Fooling the Savvy Investor? Secrecy and Hedge Fund Performance

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Abstract

If a qualified investor has a choice between investing in a secretive fund and a transparent fund with the same investment objective, which should she choose? Prior work suggests that the secretive fund is better. Hedge fund managers generally use their discretion for the benefit of their investors (Agarwal, Daniel and Naik, 2009, Agarwal, Jiang, Tang and Yang, 2013). In this study we identify a subset of hedge funds managers, which appear to use their discretion to feign skill. Using a proprietary dataset obtained from a fund of funds, we document that hedge funds that are more secretive vis a vis their own investors earn somewhat higher returns than their investment-objective-matched peers during up markets, consistent with earlier papers documenting skill-based performance, but significantly worse returns during down markets. This evidence suggests that at least part of the superior performance that secretive funds appear to generate is in fact compensation for loading on additional risk factor(s) as compared to their objective-matched peers.

Keywords: Hedge funds, Risk premia, Disclosure, Transparency

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1 Introduction

Hedge funds in the U.S. are exempt from many disclosure requirements funds under the rationale that the savvy and sophisticated clientele permitted to invest in hedge funds is well qualified to evaluate funds' governance and investment strategies without the interference of government regulation.[5]

While the greater secrecy afforded hedge funds allows them to pursue proprietary investment strategies with less risk that other investors might mimic and free ride on their strategies, there is a natural tension between secrecy and the ability of a hedge fund's investors to monitor the managers, who in the absence of monitoring may deviate from strategies which are optimal for the investors.

Prior research provides evidence that managers often use their discretion for the benefit of their investors. Agarwal, Daniel and Naik (2009) find that hedge fund returns are higher when managers have more discretion as proxied by the length of lockup, notice and redemption periods. Aragon, Hertzel and Shi (2013) and Agarwal, Jiang, Tang and Yang (2013) provide evidence that managers use their discretion to delay the reporting of fund holdings to the U.S. Securities and Exchange Commission (SEC) for the benefit of their investors, generating higher abnormal returns during period when they keep their holdings secret.[6]

[5]Investment Company Act of 1940 carves out an exception from some disclosure requirements for investment companies which only accept funds from "accredited investors". Accredited investors are those income greater than $200,000 (or $300,000 with a spouse a net worth greater than $1 million (https://www.investor.gov/news-alerts/investor-bulletins/investor-bulletin-accredited-investors). Senate Report No. 293, 104th Cong., 2d. Sess. 10 (1996) and Staff Report to the United States Securities and Exchange Commission, September 2003, "Implications of the Growth of Hedge Funds" comment on the reasoning for this exception.

[6]Section 13F of the Securities Exchange Act of 1934 require investment companies with more that $100 million in assets to report holdings on a quarterly basis. Managers may request to delay disclosure of the holdings for up to a year

Each of these two aspects of managerial discretion has built-in disciplining mechanisms, which may reduce the ability of managers to abuse their discretion for their own benefit. With regard to regulated disclosure, managers have much less scope to conceal information as it will eventually be revealed, albeit, with some delay. In the case of contractually stipulated lock-up, notice and redemption periods, the money investors are withdrawing will eventually be returned. The fact that there are these built-in disciplining mechanisms may be important. Other work suggests that when managers have greater discretion they eschew their fiduciary responsibility in order to secure hire fees. Agarwal, Daniel and Naik (2009) find that managers with more incentive and opportunity to do so, inflate their returns in December.

In this paper we consider a situation over which managers have full discretion: how secretive they are *vis a vis* their own investors. Whether more disclosure is good or bad largely depends on the source of a fund's performance. If secretive funds attract more skillful managers that invest in acquiring more information about the instruments they trade and employ proprietary strategies to generate "alpha", more disclosure would not be necessarily good, since it might allow other funds or investors to free-ride on these more skillful managers, reducing their competitive advantage and incentives for providing superior performance. If on the other hand, secrecy allows hedge funds to misbehave and take more systematic ("beta") or unsystematic risk than they claim, then there may be a rationale for increasing disclosure requirements, so that investors understand what they are being compensated for when they receive their seemingly superior returns.

We argue that during relatively good times, the high-alpha and the high-beta/high-risk explanations for secretive funds may be observationally equivalent as long as we do not know the full model of hedge fund returns or do not observe all possible risk factors that explain variation in returns. On the other hand, during bad times, the high-alpha and the high-beta/high-risk explanations yield very different predictions under the assumption that the risks, on which the high-beta/high-risk funds load, realize during these bad times.

Using a proprietary data base first used by Ang, Gorovyy and van Inwegen (2011), we compare the performance of secretive and transparent hedge funds during good and bad times and find that during an up market secretive funds significantly outperform transparent funds, controlling for the investment style; however, during a down market the secretive funds perform dramatically worse consistent with secretive funds, relative to their investment-style matched peers, loading on additional risks, which realize during the down market. The benefit of our empirical setup lies in the opportunity for making such an assessment irrespective of knowing the true model that drives hedge fund returns, but instead by relying on the assumption that some of the risk factors that secretive funds may have loaded more aggressively on, also suffered low returns during the period of the global financial crisis.

We also examine the relation between flows and performance across secretive and transparent funds. We hypothesize that secretive funds will be less sensitive to past performance than transparent funds as it may be harder for investors to infer deviations from the secretive fund's declared strategy. Consistent with this hypothesis, we find that flow to performance

sensitivity is greater for transparent funds than secretive in both the up and down markets. This finding is consistent with investors in secretive funds viewing past returns as noisier signal of managerial skill. During the down market, the flow to performance sensitivity of transparent funds decreases, while the flow to performance sensitivity of secretive funds increases. This finding is consistent with investors in secretive funds inferring skill from risk in much the same way we do; using down-market realizations to distinguish skill from risk.

This paper contributes to three areas of the literature. First, we contribute to the literature on disclosure and managerial incentive alignment by examining whether hedge fund managers use their discretion for the benefit of their clients. Because of our proprietary data set obtained from a fund of funds, we are able to directly measure the level of secrecy of a fund – a qualitative characteristic that is missing in public hedge fund databases. The level of secrecy *vis a vis* their own investors describes the willingness of the hedge fund manager to disclose information about its positions, trades and immediate returns to investors. Using a sample that spans April 2006 to March 2009, we document that secretive funds significantly out-perform transparent funds during the up market. These findings are consistent with those of Aragon, Hertzel and Shi (2013) and Agarwal, Jiang, Tang and Yang (2013). These papers examine secrecy *vis a vis* the public, looking the performance of stock for which hedge fund managers have requested confidential treatment on SEC, 13F disclosure forms. They find that stocks that are kept secret in the filings to the SEC generate abnormal return (alpha) consistent with managers possessing skill. Our findings differ for two reasons. First, we are looking at a

different aspect of secrecy – secrecy *vis a vis* one's own investors – and, second, because we are able to use the crisis period to investigate the source of the out-performance we uncover. The fact that our secretive funds significantly underperform transparent funds during the bad times suggests that at least a part of the performance differential between secretive and transparent funds during good times can be attributed to a higher risk taking by secretive funds, which earned a premium during good times but faced these realized risks during bad times. In this way our work makes its second contribution by contributing to the literature on hedge fund performance measurement emphasizing the value of measuring performance across up and down markets.

Finally, our paper contributes to the market efficiency literature. In this literature institutional and other accredited investors are treated as savvier than typical retail investors. The evidence that investors in secretive funds are insensitive to past performance, even when controlling for the illiquidity of the funds, suggests that they are sophisticated enough to be skeptical of the signals received from secretive funds. However, the skepticism does not protect existing investors from the extreme down-market performance of secretive funds

While few papers in the asset pricing literature have raised the issue of secrecy as related to hedge funds, presumably due to the absence of adequate data to explore this question, some prior research has examined aspects of this important issue. Anson (2002) outlines different types of transparency and discusses why investors may want a higher degree of transparency; Hedges (2007) overviews the key issues of hedge fund investment from a practitioner's perspective; Goltz and Schroder (2010) survey

hedge fund managers and investors on their reporting practices and find that the quality of hedge fund reporting is considered to be an important investment criterion. Aggarwal and Jorion (2012) study the effects of hedge funds' decisions whether to provide or not to provide managed accounts for their investors. They interpret the incidence of accepting managed accounts as an indicator of the willingness of the fund to offer transparency. In contrast, we are able to directly measure the level of secrecy (transparency) of a fund by using proprietary fund of funds scores that are based on formal and informal interactions with hedge funds, such as internal reports, meetings with managers and phone calls.

There are limits to this analysis. While we believe these limitations should bias against us our findings, nonetheless they should be noted. While Ang, Gorovyy and van Inwegen (2011) provided evidence that these data are representative of the broad population of hedge funds, it would be reasonable to expect that the fund of funds providing these data have selected funds based on past performance and the expectation of future performance. As such, it could be selection criteria bias our sample in favor of funds that attempt to feign skill, because the fund of funds drops funds which are have performed poorly or were unsuccessful in mimicking the returns of skillful hedge fund managers. That is, one should not necessarily interpret our findings to mean that secretive funds will earn on average higher returns in up markets and extremely worse returns in down markets (because there could be unobserved secretive funds among the funds that were not selected for inclusion). Instead what our results show is that hedge funds that are secretive, on average take on more risk than they claim. We are able to infer what they claim by the fact that

these funds report the strategies they follow, which suggests the type of risks they are exposed to, and the fact that they report the degree of leverage, which modifies their exposure to those risks. The second limitation is that these hedge funds may have only been secretive with respect to this one investor, our fund of hedge funds. However, we would expect this bias to reduce our ability to find any result, as one would have to have an argument for why funds that load on extra risk would only be secretive toward the fund of funds. We cannot think of any such argument.

Our paper is closely related to Agarwal et al. (2013) and Aragon, et al (2013), which explore the confidential filings of equity hedge funds. Using the data up to 2007, they find that the confidential ("secretive") holdings of hedge funds outperform regular ("transparent") filings on a risk-adjusted basis (e.g. using Carhart's, 1997, four-factor alpha). They interpret it as a higher stock-picking skill in hedge funds confidential holdings. We consider a broader span of funds across different strategies (for which four factors may not explain large portions of cross-sectional variation in returns), as well as secrecy with respect to fund investors, rather than secrecy in the public filings with SEC. Further, we propose to evaluate performance differentials during good and bad times separately. This enables us to infer the presence of risk premia with respect to potentially unobserved factors, which would not be distinguishable from skill during good times.

