

## **Fees on Fees in Funds of Funds**

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**Abstract:** Funds of funds are an increasingly popular avenue for hedge fund investment. Despite the increasing interest in hedge funds as an alternative asset class, the high degree of fund specific risk and the lack of transparency may give fiduciaries pause. In addition, many of the most attractive hedge funds are closed to new investment. Funds of funds resolve these issues by providing investors with diversification across manager styles and professional oversight of fund operations that can provide the necessary degree of due diligence. In addition, many such funds hold shares in hedge funds otherwise closed to new investment allowing smaller investors access to the most sought-after managers. However, the diversification, oversight and access comes at the cost of a multiplication of the fees paid by the investor. It is not generally understood that the incentive fee component of the fee on fee arrangement may under certain circumstances exceed the realized return on the fund. In this paper we argue that the disappointing after fee performance of some fund of funds may be explained by the nature of this fee arrangement. We examine an alternative fee arrangement that may provide better incentives at a lower cost to investors in these funds.

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### **1. Introduction**

Despite the growing interest in hedge funds, it is difficult for many individual and institutional investors to participate in this area of the market. Minimum wealth levels and sophisticated investor requirements constrain many small investors. Legal limits on the number of U.S. investors allowed in hedge funds effectively place a lower bound on the size of investment most hedge fund managers will accept. In fact, many otherwise attractive hedge funds are closed to new investment. For those open to new investment, the minimum unit size is usually quite substantial. Thus, even for smaller institutions and endowments it can be expensive and in many cases impractical to invest in hedge funds with a prudent degree of diversification. Unlike registered investment companies, hedge funds are not required – indeed by most legal interpretations not allowed to publically disclose performance and holdings information that might be construed as solicitation materials. This has the unfortunate effect of making it more difficult for potential hedge fund investors to evaluate managers on a comparative basis. In addition, little public information exists about fund operations and their holdings and investment

strategies are typically undisclosed for strategic reasons.

Funds of funds (sometimes in this context referred to as “funds-of-hedge funds”) [FOF] are financial intermediaries established to address several of these issues. They are hedge funds themselves which hold shares in other investment companies and charge a fee for doing so. According to Tremont TASS (Europe) Limited (hereafter TASS), a London-based information and research company dedicated to the alternative investment industry, funds of funds comprise a significant proportion of the hedge fund business. As of March 2000, the TASS hedge fund database contains 2,104 hedge funds, including 1,330 survived funds and 774 dissolved funds. The total assets under management are about \$198 billion. According to TASS, there are 328 funds that are classified as funds of funds, comparing to 1,442 regular hedge funds.<sup>1</sup> The typical fund of funds invests in a range of hedge funds. They allow investors to participate in hedge fund investments that are otherwise closed, and allow for diversification across hedge funds. They also provide professional management services and access to information that would be difficult or expensive to obtain on a fund by fund basis by the investor. For this reason, some authors argue that the appropriate index of hedge fund return is indeed the return on well managed funds of funds.<sup>2</sup>

However, the major disadvantage of this arrangement is the cost to the investor. In addition to the fees charged by the fund of funds, they effectively pass on to the investor all fees charged by the constituent funds, since, in most cases, they report their raw returns after all of the underlying manager fees are paid. A common concern among practitioners is that this double

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<sup>1</sup>The remaining 334 funds are not otherwise classified by TASS.

<sup>2</sup>Fung and Hsieh(2000)

fee arrangement might induce fund of funds managers to invest in unduly risky hedge funds to ensure that the returns gross of fees are sufficiently large to absorb the FOF fees charged.<sup>3</sup> While it is true that the fund of funds structure allows for diversification and hence reduction of risk at the fund level, there is an often overlooked cost to this diversification. The more diversified the fund is, the greater the likelihood that the investor will incur an incentive fee on one or more of the constituent managers, regardless of overall fund of fund performance. In fact there is a significant probability that the incentive fee will be so large that it absorbs all of the annual fund return. We document that this was indeed an issue for the 1995-2000 period of hedge fund returns. This fact creates adverse incentives on the part of fund of funds managers. We will study this issue and suggest an alternative which would have the fund of funds manager absorb some of the incentive component of fees, in return for an incentive calculated on the basis of the fund of funds returns.

