

Skin in the Game versus Skimming the Game: Governance, Share Restrictions, and Insider Flows*

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Abstract

Hedge-fund managers justify share restrictions as a means of protecting the common interest of the shareholders. However, this paper demonstrates that such restrictions can adversely induce information asymmetry between managers and their clients about future fund flows. Focusing on share-restricted funds, this paper demonstrates that funds with recent outflows underperform funds with recent inflows by about 5.6% annually over 1998-2008. No such return spread is observed for funds with low-share restriction. The effect is mainly driven by the underperformance of funds with recent outflows. As managers may also act as investors in their own funds, the information asymmetry potentially allows them to trade in advance of their clients to avoid such losses. Consistent with this hypothesis, the flow return spread is more pronounced in funds managing insider wealth, as well as in funds with low levels of corporate governance. Even a conservative estimate of the potential profits from engaging in such activity amount to about \$215 million per year collectively over the sample period. These results therefore highlight the significance of the recent SEC allegations of flow-front-running activity by hedge-fund insiders.

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Introduction

In recent years, several case filings of the Securities and Exchange Commission (SEC) have highlighted the significance of inside information about the investor flow of hedge funds. These cases mainly present evidence that managers redeem their own capital from their funds in anticipation of future losses or future redemption requests, without alerting other investors.¹ In some cases, managers exercise preferential discretion, allowing some investors to redeem funds prior to other investors.² The frequency of this flow front-running phenomenon is yet unclear, as is its economic magnitude, as measured by the potential losses for flow-uninformed investors. In addition, there is the possibility of a similar effect for fund inflow, that is, allowing some investors to enter a fund prior to other investors.³

For example, on February 4, 2010 State Street Bank and Trust, a manager of the Limited Duration Bond Fund, agreed to pay over \$550 million to settle a complaint brought by the SEC. According to the complaint, during the collapse of the subprime market in the summer of 2008, State Street misled external investors by failing to disclose the concentration the Fund had in subprime investments. At the same time, certain insiders, including the internal advisory groups and State Street Corporation's pension plan learned that State Street was going to sell a significant amount of the Fund's distressed assets to meet significant anticipated redemptions. According to the complaint, "State Street's internal advisory groups subsequently decided to redeem or recommend redemption from the Fund and the related funds for their clients. State Street Corporation's pension plan was one of those clients. State Street sold the Fund's most liquid holdings and used the cash it received from these sales to meet the redemption demands of these better informed investors, leaving the Fund with largely illiquid holdings." Before these sales, insiders controlled approximately 20 percent of Fund's shares. By early August 2007, virtually all these shares were redeemed. This case lays out the mechanism by which inside-information about anticipated flow

¹Examples of such cases are SEC vs. a senior vice president at Evergreen Investment Management Company (Civil Action No. 10-10073) and SEC vs. two hedge-fund managers at Bear Stearns (Civil Action No. 08-2457).

²An example of such a case is SEC vs. State Street Bank and Trust (Civil Action No. 10172). In addition, the Wall Street Journal reported on November 13, 2010, that the SEC is investigating whether Harbinger Capital Partners gave illegal preferential treatment to its founder and to some clients.

³A recent example in the spirit of front-running investor inflow, is the one reported by Wall Street Journal on March 31, 2011. The article reported that a senior executive at Berkshire Hathaway had bought shares of a firm that was shortly after acquired by Berkshire Hathaway. The case is still under review by the SEC, however, an internal review by Berkshire's audit committee released end of April 2011 concluded that the executive violated insider-trading rules.

is used by flow-informed investors to redeem their shares prior to less informed outsider-investors. The SEC has recently filed several similar cases which indicate that the cases of front-running fund flow by flow-informed investors may not be isolated. This paper outlines the mechanism by which a wealth can be transferred from flow-uninformed to flow-informed investors, and highlights the type of funds and circumstances for which such a phenomenon might occur.

One key input to this discussion is the institutionalization of share restrictions in the hedge-fund industry. These restrictions, such as lockup periods or redemption-notice periods, serve the interests of both fund managers and their investors. Given the compensation structure applied in this industry, these restrictions satisfy managers' incentive to keep assets in the funds for as long as possible. In addition, these restrictions allow fund managers to slowly acquire or sell positions in illiquid assets, while reducing the impact of price pressures induced by their trades (see Aragon (2007)). This is especially important for fund investors when other investors wish to redeem their shares quickly; the share restrictions allow managers to slowly unwind positions instead of engaging in fire sales, thereby protecting the value of the assets for the remaining investors. Therefore, the practice of share restrictions seems like a reasonable equilibrium outcome.

On the other hand, share restrictions can also adversely affect outside investors by inducing information asymmetry between managers and their clients about future fund flows. For example, upon a decision to redeem shares, an investor would submit a redemption request to the fund manager. The manager then has pre-specified period of time (the redemption-notice period) to return the capital to the investor. The implication of this arrangement from an econometric perspective is that when the flow is observed in the dataset, and is also then observed by the remaining investors, it has already been known to the fund manager. It follows that although the stated goal of instituting share restrictions may be to allow the managers sufficient time to search for liquidity, these restrictions also induce information asymmetry between fund managers and their clients.

In and of itself, the information asymmetry between managers and investors about future flow is not problematic, unless managers also act as investors in their own funds (or they release the information to other privileged investors). In fact, it is common practice for managers to invest in their own funds, and they are even encouraged to do so by investors as means of aligning incentives. Yet, if fund flow predicts fund performance, the information asymmetry induced by share restriction would potentially allow fund managers to trade in advance of their clients to capture future gains or avoid future losses. Even if managers do not act, conveying flow information to some clients

in advance of others can potentially create a similar wealth transfer between flow-informed and flow-uninformed investors.

We begin the analysis by examining the smart-money effect in the universe of hedge funds. This effect, which has been extensively documented in the mutual-fund literature (see, e.g., Gruber (1996) and Zheng (1999)), alludes to the fact that funds with recent inflows typically outperform funds with recent outflows. Focusing on share-restricted hedge funds, this paper demonstrates that funds with recent inflows outperform funds with recent outflows by about 5.6% annually over 1999–2008, while no such return spread is observed for funds with low-share restriction. Separating inflows and outflows, we find that both predict one-month-ahead performance relative to the hedge-fund index, but long-run performance reveals that inflows induce a transitory effect on performance while the outflow effect is mostly permanent. We also find that the flow return spread is mostly apparent in share-restricted funds that invest in illiquid securities, as proxied by the measure of Getmansky, Lo, and Makarov (2004). To reduce the impact of incubation bias, we discard the first three years of reported performance for each fund throughout the analyses in the paper.

Share restrictions sever the ability to profit from inside information about fund flow. Managers of such funds have access to information about investor flow prior to the remaining investors, and may submit their own subscription or redemption requests upon learning this information, or share it with some, but not all, investors. Consistently, we find that the flow return spread is more pronounced for funds in which manager wealth is invested. Furthermore, we devise a measure of fund governance, and show that the flow return spread is more pronounced in funds with low levels of investor protection. Although the paper cannot provide direct evidence of managers acting on inside information, it points to some situations for which insider trading may occur. Furthermore, we conservatively estimate that the potential profits from engaging in such activity amount to about \$215 million per year over the sample period. These results therefore provide a quantification for the recent SEC allegations of flow-front-running activity by hedge-fund insiders.

This paper is related to several recent strands of literature. The first is the literature on fund flows. Ding, Getmansky, Liang, and Wermers (2009) show that the flow-chasing phenomenon in mutual funds (e.g., Ippolito (1992), Chevalier and Ellison (1997), and Sirri and Tufano (1998)) is also strongly apparent in hedge funds, but only among those with low share restriction. Teo (2010) further documents that such funds may also be significantly exposed to liquidity risk, highlighting the imbalance between the liquidity a fund offers to its investors and the liquidity of its positions.

In contrast to these studies, our results mostly pertain to restricted funds, showing that the smart-money effect is significantly apparent in these funds, but not in the unrestricted funds. We also study the liquidity risk exposure of restricted outflow funds, and find them positively exposed to liquidity risk, suggesting that the flow-front running opportunities are profitable primarily during illiquid periods. Finally, in contrast to Frazzini and Lamont (2008), who find a long-run dumb-money effect in mutual funds, we show that the outflows from restricted hedge funds impose a permanent long-run effect on performance. This permanent effect can arise if a fund's portfolio is different pre- and post-flow. For example, a disproportionate sale of assets by a fund will translate into a permanent effect on fund value because the price reversal following the initial price pressure may be experienced by assets that are no longer held by the fund. Leverage can also induce permanent effects: if a fund is required to de-leverage as part of its response to outflows, the fund will not experience a full return reversal. Since hedge funds have the ability to undertake more flexible investment decisions than mutual funds, the effects of fund flow on investor share value seem more important in hedge funds than in mutual funds.

The second related literature concerns corporate governance. La Porta, López-de-Silanes, Shleifer, and Vishny (2002) show that firms in countries with better investor protection have higher valuations. Gompers, Ishii, and Metrick (2003) propose a corporate governance index per firm and show that stock returns of high-corporate-governance firms are higher than those with low corporate governance. In this paper, we develop a measure of governance for hedge funds and similarly show that high-governance hedge funds outperform low-governance funds. Furthermore, we find that the flow return spread is higher among low governance funds, suggesting that funds that offer their investors lower protection are also those for which the potential front-running is more profitable. Our measure of governance is also related to recent literature about fund operational risk. For example, relying on SEC filings, Brown, Goetzmann, Liang, and Schwartz (2008) conclude that operational risk does not significantly affect the flow-chasing phenomenon, suggesting that investors either lack this information or consider it important. Moreover, Brown, Goetzmann, Liang, and Schwarz (2009) show that operational risk positively predicts fund failure. Similar to these studies, this paper highlights yet another characteristic of hedge funds, that is, governance, which is not related to funds' underlying investment strategies but is nevertheless important for understanding their performance.

This paper is also related to a growing literature on the adverse actions of hedge-fund managers.

For example, Bollen and Pool (2009) document return discontinuity around zero and interpret it as intentional avoidance to report losses (see also Bollen and Pool (2008)). Cassar and Gerakos (2011) find that funds using less verifiable pricing sources are more likely to have returns consistent with intentional smoothing. This paper highlights yet another potential adverse outcome in the management of hedge funds, that is the practice of applying share restrictions creates information asymmetry between managers and their clients. Similar to the aforementioned studies, we do not directly observe the actions of managers, and thus base our arguments on consistent empirical findings.

