors view DLRs as an abuse of managerial discretion and not as an effective way to manage liquidity during the crisis period. Furthermore, we find that funds where a family fund enacted a gate or side pocket during the crisis were more likely to lower fees and offer more frequent redemptions after the crisis. This is consistent with DLRs creating a negative reputation spillover across the hedge fund family, as funds associated with DLRs may have had to grant more favorable contractual terms in order to win back investor favor and compete for capital in the post-crisis period.

This paper is related to the broad literature examining the interaction of funding risk and the issues that arise from institutions having an asset-liability liquidity mismatch. Diamond and Dybvig's (1983) seminal paper on the mechanics of bank runs illustrates how providing investors liquid redeemable claims while holding illiquid assets subjects the bank to the self-fulfilling prophecy of a bank run. Brunnermeier and Pedersen (2009) argue that shocks to liquidity in asset markets or funding markets can spill over into one another creating a vicious

cycle exacerbating initial shocks and further reducing liquidity across markets. The funding liquidity problem can be worsened in the case of hedge funds when investors use performance to assess managerial ability when making their withdrawal decisions (Shleifer and Vishny, 1997). Teo (2011) finds that outflows from liquid hedge funds leads to worse performance, especially for funds investing in more illiquid assets where the impact of fire-sales is likely to be greater. Teo's findings are consistent with the phenomena of DLRs during the crisis, as funds may have sought to manage the funding-liquidity problem through temporary suspensions of redemptions. Ben-David, Franzoni, and Moussawi (2011) find that during the financial crisis of 2007-2009, poor hedge fund performance precipitated substantial withdrawal requests from hedge fund investors and led hedge funds to sell large portions of their liquid equity assets. In addition, they find flow performance sensitivity was significantly diminished during the crisis period, meaning actual outflows were lower than would be predicted given the extreme poor performance of hedge funds during the crisis. This finding is consistent with hedge funds enacting DLRs during the crisis, preventing investors from accessing their funds.

In addition, our work is also related to the literature linking liquidity risk and withdrawal restrictions to hedge fund performance. Aragon (2007) finds that funds with more restrictive contractual redemption restrictions such as lockups outperform less restricted funds by 4-7% a year. Aragon attributes this outperformance to restrictions enabling funds to invest in illiquid assets and earn a liquidity premium for their investors. However, Sadka (2010) finds that while hedge funds are compensated for taking asset liquidity risk, this risk does not appear to be related to a fund's use of withdrawal restrictions. Our results suggest that managers may manage asset liquidity risk by relying on the option-like characteristic of DLRs as a restriction of last-resort.

In a closely related paper, Ang and Bollen (2010) theoretically model the manager's option to curtail investor redemptions using DLRs in a real options framework and argue that the cost of allowing managers the option to suspend redemptions far exceeds the costs of conventional restrictions, such as lockups, from the investor's point of view. Our results lend empirical support to Ang and Bollen's theoretical predictions, and further suggest that the costs of DLRs outweigh any benefits they may have in managing funding liquidity risk.

The rest of the paper is organized as follows. In the next section, we describe the institutional detail behind DLRs and discuss some hypotheses related to their costs and benefits for fund managers and investors. In Section 2, we describe our data and empirical methodology. We provide our results in Section 3, and conclude in Section 4.

## **1. Discretionary liquidity restrictions**

To date, the hedge fund literature has focused on well-specified liquidity terms, such as lockups and notice periods, that are transparent and understood by investors ex-ante. In this paper, we differentiate ourselves by instead examining a fund manager's discretionary ability to restrict the fund's liquidity ex-post. In this section, we define the side pockets and gates that comprise the fund's discretionary liquidity, examine a case study from our data, and discuss the potential costs and benefits of DLRs to funds and investors.

### **1.1 Side pockets**

We define a side pocket as a separate account created by the fund to segregate illiquid or hard-to-value securities. The remaining liquid securities are maintained in the fund's regular capital account and subject to the fund's original contractual share liquidity. The side pocket, however, is typically illiquid and can remain so for lengthy periods of time until the assets can be

unwound in what the manager deems an orderly manner. Funds may continue to charge management fees and performance fees on side pockets, though they are typically accrued while the assets are being liquidated and only paid once the assets become liquid again. Any investor that completely sells out of the fund's regular account will still remain in the side pocket until the assets can be sold. Upon the creation of the side pocket, new investors to the fund do not share in the side pocket. Rather, their purchased interest in the fund is solely the fund's regular account. Thus, in the event of a side pocket, the ongoing, realized returns to old and new investors will differ.

## 1.2 Gates

Rather than creating a side pocket for their illiquid assets, a fund may choose to gate an investor's access to liquidate the fund. We define a gate as a temporary, partial, or full restriction on the ability of investors to redeem their interest in the fund. These gates can occur at the fund-level or the investor-level with differing thresholds. A fund-level gate of 20%, for example, would prohibit redemptions from the fund should aggregate fund redemptions in a given period exceed 20% of the fund's assets. An investor-level gate of 20% would prevent any one investor from withdrawing more than 20% of their interest in the fund, regardless of the withdrawal behavior of other investors. Funds that gate investors typically continue to charge both management and performance fees to their investors. In the case of fund- or investor-level gates, redemption requests that exceed the permitted threshold are met on a pro-rata basis and any residual request is carried forward to the next redemption period.

### 1.3 Benefits and costs of discretionary liquidity restrictions (DLR)

The case of the Canyon Value Realization fund illustrates how a fund manager's option to discretionarily restrict liquidity is distinct from their contractual liquidity provisions. Canyon Value Realization ("Canyon") is an event driven hedge fund, known for investing in distressed, illiquid assets. To balance the liquidity of the firm's assets with that of investor's redemption liquidity in the fund, the fund had a one year lockup, offered only annual redemptions from the fund, and required a 90 day notice prior to the withdrawal of capital. In the fourth quarter of 2008, however, the fund's performance had deteriorated and Canyon faced a series of withdrawal requests. The fund's contractual liquidity restrictions became insufficient to prevent an asset-liability mismatch at the fund. In an effort to prevent a run on the fund's liquid assets or force the fund to sell illiquid assets at fire-sale prices, the manager executed its discretionary authority and created a side pocket that placed the fund's illiquid assets in a stand-alone investment vehicle. In doing so, this ensured that investors that chose not to exit the fund were not left with an increasing mix of illiquid assets and that illiquid assets could be unwound in a more orderly fashion. For the liquid assets that were not placed in a side pocket, the fund met redemptions on a pro-rata basis. At the end of 2011, Canyon still had assets held in the side pocket; an investor that sought to fully liquidate the fund in 2008 would have still not fully recovered their assets three years later.

The goal of this paper is to examine whether investors were made better off by those funds that chose to enact discretionary liquidity restrictions. Hedge fund managers claim that DLRs benefit investors as they mitigate the adverse effects of redemption risk. In an effort to capture the rewards to bearing liquidity risk, managers may take on greater asset liquidity exposure than their share liquidity would typically warrant (Teo, 2011). When liquidity of the

fund's assets and liabilities become misaligned, as they did with Canyon in the Fall of 2008, this creates an opportunity for a funding-liquidity spiral (Brunnermeier and Pedersen, 2009). Managers argue that by initiating DLRs the fund can protect investors from themselves and ensure that assets can be sold at fair values after market prices stabilize. Thus, managers that invoke gates or create side pockets could be doing so as a way to stem the tide of a financial panic and increase overall asset values for their investors.

However, because of their discretionary nature, it may be tempting for some hedge fund managers to abuse the use of side pockets and gates as a means of preserving fund capital and earning excess fees. Though DLRs can help stem the tide of a funding-liquidity spiral, discretionary withdrawal restrictions could dull the monitoring function inherent in demand deposits (Fama and Jensen, 1983; Diamond and Rajan, 2001). Restricted investors can no longer "vote with their feet" when fund performance is poor. Restricted investors could also be forced to pay management and performance fees on restricted assets. In addition, side pockets could be used to obscure the true performance of the main fund, which not only bolsters the fund's track record, but also creates the potential for gaming performance fees. For example, fund managers may place poorly performing, illiquid assets into side pockets in an effort to boost the overall performance of the fund's main share class, thereby allowing the fund to stay above their high-water mark and charge higher performance fees.