In the remainder of this paper we describe the data used in the study and then analyze the characteristics and performance of funds of hedge funds. We document some of the problems associated with the current fee structure arrangement and conclude with a suggested alternative.

## **2. Data**

We use the dataset provided by TASS which contains data on after fee returns for the period February 1989 through March 2000. The dataset also includes the TASS “graveyard” – funds that existed in the period 1994 to the present but which have since dropped from the active fund sample. The last three months of data were excluded because of concerns about late reporting by

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<sup>3</sup>See for example <http://www.planethedgefund.com/hedgeqa/questionpages/q14.php3>.

a subset of hedge funds covered in the report. TASS also provides data on the considerable variety of fee structures used by hedge funds, including management and incentive fees. Among other things, it documents performance benchmarks used in calculating fees and redemption charges and other expenses payable by the investor. An accompanying file of notes records the many exceptions to standard fee structures. For example, in a number of cases, the incentive fee charged per dollar return in excess of the performance benchmark increases as a function of the positive performance realized by the fund in excess of benchmark. In most cases, this performance benchmark is zero, but in many cases the fund has to earn a fixed return typically 10 percent, and sometimes even as high as 30 or even 50 percent before incentive fees are charged. In other examples, the fund has to earn a return in excess of the Treasury Bill rate, LIBOR or some other performance index benchmark. Highwatermark provisions typically require fund managers to make up losses relative to their benchmark from previous years before earning an incentive fee in the current period. This provision makes the valuation of the hedge fund management contract an interesting challenge (c.f. Goetzmann, Ingersoll and Ross, 1997).

While the TASS database, in common with other hedge fund data providers, gives only returns after fees have been paid, it is possible using the fee schedules to calculate an approximation of the before-fee return. The resulting before-fee numbers are an approximation for two reasons. In the first place, there is some variation in when fees are computed and charged. In the overwhelming majority of cases, the fees are calculated on an annual basis, although there are a few instances where the fees are computed and payable on a quarterly basis, and one instance where fees are charged on the basis of a five-year return period. We assume for simplicity that all fees are computed and payable on an annual cycle. For this reason, in the

results that use before fee returns, we are forced to exclude funds for which we have less than one full calendar year of data. In addition, a minority of funds charge management fees that vary with the size of account. We also ignore this qualification in our before-fee results. Finally, there were 12 cases where the algorithm<sup>4</sup> used to compute before fee returns failed, and for this reason those funds were excluded from the before fee analysis.

### **3. Characteristics and performance of fund of funds**

Table 1 provides the basic statistics for funds of funds and hedge funds. As expected, fund of funds provide significant diversification potential. The notion that fund of funds are unduly risky is not supported in the data. Not only do fund of funds reduce by a third the standard deviation of monthly hedge fund returns, but they also significantly reduce the value at risk of hedge fund investment.<sup>5</sup> This value at risk result is particularly significant, as it is based on an examination of returns after all fees are paid. A fiduciary who is primarily concerned about the downside risk associated with hedge fund investment should seriously consider a fund of funds vehicle.

However, as noted before, diversification is not the only reason why investors invest in

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<sup>4</sup>The algorithm used to compute before fee returns is as follows. For each year, the annual incentive fee was computed on the basis of an estimate of prior year before-fee returns. The estimate of before-fee returns is updated by adding back to the after-fee returns for each month, one twelfth of the annual fee expressed as a fraction of the prior month value accumulated at the estimated before fee return. Convergence is achieved when successive estimates of the before fee return differ in absolute value by less than  $10^{-11}$  within 35 iterations. This algorithm failed in only twelve cases. These cases corresponded to short-lived funds with extraordinary volatility of returns.

