

**Who benefits from funds of hedge funds?
A critique of alternative organizational structures in
the hedge fund industry**

Preliminary Manuscript^{*}

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Abstract

This paper provides a critique of alternative organizational structures in the hedge fund industry. Our critique is facilitated by several stylized models describing alternative industry structures. The models include: (1) An inside-only hedge fund model; (2) A straddling hedge fund model; (3) A straddling 'feeder' fund of funds (FOF) hedge fund model; (4) A stand-alone outside hedge fund; and (5) An outside 'feeder' FOF hedge fund model. Our discussion of these models, which centers on benefits vs. fundamental problems related to illiquidity, information asymmetry, and conflicts of interest, leads to several hypotheses about the differential characteristics and return performance of both individual hedge funds and FOFs. We test as many of these hypotheses as data availability allows, and evidence is consistent with these hypotheses. Regarding characteristics, we predict that some hedge funds and FOFs will have greater leverage and/or more restrictive withdrawal policies than others, and evidence is consistent with these predictions. Regarding return performance, we predict that certain hedge funds, and FOFs in general, will have relatively poor return performance, and evidence is consistent.

Keywords: Hedge funds; Funds of funds; illiquidity; information asymmetry; conflicts of interest; adjacency risk; contagion; return performance

JEL Classification Codes: D02, G2

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1 Introduction

Over the past 20 years, the hedge fund industry has experienced a tremendous boom-and-bust cycle. Regarding the boom, Stulz (2007) reports that: “In 1990, less than \$50 billion was invested in hedge funds; in 2006, more than \$1 trillion was invested in hedge funds.” (p. 176). Citi (2010) reports that from 2000-2003, assets under management (AUM) increased 67.1%, from \$490.6 billion to \$820.0 billion, and increased an additional 135% to \$1.93 trillion in the second quarter of 2008, when AUM peaked. Thereafter, however, the financial crisis took a heavy toll on AUM, as the industry experienced outflows of \$151.7 billion and \$103.3 billion in the fourth quarter of 2008 and first quarter of 2009, respectively. Over time, one particular class of funds, namely funds of hedge funds (FOFs), steadily represented about a third of the industry.

Citi argues that the hedge fund industry grew after 2000 largely because of institutional investors’ disillusionment following the busting of the ‘dot-com’ bubble: “As the technology boom of the late 1990s faded and market turmoil set in during the early 2000s, institutional investors’ allocations to long-only equities and bonds failed to generate the returns many sought. As their liability gaps increased, institutional investors began to broaden their investment horizon and look increasingly at alternatives.” (p. 12) Specifically, hedge funds held out the promise of positive performance regardless of market returns. However, if hedge funds can fulfill this promise, the trillion dollar question is: Why did the industry experience outflows rather than inflows during the turmoil of the latest financial crisis?

In this paper, we attempt to address this question through a critique of structures that have evolved in the hedge fund industry, particularly post-2000, and specifically, Funds of Funds. Our critique is facilitated by several stylized models describing alternative structures in the industry. The models are: (1) An inside-only hedge fund model; (2) A straddling hedge fund model; (3) A straddling ‘feeder’ fund of funds (FOF) hedge fund model; (4) A stand-alone hedge fund model; and (5) An outside ‘feeder’ FOF hedge fund model. Our discussion of these models, which centers on advantages versus fundamental problems, leads to several hypotheses about the organizational structure, operational structure, risk, and return performance of both individual hedge funds and FOFs. We test as many of these hypotheses as data availability allows, and evidence is generally consistent with these hypotheses. We discuss FOFs from two distinct perspectives. First, an investor’s perspective includes whether FOFs offer attractive

features relative to regular hedge funds, or whether they outperform. In this respect, regarding characteristics, we predict that some hedge funds and FOFs will have greater leverage and/or more restrictive withdrawal policies than others. Regarding return performance, we predict that certain hedge funds, and FOFs in general, will have relatively poor return performance. Second, we analyze the role that FOFs play in the industry. Specifically, we ask whether FOFs “help” the funds in which they invest, or the industry in general, and we find that they do not. Finally, we discuss current trends in the industry that also appear to bear out our hypotheses. The paper is organized as follows. Section 2 provides a review of the literature related to hedge funds. In Section 3, we present and discuss several stylized structural models of the hedge fund industry, and specify several testable hypotheses. Section 4 describes the data that we use in our empirical analysis. In Section 5 we present and discuss results of empirical tests of our hypotheses. In Section 6 we discuss current trends in the hedge fund industry that relate to our hypotheses. Finally, Section 7 summarizes.

2 Literature Review

In this section, we briefly review the extant literature related to hedge funds. Fung and Hsieh (1999) and Stulz (2007) provide excellent general descriptions of hedge funds’ legal and organizational structures, so we do not repeat this discussion here, except to state that: (a) hedge funds are formed as private limited partnerships; (b) investment is restricted to high net-worth individuals or institutional investors; and (c) hedge fund managers typically receive compensation in the form of a fixed fee (e.g., 2% of AUM) and an asymmetric performance fee (e.g., 20% of fund returns above a hurdle rate (e.g., the risk-free rate)), while the typical compensation for the manager of a FOF includes a fixed fee of 1% and an asymmetric performance fee of 10%. Both types of managers are generally subject to a ‘high-water mark’ restriction.

Instead, we review literature directly related to issues addressed in this paper, including illiquidity, opacity, conflicts of interest, leverage, and performance. As this review reveals, these issues are addressed in piecemeal fashion across articles in the extant literature. The objective of our modeling effort in Section 3 is to address, in an integrated fashion, not only these issues but others that have received little attention in the literature.

2.1 Information Asymmetry (or Opacity)

The information asymmetry or opacity problem may be the most serious problem that besets the hedge fund industry. Hedge funds lack transparency because each hedge fund's investment strategy is proprietary, so managers are loathe to reveal details about their strategy and operations to anyone, including current and prospective investors. They are private, rather than public, in order to avoid SEC requirements for filing audited financial statements (though some hedge funds do so). Hedge funds' reporting is essentially limited to a broad statement about investment strategy and periodic reports of fund returns. As a result, the entire hedge fund industry is potentially subject to the lemons problem associated with information asymmetry as in Akerlof (1970). Consequences of this problem have received considerable attention in the literature, though analyses focus more on implications of the problem and less on mechanisms to mitigate the problem.

Bollen and Pool (2009b) use statistical analysis to determine whether hedge fund managers fully report gains but delay reporting losses in order to reduce the risk of capital flight. They suggest that their conditional serial correlation measure is a leading indicator of fraud. Bollen and Pool (2009a) find "... a significant discontinuity in the pooled distribution of monthly hedge fund returns: the number of small gains far exceeds the number of small losses. The discontinuity is present in live and defunct funds, and funds of all ages, suggesting it is not caused by database biases. The discontinuity is absent in the three months culminating in an audit, suggesting it is not attributable to skillful loss avoidance. The discontinuity disappears when using bimonthly returns, indicating a reversal in fund performance following small gains. This result suggests the discontinuity is caused at least in part by temporarily overstated returns." (Abstract) Brown, Goetzmann, Liang, and Schwarz (2008) examine SEC filings by hedge funds during a temporary period (February 2006) when SEC mandated filings (via Form ADV) were made (i.e., before a court overturned the mandate). Among other findings, they document: "... evidence that the information in the form has the potential to add value to the investor decision-making process. Hedge funds operated by managers filing Form ADV in 2006 had better past performance and had more assets than those operated by managers who did not file either because they were technically exempt from the filing requirement, or because they simply chose not to file. This result suggests that filing alone may be a potential signal of quality. In addition, we find a strong positive association between potential conflicts identified in the Form ADV filing and

past legal and regulatory problems. Finally, through a canonical correlation analysis, we are able to establish a link between potential conflicts identified in Form ADV filings and operational risk characteristics in the Lipper TASS, Inc. (TASS) database.” (p. 2787) Brown, Goetzmann, Liang, and Schwarz (2010) summarize the results of their analysis of hedge fund due diligence (DD) reports as follows: “In this paper we study a sample of 444 due diligence (DD) reports from a major hedge fund DD firm, many of which indicate a lack of transparency about past legal and regulatory problems, failure to use a major auditing firm and the use of internal pricing . . . This study uses evidence of inadequate or failed internal processes to derive a simple and direct measure of operational risk . . . Exposure to this risk increases the likelihood of subsequent poor performance. Since these DD reports are performed after positive performance it is important to control for potential bias due to this and other conditioning factors. Although our sample is not sufficiently large to determine whether this is a priced source of risk, it does not appear that exposure to operational risk influences in any way the tendency of hedge fund investors to invest on the basis of past high returns. Our study emphasizes the importance of information verification in the context of financial intermediation.” (Abstract)

Finally, Stulz (2007) suggests that the relative growth of FOFs over time may be due to their role in mitigating opacity problems, among other roles: “A fund-of-funds is a hedge fund that invests in individual hedge funds and monitors these investments, thereby providing investors a diversified portfolio of hedge funds, risk management services, and a way to share the due diligence costs with other investors.” (p. 180) So again, FOFs seem to hold promise as a positive development in the industry. In Section 3, we suggest an alternative motive for the development of some FOFs, particularly those developed by investment banks for their own funds. We also suggest a dark side to other FOFs: They may steer investors toward hedge funds that are relative lemons. We find support for this hypothesis.

2.2 Illiquidity

A hedge fund is created to exploit the talents of its managers to identify arbitrage opportunities that arise in a given security market due to temporary mispricing. Finance theory suggests that such opportunities are more likely to emerge, and to be larger, in securities that are relatively illiquid (e.g., small-firm stocks). As a general consequence, though, a considerable amount of time is required for these arbitrage strategies to yield profits. Thus, investment in a hedge fund

itself is necessarily relatively illiquid. Getmansky, Lo, and Makarov (2004) and others document that hedge fund returns exhibit considerable ‘exposure’ to illiquidity.