For an example, suppose a fund is initially composed of two assets W and L, both of which are worth \$50 at  $t=0$ . If at  $t=1$ , W increases by 50% to \$75 and L decreases by 50% to \$25, total portfolio value at  $t=1$  remains unchanged and performance for the period is 0%. However, if L is put in a side pocket and treated as a separate account, then the historical

performance of the main account (comprised solely of W) would be 50%, and a fund manager could potentially claim his 20% performance fee on the profit for the period.<sup>4</sup>

## 2. Data and summary statistics

To the best of our knowledge, ours is the first large, empirical study of hedge fund side pockets and gates. The previous lack of empirical research in this area is likely due to the fact that standard commercial databases (e.g., Lipper TASS) provide no information about whether a fund had a DLR event or when the event occurred. In this paper, we employ a new dataset that allows us to track the portfolios of a sample of large institutional investors. Using this data, we are able to determine if and when a particular hedge fund gated investors or created a side pocket, as well as the performance of the fund following the illiquidity event.

Our data comes from a set of fund of funds (FoFs) that have registered with the Securities and Exchange Commission (SEC) pursuant to the Investment Company Act of 1940 (40 Act).<sup>5</sup> We use SEC forms N-Q and N-CSR(S) to capture each FoF's portfolio holdings. The filings disclose the name of the underlying HF, the FoFs cost basis in the position, and the current value of the position. The time-series combination of these forms allows us to utilize the underlying holdings to create a quarterly panel of hedge fund returns for each FoF.<sup>6</sup> FoFs often provide footnotes about their holdings that identify whether the fund has been gated or whether a portion of the assets have been placed in a side pocket. We utilize these footnotes to identify the liquidity

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<sup>4</sup> In 2006, an article in the Wall Street Journal accused one large hedge fund, Ritchie Capital, of having placed laggard assets into side pockets in order to bolster the performance fees and historical track record of its flagship fund by 40%. Further, the article claimed the fund's side pocket contained controversial assets that should have had a liquid market, such as publicly traded corporate debt.

<sup>5</sup> See Aiken, Clifford, and Ellis (2012) for a thorough analysis of SEC-registered FoFs.

<sup>6</sup> FoFs can account for changes in cost basis on a dollar or percentage change method. Based on the funds' reported returns to the commercial databases, we are able to reasonably determine whether the fund accounts for changes in cost basis on a dollar or percentage method. However, to ensure that our results are not driven by data errors from our calculations, we re-test each of our results using only those returns where cost basis does not change. Our results are qualitatively similar under either approach.

events in this paper. The liquidity events in our sample are overwhelmingly clustered in the 2006-2011 period, with 99.1% of all illiquidity events occurring during this time frame. As such we begin our sample period in 2006. 35 FoFs in our sample do not provide footnotes or ceased operation prior to 2006. As such, we remove these FoFs from the sample, yielding our final sample of 57 unique FoFs, 1,411 unique hedge funds (HFs), and 15,133 unique FoF-HF quarterly holdings.

Our data are derived from the holdings of large institutional investors, so the HFs in our sample do not necessarily report performance or contract characteristics to the commercially available databases. We follow Joenvaara, Kosowski, and Tolonen (2012) and merge our sample to the union of five commercial databases: Lipper TASS, HFR, BarclayHedge, Morningstar, and EurekaHedge. Of the 1,411 HFs in our sample, 672 (47.6%) funds do not report to commercial databases, while 739 (52.4%) do. Throughout the paper, we run our analysis on our full sample of hedge funds, as well as the merged sample of database funds whenever possible. In doing so, we make a trade off: while the commercial data offer a richer set of contract provisions such as fees and share liquidity, it suffers from a selection bias.<sup>7</sup>

In our paper, we define a DLR fund equal to one if the hedge fund had a side pocket *or* gate for a particular quarter, and zero otherwise. We group these distinct mechanisms for two reasons. First, we identify 2,833 unique hedge fund/quarters where the hedge fund had restricted liquidity. In 152 (5.37%) of these quarters, the fund of fund from whom we collected the hedge fund information only noted that its liquidity had been temporarily restricted for a particular hedge fund, but did not specify whether this was done through a gate or side pocket. Second, we

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<sup>7</sup> Aiken, et al. (2012) document that database fund performance is upwardly biased, while Agarwal, et al. (2012) document a delisting bias for funds that exit a database. In an effort to mitigate this bias, we include funds that were present in a database, held by a fund of fund in our sample, but subsequently delisted. In doing so, we assume that contract terms, e.g., management fee, are held constant in the delisting period.

find that side pockets and gates are positively correlated. For an additional 782 of our 2,833 (27.8%) hedge fund/quarters the hedge fund both gated investors and placed assets into a side pocket. Thus, for one-third of our observations we cannot separately identify the differential impact of side pockets and gates. Summary statistics for our sample are presented in Table 1.

In Panel A of Table 1, we study our entire sample of hedge funds. For 26.08% of the hedge funds in our sample, their investors experience a DLR at some point in our sample. The average duration of this liquidity event is over 8 quarters, although we are quick to point out that 47% of the funds that experience a liquidity event still have a gate or side pocket at the end of our sample period. Thus, we understate the true length of time that the average investors liquidity is restricted. The average hedge fund in our sample is held for 11.1 quarters and represents 3.26% of the FoFs assets under management. The average hedge fund offers redemption frequency of 125.2 days and earned 8 bps/quarter of raw return over our sample period.

In Figure 1, we document the incidence of discretionary liquidity through time. For the first two years of our sample, 2006 and 2007, the percentage of hedge funds that were subject to discretionary liquidity ranged from 3.6% to 6.7%. However, with the failures of Bear Stearns and Lehman Brothers in 2008, the incidence of side pockets and gating rose from 8.1 at the beginning of 2008 to 24.2% by the end of the year. By the first quarter of 2009, nearly 1 of every 3 (31.1%) hedge funds owned by our sample of institutional investors had suspended liquidity in the fund. Interestingly, the rate remains largely unchanged for the remainder of our sample, indicating that years later, many of the funds remained at least partially illiquid.

After merging our sample to the commercially available data, we find 739 matching hedge funds. From Panel B, Table 1 we first note that 24.4% of the database hedge funds are DLR funds at some point in their life, with an average duration of illiquidity of 7.94 quarters.

The incidence and duration of the DLR events is similar to the findings in Panel A, indicating that the decision to temporarily restrict liquidity appears unrelated to the fund's decision to report to a database. The average hedge fund in our sample is large (average AUM of \$932MM), has a quarterly flow of 4.34%, is 6.9 years old, has a management fee of 1.55%, and an incentive fee of 19.58%. The average hedge fund has average share liquidity of 179.3 days for lockups, 53.9 days for redemption notice periods, and 98.8 days for redemption frequency. Finally, we find that the average database fund in our sample earned 27 bps/quarter of raw return over our sample period.

In Figure 2 we examine the incidence of discretionary liquidity by style. Multi-strategy, Event Driven, Relative Value, and Emerging Markets are the most frequent styles to gate or side pocket investors, with the percentage of their holdings subject to liquidity ranging from 39% to 28%, respectively. This evidence is consistent with liquidity risk being a potential driver of the manager's decision to restrict investor liquidity, as each of these three styles are prone to invest in less liquid assets. However, even strategies that are perceived to be relatively liquid such as Long Only or Long/Short Equity exercise discretionary liquidity in our sample.