The paper is also close in spirit to Brown, Goetzmann, Liang, and Schwarz (2008) who use SEC filing data to construct a so called ω-score, which is a combined measure of conflict of interests, concentrated ownership, and leverage, and show that it is a significant predictor of the projected fund life. In a subsequent paper, Brown, Goetzmann, Liang, and

Schwarz (2012) use proprietary due diligence data to construct an operational risk variable as a linear combination of variables that correspond to mistakes in statements, internalized pricing, and presence of an auditor in the Big 4 group. We consider operational risk in a broader sense, where the willingness of hedge fund managers to provide details of their strategies, as well as hedge fund liquidity, investment concentration, and the ability of the investors to understand fund's operations are important.

Our paper is organized as follows: Section 2 describes the data and explains the details of the identification strategy; Section 3 discusses the main results regarding the return premia associated with highly secretive funds; Section 4 examines flow-to-performance sensitivity of hedge funds based on the secrecy of funds and Section 5 concludes.

2 Data Description and Characteristics of Secretive Funds

2.1 Data Description

We use a unique data set obtained from a fund of funds, which was first used in Ang, Gorovyy, and van Inwegen (2011). The data set contains detailed monthly fund information over the period from 2006 to 2009. This fund of funds is one of the largest in the U.S., but the fund management asks that we do not disclose the identity of the fund. The data provide information on hedge fund returns net of fees, their assets under management, their long and short exposure, and the principal strategy of the fund. Most importantly, these data include scores for hedge fund secrecy, in addition to measures of illiquidity, concentration, complexity, and leverage, as rated

by the fund of funds on a scale from 1 to 4, which we convert to a zero-one dummy, where zero corresponds to the lowest value of the variable and one – to all others. We do this because we believe that the primary distinction between transparent and secretive funds is that the latter attempt to be secretive with their own investors. This aggregation also improves the power of our tests because of the small number of extreme observations.

To measure secrecy, once a year at the end of March in 2007, 2008 and 2009, the fund of funds grades all the hedge funds it invests in based on its interactions with them during the previous twelve months. These interactions consist of weekly or monthly reports to the fund of funds, meetings with managers, phone calls, etc. Due to the nature of the scoring process and a significant level of effort put into the construction of the scores, we feel confident that they represent unique information about funds' operations that cannot be captured by the quantitative data alone. Such qualitative measures are not present in public hedge fund databases, such as CISDM, HFR, or TASS. Therefore, we think our data are especially well-suited for studying the return premia associated with the secretive nature of certain hedge funds.

The definitions of secrecy, illiquidity, concentration, and complexity as used by the fund of funds are natural and intuitive. Hedge fund secrecy represents a lack of willingness of the hedge fund manager to share information about the fund's current activities and investments with its investors and, for example, provide the return instantaneously (e.g. upon a call) when a certain market event happens. Hedge fund illiquidity measures the illiquidity of investments with the hedge fund from the point of view of investors. It comprises of both the illiquidity of fund's assets and restric-

tions on investment withdrawal, such as the presence and the length of lockup periods. Hedge fund concentration represents the level of concentration of hedge fund investments. Hedge fund complexity corresponds to the complexity of hedge fund strategy and its operations. Finally, hedge fund leverage measures how leveraged the fund is. For example, a hedge fund that uses derivative instruments and swap agreements is considered to be complex, since it is harder for investors to understand exactly the kinds of exposures they face by investing with such a fund.

The data from the fund of funds includes all nominally or legally separate entities, and some of these can be managed by the same manager and follow the same strategy. In order to avoid inflating our test statistics, we conduct our analysis at the level of fund families, where each "family" corresponds to a number of funds (usually 2 or 3) that are characterized by the same returns in all periods, same strategy, and same long and short exposures. Essentially, these are different copies of the same fund having the same portfolio, but targeted at different investors: e.g. for qualified vs. regular partners, onshore vs. offshore funds, funds denominated in different currencies, and additional fund copies potentially created after the maximum of the number of partners has been achieved.[7]

This way we are left with 4,847 monthly observations of 200 different hedge fund families ("hedge funds" in what follows) that are evenly spread across the three years as shown in Panel A of Table I, with 1,663 observations between April 2006 and March 2007, 1,610 observations between April 2007 and March 2008, and 1,574 observations between April 2008

[7]This approach is very similar to conducting the analysis at the fund level, but properly accounting for perfect correlation within each fund family in a given month (e.g. by clustering errors) to avoid artificial significance of the results. We decided to look at the family level instead, because we are also interested at looking at assets under management that, given the same fund manager and strategy, are ultimately a fund family characteristic.

and March 2009. Since our qualitative grades are assigned at the end of March, we use yearly periods starting every April. For example, the monthly returns of a fund from April 2006 to March 2007 are matched to secrecy, illiquidity, concentration, and complexity grades that the fund of funds issued at the end of March 2007. This approach ensures that all interactions with the hedge fund that constitute the basis for the grades are conducted in the same period when the fund return is delivered. Although primarily emerging as a result of the grading month, this April to March time frame also corresponds nicely to three very distinct periods, that allow us to distinguish performance relative to unobserved risks that manifest during extreme market downturns.

As we argue later on, comparing and contrasting the returns of different types of hedge funds (e.g. secretive versus transparent) in different states of nature ("good" vs. "bad" periods) is essential to understanding whether there are risks associated with these types of hedge funds – in the situation when the true risk model is unknown. Because the "good" and "bad" is always relative to the unobserved risk factors, it is especially compelling that our data covers the period of the global financial crisis, where we feel comfortable to assume that risk factors on which hedge funds may have loaded did indeed realize – simply because so many things crashed during this period. Although we may have in mind some of the omitted factors being potentially related to rare events and tail risk (as also supported by loadings on strategies associated with option-based returns as in Agarwal and Naik, 2004), they may well represent other risks that were likely to realized during the crisis period. We therefore label April 2008 to March 2009 as the "bad" period – a recession period according to NBER, high-

lighted by the bankruptcy filing by Lehman Brothers in September 2008 and some of the largest drops of stock market indices in history.[8]

The period between April 2006 and March 2007, on the other hand, can be considered a "good" period: according to the Financial Crisis Inquiry Report (2011) it was a normal growth period, a growth period according to NBER, and a period of rapid rise of the U.S. stock market indices. This period also followed a period of steady growth, so it is relatively safe to assume that at least some of the omitted risks were not realizing during this period, but were instead earning a compensation.

Finally, the period between April 2007 and March 2008 is a somewhat intermediary period, as it ends with the collapse of Bear Stearns that declared the beginning of the financial crisis, but was an NBER growth period for much of the period. Since we cannot safely assume whether the possible omitted risks realized during this period or were earning a compensation, this period would not be of a particular help in trying to disentangle skill from the risk loadings.

Hedge funds in our data set represent a broad set of strategies, with each fund being identified by a single strategy. This characteristic is time-invariant for a given hedge fund (at least during the periods considered), which is not surprising given that funds are created in order to pursue a particular strategy and investors expect the fund to follow it continuously over time.

Panel A of Table 1 tabulates the number of hedge funds by investment

[8]The exogenous nature of the global financial crisis presents us with a unique opportunity to observe hedge funds returns during a truly bad event realization when the two explanations (skill vs risk loadings) would not be observationally equivalent. The idea of "good" and "bad" periods having different informational content is not completely new. For example, Schmalz-Zhuk (2013) argue that stocks should be more sensitive to news during bad periods: good or bad performance during bad times is a clearer signal for investors than good or bad performance during good times.

strategy for each of the three periods considered. There are credit (CR), event driven (ED), equity (EQ), relative value (RV), and tactical trading (TT) hedge funds. Credit hedge funds trade mostly corporate bonds and CDS on those bonds. Event-driven hedge funds seek to predict market moves based on specific news announcements. Equity hedge funds trade equities (e.g. having high/low net exposure to sectors and regions). Relative value hedge funds seek pair trades where one asset is believed to outperform another asset independent of macro events (e.g. capital structure or convertible bond arbitrage). Finally, tactical trading funds seek to establish favorable tactical positions using various combinations of the above strategies. These five strategies are further divided into 39 substrategies.

As we see, approximately half of the hedge funds in the database are equity funds, with relative value and event driven as the next most popular strategies. This distribution of strategies across funds is comparable to other databases, as reported, for example, by Bali, Brown, and Caglayan (2011) for TASS.

Panel B of Table 1 reports separately for each of the three periods considered, the mean, median, standard deviation, and the number of observations for hedge fund monthly returns, assets under management (AUM), and each variable that is included as an independent variable in subsequent regressions. Hedge funds performed well as a group during the good period from April 2006 to March 2007 delivering on average an excess return of 7.47% per year. During the intermediate period they delivered on average a –1.22% return, while during the crisis period they delivered on average a negative –17.71% return. To get a sense of how these returns to compare to the hedge fund universe, in unreported results we download the HFRI

fund-weighted composite index, which is a global, equal-weighted index of over 2,000 single-manager funds that report to HFR Database. [9] Over the same periods average returns were 9.14% for the period ending March 2007, 3.48% for the period ending March 2008, and –16.69% for the period ending March 2009. The returns to the funds included in our sample are broadly similar, if slightly worse on average.

The funds in our data set appear to be somewhat larger, than funds in CISDM, HFR, or TASS databases, because we aggregate total assets under management across funds in the same family (corresponding to the same managed portfolio). Ang et al. (2011) use the same data to explore hedge fund leverage. They note that the composition of funds by strategy is similar to the overall weighting (as reported by TASS and Barclays Hedge), and the aggregate performance of the fund of funds is similar to that of the main hedge fund indexes.

Importantly, all funds in our database report their returns and those that terminate due to poor performance are also covered in the data. Ang et al. (2011) describe the hedge fund selection criteria and note that the criteria are not likely to introduce selection bias. In addition, they note that these hedge fund data include both funds that are listed in the common hedge funds data sets, such as TASS, CISDM, and Barclay Hedge, and funds that are not. This mitigates concerns about selection bias associated with voluntary performance disclosure (Agarwal et al, 2010, among others). Finally, survivorship bias is mitigated by the fact that hedge funds enter the database several months prior to the fund of fund's investment and the hedge funds exit the database several months after disinvestment.