To deal with illiquidity exposure, hedge funds generally impose two types of exit restrictions on its investors. First, a new investor is subject to an initial lock-up period during which the investor cannot withdraw their investment. Second, a seasoned investor must give redemption notice before they can withdraw their funds, and the filing of such a notice is often available only during certain time windows throughout the year. Exit restrictions vary considerably across hedge funds. Aragon (2007) documents evidence that average returns are higher for hedge funds that are more withdrawal restricted, suggesting that hedge fund returns in effect contain an ‘illiquidity’ premium. Similarly, Sadka (2010) finds that “liquidity risk as measured by the covariation of fund returns with unexpected changes in aggregate liquidity is an important determinant in the cross-section of hedge-fund returns. The results show that funds that significantly load on liquidity risk subsequently outperform low-loading funds by about 6% annually, on average, over the period 1994-2008, while negative performance is observed during liquidity crises.” (p. 54) Also, Khandani and Lo (2009) find that the hedge fund returns are correlated with returns on illiquid assets. (See also Longstaff (2001); Kahl, Liu, and Longstaff (2003); Lerner and Schoar (2004)). Of course, the flip side of this discussion is that hedge funds improve the liquidity of the markets in which they invest. Brophy, Ouimet, and Sialm (2009) document evidence consistent with this argument. (See also Ben-David, Franzoni, and Moussawi (2010))

Finally, it is conceivable that funds of hedge funds (FOFs) could serve to ease the illiquidity problem in the hedge fund industry. Specifically, a FOF could (a) spread investor redemptions across the numerous hedge funds in which it invests, or (b) identify specific hedge funds within its portfolio that are more amenable to redemptions at a given point in time. Indeed, such a redemptions distributing service could be a major reason for the existence of FOFs. Instead, researchers have focused on other reasons for the existence of FOFs, as we discuss below. Thus, we test the redemptions distributing hypothesis by comparing the redemption-restriction terms of FOFs with those of stand-alone hedge funds. If the argument has merit, FOFs should be observed offering better redemption terms than stand-alone hedge funds. However, our modeling discussion in Section 3 leads us to be skeptical about the realization of this redemptions distributing service, at least for some FOFs. Indeed, we shall document that in the recent period, the FOFs do not offer better share redemptions than individual hedge funds.

2.3 Leverage

An under-investigated research question is why many hedge funds employ substantial leverage. The importance of the leverage question is underscored by the spectacular failures of hedge funds Long-Term Capital Management (LTCM) and Amaranth, both of which were highly levered. In a recent paper, Titman (2010) addresses the issue of hedge fund leverage:

“... the leverage of investment funds, such as hedge funds, is not well understood. Many of the issues that relate to the leverage of hedge funds and the leverage of corporations are similar. In particular, in the event of a negative shock, the overly levered hedge fund, like an overly levered corporation, may be forced to close out illiquid positions at unfavorable costs. These costs received substantial attention in the popular press, both around the LTCM crisis in 1998 and during the more recent episode in 2008. However, the advantages of leverage for hedge funds are much less understood. Indeed, there are no tax advantages. Although issues of hedge fund leverage have attracted considerable attention from regulators and the popular press, academics have not seriously examined why hedge funds tend to be so highly levered. Despite the obvious disadvantages of leverage, hedge funds are often substantially more levered than typical corporations. Indeed, according to the Lipper TASS data base there are a number of convertible arbitrage funds that have leverage ratios that exceed five to one. And while the measurement of hedge fund leverage is itself a challenge, given the alternative avenues available to hedge funds for leveraging their investments, e.g., debt and derivatives, there seems to be substantial cross-sectional and time series variation in the use of leverage by hedge funds. The question that I will raise in this note is whether there is a fundamental (i.e., fully rational) explanation of the substantial use of leverage by hedge funds. Or do hedge funds simply use leverage to inflate returns in good times to fool or in other ways exploit naive clients?” (pp. 2-3)

Although Titman arrives at no definitive conclusions on the issue, he suggests several potential market imperfections that may explain hedge funds' use of leverage. For instance, hedge funds may use leverage on a contingent 'line-of-credit' basis to inject capital that offsets redemptions following poor performance. Alternatively, leverage “can arise from the convexity of the direct compensation of hedge funds as well as the indirect incentives that come from the hedge funds' inflows and outflows. Convex payoffs generate an incentive to increase leverage and in other ways increase risk.” (p. 7) We discuss hedge funds' use of leverage within our modeling analysis in Section 3. We arrive at a hypothesis that is actually close to Titman's early quip that hedge funds may use leverage to “inflate returns in good times to fool or in other ways exploit naive clients,” although our hypothesis predicts that only a subset of lemon hedge funds use leverage for this purpose. Later, we test this hypothesis and find support for it.

2.4 Performance

The price performance of hedge funds is easily the most widely researched issue. Overall, the evidence regarding whether hedge funds provide superior return performance is mixed. In

attempting to assess performance, researchers have had to deal with two major problems, (a) developing an appropriate benchmark for judging performance; and (b) dealing with survivorship bias in the data. (See Fung and Hsieh (1997a); Lo (2005))

Ackermann, McEnally, and Ravenscraft (1999) conducted one of the earliest empirical analyses of hedge fund performance. They summarize their results as follows: “Using a large sample of hedge fund data from 1988-1995, we find that hedge funds consistently outperform mutual funds, but not standard market indices. Hedge funds, however, are more volatile than both mutual funds and market indices. Incentive fees explain some of the higher performance, but not the increased total risk. The impact of six data-conditioning biases is explored. We find evidence that positive and negative survival-related biases offset each other.” (p. 833) In contrast, Grecu, Malkiel, and Saha (2007) find that managers of poorly performing funds more likely to fail to report results. Liang (2000) also questions the findings of Ackermann, McEnally, and Ravenscraft (1999) after finding survivorship bias of over 2% per year. (See also Amin and Kat (2003)) Liang (2001) corrects for survivorship bias and finds that HFs have a higher Sharpe ratio than the S& P 500, 0.41 to 0.27, based on data for the years 1990-1999. Both Xiong, Idzorek, Chen, and Ibbotson (2009) and Fung, Hsieh, Naik, and Ramadorai (2008) find that hedge funds generate positive abnormal returns. Edwards and Caglayan (2010) also find evidence of hedge fund outperformance, as well as performance persistence for up to two years. (See also Agarwal and Naik (2000); Kosowski, Naik, and Teo (2007))

In contrast, several studies document evidence that hedge funds are unable to generate superior returns. Asness, Krail, and Liew (2001) find that, after accounting for stale pricing in illiquid securities, hedge funds do not provide superior returns. Fung, Xu, and Yau (2004) find that global hedge fund managers are unable to provide superior performance after adjusting for illiquidity effects, nonlinearity, and survivorship bias. Malkiel and Saha’s (2005) analysis suggests that much of the reported superior performance of hedge funds is due to survivorship bias which, they estimate, adds up to 4.5% per year to hedge fund returns.

Finally, several researchers have analyzed the performance of FOFs. Ang, Rhodes-Kropf, and Zhao (2008) argue that because they offer diversification that investors cannot achieve on their own, FOFs are uniquely desirable investments. Agarwal and Kale (2007) argue that FOFs and multi-strategy hedge funds are similarly diversified, yet the multi-strategy hedge funds outperform FOFs even on a gross-of-fees basis. Fung, Hsieh, Naik, and Ramadorai (2008) find that FOFs deliver abnormal returns only for a brief period, and that mostly they underperform.

3 Fundamental problems with hedge funds and critiques of alternative organizational structures

To investors, the advantage of the hedge fund structure over mutual funds is that hedge funds have greater flexibility in seeking abnormal returns, or alpha. A hedge fund can take positions in the market that mutual funds cannot, including short positions, levered positions, and positions in derivatives. Moreover, hedge fund managers' contracts provide them with a strong incentive to create alpha, while mutual funds' contracts are more restrictive.

Against these and other advantages, however, there are many fundamental problems with hedge funds. In this section, we initially discuss these fundamental problems. We then describe several alternative organizational structures in the hedge fund industry to determine the extent to which each is subject to these fundamental problems.

3.1 A review fundamental problems associated with hedge funds

Here we briefly discuss several fundamental problems associated with at least some hedge funds. Though all of these problems may be interrelated, some problems are more obviously related to each other, so we group the problems into three clusters.

3.1.1 Problem Cluster #1: Opacity

As discussed in Section 2, the opacity of hedge funds gives rise to two fundamental problems: (a) the lemons problem; and (b) the potential for fraud. Regarding the lemons problem, if investors lack the information necessary to distinguish hedge funds with genuine ability to generate alpha, then the industry will tend to include bogus or 'lemon' hedge funds whose managers claim that their strategy produces alpha when in fact they do not. Such managers are simply attempting to reap private benefits from assets under management (AUM) for as long as possible. To extend their operations over time, they will resort to biased reporting of returns by using internal pricing, realizing gains while delaying losses, etc.

The literature reviewed in Section 2 alludes to two mechanisms to mitigate these opacity problems. First, investors will make transparency demands, such as an external audit. However, a hedge fund then may resort to hiring a lax auditor, to bribing the auditor, etc. Alternatively, a monitoring mechanism could be employed. For instance, Stulz (2007) suggests that FOFs could serve as monitors of stand-alone hedge funds. However, this argument presumes that the

manager of the FOFs is not a benefitting participant in, or indeed the chief perpetrator of, a fraud.

3.1.2 Problem Cluster #2: Operational risks

Hedge funds face numerous risks that are inherent to their operations. First and foremost, hedge funds generally face liquidity risk, as they take positions in relatively illiquid securities, or positions in liquid securities that must be maintained for a considerable length of time. In turn, liquidity risk leads to funding risks. A hedge fund is financed by equity investors who may add to or withdraw their investments over time. Hedge funds respond to the liquidity risk posed by its equity investors by restricting investment and withdrawals, both initially and over time (i.e., in terms of lock-up period, redemption notice period, and redemption frequency). As we discuss later, the restrictions that a given hedge fund must impose depends critically on its investor clientele. A hedge fund's prime broker, as its lender, can also expose the fund to funding risk, because the prime broker may later withdraw or modify their lines of credit, margin terms or short-sale terms. In turn, funding risk engenders adjacency risk. Because investors' assets are co-mingled in a hedge fund, the decisions of some investors, particularly to either add or withdraw funds, may adversely affect the overall performance of the fund, especially if these actions disrupt the fund's trading strategy, causing either overinvestment or costly premature liquidations.