<sup>5</sup>As indicated in Table 1, the lower 5 percent fractile of the empirical distribution of monthly fund returns is two percentage points higher for funds of funds. This difference is significant at the 1 percent level.

fund of funds. These instruments provide the investor with professional management and due diligence services, as well as access to otherwise closed funds. One would expect that investors would be prepared to pay for these services, but that the additional return would compensate them for any fees charged. Unfortunately that is not the case. The average monthly after fee return for funds of funds is 0.86%, only a little more than half of the 1.38% return for hedge funds over the same period of time. This discrepancy has been noted in the finance literature. Fung and Hsieh (2000), for example, find that at least part of the reported under-performance of fund of funds may be attributed to survivorship which effectively biases upwards the reported performance of individual hedge funds. Fund of funds which actually hold the shares of hedge funds when they become available, and experience the monetary losses when they are incurred, perhaps better represent the actual investment performance of the hedge fund investor, and thus are perhaps a better index of aggregate hedge fund performance. We are of course sympathetic to the survivorship story – particularly since the use of annual returns still includes some conditioning on survival. For this reason, it is essential to include returns on all defunct or non-reporting funds contained in the TASS graveyard file. The survival issues are important, but it is also useful to focus on the role of fund of fund fees as an additional explanation for the poor relative performance of funds of funds.

Table 1 documents some additional differences between hedge funds and funds of funds. On average, funds of funds are smaller in size than the hedge funds in which they invest. They manage \$64 million in assets on average, compared to \$123 million for the average hedge fund in the sample. Another difference is that fewer fund managers have a stake in their own funds. While 56 percent of fund of funds managers have a personal investment in their own funds, the

corresponding percentage is 65 percent for hedge fund managers. The difference is significant at the 1% level. Probably the most interesting result in Table 1 is the difference in management and incentive fees between the two fund groups. The median management fee for funds of funds is 1.5%, comparing to 1% for hedge funds, reflecting the nature of the two-tier fee structure of fund of funds. Both funds of funds and hedge funds typically charge an incentive fee expressed as a percentage of fund returns over a specified benchmark. In addition both funds of funds and hedge are typically required to make up for past losses before incentive fees may be charged (the “highwatermark provision”). However, the median incentive fee charged by funds of funds is only 10%, comparing to 20% for hedge funds. The differences in fees reflect the different incentives of fund of funds managers and hedge fund managers.

Since funds of funds provide significant diversification potential, an investor might expect that the reward to volatility ratio is higher for funds of funds than it is for the average hedge fund. In Table 2 we report the average Sharpe ratio on an annual basis for funds of funds and hedge funds during the nine-year period from 1990 to 1999. Funds of funds offer consistently lower Sharpe ratios, as well as lower average returns in many of the years documented. The implication is that direct investment in individual hedge funds, on average yields a higher reward to variability ratio – and that a levered position in funds-of-funds that matched the expected return of the hedge fund sample is in fact *riskier* at least in terms of standard deviation. The data suggest either that fund of fund managers have not done a particularly good job at selecting superior hedge funds, or that the fees they charge capture the

benefits they deliver.<sup>6</sup>

A cross-sectional analysis of the fund-of-fund universe is perhaps more instructive, since it allows us to compare managers that are subject to similar survival conditioning and similar evaluation by the investment community. In Table 3 we examine the extent to which fund-of-fund fees are related to performance. The fund of fund fee structure can be broken down into the incentive fee that gives the rate at which incentive fees are charged, and the management fees which represent the fixed percentage of assets under management used to pay for management expenses and other fees. As noted before, there is a rich variety of ways in which the incentive fee benchmark is specified, but this variation is not reflected in Table 3.

A linear regression of after-fee performance on the rate at which incentive fees are charged finds no connection between the two. Cross sectionally, it appears on the other hand that fund of fund managers that charge higher management fees achieve a lower risk adjusted return. Interestingly, no such relationship exists for hedge funds taken as a whole. It appears that the management fee for the typical fund of fund company is a deadweight load that has the effect of simply reducing after fee return. On the other hand, the rate at which incentive fees are charged

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<sup>6</sup>Differences in Sharpe ratios do not necessarily indicate differences in skill where returns are left-skewed due to inclusion of derivative securities or option-like trading strategies (Goetzmann, Ingersoll, Spiegel and Welch (2002)). However, in this case fund of fund returns are actually more left skewed (average skewness -.307) than are individual fund returns (average skewness -.126) and the difference is significant at the 1 percent level. For this reason it is difficult to attribute the higher Sharpe ratio of individual funds to increased negative skewness in the distribution of returns. This argument does not affect cross sectional results reported later in the paper. Lo (2002) advises care in the interpretation of hedge fund Sharpe ratios where positive autocorrelation in monthly returns can cause an upward bias in the estimated ratios. While the average first and second autocorrelation coefficients are significant (albeit smaller in magnitude than for the sample that Lo (2002) reports), they are significantly higher for the fund of funds sample. Hence we cannot attribute a lower fund of funds average Sharpe ratio to an autocorrelation artefact.