[9]Source: Hedge Fund Research, Inc. www.hedgefundresearch.com, 2016 Hedge Fund Research, Inc. All rights reserved.

Therefore, we are confident that our data set is broadly representative of the hedge fund industry and suffers from less bias than is typical.

Finally, for each of the fund qualitative characteristics (secrecy, illiquidity, concentration, complexity, and leverage) we define a set of dummy variables that represent their High and Low levels, based on the original grades assigned by the fund of funds.[10]

Lastly, Panel C of Table 1 reports pairwise Spearman rank correlations between all of our qualitative scores (using one observation per fund-year). We observe that more secretive funds are also more illiquid, with the correlation statistically significant at 1% level. More secretive and are also slightly more complex on average, while more illiquid funds are also more concentrated. More leveraged funds are more illiquid, more complex, and more concentrated. These relations between our qualitative scores are quite expected and give even more credibility to our measures of secrecy, illiquidity, concentration, complexity, and leverage. In our empirical estimation we will account for these within-fund correlations accordingly.

2.2 Characteristics of Secretive Funds

Panels A and B of Table 2 report the distribution of fund secrecy levels (which are of our primary interest) across periods and across strategies. As we see, most funds are rated as being secretive. About half the observations of secretive and transparent funds are from funds investing in equity-based strategies. Funds following credit-based and tactical trading

[10]Interestingly, the original scale for grades represents levels of "problem" for the fund of funds associated with each characteristic. As we check with the fund of funds, transparency score of 1 means lowest problem with transparency (i.e. these are least secretive funds), and concentration score of 1 means lowest problem with concentration (i.e. least concentrated funds). Based on how the original scale is constructed, fund of funds views secrecy, illiquidity, concentration, complexity, and leverage as problematic characteristics of the fund.

strategies are relatively better represented among the transparent funds than the secretive ones, while the opposite is true for relative value funds. Importantly, we have both high- and low-secretive funds in each strategy (this is also true for "good" and "bad" period separately), which means that we can identify differences in performance across these two groups of funds within each strategy, and do not simply rely on some fund strategies performing differently in various periods and accidentally being also intrinsically different in terms of their secrecy.

In Panel C of Table 2 we examine whether high and low secrecy funds are different along a number of characteristics which may incentivize funds to be more secretive (assets under management, complexity, and prior year returns) or which may influence the ability of funds to generate abnormal performance (assets under management, concentration, illiquidity, and leverage). As documented in the mutual fund literature, managers may load on risk, without informing investors, in order to generate the appearance of skill. Smaller funds and those with low past returns may have a greater incentive to engage in such deceptive behavior. However, Table 2, Panel C shows that high secrecy funds are both statistically and economically significantly larger than low secrecy funds, with an average of \$2.5 billion assets under management for high secrecy funds versus just under \$1 billion for low secrecy funds. In addition, we find no significant difference in past returns between high and low secrecy funds. Reasons for secrecy do not need to be nefarious. Funds follow more complex trading strategies may have trading strategies that are more easily undermined if knowledge of the strategies became more widely known. As such, we might expect that more complex funds tend to be more secretive. This is what

we find. Among secretive funds, 42% follow complex strategies, but only 31% do among transparent funds.

Whether due to price pressure during the execution of larger trades or due to diminishing returns to scale, large funds may be less able to generate abnormal returns than small firms. Given the evidence that secretive funds tend to be larger than non-secretive funds, we would expect less secretive funds are better positioned to generate alpha than highly secretive funds. Recent work by Choi, Fedenia, Skiba, and Sokolyk (2016) shows that institutional managers invest in more concentrated portfolios, when they are more confident of their trades. This translates to higher abnormal returns to more concentrated portfolios in their study. As ranked by the fund-of-funds management, we find no statistically significant difference in hedge fund portfolio concentration between high and low secrecy funds. Funds which invest in illiquid assets can generate returns simply as compensation for the difficulty of buying and selling illiquid assets. Similarly, highly leveraged funds may earn high returns simple as compensation for the extra risk they take on as a result of their levered positions. As ranked by the management of the fund of funds, high secrecy funds are more illiquid, but, more transparent funds are slightly more likely to be highly levered.

We are able to examine differences in leverage in more detail because we also have measures of the long and short positions as a percentage of assets under management, reported by the hedge funds. These leverage measures are the same as those used in Ang, Gorovyy and van Inwegen (2011) and are defined as follows. Long holdings (Short holdings) are the value of long (short) positions as a percent of assets under management. Gross leverage is the sum of long and short holdings. It represents the leverage of the

fund, if none of the short positions hedge long positions. Net leverage is the difference between long and short holdings and it represents the leverage of the fund if all of the short positions hedge long positions. These leverage calculations account for derivatives by decomposing them into replicating positions on the underlying securities.

Table 2, panel C shows that while the long holdings are similarly levered on average, secretive funds on average have larger short holdings. These differences translate to higher gross leverage for secretive funds, but higher net leverage for transparent funds. Because differences in concentration, illiquidity and leverage can directly translate to differences in performance, when we test the relation between secrecy and hedge fund performance, it will be important to control for differences in concentration, illiquidity and leverage.

3 Do More Secretive Hedge Funds Take More Risk?

3.1 Preview of findings – a graphical analysis

Before turning to the formal analysis, we first use the data to explore the time-series performance of secretive and transparent funds graphically. The return data in these graphs are not adjusted for factor related returns; however, this does not mean the findings are uninformative. If the factor loadings on high and low secrecy funds are stable across periods then differences in the relative performance of high versus low secrecy funds across periods can suggest whether the differences are due to skill or risk.

To see this consider if returns to secretive funds are higher in the first period than returns to transparent funds. The high returns could be either

due to the skill (i.e. alpha) of the secretive hedge fund manager or it could be due to the secretive hedge fund manager loading on additional risks that earn compensation in the form of positive returns akin to high beta strategies. However, suppose there is a second period and in the period the returns to secretive funds are lower than returns to transparent funds. Given that the returns to secretive funds were higher in the first period, such an observation can only be due to the secretive hedge fund manager having loaded on risks which realize in the second period in the form of lower or negative returns. Such a finding does not preclude the possibility that the manager possesses skill over and above the risk exposure, but it indicates that the managers of secretive funds loaded on risks differently than did transparent funds. The appendix provides a detailed discussion and proof of this argument, including the discussion of the importance of selecting the periods appropriately.

Figure 1 plots the equally-weighted monthly returns of secretive funds (red line) and transparent funds (blue line). Figure 2 plots performance of similar equally-weighted portfolios averaging across funds that also have the same secrecy in 2007 and 2009. This makes a somewhat cleaner comparison, since we only look at funds that did not adapt their reporting levels to different market conditions, potentially reflecting a change in their underlying risk strategy.

As can be seen from these figures, when both portfolios of funds are doing relatively well (having a positive return), e.g. during 2006 and most of 2007, the portfolio of secretive funds outperforms the portfolio of transparent funds almost in every month. On the other hand, when all funds do poorly, e.g. during most of the year 2008, the portfolio of secretive

funds under-performs the portfolio of transparent funds. This pattern is especially pronounced during the crash of 2008 when secretive funds earn noticeably lower returns than transparent funds.

These figures convey the main message of the paper: the outperformance of secretive funds observed in good times is at least in part due to secretive funds having higher loadings on risks that realized during the crisis and that resulting in more severe declines for secretive funds than transparent ones during the down-market period.

3.2 Differences in Performance between Secretive and Transparent Funds: Identification Strategy

In this section we turn to a more systematic analysis of the differences in return performance between high and low secrecy funds by estimating the following empirical specification for different periods of our data ("good" and "bad"):

$$R_{it} = c + a^H Sec_i^H + \delta X'_{it} + d_t + \varepsilon_{it}$$

where R_{it} is the excess return of fund i in month t, Sec_i^H is a dummy variable that equals 1 if the fund is rated as secretive in the period of estimation, and 0 otherwise.

By separately examining the good period, 2007 (April 2006 to March 2007) and the bad period, 2009 (April 2008 to March 2009) we can distinguish return performance due to skill and performance due to risk taking, if we can assume that the unobserved factors realize during the bad period. In addition, in most of the specifications we include monthly fixed effects, d_t, to account for macroeconomic conditions that affect all hedge fund returns. In some specifications we further include a vector of controls, X'_{it} ,

which includes dummy variables for illiquidity, concentration, complexity, and leverage (defined similarly to secrecy indicator), the natural logarithm of fund's assets under management, net percentage flows to the fund over the last month – to account for a potential difference in performance of funds that have different size or have recently experienced abnormal flows. It is worth noting that including these controls is equivalent to controlling for the predicted level of fund secrecy, under the assumption that these measures, X'_{it}, predict the level of secrecy. ε_{it} denotes the error term in the above-specified regression model.

/par In some specifications we include an additional set of controls: a dummy to indicate whether the fund management files 13F disclosures with the SEC, under the assumption that funds that file 13F forms are somewhat constrained in their ability to be secretive; and strategy fixed effects to control for unobserved differences across funds that pursue different strategies. Finally, in all our specifications we report standard errors that are robust to heteroskedasticity, as well as within-fund correlation over time (i.e., clustered at the fund level).

3.3 Differences in Performance between Secretive and Transparent Funds

In the next subsections we look at performance in two ways. First, we examine the differential performance of secretive and transparent funds, controlling for various characteristics of the funds including size, flows, illiquidity, concentration, complexity, and leverage. Controlling for these characteristics allows us to measure the direct effect of these characteristics of the performance of the fund. In addition, using these controls is tan-

tamount to measuring the impact of observed secrecy incremental to the predicted level of secrecy, under the assumption that our controls predict whether a fund is secretive or transparent. These results show that conditional on these observed characteristics levels of secrecy are associated with higher returns in the up market and lower returns in the down market, consistent with secretive funds loading on additional risks and inconsistent with fund managers who successfully time risk loadings or leverage. Second, we examine whether the relation between secrecy and returns can be explained by funds in different strategies (and substrategies) loading differentially on various risk factors. We do this non-parametrically by using strategy-month fixed effects. This is econometrically equivalent to assuming that funds that follow the same strategy have the same exposure to the all risk factors, whatever they could be, and similar to.running our results on a strategy-matched sample. In each case, whether examining abnormal secrecy or using a strategy-matching risk adjustment, the central findings hold. The abnormal positive up-market returns and negative down-market returns of the secretive funds are consistent with them loading on additional risks that realize during the down-market.