Of course, hedge funds' use of leverage poses its own risks, especially the potential need for costly distressed liquidations. Leverage can be used on a contingent 'line-of-credit' basis to inject capital that offsets redemptions by equity investors following poor performance. On the other hand, as Titman (2010) argues, hedge fund managers may have an incentive, due to the convexity of their contracts, to use leverage even if it is not in the investors' interest.

Finally, we have concentration risk. If a hedge fund invests in only a few investments, or in only a few asset classes, sectors, or geographical areas, the fund will be more risky than if it was more diversified. FOFs and multi-strategy funds can alleviate this problem, the former by investing in stand-alone hedge funds that collectively are diversified, the latter by directly pursuing diversified strategies.

3.1.3 Problem Cluster #3: Alpha dilution risks

There are at least three ways in which a given hedge fund, pursuing a given strategy to generate alpha, can see their efforts thwarted. First, we have the issue of size. If the size of a hedge fund's AUM becomes large relative to the size of the market in which it is operating, its own trades can move prices and destroy alpha at the margin. Alternatively, if multiple hedge funds are, even unwittingly, pursuing the same source of alpha, as their collective AUM grows the same result will occur. Second, and related, is the risk of mimicking. New mimicking hedge funds may develop based on the success of a given hedge fund's strategy, especially if the initial hedge fund loses key personnel who then become competition for the same alpha. Third, because a hedge fund must use one or more prime brokers to execute trades, the executing broker may engage in *front running* of the hedge fund's trades, which can substantially dilute the hedge fund's ability to generate alpha.

3.2 Critiques of alternative hedge fund organizational structures

Next, we describe and critique several alternative organizational structures in the hedge fund industry in light of the fundamental problems discussed above. We facilitate our discussion by developing several stylized models of the organizational structures that have evolved in the industry in recent years. (We admit that these models are simplifications of the hedge fund world, and are limited in scope to essential elements upon which we focus.) The alternative structures vary in terms of the extent to which a given hedge fund is (a) tethered to a given investment bank and its 'inside' investor clients, at one extreme, versus (b) funded by 'outside' investors and/or a fund of funds, at the other extreme. Our discussion of these models highlights advantages and disadvantages of the alternative structures. In particular, we argue that opacity and conflict of interest problems vary substantially across these alternative structures, to the extent that some structures may be fundamentally flawed. Our critique leads to several hypotheses about cross-sectional variation in stand-alone hedge fund characteristics (redemption restrictions, leverage, the use of 1 vs. multiple prime brokers, etc.) and performance, as well as a hypothesis about the boom-and-bust cycle that the industry exhibited during the decade of the 2000s.

3.2.1 The traditional investment bank model

The alternative hedge fund organizational structures that we will discuss are illustrated in Figure 1, Panels B through F. However, we initially discuss a model of the traditional investment bank, illustrated in Panel A. The traditional model is important for perspective, as 'inside' hedge funds, defined later, directly supplant the traditional model. In the traditional model, the investment bank (the 'House') employs investment managers who make trades for the individual accounts of 'inside' or 'client' investors, as well as proprietary trades for the House account. The investment bank executes these trades in its role as the sole prime broker, receiving commissions directly from individual clients. Individual client investors also pay the House full fees (as distinguished from the reduced fees they pay in a hedge fund structure). Finally, the investment bank pays salaries and bonuses to investment managers.

From the perspective of our analysis, the primary advantage of the traditional structure is the relatively stable bond that exists among (a) the House/prime broker, (b) the investment managers (i.e., trading talent), and (c) the individual investor clientele. In particular, the House serves as an effective monitor of investment managers on behalf of its clients because (a) it has inside information on the investment managers' trading strategies and performance, and (b) it has an incentive to protect its reputational capital. The primary disadvantages of the traditional structure include: (a) Individual investment managers are constrained in their trading strategies; (b) Investment managers' incentives are curbed if bonuses are based on pooled performance; and (c) The House incurs substantial back office costs associated with the numerous individual trades with individual clients. These disadvantages, among others, may have spurred the development of 'inside' hedge funds, to which we now turn.

3.2.2 The inside-only hedge fund model

Our initial hedge fund model is illustrated in Panel B of Figure 1. We label the depicted structure as 'inside-only' because the focal hedge fund is open only to a given investment bank and its investor clientele. The inside-only hedge fund has the simplest hedge fund structure among those we discuss, and it is also the oldest (i.e., in the modern hedge fund era). Comparing the inside-only hedge fund model with the traditional investment bank model, we see that: (a) the general managers of the hedge fund(s) replace the cadre of investment managers; (b) clients, as well as the House, invest in the hedge fund(s) rather than in individual securities; and (c) the

House, via its role as prime broker, collects commissions from the hedge fund rather than from individual clients. Moreover, the hedge fund's general partners are paid directly from the hedge fund for their investment management services, so client investors pay only reduced fees to the House (rather than full fees in the traditional model, which include a component to pay salary and bonuses to investment managers). Finally, the House provides the hedge fund with a credit facility and risk management services.

The advantages of the inside-only hedge fund structure are primarily that they mitigate disadvantages of the traditional structure noted earlier. First, the investment constraints faced by investment managers in the traditional structure are alleviated; the hedge fund's general partners are relatively free to pursue specific investment strategies that may involve specific securities, short-selling, the use of leverage, etc. Second, the hedge fund's general partners have a stronger incentive to perform than is the case for traditional investment managers because their pay is directly tied to the performance of the hedge fund that they control. Third, the House's back office costs are substantially reduced because individual clients invest in the hedge fund rather than numerous individual securities. The inside-only hedge fund structure should be able to capture these advantages without substantial loss of the 'trust' advantage of the traditional structure. After all, the House can (a) control the amount of client (and House) capital that is invested in each of its inside hedge funds, and (b) effectively monitor the trading strategies and performance of its inside hedge funds. Moreover, the House has two strong incentives to monitor the performance of its inside hedge funds: (a) It still collects (albeit reduced) fees from its investor clientele; and (b) It stands to benefit from its own (i.e., proprietary) investment in the hedge funds. The inside hedge fund model also avoids all of the fundamental problems discussed earlier. Overall, we conclude that the inside-only hedge fund structure dominates the traditional investment bank structure. As we will see below, the inside-only hedge fund structure also appears to dominate other hedge fund structures.

3.2.3 The straddling hedge fund model

The second hedge fund structure is illustrated in Panel C of Figure 1. We call this the 'straddling' hedge fund model because, while the hedge fund remains strongly tethered to a single investment bank (especially its prime brokerage and investor clientele), it is also open to outside investors. A potential advantage of this structure over the 'inside-only' structure is that each hedge fund has the opportunity to be larger, and thus better able to capture economies of scale, than if its

size is restricted to include only the 'inside' capital (i.e., clientele and House capital) allocated by the House. The hedge fund's general partners would be particularly keen to pursue this opportunity because both their base fee and profit share increase with fund size.

However, several fundamental problems attend the straddling hedge fund structure do not exist within inside-only hedge fund structure. These include transparency demands, funding risk, adjacency risk, and size. Regarding size, we stated above that increasing the size of a hedge fund can be an advantage due to economies of scale and increased incentive compensation for investment managers. However, if the fund grows too large for the market being exploited, alpha will be diluted. Of course, hedge fund can close to new investors to avoid this threat to its strategic mandate. Nevertheless, the adjacency problem emerges with new outside investors because, unlike the investment bank's inside investor clientele, outside investors have no bond of trust with the investment bank or its hedge funds. Thus, if outside investors withdraw substantial funds, other investors, including and especially the investment bank's inside investor clientele, stand to lose, which would compromise the bond of trust with the investment bank. A straddling hedge fund can reduce the expected costs of un-orderly liquidations by having a longer lock-up period and more restrictive redemption terms, but these would also be imposed on inside clients, which was unnecessary in the 'inside-only' hedge fund structure. Allowing outside investors into a hedge fund also engenders a transparency demands problem. Outside investors will demand information about the fund's investment strategy. Indeed, many institutional investors are barred from making investments where due diligence is inadequate. This may pose a dilemma because a hedge fund's investment strategy is proprietary, and its revelation in any detail would jeopardize its value. This problem may not be severe in the case of a straddling hedge fund because it can lean on its tether to the House's reputation; hence the term 'brand hedge fund' in industry lexicon. However, as we discuss later the transparency dilemma may be a serious problem for 'outside' hedge funds.

3.2.4 The straddling 'feeder' fund of funds model

One means by which an investment bank can manage both investments into and withdrawals from its 'opened' hedge funds by outside investors is to create a straddling 'feeder' fund of funds as depicted in Panel D of Figure 1. Outside investors invest in and withdraw from the FOF, and the FOF's general partners, working in conjunction with the House, allocate new outside capital to hedge funds that can profitably invest it, and allocate withdrawals to hedge funds

that are most amenable to withdrawals. This investment-and-withdrawal allocation motive for developing a FOF complements the motives suggested by Stulz (2007) and noted earlier: monitoring, diversification, risk management, and due diligence efficacy.

The investment bank can make further use of its FOF to reduce adjacency risk for its client investors by allocating some of the outside capital to additional 'outside' hedge funds. These additional 'relief valve' hedge funds can be employed to mitigate adverse effects of either excess capital inflows or withdrawals by outsiders on the inside hedge funds in which clients are directly invested. Of course, the outside hedge funds may be inferior to inside hedge funds, in which case the performance of the FOF will be inferior to the performance of the investment bank's inside hedge funds, even before the FOFs general partners take their cut. Thus, our straddling 'feeder' FOF model suggests one reason why evidence (Agarwal and Kale (2007); Fung, Hsieh, Naik, and Ramadorai (2008)) has shown that FOFs underperform stand-alone hedge funds even on a gross-of-fees basis: 'Relief-valve' hedge funds may be lemons.