The results of this study have several implications that may be of interest to policy makers. First, our results suggest a potential wealth transfer from flow-uninformed clients to flow-informed managers. Even though hedge-fund managers typically impose liquidity constraints (share restrictions) on their investors to limit the potential impact of large and perhaps unexpected outflow on their funds' asset prices, such constraints also induce information asymmetry between fund managers and their clients about future investor flow. Therefore, similar to the prevention of insider trading in publicly traded corporate securities, managers should disclose their intention to subscribe to or redeem shares from the funds they manage to avoid the appearance of front-running their less-flow-informed investors.

Second, the issues discussed in this paper touch upon the question of what constitutes material inside information. Most of the insider-trading cases in fund management focus on trading based on information pertaining to the underlying investments of the fund. Yet, information about the liquidity needs of some investors, for example, a redemption request as part of a rebalancing strategy with no relation to the fundamental value of the assets, can prove valuable if it affects prices. In an initial decision of a recent case, an SEC Administrative Law Judge held that information about a fund itself may constitute material nonpublic information for insider trading and breach of fiduciary duty purposes.⁴ The case involves a fund manager that reveals inside information about his fund's flow to his relatives who consequently redeem their shares in the fund before the information is known to other shareholders. This initial decision suggests that, not only investment-level, but also fund-level information, such as fund flow, could be considered material nonpublic information.⁵

Another consideration is that in light of the recent financial crisis, managers are further pres-

⁴See Administrative proceeding File #3-13887; United States of America before the Securities and Exchange Commission; Washington, D.C. 20549; in the matter of David W. Baldt: Initial Decision: April 21, 2011.

⁵For more on this topic see The Hedge Fund Law Report, Vol. 4, No. 14 (April 29, 2011).

sured to invest their own wealth in their funds, to better align manager-client incentives. However, as stressed throughout the paper, the presence of share restrictions may provide an informational advantage to the managers. The implication is that funds with a significant amount of manager wealth should be required to reduce their share restrictions. Finally, for funds that invest primarily in illiquid securities, instead of reducing share restrictions altogether, thereby exposing all investors to the risk of fire sales, the regulator may impose higher share restrictions on insiders compared to outsiders. Higher share restrictions on insiders would reverse the adverse consequences, though it would not resolve the informational advantage of investors who are tipped off by managers.

The rest of this paper is organized as follows. Section 1 describes the data used for this study and the measure of fund flow. Section 2 introduces the main results about flow-based return spreads for restricted funds, while Section 3 discusses several additional tests. Section 4 concludes.

1 Data and Measures

This study obtains information about hedge funds from the Lipper/TASS dataset. The data include information about monthly hedge-fund returns, assets under management (AUM), as well as information about share restriction such as lockup and redemption notice periods. The data include both "live" and "dead" funds. Table 1 describes some summary statistics including the number of funds in the dataset per year, as well as return and flow statistics. The data includes 2,044 hedge funds at the beginning of the sample (1998), increases to over 5,600 in 2006 before declining to 4,709 by 2008. Overall, the sample period includes 7,280 different funds.

We estimate investment flow by applying the conventional flow calculation (see, e.g., Sirri and Tufano (1998), Fung, Hsieh, Naik, and Ramadorai (2008)). Specifically, we use the following formula to estimate fund flow

$$F_{i,t} = \frac{AUM_{i,t} - AUM_{i,t-1} \times (1 + R_{i,t})}{AUM_{i,t-1}}, \quad (1)$$

where $AUM_{i,t}$ represents the value of the assets under management of fund i at month t and $R_{i,t}$ is the fund's return. Overall, our sample includes 392,300 monthly flow observations among which 356,229 are considered reliable (91% of flow observations).

The data include a couple of variables that are used to proxy for the tightness of fund share restrictions. These variables are the redemption notice period, that is the number of days prior

to withdrawing capital from a fund that an investor has to notify the hedge-fund manager, and the lockup period, that is the number of days following an investment for which investors are not allowed to withdraw their capital. Both variables are used as binary variables, valued at zero if there is no restriction (no notice period required for redemptions or no lockup period) and one otherwise. The main results of the paper are obtained using the redemption notice period, while lockups are used later for robustness.

2 Flow-Based Portfolios

In this section, we demonstrate the role of flow in understanding future fund performance using hedge funds grouped into portfolios. We report both portfolio returns excess of the industry average and risk-adjusted returns (alphas) using the Fung and Hsieh (2001) factors.⁶ The industry average return is computed each month as the equally weighted average return of the hedge funds in our sample.

Some studies raise concerns about a potential back-fill, or incubation bias in the hedge-fund database. Such a bias can occur if a hedge fund begins to report its performance to the data provider, and simultaneously provides its recent historical performance. To alleviate any concerns, we follow the suggestion in Jagannathan, Malakhov, and Novikov (2010), and discard the first 36 observations of each hedge fund reported in the database.

2.1 Portfolio Sorts

We begin the analysis by demonstrating the existence of smart money in our sample. Hedge funds are sorted into equal-size quintile portfolios based on their flow over the previous month. We use the prior one-month flow instead of, for example, prior three-month flow as used in the literature (e.g., Fung, Hsieh, Naik, and Ramadorai (2008)), because we wish to use the most recent information available to fund investors, however on which they cannot act in the presence of share restrictions. We rebalance portfolios monthly and hold them for one month. The results are reported in Table 2.

Consistent with a smart-money effect, portfolio returns increase with prior flow. The portfolio

⁶We thank David Hsieh for providing the risk factors on his web site:
<http://faculty.fuqua.duke.edu/~dah7/DataLibrary/TF-FAC.xls>.

return spread of the high-minus-low flow earns 43 basis point per month (5.2% annually) with a t -statistic of 4.75. Pre-sorting funds into those restricted and those unrestricted, the results suggest that the smart-money effect is only apparent among the restricted funds. The flow return spread among restricted funds is about 5.6% annually; both return and alpha are statistically significant (t -statistics of 4.94 and 4.90, respectively).

The time series of quarterly returns to smart money among the restricted funds is presented in Figure 1. For this figure, the return during a calendar quarter is simply the sum of its monthly returns. The smart-money effect is positive for 84% of the quarters. The existence of smart money in restricted funds highlights that the funds for which redemption notice periods may cause information asymmetry about future flows are precisely those that such information is valuable because it predicts future fund performance.

2.2 Long-Run Performance

To further establish the significance of the flow effect, we study the long-run performance of restricted funds with recent flows. Table 3 extends performances reported in Table 2 from one-month-ahead returns to returns 12-months post portfolio formation. The table reports the performances (relative to the industry average) of funds in the top and bottom quintile of past one-month flow, as well as the quintile return spread. Both monthly returns and cumulative returns are reported, along with the respected t -statistics. Newey-West adjusted standard errors are computed to correct for the overlap in returns. Figure 2 exhibits a graphical illustration of the results, plotting the long-run cumulative returns along with the 95% confidence interval bounds.

The results show that the return spread high-minus-low past-flow funds is positive throughout the first 12 months post portfolio formation. Performance remains statistically significant over the first ten months, ending with 35 basis points after a year. Therefore, flow appears to predict a permanent effect on fund value. The performances of the funds in the top and bottom quintiles of flow suggests that this permanent effect is due to outflows rather than inflows: Outflow funds lose about 50 basis points over the year post formation, while inflow funds exhibit a temporary gain in value followed by a full reversal within a year.

The permanent effect of flow seems to contrast the dumb-money results of Frazzini and Lamont (2008). Yet, the fact that the latter results are obtained using mutual funds, while this paper uses

hedge funds, may explain the apparent contradiction. This permanent effect can arise if a fund’s portfolio is different pre- and post-flow. For example, a disproportionate sale of assets by a fund will translate into a permanent effect on fund value because the price reversal following the initial price pressure may be experienced by assets that are no longer held by the fund. Another example is leverage—if a fund is required to de-leverage as part of its response to outflows, the fund will not experience a full return reversal. Therefore, the ability of hedge funds to undertake more flexible investment decisions than mutual funds can explain the differences in their long-run flow effect.

3 Manager Investment and Corporate Governance

The moral hazard scenario outlined in this paper relies on the possibility of managerial extraction of personal gains in light of inside information about fund flow. This section therefore studies whether the flow effects in restricted funds depend on management self-investment as well as the level of fund shareholder protection.

3.1 Personal Investment

The Lipper/TASS database contains information about managers’ personal capital invested in their fund. Unfortunately, as newer reported amounts replace older ones, we do not have access to the historical time-series of this quantity, and therefore we cannot directly observe managers’ flow. Nonetheless, we use the last reported personal capital amount per fund, scaled by its corresponding assets under management, to proxy for the proportion of fund capital invested by managers. There are 3,726 funds (51% of the sample) for which Personal Capital Amount is reported in the database, whereas the rest choose not to report this information at all (missing observations). Among the reporting funds, 470 (13%) report capital investment greater than zero with a median of 8.9%.

Table 4 reports the flow-based performance of share-restricted funds contingent on manager investment. There are 1,682 share-restricted funds with such information available. For the 440 funds that report strictly positive amounts of investment by managers, the flow-based return spread is 0.96% per month, with a t -statistic of 4.17. In comparison, the monthly return spread among funds that report zero personal amount is significantly lower (0.37%). The difference in return spreads (0.58%) is statistically significant (t -statistic of 2.58). Using the Fung-Hsieh factors to adjust for risk does not change the results. We further separate the funds with manager investment

into two equal-size groups, high and low investment. The flow return spread among the high-investment funds exceeds that among the low-investment funds by 0.80% after adjusting Fung-Hsieh factors, albeit the statistical significance of this difference is marginal (t -statistic of 1.62).

These results point out that the funds for which the knowledge about flows seems to be particularly important, as measured by the performance they are able to predict, are also those in which managers have a higher percentage ownership. This situation exacerbates the agency problem.

3.2 Corporate Governance

This section investigates whether the flow return spread appears more significant among funds that offer less protection of shareholders. Inspired by the corporate-governance literature (e.g., La Porta, López-de-Silanes, Shleifer, and Vishny (2002) and Gompers, Ishii, and Metrick (2003)), we consider several fund characteristics to proxy for shareholder protection, such as had it been audited, the existence of high water marks, domiciliation, and registration with the SEC. We also aggregate these variables to devise a measure of fund governance, and show that the flow return spread is more pronounced in funds with low scores of investor protection.