3.3.1 Performance of hedge funds in the good period: April, 2006 to March, 2007

We start by considering the "good" period – the normal growth period of April 2006 to March 2007 – to see if there are any performance differences across different types of funds during good times, which could be later attributed to skill or risk-taking, once we have also explored the "bad" period.

Table 3, Panel A, column 1 reports the results of the simplest specification that regresses hedge fund performance on the indicator variable corresponding to high levels of secrecy – our primary variable of interest. The coefficient a^H identifies the mean difference in performance between secretive funds and transparent funds, which are used as the base category in this estimation. In this first specification we do not include any other qualitative characteristics or controls, and as such this test is exactly analogous to a difference in means for secretive versus transparent funds. We see that during good times secretive hedge funds outperformed the transparent hedge funds by 2.81% on an annual basis. This difference is significant at the 10% level. While this difference is only significant at the 10% level, we believe this is a significant difference because (1) these are fairly tight specifications, with only 12 observations per fund per year and (2) the magnitudes on the order of 2 to 3% per year are economically meaningful.

We proceed by adding month fixed effects in column 2 to account for macroeconomic conditions that affect all hedge fund returns. Equivalently, these monthly fixed effects account for the average loadings on all time-varying factors, both observable and unobservable. Accounting for time-series differences across months explains 17.6% of the total variation in returns, but our cross-sectional comparison between secretive and transparent funds remains similar in magnitude and statistical significance: secretive funds significantly outperform transparent funds by 2.86% per year.

In column 3 we add the illiquidity, complexity, concentration, and leverage because these may be related to performance as discussed in an earlier section. We also add the natural log of the prior months AUM, and finally,

because flows can affect how much cash the fund has on hand, we also include contemporaneous flows. In addition, by including these measures along with secrecy it allows us to disentangle the impact of secrecy on returns as something distinct from these other measures.

These results are largely sensible. More leveraged funds earn 4.33% higher returns, arguably as compensation for the extra risk they bear. More concentrated funds yield higher returns. Although this finding may be surprising in light of standard finance theory, in which concentrated portfolios should not bear a premium, this result is in line with a recent empirical study by Ivković, Sialm and Weisbenner (2008) and Choi, Fedenia, Skiba, and Sokolyk (2016) who find that individuals and institutions, respectively, with more concentrated portfolios outperform those with more diversified portfolios.There is also some suggestive evidence of more complex funds underperforming less complex funds, which may be related to higher transactions costs when executing more complicated trading strategies. Funds running more complex strategies underperform by -2.11% per year, however a high standard error of this estimate prevents us from drawing strong conclusions with respect to this variable.. In column 3 we also also add the logarithm of total assets under management and percentage net flows during contemporaneous month to control for potential differences in the size that may exist across different types of funds, and that could also be responsible for the performance difference. The difference between secretive and transparent funds has the same magnitude and is still significant at the 10% level.

In column 4, we add strategy fixed effects to control for unobserved differences in returns across funds following different strategies, for example

for the differences in returns that Equity funds experienced on average during this period, as compared to funds in Credit strategy. Secretive funds still out perform, but with a similar coefficient of 2.76, which is still significant at the 10% level.

In column 5, after having separately collected 13F filings from SECs EDGAR database, we control for whether firms file 13F disclosure of long holdings to the SEC at some point in the sample, since secrecy may have a different meaning for funds that must make quarterly disclosures to the public through the SEC. The 13F filing dummy is equal to 1 if the hedge fund manager (or management company) filed a 13F for a given quarter and 0 if it did not (or if we were unable to find a matching management company or manager). The results are the same, both in economic and statistical magnitudes. Controlling for disclosure to the SEC, secretive funds in our sample still outperform transparent ones.

Finally, to address the concern that funds endogenously change their secrecy e.g. in order to attract more flows from the fund of funds as time passes, in column 6 we reestimate our fullest specification from column 5, for the subsample of funds that have the same level of secrecy , both in the good period and in the bad period.This also allows us to make a cleaner comparison across funds that are likely to be characterized by the same investment strategy in both "good" and "bad" periods, since a within-fund change in secrecy score may signal an adaptation of its reporting levels to a new underlying risk strategy or to the new manager with a different skill. We find that funds that were highly secretive over these periods outperformed those that remained transparent over the entire period by 6.74% annually during the "good" period. This estimate is significant at

1% level.

Given that imposing such a restriction mechanically introduces survivorship bias, the fact the results in column 6 are much stronger when we limit the sample to funds that exist through the entire sample suggests that weakly performing secretive funds are more likely to drop out of sample than similar transparent funds. This raises the possibility that in response to performance investors might condition their decisions to invest in or divest from hedge funds differently based on whether the fund is secretive or not. In subsequent analyses we will examine whether flow-to-performance sensitivity is different for secretive and transparent funds.

Overall, we find robust results with respect to the outperformance of the secretive funds during "good" times. So far this evidence is consistent with secretive funds either having better skill and/or taking more risk that earns a premium during good times. In the next subsection, we will consider whether this pattern in performance survives during the period of crisis.

3.3.2 Performance of hedge funds in the "bad" period: April, 2008 to March, 2009

In Panel B of Table 3 we examine the differential performance of secretive and transparent funds funds in the bad period from April of 2008 through March of 2009. If we find that a^H, which was positive during the "good" period, is also positive during the "bad" period, we will be unable to disentangle the skill explanations for the previous returns from the risk explanations. On the other hand, if we find that a^H is negative during the "bad" period, then this is evidence that secretive hedge funds take on more

risk than their less secretive counterparts, which realizes during 2009.

The differences are striking. Across all specifications secretive funds now underperform transparent ones. The secretive funds on average earned 8%-14% lower return than transparent funds, with all specifications being statistically significant at 5% to 10% levels. Importantly, these findings are incremental to the impact of illiquidity on returns as well as the impact of flows. More illiquid funds suffered 15% to 22% lower returns on an annualized basis depending on the specification. Since the performance difference reverts in the "bad" period, as compared to the "good" period, we conclude that this qualitative characteristic is a good proxy for fund loading on the illiquidity factor, which was likely to crash during the "bad" period as well. This also suggests that the performance differences between secretive and transparent funds cannot be attributed purely to a different loading on illiquidity factor, but rather on some other factor that also collapsed during the "bad" period. [11] Finally, as in Panel A, the last four specifications control for net fund flows among other variables, so that the underperformance of secretive funds cannot be explained by investors pulling money more out of these funds during the "bad" period.

For the purpose of illustrating the identification strategy in Section 2 we assumed that factor loadings were constant over time. However, a possible explanation for secretive funds outperforming transparent funds during good times, could be a better market-timing ability of the managers of secretive funds. In particular, they could be optimally adjusting their

[11] In unreported robustness checks, we collect the long positions of the managers who run the hedge funds in our study from 13F forms file with the SEC and we calculate several measures of liquidity, including measures developed in Amihud (2002), Kyle and Obizhaeva (2016), and Lesmond (2005). We average these measures up to the fund level on a market-value of investment weighed basis and use these continuous measures in lieu of the discrete illiquidity measure used in Tables II and III. Results are qualitatively the same.

loadings upwards on factors that perform well in good periods as would be optimal to do in order to earn a higher return. However, if secretive funds were indeed better market timers, than transparent ones, they should have adjusted loadings on factors that perform poorly during the bad times downwards, in order to not lose as much. The observed performance pattern during bad times is not consistent with secretive funds being purely better market timers. If anything, the ability of secretive funds to time some of the factors well, would mean they loaded even more on factors that they couldn't time (and that crashed during the bad period).

The fact that secretive funds earned higher returns during the up market, but significant lower during the down market provide evidence that secretive funds load more on risk factors that earn a premium during good times, but severely underperform during bad times. Higher managerial skill or superior proprietary strategies of secretive funds on their own are not consistent with the observed pattern of performance. If the up-market out performance of secretive funds were due to skill, then we would expect that the skilled managers at secretive funds would still outperform the less skilled managers at transparent funds, even in the down market. However, this is not what we see. Secretive funds underperform the transparent group by 8 to 14% depending on the specification and sample chosen.

In summary, in Table 3 we document that secretive firms earn more positive returns than transparent funds during an up market, but significantly worse returns during a down market. This is consistent with the funds loading on risk(s) which carry a premium during the up market, but the funds suffer severe losses when that risk is realized.

3.4 Differences in risk-adjusted performance of secretive and transparent funds

In this section we use a model-free approach, which uses strategy- and substrategy-month fixed effects, to control for the risk of the funds strategies. The results of the model-free approach can be interpreted as either a risk adjustment for any possible, even unknown, factors as long as funds that follow the same strategy or sub-strategy load on the same unobserved risks, or as the equivalent of strategy and sub-strategy matching. The former interpretation allows us to identify more clearly the skill (or lack of skill) of the hedge funds. The later allows us to examine whether secretive funds out- or underperform their strategy or sub-strategy matched peers; that is, are their returns different from other funds which follow the same investment strategy. Once again we separately examine the good and bad periods to allow funds to adjust their risk exposure across periods.

3.4.1 Abnormal Performance of hedge funds in the "good" period

In Table 4, Panel A we examine the difference in abnormal returns to secretive funds controlling for the risk of the fund. In columns 1 and 2 we regress hedge fund returns on a dummy for secretive funds and include strategy-month fixed effects. This is equivalent to matching secretive and transparent funds based on the investment strategy they claim to follow. Specifically, we model excess returns as the following:

$$R_{it} = c + a^H Sec_i^H + d_{st} + \varepsilon_{it}$$

where d_{st} is a group-month (strategy- or substrategy-month) fixed effect.

The advantage of this method is that it automatically subsumes any

group-specific loadings on *all* factors, including unknown factors, and, in this sense it is model-free – because we do not need to know all the factors that are relevant for a particular hedge fund style. Notably, if our results were similar when using group-month fixed effects (i.e. secretive funds outperforming during the good period and underperforming during the bad period), this would strengthen our main conclusion that there is still some unobserved risk that secretive funds loaded on more than transparent funds, and that crashed during 2009. , This method also effectively matches funds on strategy and substrategy, allowing us to compare the performance of funds that purport to follow the same strategy and which, therefore ought to have otherwise similar risk exposure and similar performance.