### **3. Results**

To begin, we study the fund manager's decision to restrict investor liquidity. We posit that funds with higher liquidity risk and lower performance are more likely to restrict investor liquidity, as the outflows brought about by poor performance is more likely to exacerbate the asset-liability mismatch for the most illiquid hedge funds. Next, we use this logit framework to identify a control group of funds that have similar observable characteristics as the DLR funds, but chose not restrict liquidity. We compute the difference in returns between the DLR funds and

the control funds in an effort to assess the performance impact to investors. We conclude by studying the impact of the DLR decision on the manager's reputation.

### 3.1 Determinants of discretionary liquidity restrictions

We model the manager's decision to implement a DLR as a function of the hedge fund's liquidity risk and fund characteristics. We follow Aragon, Liang, and Park (2012) and estimate three types of liquidity risk for the fund: share liquidity (as in Aragon, 2007), asset liquidity (as in Getmansky, Lo, and Makarov, 2004), and market liquidity (as in Sadka, 2010). We follow Teo (2011) and use the fund's withdrawal frequency to proxy for the fund's share restriction.<sup>8</sup> We focus on withdrawal frequency because it is the only measure of share liquidity that is available for both the full sample of hedge funds, as well as the sample of funds found in the commercially available data.

To assess the fund's asset liquidity, we estimate a rolling 36-month AR(1) model:

$$R_t = a + b_{AR}R_{t-1} + \varepsilon_t \quad (1)$$

where  $b_{AR}$  captures the fund's serial correlation. Getmansky, et. al. (2004) and Bollen and Pool (2012) argue that fund's invested in more illiquid assets will face higher serial correlation. Finally, we follow Sadka (2010) to capture the fund's sensitivity to market liquidity risk. We estimate a rolling 36-month regression of the following form:

$$R_t = a + b_1MKTRF_t + b_{Sadka}Liquidity_t + \varepsilon_t \quad (2)$$

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<sup>8</sup> For robustness, we have separately examined the fund's lockup and withdrawal notification period. Additionally, in an effort to create a single measure which captures the effect of share liquidity, we have taken the first principal component of the fund's lockup, withdrawal frequency, and withdrawal notification period. Our results are similar for each approach.

where BSADKA captures the fund's sensitivity to changes in market liquidity risk. We estimate the determinants of discretionary liquidity by modeling the probability that the hedge fund enacts a DLR during our sample period. The model is as follows:

$$DLR Fund_{i,t} = \alpha + \sum_{r=1}^R \beta_r * liquidity\ risk_{i,t-1} + \sum_{f=1}^F \beta_f * firm\ characteristics_{i,t-1} + \theta_t + \phi_s + \epsilon_{i,t} \quad (3)$$

where the dependent variable takes on a value of one for each hedge fund (i), quarter (t) the fund gated assets and/or created a side pocket, and zero otherwise. Firm characteristics include management fee, incentive fee, log of fund size, log of fund age, and the funds trailing quarterly return. We include both time and style fixed effects to control for unobserved heterogeneity, and cluster the standard errors by hedge fund. Our results are presented in Table 2.

In Model 1 of Table 2, we find that funds with higher share illiquidity and lower trailing returns are more likely to enact a DLR. In this model, we use the full sample of hedge funds, including both database and non-database funds, as in Panel A of Table 1. As previously pointed out, the advantage of this approach is that we include all hedge funds in our sample and alleviate concerns of selection bias stemming from the use of database funds only. The downside is that outside of quarterly returns, fund style, and information on the fund's withdrawal frequency, no other fund characteristics are available. Further, because we have only quarterly frequency data over a relatively short time period, calculating rolling AR(1) and market liquidity regressions, as in Eqs. (1) and (2) respectively, is difficult.

As such, in Models 2-5 of Table 2, we focus on the sample of funds that are also in a commercial database. In Model 2, Table 2 we find that share illiquidity is positively related to

DLR, while trailing past performance is negatively related. These results are similar to our findings for the full sample. Teo (2011) finds that hedge funds may offer liquid share structures, yet own illiquid assets; thereby creating an asset-liability mismatch. As such, we might expect that share illiquidity would be negatively related to a DLR event. That is, funds with less frequent redemption periods would be less susceptible to runs on their assets and therefore less likely to gate the fund or create side pockets; we find the opposite. We find that funds with less frequent redemptions are more likely enact a DLR. Further, we find evidence that fee arrangements are positively related to a DLR. We find that both higher management and performance fees are associated with an increased likelihood of the manager exercising his discretion and temporarily suspending liquidity.

In Models 3 and 4 of Table 2, we examine the relation of the funds asset illiquidity and market illiquidity to the probability of a DLR, respectively. In Model 3, we find that funds with higher asset liquidity, as measured by the fund's serial correlation in returns, are more likely to enact a DLR. In Model 4, we find that funds with higher sensitivity to market liquidity, as measured by the fund's factor sensitivity to the Sadka (2010) liquidity factor, are more likely to enact a DLR. As before, we continue to find that both trailing fund performance is negatively related to a DLR event. This result is consistent with the fact that funds that perform poorly are more susceptible to capital outflows and therefore more susceptible to run on the bank behavior.

In Model 5 of Table 2, we jointly estimate the impact of all three forms of fund liquidity. Even after controlling for both asset and market illiquidity, we find that a fund's share liquidity is positively related to the fund's probability of enacting a DLR. Further, we continue to find evidence that fees are positively related to a DLR. Our results suggest that fund managers are cognizant of the expected illiquidity of the assets in their portfolio and that on average, funds that

are more susceptible to runs may, at least partially, structure their shares in a way that mitigates this risk. However, managers appear to not fully adjust share liquidity, given that the greater a fund's share liquidity, the more likely the fund is to enact a DLR. This result could stem from the fact that fund managers underestimate liquidity risk, or it could result from an equilibrium where managers use discretionary liquidity as a substitute for contractual share liquidity. On average, the fund manager may offer more liquid hedge fund share than their assets would otherwise justify, because they know they have the option to temporarily restrict liquidity by gating or placing assets in a side pocket if a run would occur. This equilibrium allows improved share liquidity in most states of the world, but allows the fund to limit fire sales during periods of high liquidity risk.

The finding that DLRs are more prevalent among funds charging higher fees is consistent with an agency story. All else equal, restricting redemptions artificially inflates hedge fund assets under management, accruing greater benefits to funds that charge higher fees. Also, as previously mentioned, funds can use the ability to segregate laggard assets in side pockets to realize greater performance fees on their profitable assets. Moreover, the fact that DLRs impose costs on investors suggests they could adversely affect managerial reputation in the future. Managers with a greater fee structure may be more willing to bear those long-run reputational costs in order to extract greater fees in the short-run. Ultimately, the question of whether investors were better served by having their redemption rights suspended hinges on how the funds performed afterwards; an issue we address in the next section.

### 3.2 Performance of funds with DLRs

Despite the fact that DLRs restrict liquidity on otherwise exempt investors, fund managers argue that DLRs enable them to meet investor redemptions in an orderly setting and

liquidate assets at their full value. Therefore, in the absence of such discretion manager's would argue that the fund's performance would suffer. To investigate this claim, in the following section we study the performance of the DLR funds after they restrict liquidity.

### 3.2.1 Naive approach

We begin by taking a naive approach to explore the performance of DLR funds. We calculate buy-and-hold excess returns for each DLR fund, beginning eight quarters prior to the event quarter and holding the portfolio for the eight quarters following the event. From each DLR fund quarterly return, we subtract an equal-weighted hedge fund index return and collapse the individual excess returns into an equal-weighted portfolio. We present the performance of this portfolio in Figure 3. From this figure, several interesting patterns emerge. First, two years prior to the DLR event, the performance of DLR funds was quite similar to that of the hedge fund index. From quarters (t-8 to t-4), excess returns were centered on zero. Beginning, in quarter (t-3), however, things begin to change. We find that performance clearly starts to deteriorate from quarters (t-3) until quarter (t), likely resulting in a coordinated series of redemption requests for the fund. At this point, the manager exercises his discretion and restricts the fund's liquidity through a gate or side pocket.