3.2.1 Measures

Audit: Out of the 5,826 share-restricted funds, 4,120 have an audit date listed in the database. Following Bollen and Pool (2009), we assume that funds with no audit date listed are likely comprised of two groups of funds, those which have been audited but for which no information was provided to the database and those which have not been audited. The conjecture is that, taken as a group, the funds with no audit date listed have less oversight than the funds with an audit date listed (see also Liang (2003)). If a fund reports a date for a completed financial audit it is assigned a score of one and zero otherwise.

High water mark: Some hedge funds offer high-water-mark protections for their investors. This mechanism allows funds to collect their performance fees only if the net asset value (NAV) exceeds the previous maximum. Without this mechanism a fund would charge performance fees given a profitable recent period even if it fails to surpass its maximum NAV. Of the 7,280 hedge funds in our sample, 4,213 (58%) apply high water mark. A fund is assigned a high-water-mark score of one if it offers investors high-water-mark provisions and zero otherwise.

Domiciliation: Hedge funds also report their “Country of Domicile” to the database. We identify 22 offshore centers and indicate any fund residing in one of these centers as “offshore.” About 52% of the sample funds (3,787) are offshore. The list of offshore centers: Andorra, Anguilla, Argentina, Bahamas, Bermuda, Botswana, Cayman Islands, Gibraltar, Guernsey, Isle of Man, Jersey, Liechtenstein, Luxembourg, Malta, Mauritius, Netherlands Antilles, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and The Grenadines, Samoa, British Virgin Islands, and U.S. Virgin Islands. Along the domiciliation dimension, we assign a value of one to onshore funds and zero to offshore funds.

SEC Registration: Unlike mutual funds, hedge funds are not required to register with the SEC. Hedge funds typically issue securities in private offerings that are not registered with the SEC under the Securities Act of 1933. In addition, hedge funds are not required to make periodic reports under the Securities Exchange Act of 1934. While the SEC may conduct examinations of any hedge fund manager that is registered as an investment adviser under the Investment Advisers Act, the SEC and other securities regulators generally have limited ability to routinely examine hedge fund activities. Some hedge funds may choose to register with the SEC if, for example, they wish to offer mutual funds. We assign a score of one to funds registered with the SEC and zero otherwise.

Aggregate corporate governance: We combine the four governance variables discussed above by summing their scores across the four measures. A high total value corresponds to a fund that offers relatively favorable investor protection.

Figure 3 reports the distributions of the variables above. Panel A plots the binomial distribution of four dummy variables corresponding to the governance measures. Panel B plots the distribution of the aggregate governance score, which can assume five different values (zero through four). This distribution is centered around the value two.

3.2.2 Performance and Governance

To study the impact of governance on the flow return spread, for each governance variable funds are sorted into two groups according to the value of the variable (zero or one). In each group, funds are further sorted into quintiles by prior-month flow. Table 5 reports the average returns of the funds in each group (relative to the equal-weighted hedge-fund index), the flow return spread

(calculated as the return difference between the top and bottom quintiles of past flow) as well as the Fung-Hsieh alpha spread, and the return differences between the two groups of each governance variable.

The results are consistent across governance variables. For each variable, the flow return spread of high governance outperforms that of low governance; values vary between 47 and 68 basis points per month with t -statistics varying from 3.03 to 4.51. The spread seems to stem from the bottom quintile of flow, whose underperformance varies between 24 and 42 basis points per month (t -statistics vary between 2.53 and 4.77). The differences in returns between high and low governance values are also particularly significant for the bottom quintiles of past flow. This suggests that outflows predict more negative fund performance for funds with low investor protection.

We also study the impact of the aggregate governance index on the flow return spread. Since the tails of the aggregate governance score distribution are relatively small, we separate funds into three similar size groups: funds whose governance scores are zero or one, funds whose score is two, and funds whose scores are three or four. Table 6 reports the flow return spread for each governance group. The spread is 0.63% per month (t -statistic of 3.35) among the low-governance funds, but insignificant for high-governance funds. These results are mainly due to the bottom quintile of past flow: The performance of the funds in this quintile drops the lower the governance, while no pattern is observed for the top quintile of past flow. These findings are also plotted in Figure 4. The results further stress the value of flow information to fund insiders, as funds with lower governance seem to have the most exploitable opportunities.

4 Additional Tests

The previous section introduces the main results of the paper. In what follows, we provide additional analysis and discussion to highlight the significance of the results.

4.1 Cross-Sectional Regressions

The sections above typically apply double sorts to draw conclusions. In this subsection we describe the results of cross-sectional regressions, which allow us to control for several confounding effects simultaneously. The dependent variable is the monthly return of share-restricted funds, while the independent variables are prior month capital flow, personal investment, and low governance. As

defined above, personal investment is a dummy variable, which equals one if a fund reports positive capital investment by its manager and zero otherwise. Low governance is a dummy variable which is assigned a value of one if the aggregate governance score of a fund is lower than the population median and zero otherwise. We consider the following control variables: size, leverage, management fees, and performance fees. Size is computed as the natural logarithm of fund AUM at the end of the prior month and leverage is a dummy variable which equals one if a fund can undertake leverage and zero otherwise. Statistical significance is inferred using Fama and MacBeth (1973) t -statistics.

Table 7 reports the results using the universe of share-restricted funds. Consistent with the existence of a flow return spread shown in Table 2, the variable flow is significant in all regression specifications. The control variables size and leverage are both negative, yet not statistically significant in any specification. Incentive fees appear significantly positive in all specifications while management fees positively impact hedge-fund performance, but the effect is not always significant. Personal investment yields mixed evidence. The low-corporate-governance indicator is significantly negative. This result may be of independent interest to researchers, as it provides corroborating evidence for the effects of corporate governance so far shown for companies. For example, Gompers, Ishii, and Metrick (2003) find that firms with high corporate governance also earn higher stock returns (see also Core, Guay, and Rusticus (2006)). Our results suggest such an effect is also present in the universe of hedge funds.

In addition, we study an interaction term between flow, personal investment, and low governance. The results in the previous section suggests flow would be more valuable for predicting fund performance for funds that hold manager personal investments and whose governance score is low. Consistent with this prediction, the interaction term is positive and significant.

4.2 Smoothed Returns

The literature documents that hedge-fund returns exhibit some smoothing. For example, funds that hold assets that do not trade often and therefore are not marked-to-market daily or even monthly, may exhibit smoothed returns. To alleviate concerns that the results are primarily a result of such an effect, we apply a couple of robustness tests.

First, we add the first two lags of return to the cross-sectional regressions examined in Table 7. Indeed, the coefficients of these lagged returns are significant, but the coefficients as well as

the statistical significance of the variables of interest, that is, prior-month flow, the low-governance dummy, and the interaction of flow, personal investment, and low governance, remain virtually unchanged.

Second, using expanding windows to estimate an AR(2) model for the return of each hedge fund, we create a monthly time series of unsmoothed returns for each fund. Recalculating the portfolio returns of share-restricted funds sorted by prior flow (such as in Table 3), we find that the statistical significance remains although the point estimate drops by almost half. Therefore, although return smoothing accounts for some of the results, it does not completely explain the smart-money effect exhibited in the universe of share-restricted funds.

4.3 Investment Style

Each hedge fund in the database is classified into one of the following investment-style groups: Convertible Arbitrage, Dedicated Short Bias, Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Fund of Funds, Global Macro, Long/Short Equity, Managed Futures, Multi Strategy, and Others. We use this classification to examine whether the flow return spreads among share-restricted funds can be explained by investment style. We also create two additional categories: Not Long/Short Equity, which includes all hedge fund styles that are not Long/Short Equity, and ARB, which groups the arbitrage strategies, i.e., Convertible Arbitrage, Event Driven, and Fixed Income Arbitrage. Dedicated Short Bias are not examined as a group because there are only about 50 such funds over the sample period. A fund's investment style remains unchanged throughout the sample period.

Funds in each investment style are sorted into three groups by their prior-month flow. The funds in each group are combined into an equally weighted portfolio, which is rebalanced each month. Table 8 reports the average monthly portfolio returns excess of the investment-style index, calculated as the equally weighted average of across funds in each investment style. The table also reports the return spread between the top and bottom portfolios of flow as well as risk-adjusted returns. The flow return spreads and alphas are positive for eleven of the twelve investment-style groups (only Emerging Markets exhibits a negative, yet statistically insignificant performance), while seven of them are statistically significant. All the bottom terciles of flow exhibit negative returns, ten of which are statistically significant, while most of top terciles of flow display insignificant performances. These results confirm that the positive performance of the flow return spread (and the

negative performance of bottom groups of flow) documented in this paper is not investment-style specific.

4.4 Liquidity

To the extent that the act of redeeming capital may cause price pressures on the underlying assets under management (e.g., Coval and Stafford (2007) and Lou (2009)), we investigate whether the flow return spread is more pronounced in funds that invest in illiquid assets. We use the measure proposed by Getmansky, Lo, and Makarov (2004), which is estimated each month using a 60-month rolling window of fund returns. Figure 5 displays the long-run returns of the flow return spread for the top and bottom terciles of fund liquidity. The results show that funds holding relatively illiquid assets (bottom tercile of liquidity) exhibit a larger flow effect than those holding more liquid assets (top tercile of liquidity).

In light of Sadka (2010) and Teo (2010) who study the liquidity risk exposures of hedge funds (measured by the covariation of fund returns with aggregate innovations in market liquidity), we also analyze the liquidity risk exposures of the inflow and outflow funds. Using the Pástor and Stambaugh liquidity risk factor, untabulated results show that the liquidity risk loading of outflow funds is significantly higher than that of inflow funds. This suggests that the flow-front running opportunities are mostly profitable during illiquid periods.

4.5 Operational Risk

The fund governance measure developed in this paper is closely related to hedge fund operational risk. Relying on US SEC filing information on hedge funds (form ADV), Brown, Goetzmann, Liang, and Schwarz (2009) define operational risk based on personnel problems, investment process, internal control, portfolio pricing, and compliance issues. They document a positive relation between a fund's internal and external conflict-of-interests as well as ownership structure characteristics and legal and regulatory problems. While operational risk covers a broad range of issues, in this paper we mainly focus on one operational aspect, fund governance. Nonetheless, we expect a broad operational risk measure to partially substitute for the fund governance measure, and therefore offer a robustness analysis using this measure.

We estimate the time series of operational risk for each fund in our sample following the Omega

approximation suggested in Brown, Goetzmann, Liang, and Schwarz (2009). That paper includes approximations for the relation between operational risk and other fund characteristics. We therefore use observable fund characteristics to obtain estimates of operational risk each month. Note that two of the four variables that we consider for our measure of governance ("Audit" and "Domiciliation"), are also used to estimate Omega. Also, we set the coefficient of the variable "Personal Investment" to zero because, although it may reduce operational risk, it exacerbates the potential front-running by fund managers.