The evidence in column 1 is similar in magnitude to the raw results of Table 3. Secretive funds earn 2.69% more on an annual basis than do transparent funds, controlling non-parametrically for the investment strategy of the fund. As in Table 3, one might be concerned that we confound the skill of hedge fund managers in picking assets and the skill of the fund-of-fund manager in picking hedge funds, so in column 2 we restrict the sample to funds that have the same level of secrecy in 2007 and 2009. Similar to the findings in Table 3, secretive funds earn 7.23% more on a strategy-matched annual basis than do transparent funds, once the sample is limited to funds that maintain the same level of secrecy.

Concerned that the strategy classifications might be too broad, we also examine substrategy-month fixed effects. Substrategy-month fixed effects are superior to the strategy-month fixed effects because we are much more likely to have as a comparison group exactly comparable funds; but, this comes at a cost: there are many fewer funds in each substrategy, which

dramatically reduces the power of our tests – with an extra 432 parameters used. In column 3 we see that even with a such a narrow definition of strategy, secretive funds outperform transparent ones in the good period. Even the magnitude is similar at 2.38% per year, though it is only statistically significant at the 14% level. These results indicate that, for example, controlling for all possible risk factors that funds in the "Equities: High net exposure to Sector (Natural resources)" could on average load on, secretive funds earned a higher return than transparent funds during the good period As before in column 4 we require funds have the same secrecy score in 2007 and 2009. Once again the results are more pronounced, yielding a 4.42% difference between secretive and transparent funds per year. To sum up, if we were to focus only on the up-market, it would appear that secretive managers are using their discretion for the benefit of their investors and they appear to have superior stock picking skill.

3.4.2 Abnormal Performance of hedge funds in the "bad" period

As in Table 4, Panel A in in Panel B we examine the difference in abnormal returns to secretive funds controlling for the risk of the fund, but this time in the bad period from April 2008 to March 2009. In columns 1 and 3 we regress hedge fund returns on a dummy for secretive funds and include strategy-month fixed effects in column 1 and sub-strategy fixed in column 3. While not as large an impact as the raw results, in Table 3, Panel B, the differences between secretive and transparent funds are economically large at -8.21% in column 1 and -5.22% in column 3, although this coefficient is only significant at the 15% significance level. The weaker results are in part due to the lower power of the tests. In columns 2 and 4, as above, we restrict

the sample to only those funds which have the same level of secrecy reported in both periods. Once again the results are more pronounced. Secretive funds significantly underperform their strategy-matched peers by -18.55% on a strategy-matched basis and -10.71% on a substrategy-matched basis.

The important take away from these findings is that while secretive funds appear to earn higher returns during the up market, they appear to do so at the expense of high losses during the down market. This is consistent with the funds advertising one investment strategy, but actually using their secrecy for engaging in higher risk strategy.

One might prefer to control for risk using standard asset or hedge fund pricing models. We believe this is tantamount to assuming that the model we measure ex-post is identical to the model investors assumed ex-ante. We find it much more credible that investor believe that funds with similar strategies are similarly risky. In addition, such an approach would not be able to undermine our findings. Suppose, hypothetically, that we use a more traditional factor model and find out that our main result on the secretive funds outperforming transparent ones in the good period and underperforming in the bad period, disappears – in the sense of the performance difference being stable over time. Then this would mean that we have been lucky to identify and name particular factor(s) (in that factor model) that secretive funds were loading excessively on, as compared to transparent funds, so that our main conclusion remains the same. If on the other hand, we found that performance differentials still flip signs in different periods, then we would again argue that there is yet an unobserved factor that secretive funds loaded more on.

Any model-based conclusion on skill has to be ultimately based on the

assumption that the factor model is correct. Given the dynamic nature of many of hedge fund strategies and the resulting difficulty of modeling factor structure for hedge funds, we opt to using the model-free framework as above. From the econometric point of view, even the more successful attempts of modeling hedge fund factors, such as the Fund and Hsieh (2001) seven-factor model, would quickly use up degrees of freedom leading to over fit.

4 Are investors fooled? Flow-to-performance sensitivity

Flows may act as a disciplining mechanism, keeping hedge fund managers incentives aligned with their investors, under the threat of losing the asset based from which they derive their fees. We hypothesize that secretive funds will be less sensitive to past performance than transparent funds as it may be harder for investors to infer deviations from the secretive fund's declared strategy (see Huang, Wei and Yan, 2012). In Table 5 we examine flow to performance, regressing flow on the return over the past quarter plus controls for illiquidity, median strategy flow, size, volatility, and strategy fixed effects. The specification is similar to other flow-to-performance regressions in the literature (Bollen and Pool, 2012, Sialm, Starks and Zhang, 2015, and Sirri and Tufano, 1998) except that instead

of rank-based performance measures, we use the past quarter's return.[12]

$$\begin{aligned} NetFlow_{i,t+3} &= c + a^H Sec_i^H \\ &+ \gamma^L SecL_{i,t} \times (R_{i,t} - r_{f,t}) \\ &+ \gamma^H SecH_{i,t} \times (R_{i,t} - r_{f,t}) \\ &+ X'_{i,t}\delta + d_s + \varepsilon_{it} \end{aligned}$$

Given that $SecL_{i,t}$ and $SecH_{i,t}$ are mutually exclusive dummy variables for transparent and secretive funds, respectively, the coefficients of primary interest are γ^L and γ^H that accordingly measure the average flow-to-performance sensitivity for transparent and secretive funds.

We start by estimating a simpler specification that does not disaggregate flow-to-performance sensitivity by whether the fund is secretive or not: column 1 and 5 of Table 5 show that overall flows chase past quarterly returns. In particular, one additional percentage point of past return associates with 7.28 percentage point higher flows in the next quarter during the good period and 4.34 percentage point during the bad period. This difference is statistically significant and is consistent with the literature finding the asymmetric reaction for positive versus negative returns. Next we turn to estimating the above specification.

We would expect that investors who are fooled by secretive hedge funds would be relatively more responsive to past performance than would the investors in transparent funds. However, this is not what we find. During the up market in columns 2 through 4 both secretive and transparent funds are are responsive to past returns in the manner one would expect,

[12]We opt for the raw return instead of a relative performance rank as in prior research because, while we believe our database is representative of the universe of hedge funds, it is not the entire universe.

positive returns lead to more inflows controlling for illiquidity, strategy fixed effects and various other controls. Particularly notable is that the sensitivity of transparent funds is nearly three times larger than for secretive funds, 12.2 versus 4.92 percentage points. There difference between the flow-to-performance sensitivity of secretive and transparent funds is statistically significant at the 1% level in untabulated tests. This is consistent with the hypothesis that investors are better able to make inferences about managerial quality for transparent funds, whereas the past returns to secretive funds are deemed to be a less clear signal of managerial quality During the down market secretive funds are similarly sensitive to past flows as in the up market, even when controlling for fund illiquidity, while transparent funds become much less sensitive. Overall these findings suggest that, if anything, investors in secretive hedge funds are not fooled per se, but rather they treat return-based signals of performance skeptically. .

5 Concluding Remarks

In this paper we use proprietary data obtained from a fund of funds to document that funds that are less willing to share the information about their holdings and trades with their investors significantly outperform the more transparent funds during an up market. This general finding holds controlling for a wide range of fund-level characteristics, as well as any risk factors that would be common to all funds within the same strategy or substrategy. We further investigate the source of this outperformance and conclude that it cannot be explained purely by superior asset-picking skill, trading strategy or market-timing ability of more secretive funds. By looking separately at good and bad periods we infer that at least part

of this outperformance is explained by secretive funds loading more than transparent ones on risk factors that earn a risk premium during good times, but crash during bad times.

The benefit of our empirical setup lies in the opportunity of making such an assessment irrespective of knowing the true model that drives hedge fund returns, but instead by relying on the assumption that some of the risk factors that secretive funds may have loaded more aggressively on, crashed during the period of the global financial crisis.

While we cannot provide direct evidence, our findings are also largely consistent with various sorts of misbehavior on the side of secretive funds. The examples could include pocketing the bulk of fund returns during up markets and shifting losses to their investors during down markets, or engaging in put-option-like-writing strategies. Even though we have interpreted our finding as loading excessively on risks, our findings could result from the funds inability to hide their misbehavior in the face of large losses. Nevertheless, excessive risk loading could also be interpreted as bad behavior on the side of secretive funds: if not for mimicking skill there would be just no reason for the fund to be secretive about these higher risks. In this respect, no matter the exact interpretation, our results suggest that secrecy is not used for the benefit of the savvy investor, and as such is consistent with fund-of-funds regarding secrecy as a problematic characteristic of the fund.

Our evidence on the flow to performance sensitivity of the funds shows that transparent funds are more sensitive to past performance than secretive funds, consistent with investors having a more difficult time making inferences when signals are obscured. This evidence suggests that even

though ex ante hedge funds may have been trying to fool their investors, they were only modestly successful in doing so ex post.

Appendix

A Illustration of the Identification Strategy

The basic intuition of our identification strategy is related to the notion that omitted priced factors will be manifest in the alpha of an incompletely specified model. However, in our identification strategy we flip this notion on its head. We do not worry whether we have the correct pricing model, so that we can accurately measure alpha. Instead, we use the difference in alphas across periods when factors might have positive and negative realizations to infer whether or not the funds are loading on unobserved risks.

To illustrate the use of different periods in identifying the risk premia associated with different hedge fund characteristics, and hedge fund non-transparency in particular, suppose that the true model for hedge fund returns consists of n factor returns:

$$R_{it} = \alpha_i + \beta_1^i F_{1t} + \beta_2^i F_{2t} + ... + \beta_n^i F_{nt} + \epsilon_{it}, \tag{1}$$

where R_{it} is the excess return of fund i in month t, α_i ("fund alpha") is the fund-specific performance excess of what can be explained by factor loadings β_j^i on (excess) factor returns F_{jt} $(j = 1, 2, ...n)$. [13]

If the econometrician knows the true model and observes all n factor returns, then she can obtain unbiased and consistent estimates of α_i and β_i^j from historical data. However, not knowing the true model (or observing

[13] These factors may or may not be priced in the cross-section, they may also be non-linear functions of returns. For example, if hedge funds aggressively short index put options, one of F_{jt} could be the return on shorting index puts, with β^j then related to the relative weight of this strategy in fund's total portfolio.

fewer than n factors) can make inference about α_i incorrect, even if the omitted factors are orthogonal to the observable ones.