Though the poor performance leading up to a DLR is not surprising, what happens following the DLR is more striking. Presumably the purpose of enacting a DLR is to avoid the poor performance that accompanies redemption-induced fire-sales. However, we find that the excess returns of DLR funds continue to fall from quarter (t) to (t+8). Over the course of the 4 years centered on the DLR event, the portfolio of DLR funds underperforms the average hedge fund by 22.53%; more than half of the underperformance occurs following the event. This suggests the DLR did little to mitigate negative shocks to fund value.

### 3.2.2 Matched sample

A disadvantage of the naive approach is that we do not control for factors that simultaneously affect a fund's decision to enact a DLR and its future performance. In this section, we attempt to establish a causal link between a fund's decision to implement a DLR and its future performance by employ a matching framework that pairs each DLR fund with a similar fund that *never* implements a DLR in our sample. First, we match each DLR fund at its event date with a hedge fund in our sample, within the same style, and that has the closest past performance. By restricting the match to a hedge fund in our sample, we are attempting control for the unobservable characteristics, such as size and operational risk, which make a fund attractive to a FoF investor. We require control funds to be within the same style, which serves as a crude proxy for liquidity risk, and we match on cumulative returns from the event quarter and the quarter before, so that the control funds performed similarly to the DLR funds. We report our results in Panel A of Table 3. We report the mean quarterly return for the DLR funds and the control group, as well as the mean of cumulative returns across both groups. All returns are winsorized at the 1% and 99% levels before matching.

We find strong evidence that DLR funds underperform the control group. In each of the first three quarters following the DLR, the control portfolio outperforms the DLR portfolio by an economically meaningful margin. DLR funds continue to underperform as we move out eight quarters following the event. While the DLR funds have an average cumulative return of 4.29%, the control group has strongly rebounded with an average cumulative return of 34.56%. The resulting difference of 29.74% is significant at the 1% level.

We note that our control approach in Panel A may fail to capture other observable characteristics that are likely to influence the probability of a fund enacting a DLR. Thus, in

Panel B of Table 4, we use a propensity score matching approach to form a control group of funds. We estimate Eq. (3) and select the fund in the same style with the closest predicted probability of having a DLR that never actually implements a restriction. Under this alternative approach, we obtain similar results. DLR funds have an average cumulative underperformance of 11.43% and 27.86% in the four and eight quarters, respectively, after the DLR event quarter. In short, we find no evidence that DLRs protect investors by allowing the fund to avoid fire sales.

In addition to bearing the costs of losing access to their capital, investor interests in restricted funds significantly underperform similar funds that do not suspend redemptions. These results reflect the possibility that, on average, DLRs may indicate a source of agency conflict between the manager and investor. Rather than restricting liquidity in an effort to provide an orderly wind down of assets, managers appear to restrict liquidity in an effort to collect fees on a larger asset base while prolonging their own business continuity. In the following section, we study whether managers of DLR funds pay a reputational penalty for engaging in this behavior.

### 3.3 The effects of DLRs on fund family reputation

The results in Section 3.2 suggest that investors in DLR funds suffered abnormally low performance on their locked up capital for several quarters following the initiation of a gate or side pocket. Not only were investors unable to access their capital, they had to sit idly by as their account values dwindled as funds slowly brought their marks down to market. Coupled with the fact that DLR fund interests sell for pennies on the dollar in secondary markets, there is little evidence to support the hypothesis that DLRs are value enhancing for investors. In this section, we test whether hedge fund firms that enacted DLRs during the crisis suffered a reputational penalty for doing so. The funds that enacted these measures would likely find it difficult to raise future capital from investors, and, in fact, many such funds ended up delisting from hedge fund

databases and remain illiquid to this day. Moreover, if investors view these restrictions as evidence of agency problems at the hedge fund firm level, this could make investors wary of making investments in the family of hedge funds that enacted DLRs during the crisis. We examine the reputational penalty of DLR through two channels. First, we examine whether the flows to DLR funds and DLR fund families suffered following the crisis. Second, we investigate if DLR fund families were forced to reduce their fees or liquidity restrictions post-crisis in order to attract capital given their behavior during the crisis.

### 3.3.1 Post Crisis Flows

We expect that negative investor experience, combined with the significant negative publicity of DLRs, would cause investors to avoid investing in hedge fund firms that enacted DLRs in the past, for the fear that these funds may subsequently shut the gates in the future. We test this hypothesis by examining the flows of hedge fund families that enacted DLRs in one of their family funds during the crisis.

Our test is constructed as a regression model of quarterly hedge fund flows as a function of fund-level and family-level characteristics. Our sample consists of all hedge funds whose family had at least one fund in our sample during the 2006-2009 period. Because we are interested in the spillover effects of DLRs on reputation, our analysis of flows is restricted to the post crisis period from 2010-2011. We define capital flows as a percentage change in assets over the quarter using the following equation:

$$Flow_{i,t} = \frac{AUM_{i,t} - (1 + Return_{i,t}) * AUM_{i,t-1}}{AUM_{i,t-1}} \quad (4)$$

There is a significant literature on hedge fund and mutual fund flows suggesting fund flows respond positively to past performance and the relationship is non-linear. We follow the piecewise linear regression approach in Ding et al. (2009) and Ben-David et al. (2012) and model flows as a function of three ranges of past performance. Specifically, we compute each fund's percentile rank of performance relative to funds in its own style each quarter. Thus, each fund has a ranking between 0 and 1 ( $Frank_{i,t}$ ). We then split the rank into three ranges of performance in the following way:

$$\begin{aligned}
 Trank1_{i,t} &= \min\left(\frac{1}{3}, Frank_{i,t}\right) \\
 Trank2_{i,t} &= \min\left(\frac{1}{3}, Frank_{i,t} - Trank1_{i,t}\right) \\
 Trank3_{i,t} &= \min\left(\frac{1}{3}, Frank_{i,t} - Trank1_{i,t} - Trank2_{i,t}\right) \quad (5)
 \end{aligned}$$

In Table 4 we model flows in a pooled OLS regression framework including the three performance ranges as independent variables, as well as measures of fund and family DLR activity over the financial crisis. We also include controls for fund size and age, as well as style and time fixed effects. We cluster our standard errors at the fund level.

We begin by testing whether funds that enacted DLRs had a harder time raising capital in the post crisis period. In Model 1, our primary variable of interest is *DLR fund* which equals 1 if the hedge fund enacted a DLR during the period of 2006-2009. The results in Model 1 reveal that controlling for other factors affecting flows, quarterly flows to funds that enacted DLRs were 3.47% lower (as a proportion of assets) than other hedge funds in the post crisis period. This effect is economically significant given that the median quarterly flow to hedge funds in our sample is only -0.77% of assets per quarter. This is consistent with investors being reluctant to invest in hedge funds that locked up capital during the crisis.

If DLRs reflect agency problems at the hedge fund family, then investors may eschew hedge funds affiliated with funds that enacted DLRs in the past. In Model 2 we test for the spillover effects of DLRs on other funds in the hedge fund family by also including the dummy variable *DLR family*, which equals 1 if another fund in the hedge fund family enacted a DLR in the crisis period. Though the negative impact of DLRs on flow was stronger for funds that themselves enacted DLRs, family members of DLR funds were not unaffected. The coefficient on DLR family is -2.64% and is significant at the 1% level. This result supports an agency cost story: even funds that did not enact DLRs during the crisis found it harder to raise capital post-crisis if their fund family had a history of enacting DLRs.

In Model 3 we exclude all DLR funds themselves from the analysis and only examine the family indicator. DLR family remains negative and significant, suggesting the results are not driven by clustering of DLRs within families. In unreported results, we find these results are robust to including additional fund level controls such as fees and regular share restrictions, and are similar if we employ a Fama-Macbeth regression methodology rather than pooled OLS.