We replace the Low Governance dummy variable with prior-month estimated Omega and repeat the analysis reported in Table 7. Unreported results (available from the authors by request) indicate that, similar to Low Governance, a high Omega predicts low fund returns (t -statistic of 2.25) and the coefficient of the interaction between Flow, Personal Investment, and Omega is positive (t -statistic of 1.83). Therefore, it seems that our main findings are robust to using the Omega measure of operational risk.

4.6 Fund Families and Share Classes

This paper follows the standard practice in the literature insofar as treating unique strings of Fund Name as distinct funds. The dataset also includes a variable named Management Company Name. We find that roughly 1,200 funds are associated with management companies with more than one fund. We utilize this fact to execute two tests. First, we verify that our results hold in the universe of funds for which their management company is associated with only one fund. Second, we study the flows of fund families, i.e., management companies with more than one fund listed in the dataset, and show evidence consistent with the front-running phenomenon highlighted in this paper.

For the first test, we identify 1,257 share-restricted hedge funds, each the sole fund of a management company. For this sample of funds, the tercile flow-return spread is 0.34% per month (t -statistic of 2.83) with a monthly alpha of 0.32% (t -statistic of 2.75). There are only 265 non-restricted funds, each the sole fund of a management company. These funds generate an insignificant flow-return spread. These results confirm that the main results of this paper are not driven by funds with multiple share classes.

For the second test, we find that some of the management companies that have multiple funds,

also apply different management fees to each of their funds. About 600 funds are associated with such management companies. For each management company that applies a diverse management fee structure, we separate the funds whose management fee is above and below the median fee of the particular management company. We then compute the average flow each month for each of the two groups within each management company. Therefore, each management company has two time series of monthly flows. We run the following regression:

$$F_{i,t}^{High} = \alpha_j + \gamma_j F_{i,t+j}^{Low} + \epsilon_{j,t}, \quad (2)$$

where $F_{i,t}^{High}$ is the average flow of the high-management-fee group of management company i during month t , $F_{i,t-j}^{Low}$ is the average flow of the low-management-fee group of management company i during month $t-j$, and $\epsilon_{j,t}$ is the error term. We consider specifications using the integer values in the range -6 to +6 for the index j . These regression models are run using the full sample available for each management company.

Figure 6 reports the average t -statistic of the coefficient γ . The figure exhibits a significant positive contemporaneous correlation between the flows of the high- and low-fee groups. While this result is not entirely surprising, the fact that γ_{-1} is marginally significant suggests that the low-fee group, that is fund insiders, be it the fund manager or some preferred clients, exit or enter the fund prior to the high-fee, outside investors. This result is consistent with the front-running phenomenon advanced in this paper.

4.7 Economic Significance

The analysis so far stressed the potential profitability of inside information about flows by observing the post-flow performances of hedge funds. One can also express the potential value of information about flows in terms of dollar amounts using a simple, back-of-the-envelope calculation as follows.

The number of funds with a positive personal investment in the database is 440, whereas the number of funds with a value of zero personal investment is 1,242. The rest of the funds have missing values. Therefore, the fraction of positive-value funds is 26% ($=440/(440+1,242)$). Conditional on a positive personal investment, the median of this amount is 9.51% of a fund's AUM. Thus, the unconditional fraction of total hedge-fund AUM is 2.5% ($=26\% \times 9.51\%$). Our exercise uses the total AUM of share-restricted funds each month and calculates the potential profits earned by avoiding the flow return spread in the following month. We then multiply this sum by 2.5% and repeat this

procedure across all the months in the sample period. Our calculation yields an amount of \$214.48 million on average per year or \$2.4 billion over the entire sample period.

The quantity calculated above assumes that the managers fully redeem their shares when they are faced with significant redemption requests from investors. Yet, it does not include the possibility of preferential treatment for some select clients that are given information about flow from the fund manager prior before other clients (as outlined in the case against State Street Bank and Trust described in the introduction). Therefore, we argue that our estimation be viewed as conservative.

5 Conclusion

This paper provides an assessment of the potential profits associated with trading based on inside information about hedge-fund-investor flows. Focusing on share-restricted funds, we find that funds with recent outflow underperform funds with recent inflow, especially for the group of funds with high personal investment of fund insiders and low corporate governance. The flow-based return spread amounts to 5.6% per year over 1998–2008, after controlling for various risk factors. Therefore, despite the lack of direct supporting evidence for the above-mentioned SEC case filings, the flow-based return spreads documented in this paper may provide a quantification of the potential profits from engaging in the alleged flow-front-running activity in the hedge-fund industry.

The results of this study have several implications. Hedge-fund managers typically impose share restrictions on their investors to limit the potential impact of large outflows on their funds' asset prices. However, such constraints may also allow fund managers to take advantage of information concerning their investor future flow. Therefore, similar to the prevention of insider trading in publicly traded corporate securities, fund managers should be required to disclose their intention to subscribe to or redeem shares from the funds they manage to avoid the appearance of front-running their less-flow-informed investors. A potential resolution might involve the imposition of tighter share restrictions on fund managers and insiders in comparison to outside investors.

References

- Aragon, O. George, 2007, Share restrictions and asset pricing: Evidence from the hedge fund industry, *Journal of Financial Economics* 83, 33–58.
- Berk, Jonathan B., and Richard C. Green, 2004, Mutual fund flows and performance in rational markets, *Journal of Political Economy* 112, 1269–1295.
- Bollen Nicolas P. B., and Veronika K. Pool, 2008, Conditional return smoothing in the hedge fund industry, *Journal of Financial and Quantitative Analysis* 43, 267–298.
- Bollen, Nicolas P.B., and Veronika K. Pool, 2009, Do hedge fund managers misreport returns? Evidence from the pooled distribution, *Journal of Finance* 64, 2257–2288.
- Brown, Stephen J., William N. Goetzmann, Bing Liang, and Christopher Schwarz, 2008, Mandatory disclosure and operational risk: Evidence from hedge fund registration, *Journal of Finance* 63, 2785–2815.
- Brown, Stephen J., William N. Goetzmann, Bing Liang, and Christopher Schwarz, 2009, Estimating operational risk for hedge funds: The ω -score, *Financial Analysts Journal* 65, 43–53.
- Cassar, Gavin, and Joseph Gerakos, 2011, Hedge funds: Pricing controls and the smoothing of reported returns, *Review of Financial Studies* 24, 1698–1734.
- Chevalier, Judith, and Glenn Ellison, 1997, Risk taking by mutual funds as a response to incentives, *Journal of Political Economy* 105, 1167–1200.
- Coval, Joshua, and Erik Stafford, 2007, Asset fire sales (and purchases) in equity markets, *Journal of Financial Economics* 86, 479–512.
- Core, John E., Wayne R. Guay, and Tjomme O. Rusticus, 2006, Does weak governance cause weak stock returns? An examination of firm operating performance and investors’ expectations, *Journal of Finance* 61, 655–687.
- Ding, Bill, Mila Getmansky, Bing Liang, and Russell R. Wermers, 2009, Investor flows and share restrictions in the hedge fund industry, working paper.
- Fama, Eugene, and James MacBeth, 1973, Risk, return and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607–636.
- Frazzini, Andreas, and Owen A. Lamont, 2008, Dumb money: Mutual fund flows and the cross-section of stock returns, *Journal of Financial Economics* 88, 299–322.
- Fung, William, and David A. Hsieh, 2001, The risk in Hedge fund strategies, theory and evidence from trend followers, *Review of Financial Studies* 14, 313–341.
- Fung, William, David A. Hsieh, Narayan Y. Naik, and Tarun Ramadorai, 2008, Hedge funds: Performance, risk, and capital formation, *Journal of Finance* 63, 1777–1803.
- Getmansky, Mila, Andrew W. Lo, and Igor Makarov, 2004, An econometric model of serial correlation and illiquidity in hedge fund returns, *Journal of Financial Economics* 74, 529–610.
- Gompers, Paul A., Joy L. Ishii, and Andrew Metrick, 2003, Corporate governance and equity prices, *Quarterly Journal of Economics* 118, 107–155.
- Gruber, Martin J., 1996, Another puzzle: The growth in actively managed mutual funds, *Journal of Finance* 51, 783–810.
- Ippolito, Richard A., 1992, Consumer reaction to measures of poor quality: Evidence from the mutual fund industry, *Journal of Law and Economics* 35, 45–70.
- Jagannathan, Ravi, Alexey Malakhov, and Dmitry Novikov, 2010, Do hot hands exist among hedge fund managers? An empirical evaluation, *Journal of Finance* 65, 217–255.
- La Porta, Rafael, Florencio López-de-Silanes, Andrei Shleifer, and Robert W. Vishny, 2002, Investor protection and corporate valuation, *Journal of Finance* 58, 1147–1170.

- Liang, Bing, 2003, Hedge fund returns: Auditing and accuracy, *Journal of Portfolio Management* 29, 111–122.
- Lou, Dong, 2009, A flow-based explanation for return predictability, working paper.
- Pástor, Lubos, and Robert F. Stambaugh, 2003, Liquidity risk and expected stock returns, *Journal of Political Economy* 111, 642–85.
- Sadka, Ronnie, 2006, Momentum and post-earnings-announcement drift anomalies: The role of liquidity risk, *Journal of Financial Economics* 80, 309–349.
- Sadka, Ronnie, 2010, Liquidity risk and the cross-section of hedge-fund returns, *Journal of Financial Economics* 98, 54–71.
- Sirri, Erik R., and Peter Tufano, 1998, Costly search and mutual fund flows, *Journal of Finance* 53, 1589–1622.
- Teo, Melvyn, 2010, The liquidity risk of liquid hedge funds, *Journal of Financial Economics*, forthcoming.
- Zheng, Lu, 1999, Is money smart? A study of mutual fund investors' fund selection ability, *Journal of Finance* 54, 901–933.