3.2.5 The stand-alone outside hedge fund model

Panel E of Figure 1 depicts a model for a simple stand-alone outside hedge fund. The outside hedge fund exhibits all of the fundamental problems that we have discussed. An outside hedge fund is likely to exhibit a greater lemons problem than the inside hedge funds discussed earlier because they are not formally tethered to an investment bank and its reputational capital. Thus, potential investors will make more transparency demands. Funding and adjacency risks are also likely to be high for an outside hedge fund. Size issues and mimicking may be a greater problem for outside hedge funds, as well. Finally, outside hedge funds are exposed to greater front running risk. In the figure, we depict the outside hedge fund as having two prime brokers, as this may be necessary to limit front running.

3.2.6 The outside 'feeder' fund of funds model

The final hedge fund organizational structure that we discuss, which we call the outside 'feeder' fund of funds model, is depicted in the Panel F of Figure 1. Investors invest in the FOF, which in turn invests in a variety of 'tethered' outside hedge funds. This arrangement has two potential advantages over the stand-alone outside hedge fund model. First, the outside FOF managers can efficiently screen 'winner' outside hedge funds, and monitor those selected, on behalf of

investors. Second, the arrangement may serve to stabilize the flow of funds into and out of each hedge fund, thus alleviating both funding and adjacency risks for each of the outside hedge funds relative to what they would face on a stand-alone basis. This structure provides additional advantages in terms of reducing concentration risk and capturing economies of scale in terms of due diligence, risk management, and back office duties.

However, the outside 'feeder' FOF structure is also replete with problems. First, adjacency risk may be substantial despite the moderating effect of a FOF because the investor base does not include a cadre of stable 'inside' investors. For this reason, we predict that an outside FOF may actually be forced to offer relatively poor liquidity for outside investors (i.e., in terms of lock-up period, redemption notice period, and redemption frequency). Second, the general managers of both the outside FOF and the outside hedge funds in which it invests may have relatively small amount of reputational capital at stake, which can lead to a situation in which many of the outside hedge funds in the structure may be lemons. Third and finally, the bond between each hedge fund and the prime broker(s) it uses is much weaker than for 'inside' hedge funds. Consequently, the stand-alone hedge funds in this structure may still need to employ multiple prime brokers to mitigate front running risk.

4 Data and preliminary evidence

In this section, we first detail our data sources and then provide evidence on the importance of the funds of hedge funds in the hedge fund industry.

4.1 Data sources

For funds performance and characteristics, we obtain data from Lipper TASS (henceforth TASS). Our data spans the period from January 1994 to December 2008, but since funds may report late (Titman and Tiu (2010)), we use records as of April 2009. The TASS database has been used extensively by hedge funds researchers with some (e.g. Liang (1999)) suggesting that it should be the preferred database for academic research. There are a total of 12,678 funds reporting in the TASS database, of which 6,749 are still in existence. Of all the funds reporting, roughly a third (3,689) are funds of hedge funds.

Table 1 presents summary statistics of the funds in the TASS database. The AUM tracked by TASS exploded from a little over \$50 billion in 1994 to over \$1.7 trillion in 2006,¹ to decrease to around \$1 trillion until December 2008 as the industry traversed the world financial crisis. While TASS provides data on a variety of fund characteristics, such as leverage or style, it does not track whether stand-alone funds have a fund of hedge funds among their investors. Funds of hedge funds, in turn, do not disclose their portfolios.

In order to obtain information on whether a fund has a FOF among its investors, we collect data from Morningstar. In addition to tracking hedge funds, the Morningstar database reports a specific variable that is equal to one if an stand-alone hedge fund had at least one FOF among its investors. The Morningstar database has been previously used by de Roon, Guo, and ter Horst (2010) to argue that the stand-alone funds having funds of hedge funds investors are not selected randomly from all the funds available. The Morningstar database tracks 6,976 funds as of December 2008; unfortunately, statistics such as leverage, or data such as the day a fund joins a database are not reported in Morningstar and thus we needed to merge the the two databases. We performed the merger using fund names. Such matching procedures are used in the hedge funds literature, for example recently by Agarwal, Jiang, and Fos (2010). In the merger, we identify a total of 7,283 common funds. Of these, 2,085 have at least one FOF investor, while the remainder of 5,198 were never associated with a FOF.

4.2 How important are funds of hedge funds?

We continue by analyzing how important funds of hedge funds are in the industry.

First, from Table 1, we observe that the average FOF is more than 50% larger in terms of AUM than the average hedge fund. Anecdotal evidence suggests that institutional investors prefer hedge funds that are larger, over \$200 million in AUM, so it appears that funds of funds are more likely to fall onto the radar screen of institutions.

In order to analyze the relative importance of the FOFs in the industry, in Figure 2 we plot the number of funds of hedge funds as well as their AUM relative to the entire industry excluding the funds of funds themselves. Figure 2 tells an interesting story: The size of AUM for FOFs *increased* slightly over time relative to the size of the industry. FOFs manage roughly a third of the assets in the hedge fund industry. At the same time the relative number of FOFs also

¹These are funds other than funds of hedge funds. We assume that including the funds of hedge funds in the total AUM means double counting.

increased relative to the number of funds in the industry. These results suggest that funds of hedge funds are an important part of the hedge fund industry and that their importance did not diminish in time. Funds of funds survived not only crises but also academic research questioning their fees-on-fees (e.g. Brown, Goetzmann, and Liang (2004)) or their underperformance relative to similarly diversified organizations such as multi-strategy funds (Agarwal and Kale (2007)). Moreover, FOFs see their role in the industry increasing even when the entire industry (including funds of funds themselves) experienced outflows in 2008. If funds of funds indeed are important for the hedge fund industry, the goal of our study is to elucidate the role they fulfill.

We continue by exploring the role funds of hedge funds play for their investors.

5 Funds of hedge funds and their investors

In this section we study funds of hedge funds performance and liquidity from the perspective of their investors. In the previous section we documented an increase in the relative importance of funds of hedge funds in the industry. One possible explanation is that investors prefer to invest in funds of hedge funds rather than investing directly, and such preferences may be motivated by the performance of funds of funds and by the liquidity they offer to their investors. In this section, we explore whether, relative to the funds they invest in, funds of hedge funds deliver performance and liquidity to their investors.

5.1 The relative performance of funds of hedge funds

In this subsection we examine the relative performance of funds of hedge funds. In order to do so, we perform a set of tests whose results are presented in Table 2. In order to estimate the performance of funds of funds relative to the funds they may invest in, we start with the investment opportunity set for funds of hedge funds managers. We initially examine all hedge funds with at least one fund of funds investor and that have at least 5 years of history (from January 2004 to December 2008). In Panel A of Table 2, we consider all possible hedge funds with a fund of funds investor, while in Panel B we restrict attention to only the funds which are currently open for investment.

As a first test, we extract principal components from the returns of all hedge funds, as this is representative of the investment opportunity set of funds of hedge funds. We retain the first 10 principal components, which explain 78.20% of the variance of returns, and regress excess

returns of funds of funds on excess returns of the 10 principal components. We then record the distribution of fund of funds alphas. From Table 2 we observe that the alphas of funds of funds are negative and significantly different from zero. A negative alpha suggests that the performance of funds of funds investment strategies are insufficient to cover the extra layer of fees the funds of funds charge.

For robustness considerations we perform several additional tests. First, we impose the restriction that a hedge fund cannot be shorted. Therefore, a negative alpha from an OLS model may be misleading when the regressors are hedge fund portfolios and some of the betas are negative. From this perspective, in addition to OLS we have also performed Sharpe (1992) style regressions. The results of these tests are stronger. For example, while the average alpha with respect to principal components is -1.02% annually when we regress fund of funds returns on the principal components extracted from the returns of funds open to investment, the average alpha becomes -2.12% per year when Sharpe style regressions are used. In some of the models, more than 75% of the funds of funds have negative alphas.

Although principal components represent the most direct way to calculate the relative performance of funds of hedge funds, these portfolios may not necessarily be investible. We therefore perform an alternative test in which we replace the principal components with strategy indices from Hedge Funds Research. Our result, that the average hedge funds alpha is negative, continues to hold. Finally, funds of funds may exhibit relative underperformance when compared to the average hedge fund, but as long as they exhibit positive risk adjusted performance, they may still be a desirable investment. To check if this is the case we regressed the performance of funds on hedge funds on the Fung and Hsieh (2004) factors. The result remains that the average FOF underperforms. These results are consistent with the work of Agarwal and Kale (2007) who argue that funds of funds underperformed one particular class of hedge fund, namely multi-strategy funds, both on a net as well as gross basis.

These results suggests that from a performance perspective, funds of funds are a less-than-perfect alternative to investing in hedge funds directly. In the next subsection we investigate how investing in funds of funds compares to direct investment in hedge funds from a liquidity perspective.

5.2 The relative liquidity of funds of funds

Funds of hedge funds are in principle diversified; thus, they should offer their investors better liquidity terms than investors would obtain by investing directly in stand-alone hedge funds. In this subsection we investigate this issue.

In order to compare the liquidity offered by funds of funds with that offered by the funds in which they invest, we analyze three fund characteristics determining the liquidity offered by funds to their investors. The first is the lockup period. This is the time period a new investor in a hedge fund is precluded from taking their capital out. Hedge funds may engage in strategies which attempt to earn a premium for holding illiquid assets. In order for the funds to execute these strategies, investors need to keep their capital in the funds. Lockup periods accomplish exactly this task. Consistent with this idea, Aragon (2007) finds that funds with longer lockup periods do indeed exhibit higher alphas. The other two liquidity measures we analyze represent the “immediate” liquidity offered by hedge funds. They are, respectively, redemption frequency, which expresses how often investors are allowed to withdraw money from the fund, and the redemption notice period, which is waiting time for an investor to receive the proceeds of their withdrawn investment.