does have a significant positive relationship with risk adjusted returns for individual hedge funds. The conclusion is clear. While the fee structure appears to provide an appropriate incentive for hedge fund managers, it does not appear to motivate fund of fund managers to achieve superior returns. It is important to note that the table shows the relationship between the rate of fees charged and current performance in the cross section of funds. It does not test the proposition that high current fees are associated with higher future performance.

#### **4. An example**

The fund of funds charges incentive fees based on the after fee return to the individual hedge fund. This implies that the ultimate investor may end up paying incentive fees regardless of how well or poorly the fund of fund actually performs. To see how this might happen, consider the numerical example given in Table 4. With just three funds, the first and second funds may perform well, earning 20 and 40 percent respectively. However, if the third fund performs sufficiently poorly, the overall fund may end up losing money. In this example, the before fee return is -5 percent. However, there are incentive fees owing to the first two funds, amounting in total to 4 percent of the assets at the start of the year. This 4 percent represents an additional fee that is subtracted from returns in calculating the after fee returns. In this example, the after fee return correspond to a loss of nine percent. While the investor escapes the fund of fund incentive fee because of a negative portfolio return, he or she must pay the incentive fees to the underlying managers. While an accounting of the incentive fees of the underlying managers is generally not explicitly provided to the fund of fund investor, the fees are never-the-less genuine monetary expenses that the intermediary institution pays and passes through to the client.

The example given in Table 4 is obviously an extreme example meant to illustrate the point. Under realistic circumstances, can it ever happen that an investor is liable for incentive fees when the fund as a whole loses money? Unfortunately, the answer is yes. To examine in some greater detail the relationship between fees and returns, we consider an example where fund of fund managers provide diversification services but, consistent with the results in Table 1, do not contribute to returns. We calculate the historical returns on funds of funds from 1995 to 2000 constructed by choosing the constituent funds at random from the set of funds in business at the beginning of the period. As funds leave the sample, they are replaced by other funds in business at the time. We perform this exercise first for funds of funds comprising only one fund, and then we consider what happens when we add more funds to the fund of funds. Stating returns on the underlying managers on a before-fee basis allows us to decompose the return to the fund of fund investor into the portion attributable to the underlying portfolio, the portions attributable to underlying manager fees, and the portion attributable to the fund-of-fund fees.

In Figure 1 we take the first case, where the hypothetical funds consist of only one fund. The data corresponds to all 811 hedge funds which according to TASS were operating at the start of 1995 and for which we were able to compute before fee returns, excluding all funds of funds. We then compute the realized annual returns to 811 hypothetical funds of funds each investing in one and only one of these funds.<sup>7</sup> In this example, the incentive fees charged by the funds and the highwatermark benchmark before which fees are paid correspond to the actual fees and

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<sup>7</sup>To deal with the fact that not all 811 funds survived the entire period we assume that the fund of funds manager was astute enough to withdraw funds the month prior to the fund leaving the database, and reinvest the proceeds in another hedge fund in operation at that time. This will of course typically overstate the realized returns, as funds fail without prior warning, and in many cases there are restrictions that prevent such rapid withdrawals.

benchmarks listed by TASS for each of the funds. The hypothetical funds of funds charge a 10 percent incentive fee over and above a zero benchmark. The red line gives the relationship between returns and incentive fees suggested by an incentive fee schedule where the fund of funds charge an incentive fee on top of the 20 percent of return fee charged by the individual fund.<sup>8</sup> Funds may actually charge less than this, either because they have more modest incentive fee schedules, or because of the requirement that they earn back past losses before they are awarded this incentive fee (the highwatermark provision). Most funds employ a zero benchmark before they are entitled to an incentive fee, while some have a fixed benchmark or a benchmark based on an index return (T Bill rate, LIBOR or other benchmark).