Table 1
Summary Statistics

The table reports the summary statistics of the Lipper-TASS hedge-fund dataset for the period of January 1998 to December 2008. Number of Funds counts the existing funds at the beginning of January and the funds which started reporting before the end of the respective year. Mean, standard deviation, 1st quartile, median, and 3rd quartiles are the 12-month means of the monthly cross-sectional statistics.

| Year | Number of Funds | Monthly Return (%) | | | | | Monthly Flow (%) | | | | |
|------|--------------------|--------------------|---------|-------|--------|------|------------------|---------|-------|--------|------|
| | | Mean | Std Dev | 25% | Median | 75% | Mean | Std Dev | 25% | Median | 75% |
| 1998 | 2044 | 0.39 | 6.61 | -1.80 | 0.47 | 2.71 | 3.62 | 49.89 | -1.54 | 0.06 | 2.64 |
| 1999 | 2321 | 2.02 | 6.06 | -0.35 | 1.42 | 3.74 | 3.67 | 48.82 | -1.85 | 0.01 | 2.31 |
| 2000 | 2600 | 0.89 | 6.35 | -1.34 | 0.81 | 2.87 | 4.02 | 37.85 | -1.14 | 0.04 | 2.87 |
| 2001 | 3034 | 0.52 | 4.76 | -0.85 | 0.54 | 1.87 | 2.65 | 19.70 | -0.62 | 0.10 | 3.29 |
| 2002 | 3496 | 0.25 | 3.93 | -0.90 | 0.26 | 1.35 | 1.95 | 16.58 | -0.72 | 0.09 | 2.96 |
| 2003 | 4021 | 1.32 | 6.57 | 0.06 | 0.86 | 2.05 | 5.09 | 38.07 | -0.54 | 0.29 | 4.11 |
| 2004 | 4727 | 0.68 | 3.73 | -0.24 | 0.54 | 1.42 | 4.49 | 24.82 | -0.39 | 0.44 | 4.42 |
| 2005 | 5327 | 0.73 | 2.81 | -0.26 | 0.56 | 1.55 | 1.33 | 17.28 | -1.08 | 0.09 | 2.66 |
| 2006 | 5642 | 0.91 | 2.72 | -0.07 | 0.75 | 1.71 | 2.35 | 22.79 | -0.76 | 0.15 | 2.75 |
| 2007 | 5222 | 0.83 | 3.01 | -0.27 | 0.67 | 1.72 | 1.13 | 10.64 | -0.93 | 0.12 | 2.43 |
| 2008 | 4709 | -1.63 | 5.53 | -3.21 | -1.32 | 0.49 | -1.86 | 9.01 | -3.54 | -0.31 | 0.80 |

Table 2
Portfolios of Share Restrictions and Flows

The tables reports the performances of portfolio sorts by share restriction and past flow. A fund is share-restricted if it imposes a nonzero redemption-notice period. Every month, all, non-restricted, and restricted funds are sorted into five portfolios based on prior-month flow (F1 is the lowest flow quintile and F5 is the highest). Portfolios are equally weighted and rebalanced monthly. The table reports the average portfolio returns excess of the industry average, as well as the average returns of the top-minus-bottom flow portfolios and their risk-adjusted returns (alphas) using the Fung-Hsieh factors. Square brackets include t -statistics. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

| | All funds (N=7,280) | Non-Restricted (N=1,454) | Restricted (N=5,826) |
|---------|---------------------------|-----------------------------|-------------------------|
| F1 | -0.25% [-4.23] | -0.39% [-2.77] | -0.22% [-3.80] |
| F2 | -0.13% [-2.38] | -0.55% [-3.60] | -0.08% [-1.46] |
| F3 | -0.15% [-2.45] | -0.41% [-3.04] | -0.07% [-1.23] |
| F4 | -0.02% [-0.54] | -0.28% [-2.13] | 0.01% [0.40] |
| F5 | 0.18% [2.79] | -0.21% [-1.50] | 0.24% [3.65] |
| F5 - F1 | Return 0.43% [4.75] | 0.18% [1.01] | 0.47% [4.94] |
| | Alpha 0.40% [4.58] | 0.13% [0.71] | 0.44% [4.90] |

Table 3
Long-Run Performance

Every month, share-restricted hedge funds are sorted into five groups based on their prior-month flow. A fund is share-restricted if it imposes a nonzero redemption-notice period. Portfolios are equally weighted and rebalanced monthly. The table reports the returns of the top and bottom flow portfolios (in excess of the hedge-fund industry average), as well as their return spread. Portfolio returns are reported for up to twelve months post formation. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

| | Inflow minus Outflow | | | | Outflow | | | | Inflow | | | |
|------|----------------------|-------------|------------|-------------|---------|-------------|------------|-------------|--------|-------------|------------|-------------|
| | Return | T-statistic | Cumulative | T-statistic | Return | T-statistic | Cumulative | T-statistic | Return | T-statistic | Cumulative | T-statistic |
| t+1 | 0.47% | [4.94] | 0.47% | [4.96] | -0.22% | [-2.47] | -0.22% | [-3.82] | 0.24% | [3.65] | 0.24% | [3.66] |
| t+2 | 0.16% | [2.08] | 0.65% | [5.24] | -0.13% | [-2.02] | -0.37% | [-4.45] | 0.03% | [0.66] | 0.28% | [2.83] |
| t+3 | -0.02% | [-0.28] | 0.61% | [3.89] | -0.01% | [-1.12] | -0.38% | [-2.94] | -0.03% | [-0.69] | 0.23% | [1.91] |
| t+4 | 0.13% | [1.63] | 0.73% | [4.35] | -0.13% | [-1.02] | -0.50% | [-3.12] | 0.01% | [0.10] | 0.23% | [1.60] |
| t+5 | 0.02% | [0.23] | 0.77% | [4.40] | -0.02% | [-1.12] | -0.55% | [-2.89] | 0.01% | [0.10] | 0.23% | [1.27] |
| t+6 | -0.02% | [-0.20] | 0.76% | [3.94] | 0.01% | [-0.88] | -0.55% | [-2.41] | -0.01% | [-0.22] | 0.21% | [0.95] |
| t+7 | 0.14% | [1.98] | 0.89% | [4.41] | -0.14% | [-0.88] | -0.70% | [-2.66] | 0.00% | [-0.06] | 0.19% | [0.72] |
| t+8 | -0.09% | [-1.05] | 0.81% | [3.17] | 0.01% | [0.31] | -0.70% | [-2.10] | -0.08% | [-1.92] | 0.11% | [0.35] |
| t+9 | -0.01% | [-0.08] | 0.84% | [3.18] | 0.01% | [0.57] | -0.73% | [-1.87] | 0.00% | [-0.02] | 0.11% | [0.30] |
| t+10 | -0.10% | [-1.44] | 0.76% | [2.48] | 0.03% | [1.13] | -0.73% | [-1.69] | -0.07% | [-1.95] | 0.03% | [0.08] |
| t+11 | -0.22% | [-2.49] | 0.53% | [1.35] | 0.05% | [0.41] | -0.68% | [-1.40] | -0.17% | [-3.24] | -0.16% | [-0.33] |
| t+12 | -0.14% | [-1.63] | 0.35% | [0.80] | 0.08% | [-0.04] | -0.57% | [-1.10] | -0.06% | [-1.07] | -0.22% | [-0.41] |

Table 4
Portfolios of Personal Investment and Flow

Every month, share-restricted hedge funds are sorted into groups based on their management's personal investment. A fund is share-restricted if it imposes a nonzero redemption-notice period. Funds with a positive personal investment are further sorted into two equal-size groups based on personal capital as a fraction of fund total asset value. Within each personal investment group, funds are sorted into five groups based on prior-month flow. Portfolios are equally weighted and rebalanced monthly. The table reports the average portfolio returns in excess of the industry average, as well as the average returns of the top-minus-bottom flow portfolios and their risk-adjusted returns (alphas) using the Fung-Hsieh factors. Square brackets include t statistics. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

| | | Personal Investment | | | | Personal Investment | High Personal Investment |
|---------|--------|---------------------|-----------|-----------|-----------|--------------------------|--------------------------|
| | | Zero | Positive | Low | High | minus | minus |
| | | (N = 1,242) | (N = 440) | (N = 220) | (N = 220) | Zero Personal Investment | Low Personal Investment |
| F1 | | -0.19% | -0.33% | 0.06% | -0.36% | -0.14% | -0.43% |
| | | [-2.18] | [-1.75] | [0.24] | [-1.57] | [-0.72] | [-1.11] |
| F2 | | -0.03% | 0.27% | -0.08% | 0.26% | 0.30% | 0.34% |
| | | [-0.32] | [1.84] | [-0.40] | [1.35] | [1.89] | [1.47] |
| F3 | | -0.17% | 0.11% | 0.17% | -0.13% | 0.29% | -0.30% |
| | | [-2.22] | [0.73] | [0.76] | [-0.67] | [1.75] | [-1.03] |
| F4 | | 0.05% | 0.11% | 0.21% | -0.01% | 0.06% | -0.21% |
| | | [0.96] | [0.66] | [1.00] | [-0.04] | [0.34] | [-0.75] |
| F5 | | 0.18% | 0.62% | 0.43% | 0.58% | 0.45% | 0.15% |
| | | [2.37] | [3.33] | [1.65] | [2.21] | [2.69] | [0.37] |
| F5 - F1 | Return | 0.37% | 0.96% | 0.37% | 0.95% | 0.58% | 0.57% |
| | | [3.39] | [4.17] | [1.16] | [3.09] | [2.58] | [1.18] |
| | Alpha | 0.39% | 0.97% | 0.23% | 1.03% | 0.58% | 0.80% |
| | | [3.90] | [4.20] | [0.71] | [3.33] | [2.49] | [1.62] |