Although funds of funds are a diversified portfolio of funds and thus in theory can offer better liquidity terms than the average hedge fund in their portfolio, we should not expect all the liquidity measures enumerated above to be better for funds of hedge funds. For example, despite diversification, unless it holds cash a fund of funds still needs to have a longer redemption notice period than each of the stand-alone funds in its portfolio. Panel A of Figure 3 presents asset weighted redemption notice periods for funds of funds as well as for the funds owned at least partially by a fund of funds. Consistent with our expectation, funds of funds require advanced withdrawal notifications of around 10 days. Furthermore, this spread has doubled in the last 5 years of our sample.

While we cannot expect funds of hedge funds to exhibit better (i.e., shorter) redemption notice periods than the funds they hold, we would expect, due to diversification, that fund of funds offer better (i.e. shorter) lockup periods as well as more generous (i.e., more frequent) redemption frequencies than the funds in which they invest. Panels B and C of Figure 3 present the asset weighted redemption frequencies and respectively lockup periods for funds of funds and for the funds in which they are invested. In the early half of our sample funds of funds did

offer better liquidity terms. However, we observe a reversal of those terms in the second half of the sample. As apparent from the Figure, the liquidity terms offered by funds of hedge funds to their investors are, in the most recent period of our sample, worse than what the investors could have obtained by investing directly in hedge funds.

We thus conclude that funds of hedge funds do not generate outperformance nor offer better liquidity terms than what investors could obtain, were they able to directly invest in the same hedge funds that are held by funds of hedge funds. In the next section we investigate the role played by funds of funds for the hedge funds industry.

6 Fund of funds and the hedge funds industry

In the previous section we have documented that funds of hedge funds do not seem to create more favorable liquidity or performance terms for their investors, than if the investors can themselves obtain, would they directly invest in stand-alone hedge funds. In this section we examine the role played by funds of funds for stand-alone hedge funds.

6.1 Funds of funds and hedge funds' prime brokers

In this subsection we study the number of prime brokers employed by an stand-alone hedge fund which is owned by a fund of funds. Our premise is that having a FOF among investors will facilitate a hedge fund's access to capital, thus, increase the number of trading programmes as well as access to more brokers.

From Table 3, we observe that generally, funds having at least one fund of funds investor indeed have more prime brokers. The particular strategies where this is not the case are the statistical arbitrage and the emerging markets categories; for these cases the differences are not statistically significant.

We thus conclude that having a FOF among its investors does not appear to reduce front-running risk, nor provide significantly better access to more trading programs.

6.2 Funds of funds and hedge funds flows

In this subsection we investigate whether hedge funds with fund of funds investors receive more flows than other hedge funds.

To do so, in Table 4 we report time series averages of quarterly flows for hedge funds with at least a fund of funds investor as well as for funds without one. Since past performance may affect flows, we reports break the funds into nine past performance bins. Finally, we have broken the reporting into two subperiods: Panel A includes the time period from 1996 to 2000 while Panel B reports from 2004 to 2008.

We observe that in the early period, having a fund of funds among investors aided good performers to receive flows. For example, the funds in the best performing bin received 3.33% more inflows per quarter, on average, than the funds without a fund of fund investor. In contrast, the funds in the worst performing decile experience a 0.01% more *outflow* per quarter when they have a fund of funds among their investors.

For the most recent time period this ceases to be the case, as apparent from Panel B of Table 4. Having a fund of funds among its investors only *increases* the flows into a hedge fund, regardless of performance. However, the increase in flows associated with having a fund of funds among your investors appears to have decreased in magnitude in the recent period.

6.3 Funds of funds and hedge funds performance

In this subsection we investigate whether funds of funds aid the funds in which they invest to outperform. The mechanism through which funds of funds may aid the funds in which they are invested to outperform may consist of monitoring or in information sharing.

To investigate if this is the case, we form portfolios of funds with and without a fund of funds investor. We form either equally weighted or value weighted portfolios, and analyze their alpha with respect to the Fung and Hsieh factors. Since Fung, Hsieh, Naik, and Ramadorai (2008) argue that there may have been a structural shift in the performance of funds of funds, we perform our analysis on subperiods.

Although, consistent with de Roon, Guo, and ter Horst (2010), portfolios of funds with fund of funds investors have higher alphas, in unreported results the difference was not statistically significant in our sample. We cannot therefore conclude that funds of funds facilitate the outperformance of the funds in which they invest.

6.4 Funds of funds flows and industry performance

In this section we analyze the effect that funds of funds flows have on the hedge fund industry. There are two channels through which we expect the FOF flows to influence the hedge funds alphas. First, as in Berk and Green (2004), flows into hedge funds in general depress alpha, and this effect has been documented in several studies, among which most recent is that of Teo (2010). The question is whether funds of funds do so to a greater extent than stand-alone hedge funds. This may happen, for example, because the FOF managers are less able to estimate hedge fund strategies' capacities than the hedge fund managers themselves.

In order to analyze if this is the case, we calculate 24-month rolling flows into FOFs and stand-alone hedge funds separately. We also calculate concomitant 24-month rolling alphas with respect to the Fung-Hsieh factors for stand-alone hedge funds, and then analyze how the distribution of hedge fund alphas changes as capital flow into or out of fund of funds. In order to quantify the importance of flows on alphas, we have regressed the first four moments of the distribution of alpha (mean, standard deviation, skewness and kurtosis) on concomitant hedge fund and FOF flows. The results are presented in Table 5. From the Table, we observe that both stand-alone as well as FOF flows are associated with a smaller mean of the hedge fund alphas. However, FOF flows contribute to a greater degree to this decrease. In fact, as apparent from the Table, flows into FOF depress the average alpha more than twice as much as the flows into hedge funds directly.

We next analyze the effect of flows on the cross-sectional dispersion of alphas. While flows into stand-alone hedge funds *increase* the dispersion of alphas (suggesting that managers with viable ideas were the ones experiencing inflows) flows into FOFs *decrease* the alpha dispersion. This suggests that when FOF receive inflows, they dispense of the capital in a manner which makes the identification of outperforming managers more difficult.

The relationship between flows and skewness is similar in spirit to the relationship between flows and the cross-sectional dispersion of alpha. While the relationship between hedge fund flows and alpha skewness is insignificant, flows into FOFs are associated with more negative skewness in alphas.

For kurtosis, both hedge funds and FOF flows are associated with a decrease in kurtosis. Given that FOF flows are associated more negative skewness, we conclude that the effect of

FOF flows on the tails of the distribution of hedge funds alphas is that the right tails of this distribution are curtailed above and beyond the effect on the left tails.

Therefore, we conclude that FOF flows negatively impact the hedge fund industry above and beyond the impact expected from stand-alone hedge funds flows. Having argued that, we go one step forward and analyze whether flows into FOFs trigger the appearance of “lemon funds”. To do so, for each month t we construct the flows into hedge funds and FOF universe during month t . We also construct value weighted and equally weighted portfolios of funds that are, respectively, less than one year old, between one and two, between two and three, and finally more than three years old. We also separate these portfolios by whether the funds have a FOF investor or not. For each of these portfolios, we calculate alphas on the subsequent year, from month $t + 1$ to month $t + 12$. We then regress the alphas on the flows, also controlling for the magnitudes of both the hedge funds’ and the FOFs’ AUM.

The results are presented in Table 6. From the Table, flows into FOFs are associated with *lower* subsequent alphas for all the funds, while the effect is generally stronger for the the younger hedge funds, albeit statistically insignificant. Although Aggarwal and Jorion (2010) document that emerging managers outperform, we document that their performance is reduced when FOFs receive flows.

7 Conclusions

In this paper we investigate the role of funds of funds for investors as well as for the hedge fund industry. We find that fund of funds do not generate excess performance on top of that investors can achieve, and do not offer better liquidity terms than the average hedge fund. On the other hand, we find that hedge funds facilitate flows into funds and access to capital in general without however improving the funds’ performance. This suggests that fund of funds would be more appropriate in their role as advisors to investors, than in their role of information facilitators or portfolio managers.

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Tables and Figures

Table 1: Summary statistics for hedge funds and funds of hedge funds.

The Table presents summary statistics for returns net of fees and fees charged for the TASS database. We divide funds in funds of hedge fund and funds which are not funds of hedge funds ("All funds"). p25 and p75 represent the 25th and respectively the 75th percentile, while M.Fee and I.Fee are the management, respectively the incentive fee charged by the funds. AUM represent the assets under management (in \$million).