We see that there is a great variation in realized before fee return across years and across funds, ranging from almost an entire loss, to a possible 441 percent gain. It is important to note that such extreme returns may be on a very small base. The largest return recorded in the database did not generate an incentive fee, as in this particular case the fund lost 95.6% of its value in the prior year. The fund did not receive an incentive fee that year, as even a quadrupling of value was insufficient to erase the prior year losses. As noted above, the losses could even be greater, as we exclude from our database funds immediately prior to failure. One of the major attractions of funds of funds is that they provide the investor with the opportunity to diversify and hence alleviate this volatility.

In Figure 2 we consider the same period of data, for a set of 811 hypothetical funds equally invested as of the beginning of 1995 in five hedge funds chosen entirely randomly from

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<sup>8</sup>These incentive fees and the benchmark correspond to the median numbers recorded in the TASS database.

the set of available funds. Diversification clearly decreases the incidence of extreme returns, both negative and positive. At the same time however, diversification can be costly. The more diversified the fund of funds, the greater is the chance that at least one of the funds generates an incentive fee to an underlying manager. Since the fund of funds provides after-fee returns to the investor, the investor may in effect be paying an incentive fee regardless of the performance of the overall fund. In fact, we find that the investor may actually end up paying incentive fees to the underlying managers that exceed the annual return on the fund. In the Figure we highlight 9.81 percent of fund/year returns for which this is the case. Comparing Figures 1 and 2 we find that diversifying into as few as five funds can substantially increase fees. When the fund earns less than 20 percent before fees, the additional fees can amount to between two to three percent of assets at the start of the year. It is important to note that these fees do not accrue to the fund of funds provider when the fund as a whole loses money. Rather, these are incentive fees paid to individual funds and are passed on to investors in the form of after fee returns through the fund of funds vehicle.

In Figure 3 we consider funds of funds that invest in ten funds chosen at random. In this case, the fund of fund investor almost always has to pay an incentive fee to an underlying manager. In fact out of 4,055 fund years, there was only one case in which no incentive fees were charged, despite fund returns falling as low as -30 percent per annum on a before fee basis. In this worst case outcome, the investor would actually end up paying an additional 2.3 percent incentive fee! Funds that lose money on a before fee basis lose on average an additional 1.1 percent on an after fee basis accounting for incentive fees paid, and this additional burden can rise to as much as 3.4 percent.

Clearly, this perverse feature of fund of fund fee structures is an increasing function of the number of hedge funds the fund of funds invests in. It is well established<sup>9</sup> that the benefits of diversification are exhausted in a portfolio of 20 funds. This result suggests that the practical limit to diversification occurs much sooner than that.

## **5. Alternative fee structures: A modest proposal**

The results reported in Tables 2 and 3 suggest that far from encouraging fund of funds managers to seek out higher risk adjusted returns, the current incentive fee arrangements represent a deadweight cost passed on to investors, payable whether or not the fund as a whole makes a positive return, consistent with the example given in Section 4. Part of the reason for the large fee liability may lie in the nature of the incentive fee contract itself.

One way to maximize the value of the fund of funds incentive fee contract is by the use of skill in selecting outstanding individual fund managers. Absent an ability to select such managers, another way of achieving this objective is to maximize the volatility of the overall fund by choosing high risk funds. Fung and Hsieh (1997) suggest that there is a countervailing reputation effect which mitigates this adverse incentive. Investors fearful of a large loss will flee a manager who consciously adopts such a high risk strategy. This conjecture is confirmed by Brown Goetzmann and Park (2001) who examine the risk-taking behavior of hedge fund managers up to 1999. However, this countervailing effect is diminished in a fund of funds that is adequately diversified. In this case, the investor fears not the chance of a large loss. Rather, the concern of the investor ought to be the large incentive fees they may incur should the fund of

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<sup>9</sup>Park and Staum (1999)

fund manager invest in high risk hedge funds.<sup>10</sup>

Another adverse implication of the fee-on-fee arrangement is that the return on fund of funds reflects not only the return on the hedge fund, but a short position in the hedge fund managers' incentive fee options. In other words, the fund of funds is actually a portfolio of a number of covered call positions. It is well known<sup>11</sup> that this fact obscures the interpretation of the Sharpe ratio and the Hendriksson and Merton (1981) timing measures. Normally, we would expect that the diversification inherent in the fund of funds would serve to reduce this left skew in the distribution of returns. However, as Table 1 indicates, the skewness in returns is actually significantly more negative for funds of funds than for the underlying hedge funds. This is consistent with funds of funds manager managing the portfolio of hedge funds to maximize the reported Sharpe ratio<sup>12</sup> rather than adding value by choice of superior hedge fund managers. The fact that the average Sharpe ratio is actually significantly *less* than that of the underlying hedge funds is further evidence of the excessive fee burden imposed by funds of funds.