Table 5
Portfolios of Corporate Governance Variables and Flow

A fund is share-restricted if it imposes a nonzero redemption-notice period. Fund governance is measured along four variables: auditing, high water mark, country of domicile, and SEC registration. If a fund reports a completed financial audit it is assigned a score of one and zero otherwise. If a fund applies a high water mark it is assigned a score of one and zero otherwise. If a fund is domiciled onshore it is assigned a score of one and zero if it is domiciled offshore. If a fund is registered with the SEC it is assigned a score of one and zero otherwise. Each month, share-restricted funds are sorted into low and high governance groups along a single variable, where low and high governance represent values of zero and one, respectively. Within each governance group, funds are further sorted into five groups based on prior-month flow. Portfolios are equally weighted and rebalanced monthly. The table reports the average portfolio returns in excess of the industry average, as well as the average returns of the top-minus-bottom flow portfolios and their risk-adjusted returns (alphas) using the Fung-Hsieh factors. Square brackets include *t*-statistics. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

| Panel A: Audit | | | | Panel B: High Water Mark | | | |
|------------------------|---------------------------------|--------------------------------|------------------------------|---------------------------|---------------------------------|--------------------------------|------------------------------|
| | High Governance (N=4,120) | Low Governance (N=1,706) | Low minus High Governance | | High Governance (N=3,888) | Low Governance (N=1,894) | Low minus High Governance |
| F1 | -0.18% [-3.17] | -0.42% [-2.53] | -0.24% [-1.52] | F1 | -0.24% [-3.69] | -0.34% [-4.62] | -0.26% [-2.93] |
| F2 | -0.09% [-1.51] | -0.08% [-0.52] | 0.02% [0.11] | F2 | -0.13% [-1.49] | -0.09% [-0.95] | -0.10% [-0.93] |
| F3 | -0.08% [-1.68] | -0.01% [-0.07] | 0.07% [0.40] | F3 | -0.08% [-0.99] | -0.17% [-2.02] | -0.18% [-1.46] |
| F4 | 0.02% [0.57] | -0.04% [-0.49] | -0.06% [-0.75] | F4 | -0.22% [-3.69] | -0.09% [-1.89] | -0.23% [-3.39] |
| F5 | 0.26% [3.34] | 0.26% [1.64] | 0.00% [0.01] | F5 | -0.11% [-0.83] | 0.21% [1.64] | -0.09% [-0.67] |
| F5 - F1 Return | 0.44% [4.21] | 0.68% [3.03] | 0.24% [1.00] | F5 - F1 Return | 0.13% [0.96] | 0.55% [3.71] | 0.17% [1.08] |
| Alpha | 0.41% [4.16] | 0.62% [2.64] | 0.20% [0.81] | Alpha | 0.35% [3.58] | 0.56% [3.69] | 0.21% [1.32] |
| Panel C: Domiciliation | | | | Panel D: SEC Registration | | | |
| | High Governance (N=2,716) | Low Governance (N=3,110) | Low minus High Governance | | High Governance (N=467) | Low Governance (N=4,639) | Low minus High Governance |
| F1 | -0.16% [-2.08] | -0.31% [-4.77] | -0.16% [-2.13] | F1 | -0.04% [-0.15] | -0.24% [-3.90] | -0.19% [-0.71] |
| F2 | -0.06% [-0.85] | -0.11% [-1.20] | -0.06% [-0.50] | F2 | -0.05% [-0.24] | -0.09% [-1.42] | -0.04% [-0.20] |
| F3 | -0.06% [-0.60] | -0.07% [-1.21] | -0.01% [-0.12] | F3 | 0.08% [0.50] | -0.10% [-1.67] | -0.18% [-0.98] |
| F4 | 0.11% [2.26] | -0.08% [-1.44] | -0.19% [-2.69] | F4 | -0.14% [-0.74] | 0.01% [0.27] | 0.15% [0.80] |
| F5 | 0.25% [3.63] | 0.19% [1.62] | -0.05% [-0.38] | F5 | 0.31% [1.69] | 0.24% [3.08] | -0.07% [-0.39] |
| F5 - F1 Return | 0.40% [3.66] | 0.51% [3.90] | 0.11% [0.74] | F5 - F1 Return | 0.36% [1.05] | 0.47% [4.51] | 0.12% [0.36] |
| Alpha | 0.38% [3.61] | 0.48% [3.69] | 0.11% [0.73] | Alpha | 0.54% [1.73] | 0.43% [4.27] | -0.11% [-0.35] |

Table 6
Portfolios of Aggregate Corporate Governance and Flow

A fund is share-restricted if it imposes a nonzero redemption-notice period. Aggregate governance is calculated as the sum of four individual governance variables: auditing, high water mark, country of domicile, and SEC registration. If a fund reports a completed financial audit it is assigned a score of one and zero otherwise. If a fund applies a high water mark it is assigned a score of one and zero otherwise. If a fund is domiciled onshore it is assigned a score of one and zero if it is domiciled offshore. If a fund is registered with the SEC it is assigned a score of one and zero otherwise. Low governance includes funds with an aggregate governance score of either 0 or 1, Medium includes funds with an aggregate governance score of 2, and High includes funds with an aggregate score of either 3 or 4. The funds in each aggregate governance group are sorted each month into five equally weighted portfolios based on prior-month flow. Portfolios are rebalanced monthly. The table reports the average portfolio returns in excess of the industry average, as well as the average returns of the top-minus-bottom flow portfolios and their risk-adjusted returns (alphas) using the Fung-Hsieh factors. Square brackets include *t* statistics. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

| Score | Aggregate Corporate Governance | | | |
|---------|--------------------------------|------------------------------|------------------------------|----------------------|
| | Low [0,1] (N = 1,766) | Medium [2] (N = 2,735) | High [3,4] (N = 1,325) | Low minus High |
| F1 | -0.35% [-4.47] | -0.27% [-3.09] | 0.08% [0.78] | -0.43% [-4.08] |
| F2 | -0.16% [-1.44] | 0.03% [0.59] | -0.10% [-1.27] | -0.06% [-0.49] |
| F3 | -0.10% [-0.93] | -0.05% [-0.78] | -0.06% [-0.67] | -0.04% [-0.25] |
| F4 | -0.13% [-2.08] | 0.00% [-0.01] | 0.19% [3.05] | -0.32% [-3.92] |
| F5 | 0.28% [1.61] | 0.21% [2.80] | 0.32% [3.65] | -0.04% [-0.18] |
| F5 - F1 | Return 0.63% [3.35] | 0.48% [3.92] | 0.24% [1.60] | 0.39% [1.82] |
| | Alpha 0.61% [3.13] | 0.48% [3.85] | 0.18% [1.39] | 0.43% [1.99] |

Table 7
Cross-Sectional Regressions

This table reports monthly cross-sectional regressions of share-restricted fund returns on various fund characteristics. A fund is share-restricted if it imposes a nonzero redemption-notice period. Flow represents fund monthly capital flow during the prior month. Size is the natural logarithm of fund asset under management (AUM) at the end of the prior month. Leverage is a dummy variable that equals one if a fund can undertake leverage and zero otherwise. Management Fees and Incentive Fees are the fees a fund charges as a fraction of AUM and of performance, respectively. Personal Investment is a dummy variable that equals one if the fund reports a positive capital investment of its management and zero otherwise. Aggregate governance is calculated as the sum of four individual governance variables: auditing, high water mark, country of domicile, and SEC registration. If a fund reports a completed financial audit it is assigned a score of one and zero otherwise. If a fund applies a high water mark it is assigned a score of one and zero otherwise. If a fund is domiciled onshore it is assigned a score of one and zero if it is domiciled offshore. If a fund is registered with the SEC it is assigned a score of one and zero otherwise. Low Governance is a dummy variable that is assigned a value of one if the aggregate governance score is lower than the median aggregate governance score and zero otherwise. Fama and MacBeth (1973) *t*-statistics are reported in square brackets. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

| Model | Intercept | Flow | Size | Leverage | Management Fees | Incentive Fees | Personal Investment | Low Governance | Flow × Personal Investment × Low Governance |
|-------|-----------------|-----------------|-------------------|-------------------|-----------------|-----------------|---------------------|-------------------|---|
| (1) | 0.59% [3.70] | 0.66% [2.49] | | | | | | | |
| (2) | 1.09% [2.90] | 1.00% [2.38] | -0.03% [-1.43] | -0.02% [-0.33] | | | | | |
| (3) | 0.95% [2.61] | 1.00% [2.38] | -0.03% [-1.46] | -0.05% [-0.91] | 0.00% [2.01] | 1.08% [3.22] | | | |
| (4) | 0.58% [3.64] | 0.66% [2.47] | | | | | 0.17% [2.29] | | |
| (5) | 0.93% [2.55] | 0.99% [2.35] | -0.03% [-1.43] | -0.05% [-0.94] | 0.00% [1.44] | 1.06% [3.20] | 0.16% [1.97] | | |
| (6) | 0.70% [4.19] | 0.64% [2.41] | | | | | | -0.15% [-3.07] | |
| (7) | 1.10% [3.09] | 1.00% [2.38] | -0.03% [-1.58] | -0.03% [-0.53] | 0.00% [0.64] | 0.96% [2.83] | | -0.15% [-3.21] | |
| (8) | 0.69% [4.15] | 0.64% [2.40] | | | | | 0.08% [1.22] | -0.15% [-2.96] | |
| (9) | 1.09% [3.04] | 1.00% [2.37] | -0.03% [-1.56] | -0.03% [-0.56] | 0.00% [0.62] | 0.95% [2.81] | 0.07% [0.93] | -0.15% [-3.19] | |
| (10) | 0.56% [3.56] | 0.68% [2.56] | | | | | | | 0.14% [3.04] |
| (11) | 0.95% [2.61] | 1.04% [2.45] | -0.03% [-1.54] | -0.05% [-0.96] | 0.00% [2.29] | 1.07% [3.22] | | | 0.16% [3.28] |
| (12) | 1.10% [3.06] | 1.03% [2.42] | -0.03% [-1.64] | -0.03% [-0.57] | 0.00% [1.11] | 0.95% [2.78] | -0.02% [-0.29] | -0.15% [-3.14] | 0.14% [2.51] |