If the negative impact of DLRs on hedge fund family flows comes via a reputation channel, then we expect the effect to be greater if the family's flagship fund enacted a DLR. Because flagship funds are larger and more visible in the press, investors are more likely to be aware if they had instituted a DLR at the flagship. Further, investors may believe that agency problems at the flagship are more likely to spillover to other funds in the family as the flagship management team likely has considerable influence over the operations of other funds within the family. In Model 4 we replace DLR family with an indicator DLR flagship, which equals 1 if a fund that was the family's flagship fund during the crisis enacted a DLR. Model 4 excludes all DLR funds from the analysis, so that we only see the spillover effects onto other funds in the

family. The coefficient on DLR-Flagship is -4.61% and is significant at the 1% level. The magnitude of DLR flagship coefficient is more than 72% greater than the magnitude of DLR family in Model 3, suggesting spillover effects on flows are significantly greater if a fund family enacted DLRs at its flagship fund. In Model 5 we break out DLR family into two indicators, DLR flagship and DLR non-flagship. Though both coefficients are negative and significant, the magnitude of DLR-Flagship is more than twice that of the magnitude of DLR non-flagship. An F-test reveals the coefficients are statistically different at the 1% level.

The results in Table 4 show that hedge funds and hedge fund families that exercised their discretionary option to lock up investor capital during the crisis (especially in a flagship fund) had a harder time raising capital after the crisis. The fact that non-DLR funds affiliated with DLR funds suffered suggests investors did not view DLRs as an efficient contracting mechanism and necessary evil during times of crisis. Rather, it supports the notion that investors viewed DLRs as an ex-post hold-up mechanism, used by hedge fund managers to artificially retain capital and expropriate excess fees from their investors.

### 3.3.2 Post Crisis Changes in Contract Characteristics

Because hedge fund families that enacted DLRs during the crisis had a harder time raising capital after the crisis, a natural question to ask is how those funds responded to the reputational penalty they faced in the market for attracting investor capital. We hypothesize that in a competitive market for investor capital, fund families whose reputation was sullied from DLRs would be forced to reduce the fees and restrictions they impose on investors in order to stay competitive and continue to raise capital. In this section, we test this hypothesis using a panel data set that contains snapshots of hedge fund contract characteristics both before and after the crisis period. Specifically we test whether fund families that enacted DLRs were more likely

to reduce their fees or share restrictions in the post crisis period from the crisis/pre-crisis period levels.

We were able to obtain several monthly snapshots of contract characteristics from the BarclayHedge and Tass databases ranging from March 2006 through June 2012. We merge this panel database with the same sample used in the flow analysis in Section 3.3.1 and keep all funds that have at least one snapshot prior to September 2008 and one new snapshot after December 2009. For each fund we create an indicator variable measuring whether the fund had a decrease in one of the following characteristics: Incentive Fee, Management Fee, Lockup Days, Redemption Days, and Redemption Notice Days. Table 5 reports the results of logistic regressions modeling the propensity to reduce fees or share restrictions as a function DLR activity at the family level and other fund and family control variables. The regression sample is a cross-section with one observation per fund, and the dependent variable equals one if the post-crisis level of the contract variable was reduced from its pre-crisis level. In each regression, we control for fund and family size, as well as the pre-crisis level of the contract characteristic, as Agarwal and Ray (2012) show that changes in contract characteristics tend to be mean reverting. We also control for the flows and returns realized from the pre and post crisis snapshots, as fund performance and capital flows could determine changes in contract characteristics as well.

The results in Table 5 collectively illustrate that funds from DLR families were more likely to reduce investor fees and restrictions in the post-crisis period. Funds from families that raised gates or created side pockets during the crisis were significantly more likely to reduce their management and incentive fees after the crisis. This is consistent with the negative reputational story of DLRs. Interestingly, we also find that funds from DLR families were more likely to reduce their redemption period in the post crisis period. All else equal, higher share

restrictions impose a cost on investors who value liquidity. Thus, funds from DLR families may have been forced to cut their redemption period to compete for capital. Also, given that DLR funds were more likely to have higher ex-ante share restrictions (see results in Section 3.1) perhaps they cut redemption periods in an attempt to ameliorate concerns that investors would have a hard time accessing their capital in the future. However, we find no significant relation between DLR activity and the propensity to cut lockups or redemption notice periods. Overall, the results in Table 5 are consistent with DLRs creating a negative reputational spillover across the hedge fund family, and that funds associated with DLRs may have had to grant more favorable contractual terms in order to win back investor favor and compete for capital in the post-crisis period.

#### **4. Conclusion**

Facing substantial redemption requests during the financial crisis, many hedge fund managers used their discretionary authority to enact gates or side pockets that served to prevent investor withdrawals from illiquid hedge fund portfolios. These discretionary liquidity restrictions (DLRs) were imposed ex-post at the discretion of fund managers and were in addition to ordinary withdrawal restrictions (e.g. lockups and redemption notice periods). Though DLRs can afford the manager greater flexibility to invest in illiquid assets and avoid value destroying fire-sales, they impose a real cost on investors by removing their option to freely access their capital. Additionally, the discretionary nature of DLRs could lead to abuses by hedge fund managers that simply want to hold on to investor assets when times are tough.

This paper is the first to empirically document and examine the widespread use of DLRs using a hand-collected database of hedge fund investor interests over the period 2006-2011. We find that, in general, the circumstances surrounding the creation of DLRs suggest a potentially

efficient rationale for restricting investor liquidity. However, the continued poor performance of these funds indicates that investors did not benefit from having their accounts locked up at the manager's discretion. Furthermore, DLRs appear to have cast a shadow in the eyes of investors on hedge fund families that chose to restrict liquidity, hindering their ability to raise capital and leading them to reduce fees in the wake of the financial crisis.

The use and potential abuse of side pockets and gates has emerged from the financial crisis as a contentious issue among the hedge fund investor community. Funding risk creates constraints for hedge fund managers that must rely on equity capital to maintain illiquid investments. By altering the fund's ordinary redemption mechanisms, DLRs effectively shift the constraints associated with illiquid investments from the hedge fund manager to the investor. If investors are forced to bear the costs of restricted liquidity, presumably they should realize the benefits of enhanced performance. Our results cast doubt on this prospect, and suggest investors should be wary about the degree of discretion they afford managers to "raise the gates" in the future.

## References

- Agarwal, V., Ray, S., 2012, "Determinants and Implications of Fee Changes in the Hedge Fund Industry," Georgia State University and University of Florida Working Paper.
- Aiken, A., Clifford, C., and Ellis, J., 2012, "Out of the Dark: Hedge Fund Reporting Biases and Commercial Databases," *Review of Financial Studies* forthcoming.
- Ang, A., Bollen, N.P.B., 2010, "Locked Up by a Lockup: Valuing Liquidity as a Real Option," *Financial Management* 39, 1069-1096.
- Aragon, G., 2007, "Share Restrictions and Asset Pricing: Evidence from the Hedge Fund Industry," *Journal of Financial Economics* 83, 33-58.
- Ben-David, I., Franzoni, F., Moussawi, R., 2012, "Hedge Fund Stock Trading in the Financial Crisis of 2007-2009," *Review of Financial Studies* 25, 1-54.
- Bollen, N.P.B., Pool, V.K., 2012, "Suspicious Patterns in Hedge Fund Returns and the Risk of Fraud," *Review of Financial Studies* forthcoming.
- Brunnermeier, M.K., Pedersen, L.H., 2009, "Market Liquidity and Funding Liquidity," *Review of Financial Studies* 22, 2201-2238.
- Diamond, D.W., Dybvig, P.H., 1983, "Bank Runs, Deposit Insurance, and Liquidity," *Journal of Political Economy* 91, 401-419.
- Diamond, D.W., Rajan, R., 2001, "Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking," *Journal of Political Economy* 109, 287-327.
- Ding, B., Getmansky, M., Liang, B., Wermers, R., 2009, "Share Restrictions and Investor Flows in the Hedge Fund Industry," SUNY at Albany, University of Massachusetts at Amherst, and University of Maryland Working Paper.
- Fama, Eugene F. and Michael C. Jensen, 1983, Separation of ownership and control, 26, 301-325.
- Financial Times, 2008a. Side-pocket solution to illiquidity, January 21st.
- Financial Times, 2008b. Funds slash fees to pull in cash, December 1st.
- Getmansky, M., Lo, A., Makarov, I., 2004, "An Econometric Model of Serial Correlation and Illiquidity of Hedge Fund Returns," *Journal of Financial Economics* 74, 529-610.