Year		Returns										M.Fee			I.Fee			AUM(million)				
		Mean	Std	min	p25	Median	p75	max	Mean	Std	Std	Mean	Std	Mean	Std	Mean	p25	Median	p75	Total		
1994	All funds (929)	0.04	5.28	-69.81	-2.10	0.15	1.93	61.11	1.56	1.16	1.56	1.16	15.51	8.36	66.92	256.07	3.10	12.72	40.92	55,814		
	Funds of funds (225)	-0.37	3.12	-22.08	-1.79	-0.21	0.95	20.42	1.74	0.96	1.74	0.96	9.40	9.11	72.77	244.21	4.50	15.58	43.65	14,873		
1995	All funds (1,154)	1.41	6.40	-83.97	-0.64	1.07	2.94	298.12	1.56	1.05	1.56	1.05	16.37	7.78	59.02	237.75	2.96	12.05	38.77	68,710		
	Funds of funds (299)	0.85	3.02	-17.91	-0.40	0.85	2.01	28.90	1.70	0.90	1.70	0.90	9.50	8.76	67.16	222.93	3.84	11.80	41.90	20,673		
1996	All funds (1,424)	1.49	6.00	-94.03	-0.38	1.21	3.23	239.42	1.50	0.94	1.50	0.94	16.89	7.40	64.35	264.00	3.34	12.51	44.16	93,964		
	Funds of funds (343)	1.11	3.46	-27.30	-0.04	1.08	2.34	33.35	1.66	0.85	1.66	0.85	9.20	8.59	76.50	257.42	4.00	12.26	44.71	27,831		
1997	All funds (1,656)	1.49	6.15	-88.68	-0.65	1.16	3.59	99.70	1.44	0.85	1.44	0.85	17.21	7.18	80.53	320.74	4.34	16.50	54.60	140,998		
	Funds of funds (403)	1.10	4.30	-89.90	-0.33	1.01	2.64	71.87	1.61	0.77	1.61	0.77	8.38	8.27	94.28	303.27	4.25	14.77	53.29	39,414		
1998	All funds (1,914)	0.42	8.04	-91.90	-1.70	0.77	3.13	245.30	1.41	0.82	1.41	0.82	17.47	6.93	106.83	421.90	4.77	18.96	60.07	153,481		
	Funds of funds (462)	0.12	4.72	-48.98	-1.25	0.42	1.80	48.48	1.56	0.71	1.56	0.71	7.67	7.78	106.83	341.01	4.06	16.10	63.58	46,588		
1999	All funds (2,205)	2.15	7.18	-83.10	-0.60	1.15	3.81	137.45	1.39	0.77	1.39	0.77	17.55	6.74	94.31	488.93	4.68	18.24	59.02	230,888		
	Funds of funds (527)	1.66	4.26	-84.78	0.12	1.09	2.58	66.90	1.53	0.67	1.53	0.67	7.78	7.54	102.09	329.79	3.90	16.36	61.24	56,349		
2000	All funds (2,487)	0.82	7.44	-84.26	-1.65	0.77	2.90	97.61	1.38	0.72	1.38	0.72	17.67	6.57	118.68	667.69	5.29	21.48	73.99	310,967		
	Funds of funds (646)	0.67	3.93	-78.40	-0.59	0.65	1.84	34.40	1.49	0.62	1.49	0.62	7.61	7.14	117.09	385.59	4.14	20.00	70.01	76,155		
2001	All funds (2,856)	0.57	5.57	-58.31	-1.02	0.60	2.17	122.46	1.38	0.67	1.38	0.67	17.78	6.48	152.81	1,176.26	5.33	22.89	78.48	430,827		
	Funds of funds (897)	0.41	2.64	-31.43	-0.20	0.47	1.12	86.59	1.46	0.61	1.46	0.61	7.57	6.89	127.70	476.36	4.20	20.58	82.49	116,283		
2002	All funds (3,311)	0.28	4.46	-54.00	-1.14	0.35	1.68	167.41	1.40	0.64	1.40	0.64	17.63	6.52	158.46	1,354.52	4.74	23.00	83.00	480,733		
	Funds of funds (1,191)	0.21	2.06	-33.29	-0.36	0.30	0.84	59.57	1.43	0.61	1.43	0.61	7.49	6.84	133.09	521.59	3.80	22.00	92.41	167,616		
2003	All funds (3,843)	1.40	3.93	-39.79	-0.09	0.88	2.35	151.74	1.43	0.62	1.43	0.62	17.42	6.64	168.54	1,393.14	4.24	23.69	88.05	744,881		
	Funds of funds (1,569)	0.90	2.09	-94.83	0.19	0.76	1.44	54.93	1.43	0.60	1.43	0.60	7.55	6.94	148.26	668.69	1.65	22.00	92.79	244,127		
2004	All funds (4,515)	0.71	3.21	-47.69	-0.44	0.54	1.71	55.76	1.46	0.62	1.46	0.62	17.21	6.78	246.41	2,170.56	3.70	26.25	103.99	1,199,484		
	Funds of funds (2,067)	0.54	1.67	-27.57	-0.17	0.45	1.26	41.22	1.43	0.58	1.43	0.58	7.62	6.95	185.51	1,226.36	1.24	23.66	100.07	410,715		
2005	All funds (5,190)	0.83	3.41	-80.00	-0.48	0.70	2.00	73.81	1.49	0.64	1.49	0.64	16.98	6.99	315.50	3,220.43	2.70	25.90	110.70	1,700,660		
	Funds of funds (2,428)	0.60	1.85	-17.59	-0.30	0.73	1.52	64.71	1.43	0.57	1.43	0.57	7.50	6.87	206.88	1,481.36	1.22	24.58	104.29	498,479		
2006	All funds (5,659)	0.97	3.64	-98.99	-0.27	0.83	2.10	272.86	1.51	0.65	1.51	0.65	16.44	7.40	332.70	2,812.85	2.08	25.87	114.11	1,719,393		
	Funds of funds (2,683)	0.71	1.94	-88.26	-0.09	0.77	1.61	43.52	1.42	0.58	1.42	0.58	7.44	6.92	197.05	1,299.72	0.91	25.13	104.68	499,107		
2007	All funds (5,820)	0.85	3.91	-89.98	-0.54	0.78	2.18	137.67	1.52	0.64	1.52	0.64	15.85	7.70	340.92	2,895.07	1.18	26.25	119.44	1,710,819		
	Funds of funds (2,936)	0.65	2.37	-100.00	-0.14	0.80	1.69	30.45	1.43	0.62	1.43	0.62	7.33	6.95	193.79	1,104.01	0.43	24.80	107.00	550,507		
2008	All funds (5,374)	-1.48	7.09	-100.00	-3.37	-0.39	1.30	468.58	1.52	0.64	1.52	0.64	15.23	8.01	312.22	3,211.26	0.49	21.25	102.60	1,046,094		
	Funds of funds (3,017)	-1.66	3.97	-74.61	-3.01	-1.06	0.58	68.78	1.44	0.72	1.44	0.72	7.13	7.68	181.07	1,020.54	0.38	21.49	95.00	360,649		

Table 2: The performance of funds of hedge funds.

The Table presents the distribution of risk adjusted performance measures across funds of hedge funds. In each row we present the mean, t-statistics and the percentiles of the distribution of funds of hedge funds alphas. In order to calculate alphas, we employ the following models: in one class of models we employ the first 10 principal components (“Princ. Comp.”) from the returns of either all the stand-alone hedge funds in our database (“All HFs”) or only from the funds which are currently open (“Open Funds”); principal components are extracted from the returns of funds having 5 years of history between January 2004 and December 2008; in another class of models we are using the Fung and Hsieh 8 factors (“FH 8-factor”); in a different class of models we are using the Hedge Fund Research strategy indices as factors (“Strategy Indices”). Econometrically, we estimate alphas using either OLS (“OLS”) or Sharpe (1992) style regressions (“Sharpe style reg.”). Panel A presents results for those 978 funds of hedge funds which reported returns for every month between January 2004 and December 2008, while Panel B presents results for the 2,633 funds of funds which reported at least 24 months of returns between January 2004 and December 2008.

Panel A: FOFs with complete history during Jan 2004 – Dec 2008 (978 funds)

	Mean	t-stat.	p10	p25	Median	p75	p90
Princ. Comp., All HFs, OLS	-1.15	-11.78	-4.22	-2.47	-1.14	0.25	1.62
Princ. Comp., All HFs, Sharpe style reg.	-1.23	-12.49	-4.14	-2.49	-1.25	0.12	1.68
Princ. Comp., Open Funds, OLS	-1.02	-10.46	-4.16	-2.32	-1.06	0.28	1.77
Princ. Comp., Open Funds, Sharpe style reg.	-2.12	-21.78	-4.87	-3.35	-2.08	-0.74	0.68
FH 8-factor	-1.52	-12.08	-4.92	-3.13	-1.48	0.21	1.97
Strategy Indices, OLS	-3.45	-23.18	-8.1	-5.91	-3.29	-0.83	1.11
Strategy Indices Sharpe style reg.	-2.82	-23.45	-6.4	-4.35	-2.56	-1.24	0.34

Panel B: FOFs with at least 24 months of history during Jan 2004 – Dec 2008 (2,633 funds)

Princ. Comp., All HFs, OLS	-1.48	-14.73	-5.43	-3.18	-1.44	0.28	2.18
Princ. Comp., All HFs, Sharpe style reg.	-1.13	-12.87	-5.85	-3.31	-1.2	0.93	3.31
Princ. Comp., Open Funds, OLS	-1.21	-11.73	-5.25	-2.97	-1.12	0.55	2.74
Princ. Comp., Open Funds, Sharpe style reg.	-2.30	-25.52	-7.21	-4.50	-2.20	-0.19	2.31
FH 8-factor	-1.31	-14.07	-5.56	-3.24	-1.32	0.76	3.35
Strategy Indices, OLS	-3.68	-25.42	-9.91	-6.60	-3.41	-0.6	2.36
Strategy Indices Sharpe style reg.	-3.11	-32.83	-8.28	-5.26	-2.91	-0.94	1.61

Table 3: Funds of funds and prime brokers.

The Table presents the number of prime brokers of hedge funds with at least a fund of funds investor, and the hedge funds without fund of funds investors. The number of fund in each category are in brackets and categories with less than 10 observations are excluded.

Strategy type	FOF-owned HFs	Non-FOF-owned HFs	Difference	<i>p</i> -value
Managed Futures	1.24 [102]	1.05 [146]	0.19	0.00
Equity market-neutral	1.04 [57]	1.06 [153]	-0.02	0.53
Multistrategy	1.14 [98]	2.05 [201]	0.09	0.07
Fixed income arbitrage	1.00 [49]	1.05 [79]	-0.05	0.11
Dedicated short	1.00 [6]	1.00 [10]	0.00	1.00
Global Macro	1.13 [62]	1.09 [93]	0.04	0.51
Convertible arbitrage	1.14 [50]	1.21 [58]	-0.07	0.56
Event driven	1.15 [91]	1.10 [190]	0.05	0.36
Emerging markets	1.04 [76]	1.06 [121]	-0.02	0.63
Equity long-short	1.08 [504]	1.03 [909]	0.05	0.00

Table 4: Funds of funds and fund flows.