Table 8
Investment-Style Analysis

The tables reports the performances of share-restricted hedge funds sorted into groups by investment style and past flow. A fund is share-restricted if it imposes a nonzero redemption-notice period. Every month, the funds of each investment style are sorted into three portfolios based on prior-month flow (F1 is the lowest flow tercile and F3 is the highest). Portfolios are equally weighted and rebalanced monthly. The table reports the average portfolio returns excess of the industry average, as well as the average returns of the top-minus-bottom flow portfolios and their risk-adjusted returns (alphas) using the Fung-Hsieh factors. The group ARB includes the arbitrage strategy funds, i.e., Convertibel Arbitrage, Even Driven, and Fixed Income Arbitrage. Square brackets include t -statistics. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

| Style | N | Return | | F3 - F1 | |
|------------------------|-------|---------|---------|---------|---------|
| | | F1 | F3 | Return | Alpha |
| Convertible Arbitrage | 162 | -0.10% | -0.08% | 0.03% | 0.05% |
| | | [-1.01] | [-0.79] | [0.18] | [0.34] |
| Emerging Markets | 300 | -0.08% | -0.15% | -0.07% | -0.02% |
| | | [-0.55] | [-1.15] | [-0.37] | [-0.11] |
| Equity Market Neutral | 325 | -0.24% | -0.06% | 0.19% | 0.13% |
| | | [-2.80] | [-0.81] | [1.64] | [1.08] |
| Event Driven | 464 | -0.27% | -0.02% | 0.25% | 0.22% |
| | | [-4.75] | [-0.31] | [2.94] | [2.44] |
| Fixed Income Arbitrage | 229 | -0.26% | 0.21% | 0.47% | 0.40% |
| | | [-3.44] | [1.56] | [3.05] | [2.80] |
| Fund of Funds | 1,537 | -0.09% | 0.03% | 0.13% | 0.08% |
| | | [-2.28] | [0.78] | [1.89] | [1.17] |
| Global Macro | 241 | -0.29% | 0.28% | 0.56% | 0.50% |
| | | [-2.77] | [2.07] | [3.35] | [2.88] |
| Long/Short Equity | 1,760 | -0.25% | 0.09% | 0.35% | 0.31% |
| | | [-3.37] | [1.57] | [3.30] | [3.26] |
| Managed Futures | 381 | -0.39% | 0.46% | 0.85% | 0.83% |
| | | [-2.47] | [1.43] | [2.38] | [2.22] |
| Multi-Strategy | 377 | -0.18% | -0.15% | 0.03% | 0.04% |
| | | [-2.73] | [-2.25] | [0.30] | [0.46] |
| Not Long/Short Equity | 4,066 | -0.20% | 0.10% | 0.30% | 0.30% |
| | | [-3.66] | [1.94] | [3.88] | [3.82] |
| ARB | 855 | -0.24% | 0.04% | 0.28% | 0.26% |
| | | [-5.24] | [0.86] | [4.42] | [4.15] |

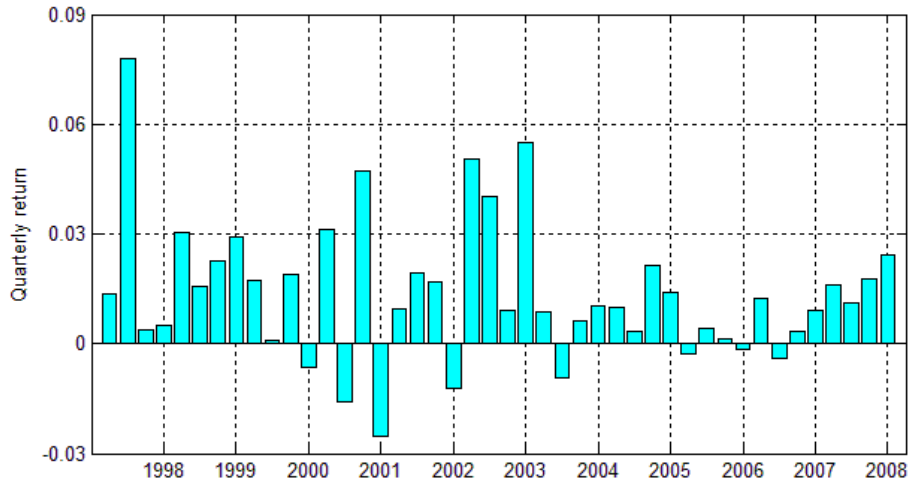
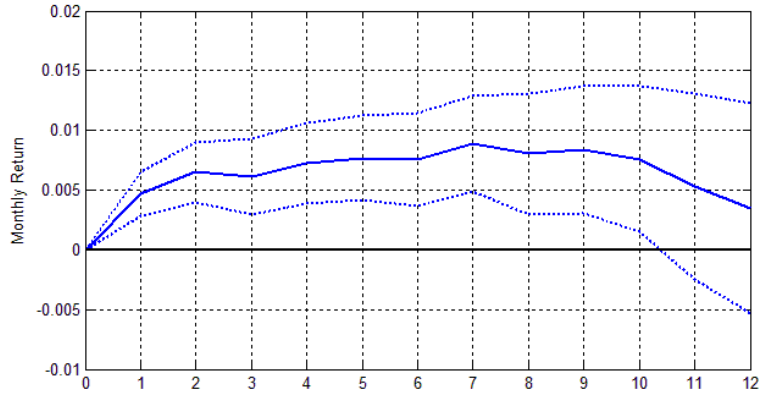
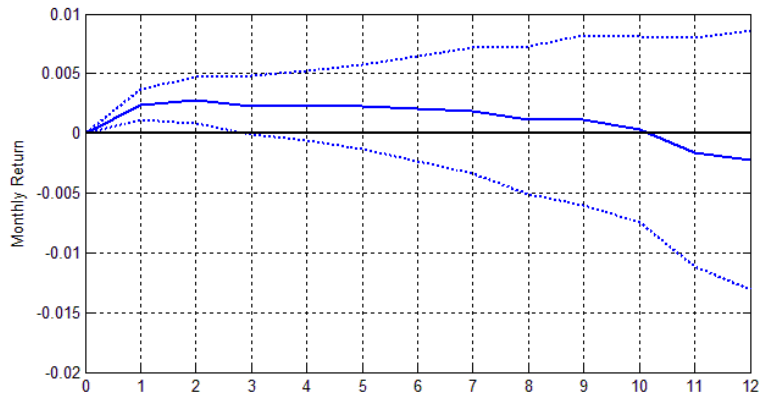


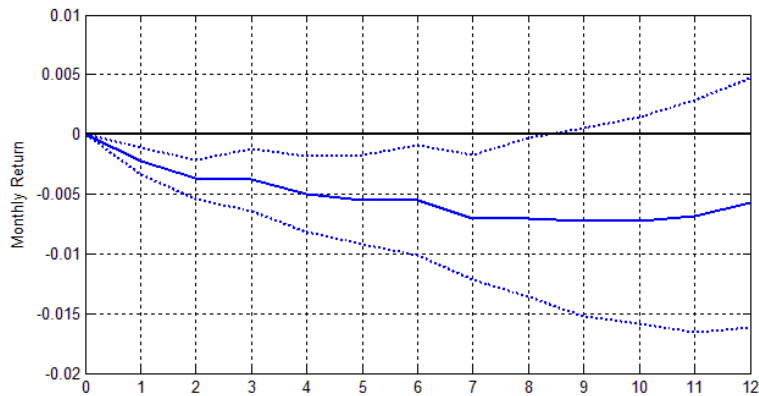
Figure 1. The time series of the flow portfolio return spread for restricted funds. Every month share-restricted hedge funds are sorted into equal-size quintiles by previous month flow. Funds in each quintile are grouped into a portfolio with equal weights. Portfolios are rebalanced monthly. The graph plots the top-minus-bottom portfolio return spread. The vertical grid represents the fourth quarter of each year. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.



Panel A: Flow return spread

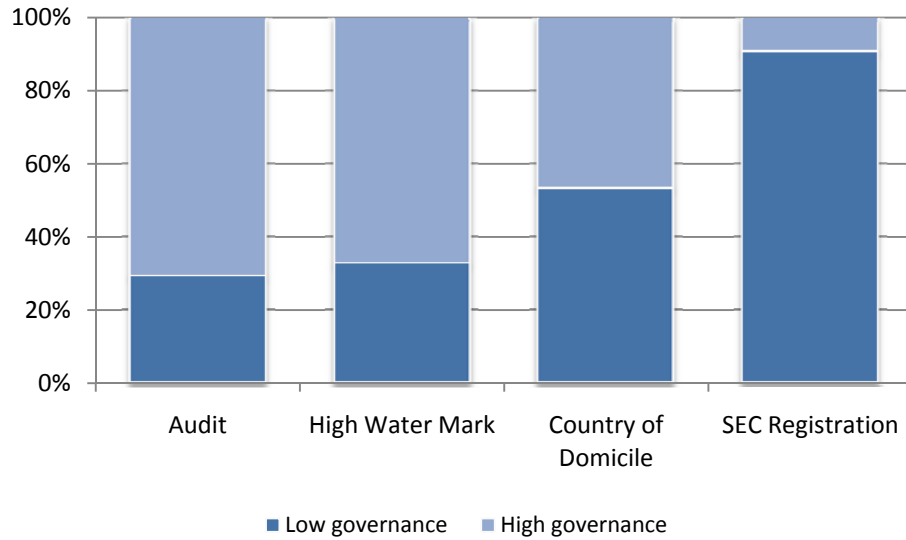


Panel B: Inflow return relative to hedge-fund index

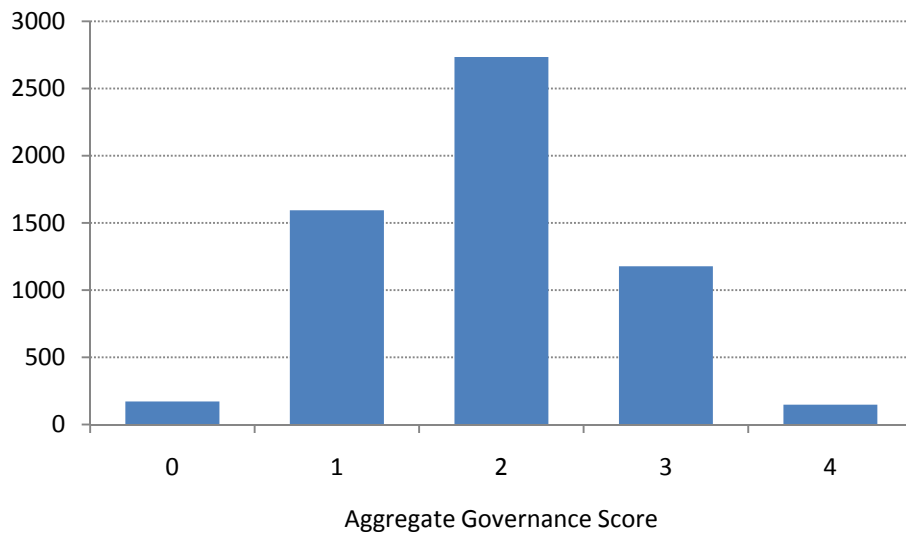


Panel C: Outflow return relative to hedge-fund index

Figure 2. Long-run performance of portfolio return spreads. Every month share-restricted hedge funds are sorted into equal-size quintiles by previous month flow. Funds in each quintile are grouped into a portfolio with equal weights. Panel A plots the top-minus-bottom portfolio return spread, while Panels B and C respectively plot the returns of the top and bottom flow portfolios, relative to the equally weighted hedge fund index. The figures plot the performance of the portfolio cumulative return spreads during the first 12 months post-formation (solid lines) along with the two-standard-error bounds (dotted lines). The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