An approach that might more closely align the interests of the fund of funds manager with the ultimate investor would have the fund of funds manager absorb the individual fund incentive fees in return for a higher fund of funds management fee and/or incentive fee

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<sup>10</sup>This analysis does not tell the entire story. In a typical fee-on-fee arrangement, the fund of funds incentive fee is based on individual fund after fee returns over a specified highwatermark. Excessive individual fund fees may reduce the likelihood of a fund of funds manager receiving an incentive fee payment because the after fee returns may consequently fall below the highwatermark provision.

<sup>11</sup>See Spurgin (2001) and Goetzmann, Ingersoll, Spiegel and Welch (2002).

<sup>12</sup>Goetzmann, Ingersoll, Spiegel and Welch (2002)

structure.<sup>13</sup> An additional benefit of this arrangement would be that the fund of funds investor would never pay incentive fees when fund of funds lose money across the funds they invest in. Finally, because the fund of funds manager would bear the cost associated with investing in high volatility funds, this policy would concentrate attention on adding value at the fund of funds level where the manager can in fact earn a substantial incentive fee.

Indeed, it is the practice elsewhere in the funds management business for the fund management company to absorb fees and expenses in return for a fee charged at the fund level. Mutual funds for instance, frequently compensate money managers employed by them using annual bonuses and other forms of performance related compensation. These incentive fees are then considered part of the management expenses that are passed on to investors in the form of a management fee computed on the basis of a flat percentage of the assets under management.<sup>14</sup> Very rarely do mutual funds charge incentive based fees, and SEC guidelines require that any such fees be symmetric in nature.<sup>15</sup> The very prevalence of this type of arrangement suggests the conjecture that it may in fact resolve a number of the agency issues that arise in the context of fund management.

The net cost to the fund of funds providers may not be that great. Take the simple case

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<sup>13</sup>As of 2000, there was only one fund of funds in the TASS survey, Commodities Corporation International plc (a Dublin based commodities trader) which offered to absorb incentive fees of the funds under its management in the event that the fund as a whole lost money. There are reports that several large institutional investors are beginning to negotiate such arrangements with fund of funds providers both in the United States and in Europe.

<sup>14</sup>Carpenter(2000) describes the consequences of these manager incentive payments on their risk taking behaviors.

<sup>15</sup>Incentive fees are relatively new to the mutual fund industry, and are discussed in Elton and Gruber (2002)

where a fund of funds provider charges a 20 percent incentive fee on returns in excess of the annual Treasury Bill rate, in return for which the fund absorbs any and all similar incentive fees charged by the constituent funds. If all of the constituent funds have a similar volatility, then the cost to the fund is easy to calculate and will depend only on the volatility of the underlying funds and the extent to which fund diversification reduces aggregate fund volatility.

To see this, note that essentially the fund is short a portfolio of  $k \times p$  call contracts where  $k$  is the number of funds in the fund of funds, and  $p$  is the incentive fee for each (in this case, 20 percent), where the exercise price for each call is equal to the future value of the beginning of year fund value at the riskless rate of interest. It is long  $p$  calls on a portfolio consisting of  $k$  funds. It is possible to determine the appropriately hedged cost of providing this service to fund clients<sup>16</sup>If for simplicity we neglect the highwatermark provision typical in such incentive contracts<sup>17</sup>, rearranging the Black Scholes formula, one can easily show that not only is the net cost positive, but it depends only on the volatility of the original funds and the extent to which diversification reduces that volatility.<sup>18</sup> Furthermore, this value is small in absolute value.

In Figure 4 we plot the net cost as a function of the volatility of the underlying funds and

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<sup>16</sup>Presumably the fund of funds provider is in a better position to hedge the individual manager incentive fee contracts than is the ultimate investor, given that he or she has timely and accurate information on position sizes.