To be specific, suppose the econometrician does not observe F_{1t} and estimates a misspecified model containing the other $n-1$ factors only, so that F_{1t} implicitly ends up in the error term (for simplicity assume it is orthogonal to the included factors).

In this case, the estimate of fund alpha, $\widehat{\alpha}_i = \alpha_i + \beta_1^i \overline{F_{1t}} + \sum_{j=2}^{n}(\beta_j^i - \widehat{\beta}_j^i)\overline{F_{jt}} + \overline{\epsilon_{it}}$, will be over-estimating the true α_i when omitted factor is performing relatively well ($\overline{F_{1t}} > 0$), while under-estimating the true α_i when omitted factor performs relatively poorly ($\overline{F_{1t}} < 0$).

Therefore, if we do not know the true model then – by estimating an abridged (misspecified) model during times when realized returns on the omitted factors are generally positive – we would erroneously attach the risk premium with respect to these omitted factors to fund alpha (e.g. managerial skill). We can further think about one of these omitted factors being related to tail risk. In this case, realized returns during "good" times (when tail risk earns a premium) could not be empirically distinguished from fund alpha. This is especially important because market crashes – when tail risk realizes or when the strategy of shorting put options goes bust – do not happen often, and hence with respect to these potential omitted factors most of the times are actually "good" times. In the example above, even adjusting for risk premia associated with all observable factors (F_{2t} to F_{nt}) does not entail an unbiased estimation of skill, as long as the times are on average "good" with respect to the omitted factors.

Similarly, if we compare performance of any two groups of funds (e.g. secretive vs. transparent funds) and find that one group of funds over-

performs the other in a particular period (even on a risk-adjusted basis), we cannot disentangle the two explanations: either the first group has better managers and earns an alpha and/or it simply loaded more on unobserved risk factors that earned a premium and did not crash during this particular period.[14]

To illustrate the point, rewrite (1) for the average realized returns of secretive and transparent funds and consider their difference: [15] $\overline{R_t^{SEC}} - \overline{R_t^{TRAN}} = (\alpha_{SEC} - \alpha_{TRAN}) + (\beta_1^{SEC} - \beta_1^{TRAN})\overline{F_{1t}}$

If we find that in a particular period secretive funds over-perform transparent ones ($\overline{R_t^{SEC}} - \overline{R_t^{TRAN}} > 0$), then without observing $\overline{F_{1t}}$ we cannot know, whether secretive funds had a higher alpha ($\alpha_{SEC} - \alpha_{TRAN} > 0$) and/or they loaded more on an unobserved factor that did relatively well during the period of estimation ($(\beta_1^{SEC} - \beta_1^{TRAN})\overline{F_{1t}}$) – the two explanations would be observationally equivalent. Because of this conceptual impossibility of quantifying or even establishing the overall existence of the skill component – in the absence of the true risk model of funds – we take a different approach to deducing whether there were any significant risk components associated with particular groups of funds (e.g. with secretive funds).

In particular, we attempt to identify 2 periods in the data when we would be comfortable assuming that an omitted factor F_{1t} has differential performance (i.e. there is a "good" period when $\overline{F_{1t}} > 0$ and a "bad"

[14] There is also a trivial alternative explanation for any observed empirical performance relation between two groups of funds: time-varying luck of both groups (average epsilons). In a sufficiently long estimation period they should average out, so for the sake of exposition, we dropped these from the expressions that follow.

[15] $\overline{R_t^{SEC}} - \overline{R_t^{TRAN}}$ in this expression can represent the difference of returns that are risk-adjusted for all the observable factors: $\overline{R_t^{SEC}} - \overline{R_t^{TRAN}} - \sum_{j=2}^{n}(\beta_j^{SEC} - \beta_j^{TRAN})\overline{F_{jt}}$. Alternatively, if we think that all factors in the true model are not observable or they are measured with error, or the length of the time-series does not allow for a credible estimation of loadings on all observable factors, $\overline{R_t^{SEC}} - \overline{R_t^{TRAN}}$ can represent the difference in raw performance without changing the conclusion conceptually.

period when $\overline{F_{1t}} < 0$). Then if it turns out that $\overline{R_t^{SEC}} - \overline{R_t^{TRAN}} > 0$ in the "good" period while $\overline{R_t^{SEC}} - \overline{R_t^{TRAN}} < 0$ in the "bad" period, it follows that secretive funds load more on F_{1t} than do transparent ones, with the proof amounting to noticing that the two inequalities on returns can be satisfied simultaneously only when $\beta_1^{SEC} > \beta_1^{TRAN}$.[16]

Given relatively low levels of disclosure among hedge funds and the virtual absence of information on what exactly hedge funds may be doing at any particular moment of time, this approach has the advantage of not requiring the complete knowledge or observation of all factors in the model, but instead of assuming omitted factors in particular periods do relatively well or relatively poorly. It thereby poses an empirical challenge of identifying such periods in the data.

The March to April time frame, introduced by the fund of funds grading scheme corresponds nicely to three very distinct periods, so that it is relatively easy to select a "good" and a "bad" period. Because the "good" and "bad" is always relative to the omitted factors, it is especially compelling that our data covers the period of the global financial crisis, where we feel comfortable to assume that risk factors on which hedge funds may have loaded did indeed realize – simply because so many things crashed during this period. Although we may have in mind some of the omitted factors being potentially related to rare events and tail risk (as also supported by loadings on strategies associated with option-based returns as in Agarwal and Naik, 2004), they may well represent other risks that were likely to realized during the crisis period. We therefore label April 2008 to March 2009 as the "bad" period – a recession period according to NBER, high-

[16] With more than one omitted factor, it becomes a conditional statement on at least one factor performing sufficiently bad in the "bad" period to overturn the difference in average returns.

lighted by the bankruptcy filing by Lehman Brothers in September 2008 and some of the largest drops of stock market indices in history.

The period between April 2006 and March 2007, on the other hand, can be considered a "good" period: according to the Financial Crisis Inquiry Report (2011) it was a normal growth period, a growth period according to NBER, and a period of rapid rise of the U.S. stock market indices. This period also followed a period of steady growth, so it is relatively safe to assume that at least some of the omitted risks were not realizing during this period, but were instead earning a compensation.

Finally, the period between April 2007 and March 2008 is a somewhat intermediary period, as it ends with the collapse of Bear Stearns that declared the beginning of the financial crisis, but was an NBER growth period for much of the period. Since we cannot safely assume whether the possible omitted risks realized during this period or were earning a compensation, this period would not be of a particular help in trying to disentangle skill from the risk loadings.

We argue that comparing and contrasting the returns of different types of hedge funds (e.g. secretive vs. transparent) in different states of nature ("good" vs. "bad" periods) is essential to understanding whether there are risks associated with these types of hedge funds – in the situation when the true model is unknown. The exogenous nature of the global financial crisis presents us with a unique opportunity to observe hedge funds returns during a truly bad event realization when the two explanations (skill vs risk loadings) would not be observationally equivalent.[17]

[17]The idea of using "good" and "bad" periods having different informational content is not completely new. For example, Schmalz-Zhuk (2013) argue that stocks should be more sensitive to news during bad periods: good or bad performance during bad times is a clearer signal for investors than good or bad performance during good times.

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Figures and Tables

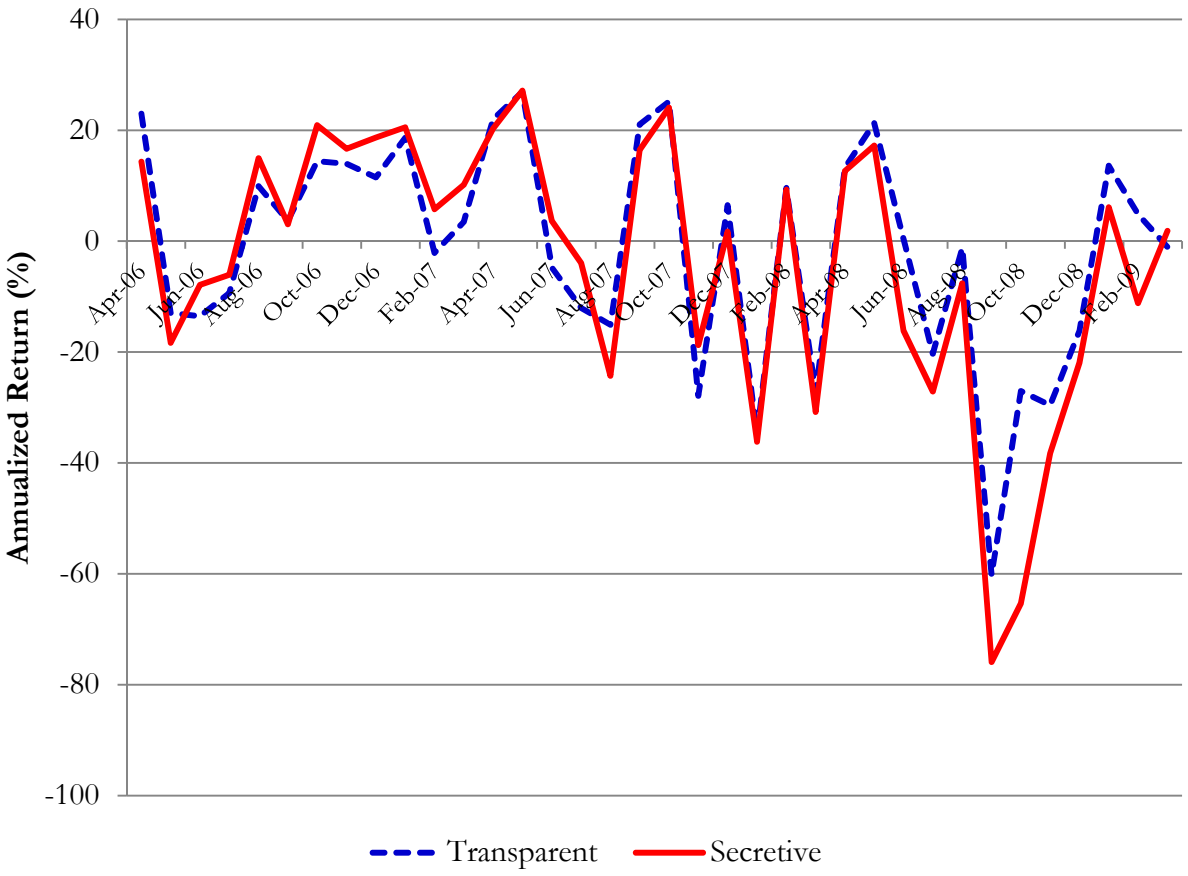

Figure 1
Annualized Excess Returns to Secretive and Transparent Hedge Funds.