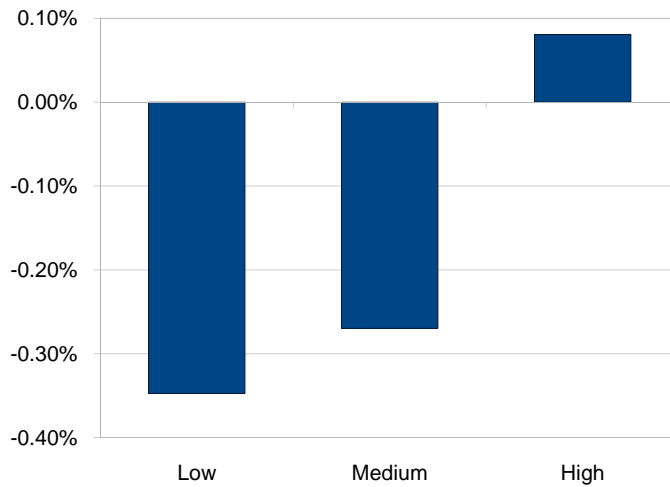


Panel A: The distribution of corporate governance variables

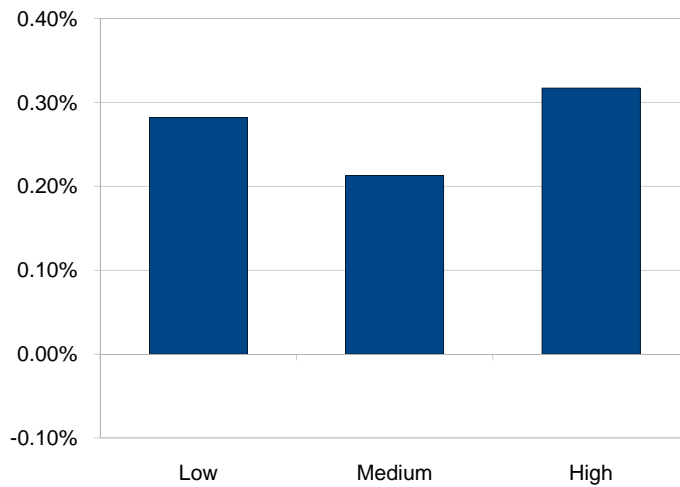


Panel B: Histogram of aggregate corporate governance score

Figure 3. The distribution of corporate-governance variables. Fund governance is measured along four variables: auditing, high water mark, country of domicile, and SEC registration. If a fund reports a completed financial audit it is assigned a score of one and zero otherwise. If a fund applies a high water mark it is assigned a score of one and zero otherwise. If a fund is domiciled onshore it is assigned a score of one and zero if it is domiciled offshore. If a fund is registered with the SEC it is assigned a score of one and zero otherwise. Panel A displays the distribution of each governance variable, where low and high governance represent values of zero and one, respectively. Panel B plots the distribution of the aggregate governance score, which is calculated as the sum of the four individual governance variables. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

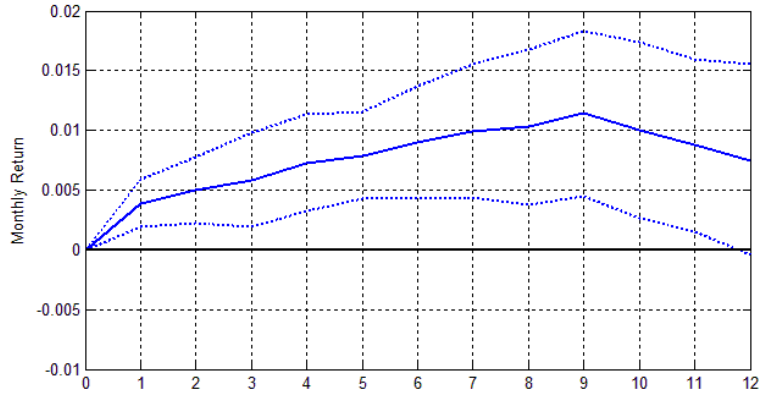


Panel A: Outflow returns of funds sorted by aggregate corporate governance

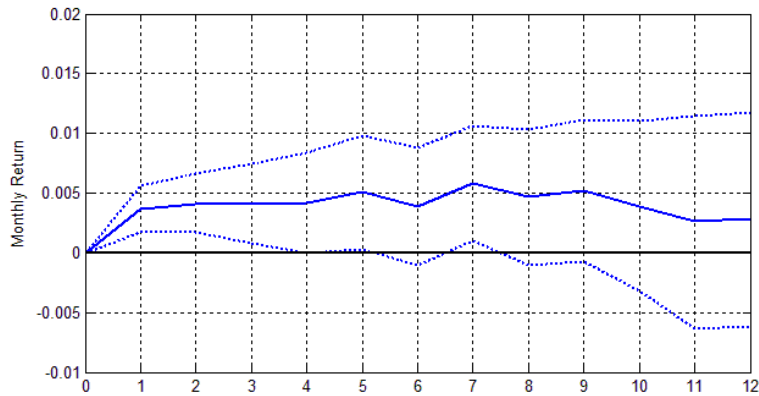


Panel B: Inflow returns of funds sorted by aggregate corporate governance

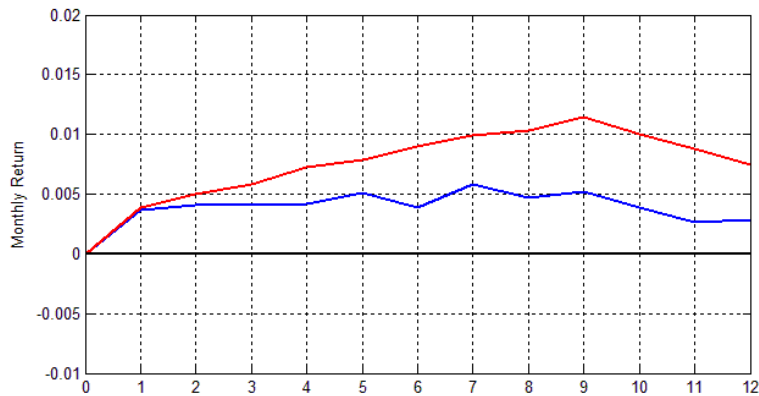
Figure 4. Each month share-restricted hedge funds are sorted by aggregate governance and past-flow. Aggregate governance is calculated as the sum of four individual governance variables: financial auditing, high water mark, country of domicile, and SEC registration. If a fund reports a completed financial audit it is assigned a score of one and zero otherwise. If a fund applies a high water mark it is assigned a score of one and zero otherwise. If a fund is domiciled onshore it is assigned a score of one and zero if it is domiciled offshore. If a fund is registered with the SEC it is assigned a score of one and zero otherwise. Low governance includes funds with an aggregate governance score of either 0 or 1, Medium includes funds with an aggregate governance score of 2, and High includes funds with an aggregate score of either 3 or 4. The funds in each aggregate governance group are sorted each month into five equally weighted portfolios based on prior-month flow. Portfolios are rebalanced monthly. The figure plots the average portfolio returns excess of the industry average for the top and bottom quintiles of flow. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.



Panel A: Flow return spread for fund holding relatively illiquid assets



Panel A: Flow return spread for fund holding relatively illiquid assets



Panel C: Flow return spread funds holding relatively liquid and illiquid assets

Figure 5. Long-run performance of portfolio return spreads for different levels of asset liquidity. Funds are sorted into three groups by the level of their asset liquidity using the measure proposed in Getmansky, Lo, and Makarov (2004). For each liquidity group, every month share-restricted hedge funds are sorted into equal-size quintiles by previous month flow. Funds in each quintile are grouped into a portfolio with equal weights. The panels plot the top-minus-bottom portfolio return spread for the top and bottom liquidity funds. The figures plot the performance of the portfolio cumulative return spreads during the first 12 months post-formation (solid lines) along with the two-standard-error bounds (dotted lines). The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.

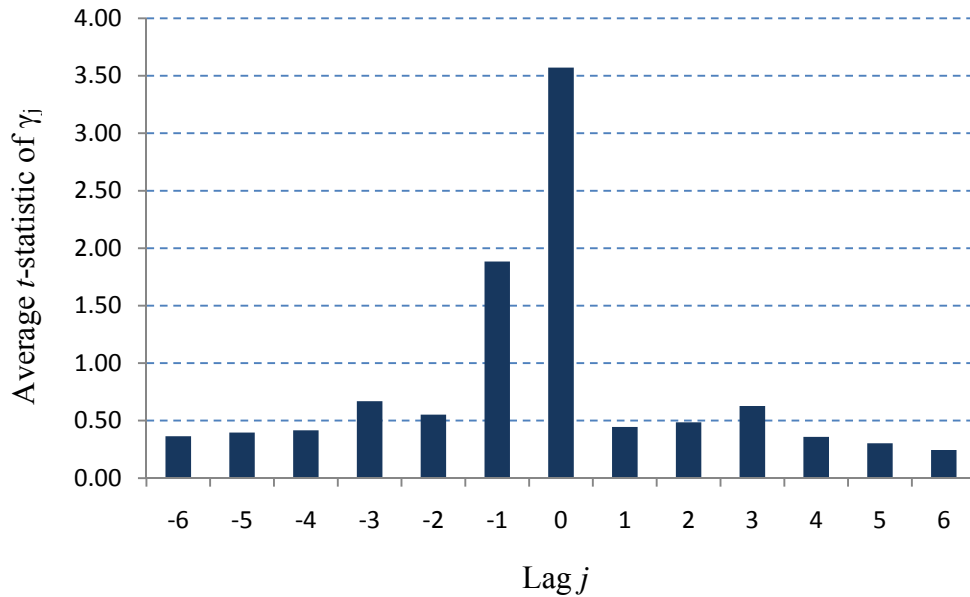


Figure 6. Lead-lag relation of high- and low-fee funds in the same fund family. Fund families are identified as asset management companies with multiple fund names. For each management company that applies a diverse management fee structure, we separate the funds whose management fee is above and below the median fee of the particular management company. We then compute the average flow each month for each of the two groups within each management company. We run the following regression

$$F_{i,t}^{High} = \alpha_j + \gamma_j F_{i,t}^{Low} + \epsilon_{j,t},$$

where $F_{i,t}^{High}$ is the average flow of the high-management-fee group of management company i during month t , $F_{i,t}^{Low}$ is the average flow of the low-management-fee group of management company i during month $t+j$, and $\epsilon_{j,t}$ is the error term. We consider specifications using the integer values in the range -6 to +6 for the index j . The regression models are run using the full sample available for each management company. The sample includes the universe of hedge funds on Lipper/TASS for the period 1998–2008.