Hong, Xin, 2012, “The Dynamics of Hedge Fund Share Restrictions,” University of Kentucky Working paper

Joenvaara, J., Kosowski, R., Tolonen, P., 2012, “Revisiting 'Stylized Facts' About Hedge Funds,” University of Oulu, Imperial College Business School, and University of Oxford Working paper.

Nanda, V., Wang, Z., Zheng, L., 2004, “Family Values and the Star Phenomenon,” *Review of Financial Studies* 17, 667–698.

Pastor, L., Stambaugh, R.F., 2003, “Liquidity Risk and Expected Stock Returns,” *Journal of Political Economy* 111, 642-85.

Sadka R., 2010, “Liquidity Risk and the Cross-Section of Hedge-Fund Returns,” *Journal of Financial Economics* 98, 54-71.

Shleifer, A., Vishny, R.W., 1997, “The Limits of Arbitrage.” *Journal of Finance* 52, 35–55.

Teo, M., 2011, “The Liquidity Risk of Liquid Hedge Funds,” *Journal of Financial Economics* 100, 24-44

Wall Street Journal, 2008. Hedge funds make it hard to say goodbye, April 10.

Warner, J.B., Wu, J.S., 2011, “Why Do Mutual Fund Advisory Contracts Change? Performance, Growth and Spillover Effects,” *Journal of Finance* 66, 271-306.

**Table 1**  
**Summary statistics**

This table presents the summary statistics for the hedge funds in our sample. Our time period of study is 2006-2011. In Panel A, we examine the full sample of hedge funds in our paper. In Panel B, we study only those funds that merge to the union of 5 commercial databases (Lipper TASS, HFR, BarclayHedge, Morningstar, and EurekaHedge). The unit of observation is an average hedge fund in our sample. We define a fund as enacting discretionary liquidity restrictions (*DLR fund*) equal to one if the fund ever used a gate or a sidepocket on its investors during our sample period, and zero otherwise. The *Duration of the illiquidity event* is the number of quarters that the fund maintained its discretionary illiquidity, conditional on DLR fund equal to one. *Redeem frequency* is the number of days between redemption periods. *Return* is the raw, quarterly return for the hedge fund. *Age* is the number of years the hedge fund was present in a database. *Management fee* and *Incentive fee* are the fees the fund charges. *Leverage* is an indicator variable as to whether the fund uses leverage. *Lockup* and *Notice period* are the length of time the fund restricts capital withdrawals and notice time the fund requires prior to a withdrawal of capital, respectively.

*Panel A: Full Sample*

Variable	N	Mean	Median	10%	90%	Std. Dev.
DLR fund (0 1)	1411	26.08%	0.00%	0.00%	100.00%	43.92%
Duration of illiquidity event (quarters)	368	8.04	7.00	1.00	15.00	5.54
Holding period (quarters)	1411	11.13	10.00	2.00	23.00	7.45
Holding size (% of AUM)	1411	3.26%	2.84%	0.60%	5.97%	3.44%
Holding size (\$MM)	1411	11.90	5.56	1.08	26.80	18.80
Redeem frequency (days)	1056	125.16	90.00	30.00	360.00	116.40
Return (quarterly)	1288	0.08%	0.87%	-5.36%	4.43%	6.33%

*Panel B: Database Sample*

Variable	N	Mean	Median	10%	90%	Std. Dev.
DLR fund (0 1)	739	24.36%	0.00%	0.00%	100.00%	42.95%
Duration of illiquidity event (quarters)	180	7.94	7.00	1.00	15.00	5.70
AUM (\$MM)	629	932.0	422.0	65.8	2,350.0	1,360.0
Quarterly % flow	558	4.34%	1.63%	-7.55%	18.13%	14.34%
Age (years)	739	6.9	5.6	2.0	14.1	4.8
Management fee (%)	732	1.55	1.50	1.00	2.00	0.51
Incentive fee (%)	737	19.58	20.00	20.00	20.00	3.23
Leverage (0 1)	691	64.11%	100.00%	0.00%	100.00%	48.00%
Lockup (days)	692	179.3	0.0	0.0	365.0	246.0
Notice period (days)	717	53.9	45.0	20.0	90.0	33.2
Redeem frequency (days)	714	98.8	90.0	30.0	180.0	99.3
Return (quarterly)	673	0.27%	0.96%	-4.79%	4.63%	6.17%

**Table 2**  
**Determinants of discretionary liquidity restrictions**

We model the determinants of a hedge fund gating assets or placing assets in sidepockets based on the liquidity of the fund, as well as other fund, style, and time characteristics. In Model 1, we include database and non-database hedge funds, while in Models 2-5 we focus only on database funds. We define *Share illiquidity* as the fund's withdrawal frequency period, *Asset illiquidity* as the fund's serial correlation over a rolling 36-month period (Eq. 1), and *Market illiquidity* as the fund's sensitivity to the Sadka (2010) liquidity factor over the previous 36 months (Eq. 2). All other variables are defined in Table 1. We include both style and time fixed effects to account for unobservable heterogeneity and cluster our standard errors at the fund level. We report p-values in brackets. \*\*\*, \*\*, \* represents statistical significance at the 1%, 5%, and 10% level respectively.

	1	2	3	4	5
	Full sample	Database sample	Database sample	Database sample	Database sample
Share illiquidity <sub>(t-1)</sub>	1.4505*** [0.003]	2.1040*** [0.004]			1.6901** [0.040]
Asset illiquidity <sub>(t-1)</sub>			1.9904*** [0.001]		1.3516** [0.018]
Market illiquidity <sub>(t-1)</sub>				0.3518*** [0.003]	0.2650** [0.031]
Management fee		0.3823** [0.014]	0.3607** [0.039]	0.2762 [0.107]	0.4079** [0.017]
Incentive fee		0.0694** [0.017]	0.0686*** [0.005]	0.0865*** [0.002]	0.0772*** [0.004]
Log size <sub>(t-1)</sub>		-0.1445 [0.103]	-0.1173 [0.207]	-0.0843 [0.351]	-0.1377 [0.141]
Log age <sub>(t-1)</sub>		0.2228 [0.355]	0.3004 [0.331]	0.0613 [0.853]	0.0939 [0.776]
Return <sub>(t-1)</sub>	-3.8380*** [0.000]	-3.1561*** [0.000]	-2.9401*** [0.000]	-3.3314*** [0.000]	-3.2290*** [0.000]
Time FE	Yes	Yes	Yes	Yes	Yes
Style FE	Yes	Yes	Yes	Yes	Yes
Observations	6,416	5,531	4,681	4,279	4,050
pseudo r-squared	0.277	0.308	0.302	0.315	0.345

**Table 3**  
**Hedge fund returns around discretionary liquidity restrictions**

This table documents quarterly hedge fund returns around a discretionary liquidity restriction (DLR) event. A DLR is defined as any hedge fund that restricted liquidity through a gate or side-pocket. We match each event fund with a control fund held by a FoF in our sample that never reports an illiquid quarter. In Panel A, the control fund is in the same style as the event fund and has the nearest two-quarter lagged return at the time of the event (the event quarter and one quarter prior). In Panel B, we first estimate a logit model across our entire sample (see Eq. 3) to predict the probability of a DLR event for every fund/qr. observation. We then match each DLR event fund at the event date with a control fund in the same style category that has the closest predicted probability and never has a DLR event. We calculate both the mean return in each period for each group, as well as the mean of cumulative returns for each group. \*\*\*, \*\*, \* represents statistical significance at the 1%, 5%, and 10% level respectively.