<sup>17</sup>Goetzmann, Ingersoll and Ross (1997) describe the adjustments that must be made to account for the highwatermark provision.

<sup>18</sup>The formula is  $2p \left( N\left[\frac{\sigma_0}{2}\right] - N\left[\frac{\sigma_1}{2}\right] \right)$  for time to maturity  $\tau$  one year,  $S = 1$  and  $K = S e^{r\tau}$ , where  $\sigma_0$  is the volatility of the  $k$  underlying funds, and  $\sigma_1$  is the volatility of the portfolio of those funds. This formula does not depend on the risk free rate or number of funds.

the extent to which diversification reduces the risk of the overall fund. For the data considered in Section 2, the median fund had a volatility of 17.1 percent. A five fund portfolio reduces the median volatility by 66.4 percent. As a result, the cost is calculated as 0.46 percent of the initial fund value. This is certainly much smaller than the two percent of fund value deadweight cost that the existing fee arrangement penalizes fund of funds investors.<sup>19</sup> The figure also illustrates the tradeoff between increased cost and volatility reduction resulting from fund of funds diversification. A fund that invests in many small high risk hedge funds would anticipate the largest benefit from diversification in terms of risk reduction. However, when each of these small funds charges a substantial incentive fee, the net cost can be large (top left corner of the figure).

The net cost to the investor of this alternative incentive fee arrangement may be quite small. In Table 5 we report the average Sharpe ratios for random portfolios of 5, 10 and 20 hedge fund portfolios, along with the reported Sharpe ratios for all funds of funds over the same period of time. It is important to note that by random selection of hedge fund portfolios we are assuming that the fund of funds manager is not adding value by selection of hedge funds. By the same token, the portfolio is not being manipulated to artificially increase the Sharpe ratios reported. Nevertheless, it is interesting to note that these random portfolios experienced Sharpe ratios an order of magnitude similar to those of managed funds of funds over the same period of time. We report the differences in average Sharpe ratios as an appropriately scaled measure of the cost to the investor of switching from the standard fee on fee arrangement to an alternative

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<sup>19</sup>Using a portfolio of calls in place of the desired call on the portfolio is akin to certain inefficient dynamic trading strategies which also result in net positive deadweight costs to investors (Dybvig 1986)

where for an additional 0.46 percent fixed management fee, the fund of fund manager replaces the individual incentive fee with an incentive fee computed on the basis of total fund return over a zero highwatermark. In each case, the Sharpe ratio for the investor improves under the alternative fee arrangement, while at the same time the fund of fund manager is made revenue-neutral in expectation. That is, the additional uncertainty he faces is compensated. Consistent with the analysis above, the benefit to the investor of this new fee arrangement increases in each case as the fund of funds becomes more diversified.

## **6 Conclusion**

Despite the popularity of hedge funds as an alternative asset class, the high degree of fund specific risk and the lack of transparency give most reasonable fiduciaries pause. In addition, many of the most attractive hedge funds are closed to new investment. Funds of funds resolve these issues by providing investors with an appropriate degree of diversification and professional management that can provide the necessary degree of due diligence. In addition, many such funds hold shares in hedge funds otherwise closed to new investment. The chief disadvantage of funds of funds is the high fees that are typically charged, with an incentive fee component that may under certain circumstances exceed the realized return on the fund. In addition to the fees charged by the fund of funds, the fund of funds typically passes on to the investor all fees charged by the constituent funds in the form of after fee returns.

As noted above, one of the principal advantages of the fund of funds arrangement is that it allows for diversification. But the more diversified the fund is, the greater the likelihood that the investor will incur an incentive fee regardless of overall fund performance. In fact there is a

significant probability that the incentive fee will be so large that it absorbs all of the annual fund return. We document that this was indeed an issue for the 1995-2000 period of hedge fund returns. Incentive fees were associated with superior performance for hedge funds, but not fund of funds. We attribute this to adverse incentives on the part of fund of funds managers. It would appear that the current arrangement provides an incentive for fund of funds managers to gain by choosing high volatility funds that have the attribute of maximizing their incentive fee payment, while at the same time immunizing them from a major cost associated with this policy. This cost arises because the ultimate investor, not the fund of funds manager, bears the cost of incentive fees incurred whether or not the overall fund makes money. An alternative arrangement common in other areas of the investment management business would have the fund of funds absorb the individual incentive fees generated by individual managers. An incentive fee at the fund of funds level would appropriately incentivize the fund of funds manager and at the same time subsidize the costs of absorbing the individual fund fees. This would in fact lead to a very modest increase in the flat management fee charged by the fund of funds provider. Such an arrangement provide better incentives to fund of funds managers. It would also reduce significantly the deadweight cost accruing to the individual investor.