The secretive portfolio return is the equally weighted average of all hedge fund annualized excess returns for all funds with a secrecy score of 1. The transparent portfolio return is the same as for the secretive portfolio, but for all funds with a secrecy score of 0. Excess returns are the natural log of the difference between a hedge fund's monthly return and the return on one-month treasuries, annualized by multiplying by 1200.

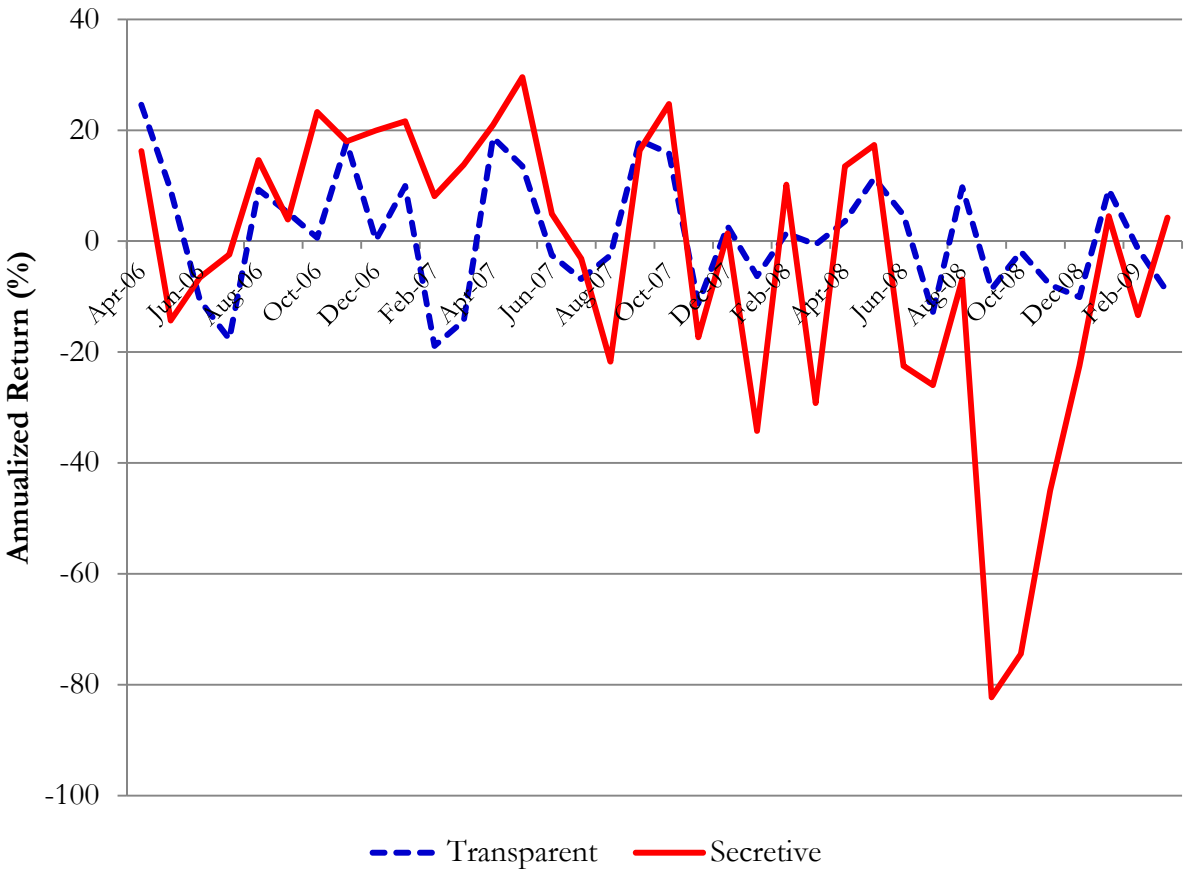

Figure 2
Annualized Excess Returns to Secretive and Transparent Hedge Funds with the Same Secrecy Scores in 2007 and 2009.

To be included in this figure a hedge fund must have the same non-missing secrecy score for both 2007 and 2009. The secretive portfolio return is the equally weighted average of all hedge fund annualized excess returns for all funds with a secrecy score of 1. The transparent portfolio return is the same as for the secretive portfolio, but for all funds with a secrecy score of 0. Excess returns are the natural log of the difference between a hedge fund's monthly return and the return on one-month treasuries, annualized by multiplying by 1200.

Table 1. Distribution of Hedge Funds and Summary Statistics

Notes: The sample includes all funds with non-missing returns and a non-missing secrecy score in a given year. Excess return is the fund return net of a risk-free rate, and volatility is the within-fund return standard deviation during the period (both measured in annualized percentage points). AUM is total assets under management summed across all funds in the same family at the end of the corresponding period and is reported in billions of USD. ln(AUM) is the natural logarithm of AUM. Prior year returns is the average prior April to March return in percent. Complexity, Concentration, Illiquidity, and Leverage are the rank measures scored by the fund of hedge funds, converted into zero-one dummy variables, where 1 corresponds to High, and 0 -- to Low. The continuous measures, AUM, ln(AUM), prior year returns, and the holdings measures are winsorized at the 1st and 99th percentiles.

Panel A: Number of observations by fund strategy and year

Strategy	April 06-March 07	April 07-March 08	April 08-March 09	April 06-March 09
Credit	152	156	131	439
Event driven	236	237	266	739
Equity	924	899	745	2568
Relative value	260	246	322	828
Tactical trading	91	72	110	273
Total	1663	1610	1574	4847

Table 1 (*continued*)

Panel B: Hedge fund summary statistics

Variable	Period	Mean	Median	Std. Deviation	N
Excess Return	April 06-March 07	7.47	8.25	27.64	1663
(%)	April 07-March 08	-1.22	1.44	40.79	1610
	April 08-March 09	-17.71	-5.29	55.42	1574
AUM	April 06-March 07	1.87b	0.81b	2.80b	1649
	April 07-March 08	2.17b	0.97b	3.24b	1604
	April 08-March 09	2.58b	1.20b	3.64b	1566
ln(AUM)	April 06-March 07	20.48	20.52	1.41	1649
	April 07-March 08	20.67	20.69	1.32	1604
	April 08-March 09	20.85	20.91	1.36	1566
Secrecy	April 06-March 07	0.80	1	0.40	1663
	April 07-March 08	0.81	1	0.39	1610
	April 08-March 09	0.87	1	0.34	1574
Illiquidity	April 06-March 07	0.85	1	0.36	1663
	April 07-March 08	0.83	1	0.38	1610
	April 08-March 09	0.81	1	0.39	1574
Concentration	April 06-March 07	0.52	1	0.50	1663
	April 07-March 08	0.65	1	0.48	1610
	April 08-March 09	0.67	1	0.47	1574
Complexity	April 06-March 07	0.34	0	0.48	1663
	April 07-March 08	0.37	0	0.48	1610
	April 08-March 09	0.49	0	0.50	1574
Leverage	April 06-March 07	0.51	1	0.50	1663
	April 07-March 08	0.53	1	0.50	1610
	April 08-March 09	0.62	1	0.49	1574
Flows	April 06-March 07	2.27	0.42	11.05	1642
(% of AUM_{t-1})	April 07-March 08	2.53	1.05	10.86	1596
	April 08-March 09	-1.80	-0.29	13.16	1560

Table 1 (*continued*)

Panel C: Pairwise rank correlations of fund scores

	Secrecy	Illiquidity	Concentration	Complexity	Leverage
Secrecy	1.000				
Illiquidity	0.2265***	1.000			
Concentration	0.0225	0.1433***	1.000		
Complexity	0.0937*	0.0109	0.0332	1.000	
Leverage	-0.0298	0.1122**	0.1187**	0.4349***	1.000

Notes: This panel reports pairwise Spearman rank correlations between secrecy, illiquidity, concentration, and complexity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels correspondingly.

Table 2. Differences by Secrecy

Notes: The sample includes all funds with non-missing returns and a non-missing secrecy score in a given year. In Panel C excess return is the fund return net of a risk-free rate, and volatility is the within-fund return standard deviation during the period (both measured in annualized percentage points). AUM is Assets Under Management and is reported in billions of USD. ln(AUM) is the natural logarithm of AUM. Prior year returns is the average prior April to March return in percent. Complexity, Concentration, Illiquidity, and Leverage are the rank measures scored by the fund of hedge funds, converted into zero-one dummy variables, where 1 corresponds to High, and 0 -- to Low. The continuous measures, AUM, ln(AUM), prior year returns, and the holdings measures are winsorized at the 1st and 99th percentiles. *, **, and *** indicate significance at the 10%, 5% and 1% levels respectively.