*Panel A: Control funds formed using prior returns and style*

Period	DLR Event Funds		Control Funds		Difference in Mean Returns		Difference in Mean Cumulative Returns	
	Mean	Cumulative	Mean	Cumulative				
-2	-1.12%	-	0.25%	-	-1.37%		-	
-1	-4.91%	-	-4.86%	-	-0.05%		-	
Event Quarter	-4.13%	-	-3.64%	-	-0.49%		-	
+1	-1.69%	-1.69%	0.84%	0.84%	-2.54%	**	-2.54%	**
+2	1.01%	-0.32%	3.76%	5.67%	-2.75%	**	-5.99%	***
+3	-0.19%	0.47%	4.27%	10.99%	-4.46%	***	-10.52%	***
+4	1.80%	4.29%	2.30%	15.64%	-0.50%		-11.35%	***
+5	0.57%	5.67%	1.22%	17.82%	-0.64%		-12.15%	***
+6	-0.63%	4.28%	0.34%	18.93%	-0.97%		-14.65%	***
+7	0.16%	5.04%	3.37%	28.63%	-3.21%	***	-23.59%	***
+8	0.03%	4.82%	2.30%	34.56%	-2.27%	*	-29.74%	***

*Panel B: Control funds formed using propensity score match*

Period	DLR Event Funds		Control Funds		Difference in Mean Returns		Difference in Mean Cumulative Returns	
	Mean	Cumulative	Mean	Cumulative				
-2	-0.94%	-	-0.16%	-	-0.78%		-	
-1	-4.66%	-	-3.33%	-	-1.33%		-	
Event Quarter	-4.49%	-	-4.57%	-	0.07%		-	
+1	-2.13%	-2.13%	0.47%	0.47%	-2.59%	**	-2.59%	**
+2	0.97%	-0.97%	3.55%	4.78%	-2.58%	**	-5.74%	***
+3	0.13%	0.04%	4.44%	9.80%	-4.30%	***	-9.76%	***
+4	2.03%	3.36%	3.40%	14.78%	-1.37%		-11.43%	***
+5	0.39%	4.58%	2.90%	18.55%	-2.51%	**	-13.97%	***
+6	-1.21%	2.36%	-0.32%	18.54%	-0.89%		-16.18%	***
+7	0.05%	2.59%	2.26%	22.48%	-2.21%	*	-19.90%	***
+8	-0.41%	0.87%	2.78%	28.73%	-3.19%	**	-27.86%	***

**Table 4**  
**Post crisis flows and reputation**

This table reports results from fund-level OLS regressions of quarterly asset flows for the post-crisis period of 2010-2011. The sample contains all funds from families that were in our crisis period sample from 2007-2009 and subsequently were alive during the post crisis period. The dependent variable is quarterly asset flows scaled by assets under management. *DLR fund* is a dummy variable equal to 1 if the fund enacted a DLR during the crisis period. *DLR family* is a dummy equal to 1 if another fund in the hedge fund family enacted a DLR during the crisis period. *DLR flagship* equals 1 if a family fund enacted a DLR and was ever the largest fund in the family prior to the crisis. *DLR non-flagship* equals 1 if a family fund enacted a DLR and was not a flagship fund. *Trank1* is a variable that contains the ranking of the fund relative to a benchmark group (ranking between 0 and 1) if the ranking is in the bottom tercile, and zero otherwise. *Trank2* is a variable that contains the ranking of the fund relative to a benchmark group (ranking between 0 and 1) if the ranking is in the middle tercile, and zero otherwise. *Trank3* is a variable that contains the ranking of the fund relative to a benchmark group (ranking between 0 and 1) if the ranking is in the top tercile, and zero otherwise. All funds are ranked relative to their style benchmarks. All other variables are defined in Table 1. We include both style and time fixed effects to account for unobservable heterogeneity and cluster our standard errors at the fund level. We report p-values in brackets. \*\*\*, \*\*, \* represents statistical significance at the 1%, 5%, and 10% level respectively.

	Include DLR funds			Exclude DLR funds	
	1	2	3	4	5
DLR fund	-0.0347** [0.012]	-0.0412*** [0.003]			
DLR family		-0.0264*** [0.000]	-0.0268*** [0.000]		
DLR flagship				-0.0461*** [0.002]	-0.0527*** [0.000]
DLR non-flagship					-0.0239*** [0.002]
Trank1	0.1626*** [0.000]	0.1661*** [0.000]	0.1650*** [0.000]	0.1626*** [0.000]	0.1654*** [0.000]
Trank2	0.0794*** [0.001]	0.0772*** [0.001]	0.0764*** [0.002]	0.0797*** [0.001]	0.0773*** [0.001]
Trank3	-0.0025 [0.935]	-0.0052 [0.868]	0.0066 [0.836]	0.0093 [0.772]	0.0069 [0.829]
Log size	0.0036** [0.023]	0.0027* [0.080]	0.0025 [0.127]	0.0032* [0.051]	0.0025 [0.131]
Log age	-0.0365*** [0.000]	-0.0379*** [0.000]	-0.0400*** [0.000]	-0.0391*** [0.000]	-0.0401*** [0.000]
Time FE	Yes	Yes	Yes	Yes	Yes
Style FE	Yes	Yes	Yes	Yes	Yes
Observations	7,458	7,458	7,118	7,118	7,118
Adj. R-squared	0.0402	0.0429	0.0443	0.0426	0.0446

**Table 5**  
**Post crisis reductions in fees and share restrictions**

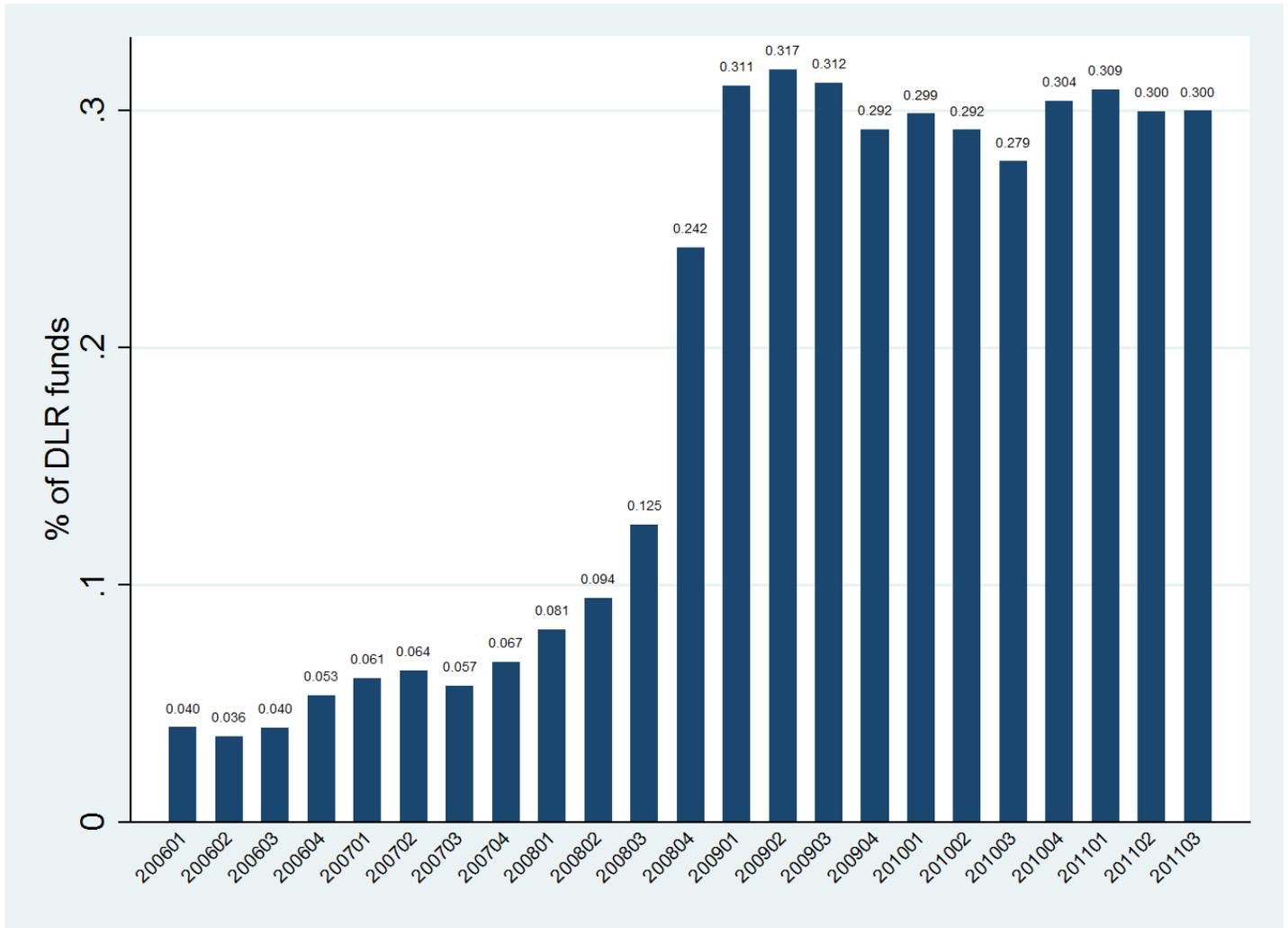
This table reports results from fund-level logit regressions of reductions in fund contract characteristics (Incentive Fee, Management Fee, Lockup Days, Redemption Days, and Redemption Notice Days). The sample consists of funds that are active and report contract characteristics to either the Lipper Tass or BarclayHedge databases both during and after the crisis period of 2007-2009. The regression sample is a cross section with one observation per fund, and the dependent variable equals one if the fund reduced a contract value in the post-crisis period, and zero otherwise. *DLR family* is a dummy equal to 1 if another fund in the hedge fund family enacted a DLR during the crisis period. *Initial level* equals the pre-crisis level of the contract characteristic. All other variables are defined in Table 1. We cluster our standard errors at the fund level. We report p-values in brackets. \*\*\*, \*\*, \* represents statistical significance at the 1%, 5%, and 10% level respectively.