The Table presents quarterly flows into hedge funds with at least a fund of funds investor, and into hedge funds without fund of funds investors.

Quarterly Performance Quartile	Average quarterly flow		Difference
	FOF-owned HFs	non-FOF-owned HFs	
Panel A: January 1996 to December 2000			
1	3.99%	4.00%	-0.01%
2	4.61%	5.79%	-1.18%
3	6.04%	5.26%	0.78%
4	6.17%	5.17%	1.00%
5	6.45%	6.57%	-0.13%
6	8.72%	7.25%	1.47%
7	5.41%	6.23%	-0.81%
8	6.40%	5.16%	1.23%
9	9.50%	6.16%	3.33%
Panel B: January 2004 to December 2008			
1	2.38%	2.31%	0.06%
2	1.78%	1.50%	0.28%
3	2.59%	2.19%	0.40%
4	1.22%	1.78%	-0.56%
5	1.99%	1.73%	0.26%
6	2.33%	2.32%	0.01%
7	2.16%	3.06%	-0.90%
8	4.80%	3.81%	0.99%
9	5.42%	4.32%	1.10%

Table 5: Funds of funds flows and the distribution of hedge fund alphas.

The Table presents regressions of moments of the cross-sectional distribution of stand-alone funds' alphas on flows into FOF as well as into stand-alone hedge funds. Four moments are included: the alpha mean, standard deviation, skewness and kurtosis. To estimate each regression, we calculate 24 months rolling alphas, as well as the first four moments of their cross-sectional distribution, and concomitant total flows into both stand-alone hedge funds as well as funds of funds. We then regress each alpha moment onto both FOF and stand-alone funds flow. Differences between the coefficient of FOF flow and stand-alone funds' flow is also reported. Data span the time interval from January 1997 to December 2008.

	Average α	Std. of α	Skewness of α	Kurtosis of α
Intercept	0.0043	0.0112	0.6396	18.2520
(t-stat)	11.5142	29.9502	7.2922	19.4404
Flow into HFs (β^{HF})	0.0556	0.1055	8.2782	-137.9136
(t-stat)	2.6348	5.0282	1.6872	-2.6261
Flow into FOF (β^{FOF})	-0.1272	-0.1033	-12.9834	-265.0520
(t-stat)	-5.1184	-4.1850	-2.2486	-4.2888
Adj. R^2	19.21%	23.75%	4.31%	16.39%
$\beta^{\text{FOF}} - \beta^{\text{HF}}$	-0.1828	-0.2087	-21.2616	-127.1384
(t-stat)	-5.6065	-6.4451	-2.8060	-1.5677

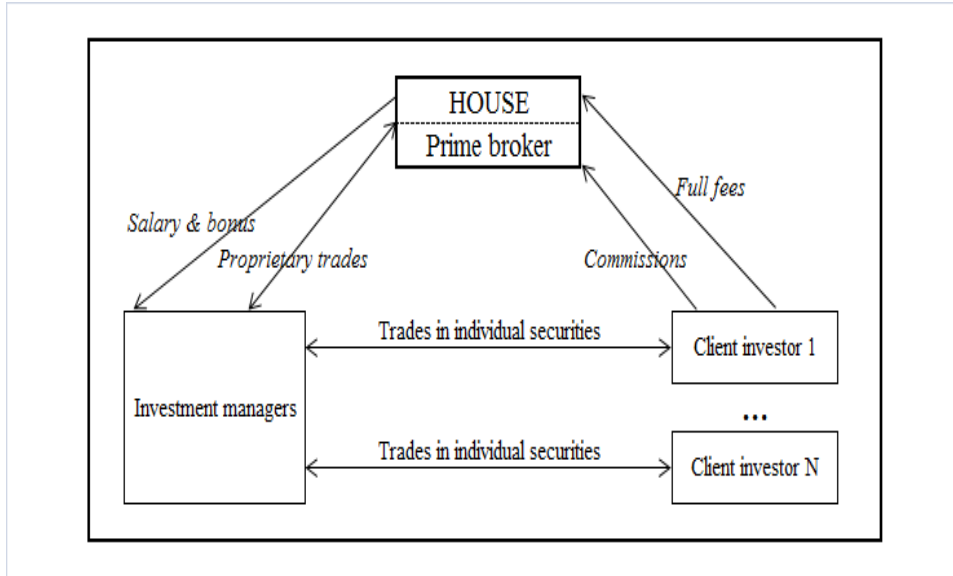
Table 6: FOF flows and the subsequent performance of stand-alone hedge fund, by age.

The Table present the coefficient b of FOF flow in the regression $\alpha_{t+1:t+12} = a + bFOFflow_t + cHFflow_t + dlog(FOFAUM_{t-1}) + elog(HFAUM_{t-1}) + error_{t+1}$, where α is the monthly alpha of portfolios of stand-alone hedge funds of various ages. Data spans the time interval from January 1997 to December 2007.

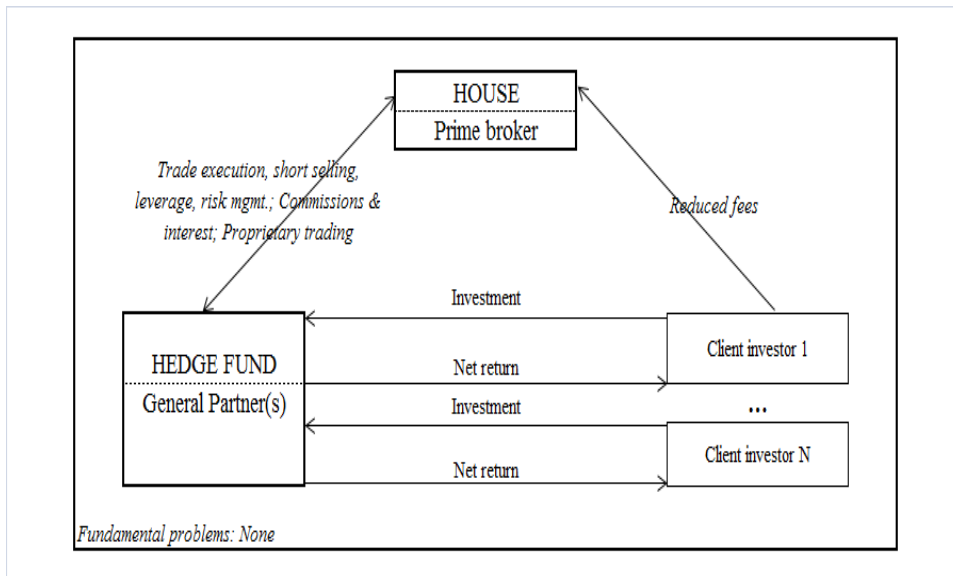
	Equally Weighted		Value Weighted	
	All HF	FOF-owned HF	All HF	FOF-owned HF
Less than 1 year	-0.0310	-0.0385	-0.0258	-0.0392
t-stat	-2.5041	-2.1462	-0.9191	-2.3631
1-2 years	-0.0307	-0.0382	-0.0313	-0.0389
t-stat	-2.4279	-2.0355	-2.4784	-2.2371
2-3 years	-0.0297	-0.0500	-0.0294	-0.0502
t-stat	-1.8995	-2.6692	-1.9022	-2.7550
More than 3 years	-0.0271	-0.0265	-0.0287	-0.0318
t-stat	-2.2758	-1.9493	-2.2771	-2.2404
Older minus Younger	0.0039	0.0120	-0.0028	0.0073
t-stat	0.5515	0.9309	-0.1031	0.6009

Figure 1: Alternative hedge fund operating structures vs. the traditional investment bank model.

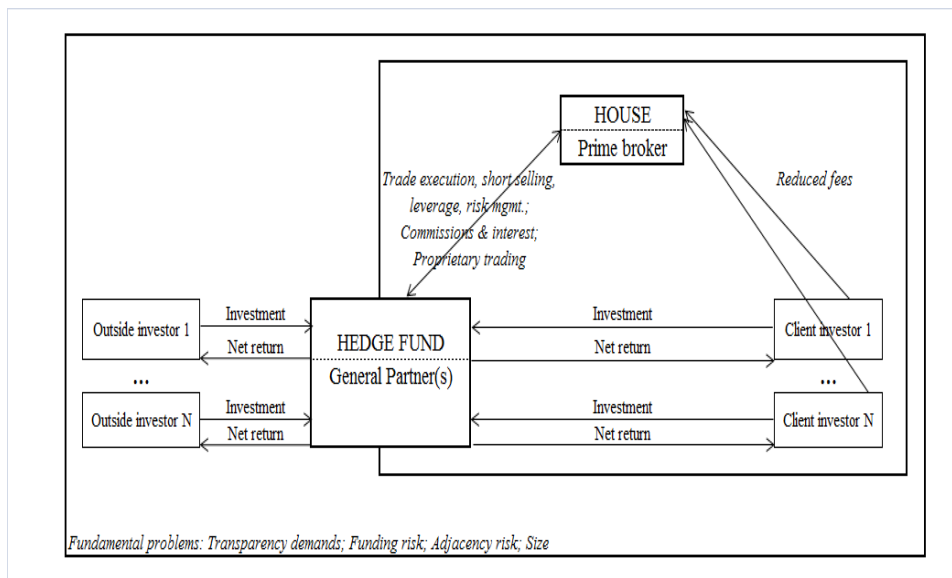
Panel A. Traditional investment bank model