Panel A: Number of observations by fund secrecy score and year

	Secrecy		
Period	Low	High	Total
April 06-March 07	326	1337	1663
April 07-March 08	308	1302	1610
April 08-March 09	210	1364	1574
Total	844	4003	4847

Panel B: Number of observations by fund secrecy score and strategy

	Secrecy		
Strategy	Low	High	Total
Credit	144	295	439
Event driven	101	638	739
Equity	415	2153	2568
Relative value	72	756	828
Tactical trading	112	161	273
Total	844	4003	4847

Table 2. (*continued*)

Panel C: Fund Characteristics by Secrecy

		Secrecy		
		High	**Low**	**Difference**
AUM	**Mean**	2.46	0.96	1.50 ***
(billions)	***StDev* / (StErr**	*3.49*	*0.98*	(0.01)
ln(AUM)		20.8	20.0	0.8 ***
		1.3	*1.3*	(0.0)
Prior Year Returns		6.8	8.6	-1.8
(%)		*31.9*	*31.6*	(1.4)
Illiquidity		0.87	0.66	0.20 ***
		0.34	*0.47*	(0.02)
Complexity		0.42	0.31	0.11 ***
		0.49	*0.46*	(0.02)
Concentration		0.62	0.60	0.02
		0.49	*0.49*	(0.02)
Leverage		0.54	0.60	0.06 ***
		0.5	*0.5*	(0.02)

Table 3. Hedge fund performance

This table reports the results of estimating the following specification during the period between April 2006 and March 2007 in Panel A and between April 2008 and March 2009 in Panel B:

$$R_{it} - rf_t = c + \alpha^H SecH_i + X_{it}'\gamma + d_t + d_s + \varepsilon_{it},$$

where R_{it}-rf_t is the excess return of fund *i* in month *t*; $SecH_i$ is an indicator variables that equals 1 if a fund is rated as secretive, and 0 otherwise; X_{it} are fund-level controls (log of assets under management and percentage net flows during past month), in specifications 3 to 6; an indicator variable for filing a SEC 13F form in the same quarter, in specification 4; d_t are month fixed effects, in specifications 2 to 6; and d_s are strategy fixed effects, in specifications 5 and 6. Specifications 3 to 6 additionally include indicator variables for illiquid, concentrated, complex, leveraged funds. Specification 8 estimates the results using only the funds that have the same secrecy in both periods (i.e. April 2006 to March 2007 and April 2008 to March 2009). Standard errors are clustered at the fund level and are reported below the coefficients. * indicates 10% significance; ** 5% significance; *** 1% significance.

Panel A: April 2006 to March 2007 ("good" period)

		(1)	(2)	(3)	(4)	(5)	(6)
Secrecy	High	2.81*	2.86*	2.90*	2.76*	2.64*	6.74***
		(1.53)	(1.56)	(1.68)	(1.59)	(1.49)	(2.21)
Illiquidity	High			2.35	0.92	0.02	1.68
				(1.57)	(1.51)	(1.57)	(1.73)
Concentration	High			3.53**	3.69**	3.42*	1.16
				(1.61)	(1.82)	(1.83)	(1.50)
Complexity	High			-2.11	-3.24**	-2.61	-3.93**
				(1.69)	(1.63)	(1.70)	(1.86)
Leverage	High			4.33**	5.14*	5.08*	7.13***
				(2.10)	(2.84)	(2.80)	(2.25)
$\ln(AUM_{t-1})$				-0.54	-0.85	-1.43**	-1.48**
				(0.52)	(0.57)	(0.64)	(0.68)
$Flow_t$				-0.43***	-0.44***	-0.44***	-0.56***
				(0.08)	(0.08)	(0.08)	(0.12)
13F filing						5.13**	3.54**
						(2.09)	(1.59)
Month FE			Yes	Yes	Yes	Yes	Yes
Strategy FE					Yes	Yes	Yes
Same Secrecy in 2007 and 2009							Yes
Observations		1,663	1,663	1,642	1,642	1,642	984
Number of funds		150	150	149	149	149	91
Adjusted R^2		0.00103	0.176	0.214	0.217	0.222	0.229

Table 3. (*continued*)

Panel B: April 2008 to March 2009 ("bad" period)

	(1)	(2)	(3)	(4)	(5)	(6)
Secrecy	-10.49***	-10.21***	-8.25**	-8.51**	-7.70**	-13.97***
	(3.70)	(3.84)	(3.47)	(3.73)	(3.43)	(5.26)
Illiquidity			-22.22***	-18.71***	-17.80***	-14.68***
			(3.69)	(4.00)	(4.09)	(5.06)
Concentration			-5.46	-3.62	-3.10	-2.16
			(3.48)	(3.91)	(3.86)	(4.13)
Complexity			3.72	0.15	-0.16	-4.08
			(3.93)	(4.31)	(4.27)	(4.95)
Leverage			-4.22	-6.39	-6.29	-7.17
			(3.61)	(4.10)	(4.11)	(4.62)
$\ln(AUM_{t-1})$			0.46	0.42	0.83	1.60
			(1.57)	(1.55)	(1.64)	(1.84)
$Flow_t$			-1.15***	-1.16***	-1.17***	-1.27***
			(0.15)	(0.15)	(0.15)	(0.17)
13F filing					-4.93	-7.23
					(4.13)	(4.66)
Month FE		Yes	Yes	Yes	Yes	Yes
Strategy FE				Yes	Yes	Yes
Same Secrecy in 2007 and 2009						Yes
Observations	1,574	1,574	1,560	1,560	1,560	1,103
Number of funds	140	140	138	138	138	94
Adjusted R^2	0.00351	0.237	0.318	0.322	0.323	0.346

Table 4. Hedge fund risk-adjusted performance

This table reports the results of estimating the following specification during the period between April 2006 and March 2007 in Panel A and between April 2008 and March 2009 in Panel B:

$$R_{it} - rf_t = c + \alpha^H SecH_i + d_{st} + \varepsilon_{it},$$

where R_{it}-rf_t is the excess return of fund i in month t; $SecH_i$ is an indicator variables that equals 1 if a fund is rated as secretive, and 0 otherwise. Columns 1 and 2 inlude strategy-month fixed effects to control for strategy-specific loadings on any factors. Columns 3 and 4 inlude substrategy-month fixed effects to control for substrategy-specific loadings on any factors. Specifications 2 and 4 estimate the results using only the funds that have the same secrecy in both periods (i.e. April 2006 to March 2007 and April 2008 to March 2009). Standard errors are clustered at the fund level and are reported below the coefficients. * indicates 10% significance; ** 5% significance; *** 1% significance.

Panel A: April 2006 to March 2007 ("good" period)

		Model-free Risk Adjustment			
		Strategy-specific loadings		Substrategy-specific loadings	
		(1)	(2)	(3)	(4)
Secrecy	High	2.69*	7.23***	2.38	4.42**
		(1.52)	(1.78)	(1.60)	(1.75)
Same Secrecy in 2007 and 2009			Yes		Yes
Observations		1,663	989	1,663	989
Number of funds		150	91	150	91
Adjusted R^2		0.229	0.241	0.320	0.317

Panel B: April 2008 to March 2009 ("bad" period)

		Model-free Risk Adjustment			
		Strategy-specific loadings		Substrategy-specific loadings	
		(1)	(2)	(3)	(4)
Secrecy	High	-8.21**	-18.55***	-5.22	-10.71**
		(4.09)	(5.37)	(3.57)	(5.25)
Same Secrecy in 2007 and 2009			Yes		Yes
Observations		1,574	1,151	1,574	1,151
Number of funds		140	98	140	98
Adjusted R^2		0.309	0.317	0.415	0.417

Table 5. Hedge fund flow-to-performance sensitivity

This table reports the results of estimating the following specification for the periods from April 2006 to March 2007 and from April 2008 to March 2009:

$$NetFlow_{it+3} = c + \alpha^{H}SecH_{it} + g^{L}SecL_{it}*(R_{it} - rf_t) + g^{H}SecH_{it}*(R_{it} - rf_t) + X_{it}'d + d_s + \varepsilon_{it},$$

where $NetFlow_{it+3}$ is the net quarterly flow to the fund from month *t* to *t+3*, R_{it}-rf_t is the quarterly excess return of fund *i* from month *t-3* to *t*; $SecL_{it}$ ($SecH_{it}$) is an indicator variables that equals 1 if a fund is rated as low- (highly) secretive, and 0 otherwise; X_{it} are fund-level controls (log of assets under management, measured at *t-3* annual volatility, measured from *t-15* to *t-3*, and median percentage net flows for funds in the same strategy, from *t* to *t+3*), and d_s are strategy fixed effects. Specifications 4 and 8 additionally include indicator variables for illiquidity, as well as their interactions with performance. Specifications 1 to 4 estimate the model for months from April 2006 to March 2007 ("good" period); specifications 5 to 8 estimate the model for months from April 2008 to March 2009 ("bad" period). Specifications 3, 4, 7, and 8 estimate the results using only the funds that have the same level of secrecy in both periods (i.e. April 2006 to March 2007 and April 2008 to March 2009). Standard errors are clustered at the fund level and are reported below the coefficients. * indicates 10% significance; ** 5% significance; *** 1% significance.

	April 2006 to March 2007 ("good" period)				April 2008 to March 2009 ("bad" period)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net Performance	0.0728***				0.0434***			
	(0.0118)				(0.00703)			
SecL*Net Performance		0.122***	0.115**	0.165***		0.0555***	0.0703***	0.0973***
		(0.0194)	(0.0454)	(0.0261)		(0.0203)	(0.0240)	(0.0275)
SecH*Net Performance		0.0492***	0.0411	-4.88e-05		0.0431***	0.0607***	0.0588***
		(0.0114)	(0.0407)	(0.0238)		(0.00723)	(0.0167)	(0.0171)
SecH		2.226	2.258	8.837*		-3.666	-3.418	-4.632
		(2.519)	(2.563)	(4.907)		(2.519)	(2.395)	(3.049)
Median Strategy Flow	0.591**	0.579**	0.576**	0.356	0.845***	0.848***	0.847***	0.831***
	(0.229)	(0.227)	(0.228)	(0.277)	(0.0628)	(0.0639)	(0.0639)	(0.0655)
lnAUM	-1.835**	-1.873**	-1.869**	-2.036**	-0.637	-0.502	-0.449	-0.525
	(0.871)	(0.879)	(0.904)	(0.889)	(0.634)	(0.588)	(0.587)	(0.611)
Annual volatility	-0.0709	-0.0740	-0.0741	-0.227**	-0.0380	-0.0214	-0.0244	-0.0135
	(0.0672)	(0.0673)	(0.0727)	(0.113)	(0.0548)	(0.0550)	(0.0579)	(0.0615)
Strategy FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Illiquidity and Illiquidity*Net Performance controls			Yes	Yes			Yes	Yes
Same Secrecy in 2007 and 2009				Yes				Yes
Observations	1,113	1,113	1,113	652	1,273	1,273	1,273	1,063
Number of funds	113	113	113	66	114	114	114	92
Adjusted R^2	0.129	0.140	0.139	0.179	1,273	0.437	0.437	0.417