	1	2	3	4	5
	Incentive fee	Management fee	Lockup	Redeem Freq.	Redeem Notice
DLR family	1.5369** [0.024]	1.2845*** [0.002]	0.4203 [0.431]	1.1185*** [0.008]	-0.4170 [0.318]
Initial level	0.6351*** [0.000]	1.3766*** [0.001]	0.0055*** [0.000]	0.0056*** [0.000]	0.0167*** [0.000]
Flow	0.0165 [0.150]	0.0044 [0.626]	0.0037 [0.660]	0.0082 [0.261]	0.0006 [0.913]
Return	0.0044 [0.710]	0.0033 [0.670]	-0.0107 [0.192]	0.0002 [0.974]	-0.0071 [0.189]
Log size	-0.0344 [0.852]	0.0718 [0.724]	-0.1258 [0.459]	0.0816 [0.580]	-0.1403 [0.283]
Log family size	0.4690* [0.090]	-0.0727 [0.654]	-0.1578 [0.329]	-0.2713** [0.036]	-0.0100 [0.936]
Observations	519	519	514	492	519
Adj. R-squared	0.351	0.251	0.278	0.0999	0.0702

**Figure 1**

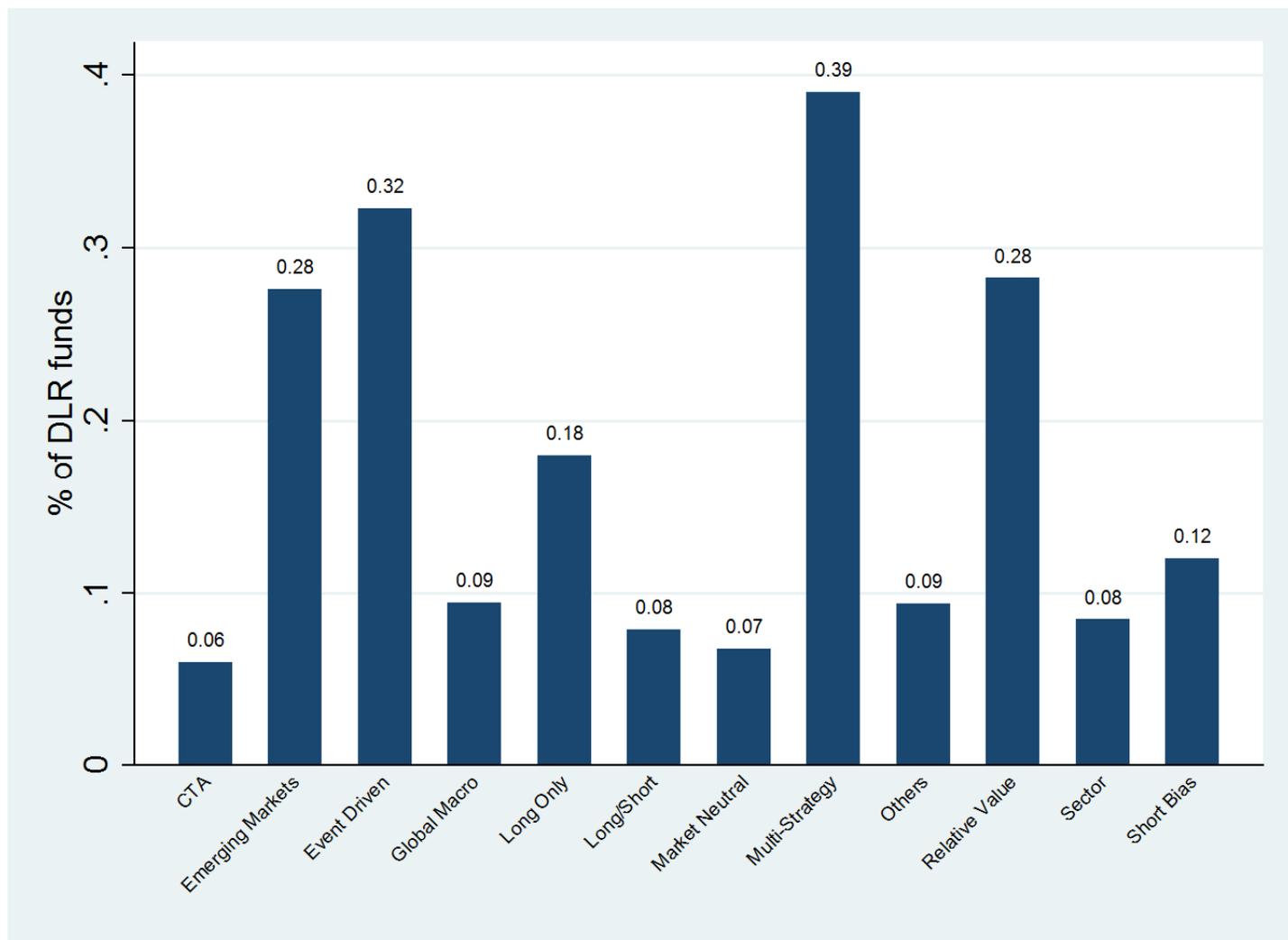
**Percentage of funds with discretionary liquidity restrictions (DLR)**

Figure 1 shows the percentage of funds in our sample in each period that have instituted a discretionary liquidity restriction (DLR). A DLR fund is defined as any hedge fund that restricted liquidity through a gate or side-pocket.



**Figure 2**  
**Percentage of discretionary liquidity restriction funds by style**

Figure 2 presents the percentage of funds by style that instituted a discretionary liquidity restriction DLR over our sample period of 2006-2011.



**Figure 3**  
**Event-time performance of discretionary liquidity restriction (DLR) funds**

This figure presents the buy and hold excess returns for DLR funds in event time, where quarter 0 is the DLR event quarter. Quarterly excess returns are calculated by subtracting the equal-weighted quarterly hedge fund index return from an equally-weighted portfolio of funds that subsequently had a DLR event.