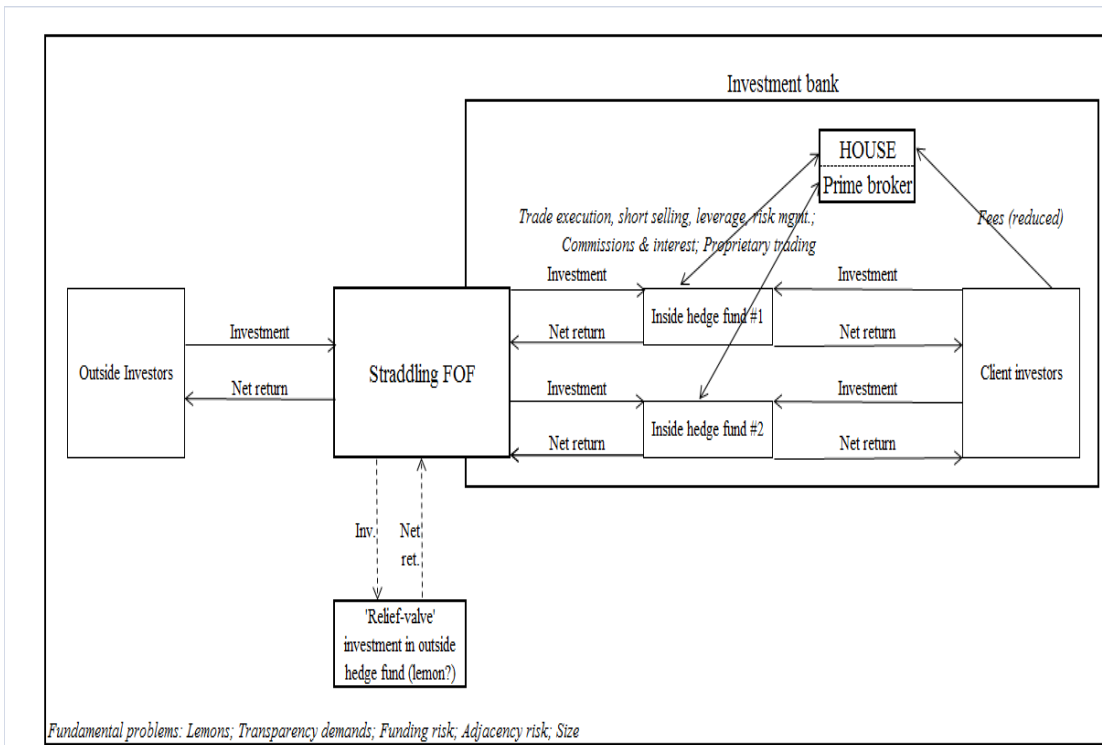
Panel B. Inside-only hedge fund model



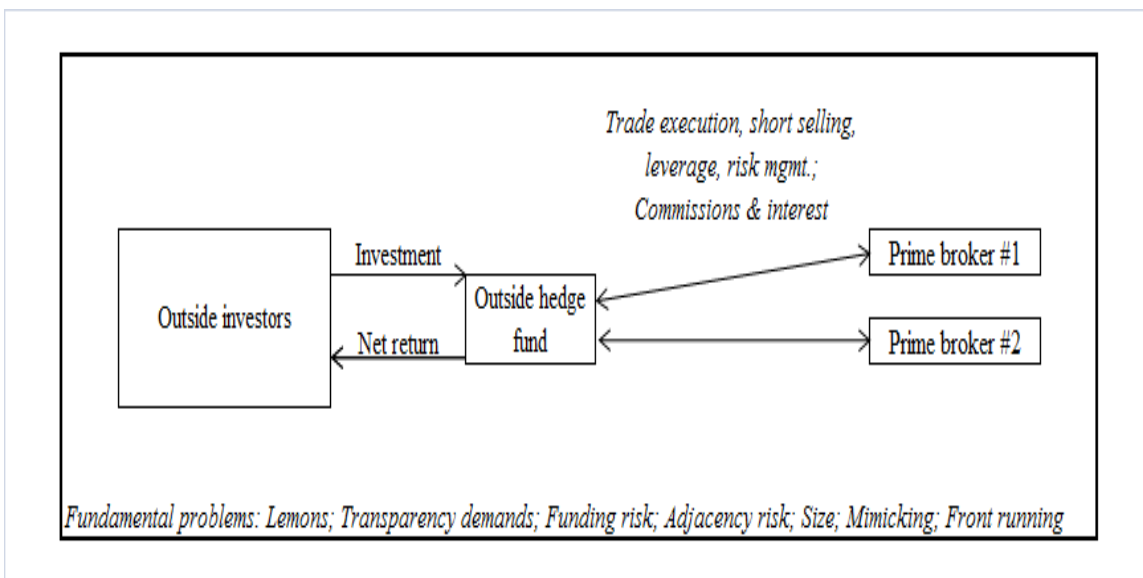
Panel C. Straddling hedge fund model



Panel D. Straddling 'feeder' fund of funds model



Panel E. Outside hedge fund model



Panel F. Outside 'feeder' fund of funds model

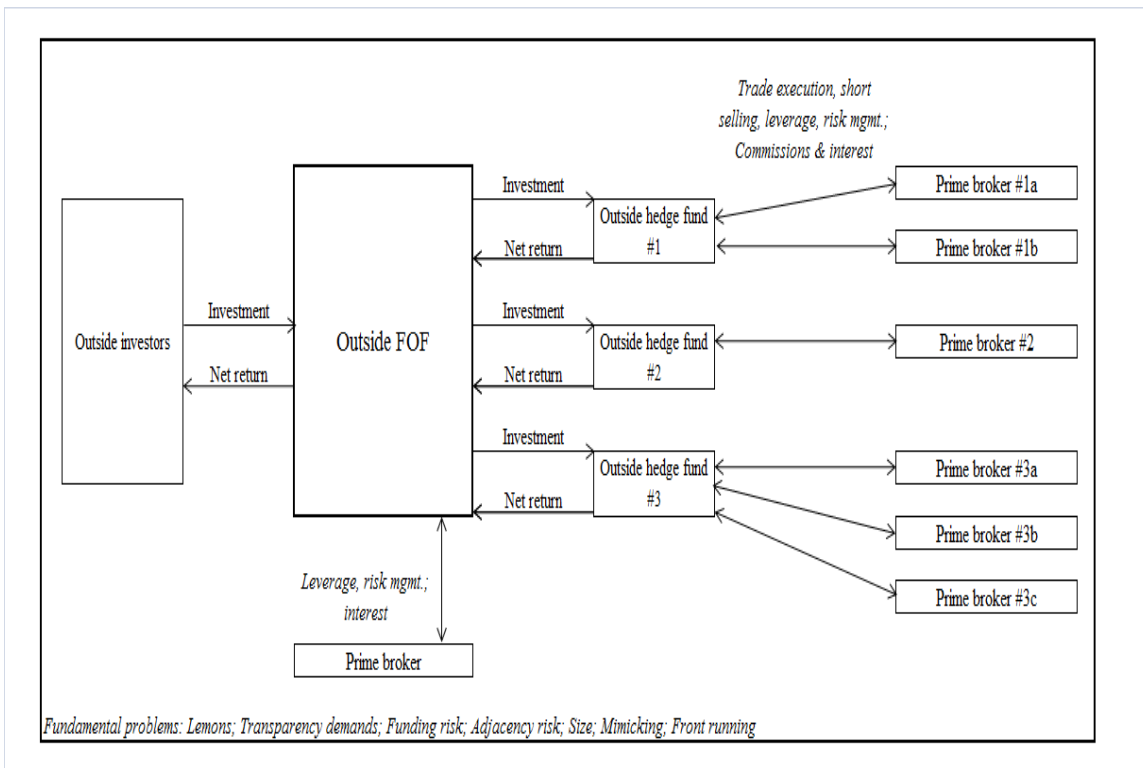


Figure 2: Relative importance of fund of hedge funds.

The Figure presents the ratio on number of funds of hedge funds relative to the number of the rest of the funds from the TASS database, as well as the relative Assets Under Management (AUM) in funds of hedge funds in the TASS database relative to the rest of the hedge fund industry.

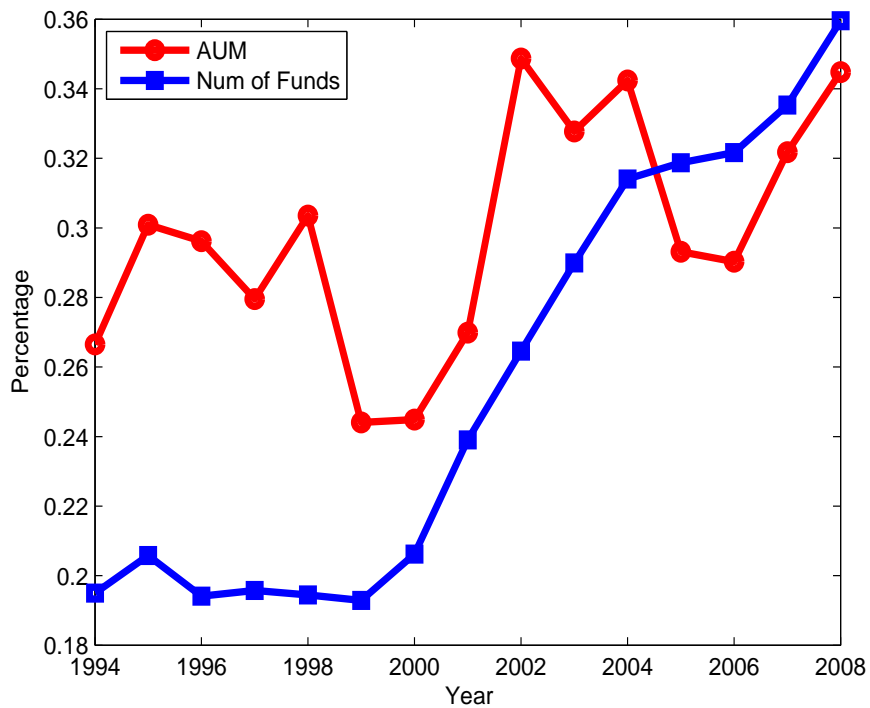


Figure 3: Liquidity of funds of hedge funds and of the funds they invest in.

The Figure presents the asset-weighted liquidity of funds of hedge funds and of the funds owned by at least one fund of hedge funds. Panel A presents the redemption notice periods, Panel B presents redemption frequencies and Panel C presents lockup periods.