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Table 1: Descriptive statistics of Fund of Funds and Hedge Funds

Data is from Tremont TASS (Europe) Limited (TASS). There are 2,104 hedge funds, including 1,330 survived funds and 774 dissolved funds as of March 2001. There are 328 funds of funds and 1,442 hedge funds. 260 out of 328 funds of funds are live funds while 68 (or 20.7%) are dissolved. In contrast, 1,063 out of 1,442 hedge funds are live funds while 379 (or 26.3%) are dissolved.

Variable	Fund of Funds (FOF)			Hedge funds (HF)			$t_{\text{FOF-HF}}$
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	
Mean return	328	0.860%	1.025%	1426	1.382%	2.016%	-6.71 **
Std. dev. of return	328	3.905%	2.859%	1425	5.741%	4.752%	-9.09 **
Skewness	328	-0.307	1.035	1424	-0.126	1.394	-2.66 **
Kurtosis	327	4.062	6.095	1423	3.794	6.522	0.71
Lower 5% fractile	328	-5.26%	5.40%	1425	-7.21%	6.90%	5.58 **
1 <sup>st</sup> Autocorrelation <sup>a</sup>	319	0.150	0.213	1346	0.082	0.198	3.25 **
2 <sup>nd</sup> Autocorrelation <sup>a</sup>	319	0.049	0.145	1346	-0.005	0.162	2.80 **
3 <sup>rd</sup> Autocorrelation <sup>a</sup>	319	-0.025	0.115	1346	-0.025	0.152	-1.55
Assets	325	\$64,041,347	\$235,552,740	1416	\$122,629,222	\$751,505,100	-2.45 *
Personal invest <sup>b</sup>	327	0.56	0.50	1420	0.65	0.48	-2.96 **
Management fee	328	1.68	0.86	1442	1.45	0.90	4.33 **
Incentive fee	328	9.64	8.51	1442	17.80	6.75	-16.24 **
Leverage <sup>b</sup>	327	0.64	0.48	1417	0.77	0.42	-4.51 **
Age	328	70.57	42.14	1426	57.79	41.19	4.97 **
Notice period	297	34.54	52.31	1324	29.92	25.66	1.48
Minimum invest	319	\$245,856	\$535,357	1388	\$781,938	\$6,910,259	-2.85 **
Minimum hold	120	\$247,841	\$775,769	585	\$554,265	\$1,693,111	-3.08 **

<sup>a</sup>Autocorrelation coefficients estimated for funds with a minimum of one year of continuous data.

<sup>b</sup>Dummy variables: 1 if yes and 0 if no.

\*\*Significant at 1% level. \*Significant at 5% level.

Table 2. Performance and risk: Fund of funds versus hedge funds

The table reports the annual average return for the funds in the TASS database including defunct funds after 1994. The cross-sectional standard deviation of mean returns is reported in the third column. The average Sharpe ratio for funds is based on calculations for the corresponding year of data, and is recorded in the fourth column. Column 8 reports a t-test of the difference in the mean return for hedge funds vs. funds of funds. Column 9 reports the results of a t-test for differences in the mean Sharpe ratio for hedge funds vs. funds of funds.

Yea	Fund of Funds			Hedge Funds			<i>t</i> -value	<i>t</i> -value
	Return	Std	Sharp	Return	Std	Sharpe	(Return)	(Sharpe)
199	1.2239	1.3250	0.0058	1.1314	3.007	0.2226	0.32	-1.78
1991	1.2983	4.4122	0.1920	2.3492	2.720	0.4797	-1.94	-3.79 **
1992	0.5343	0.9961	0.1134	1.3338	2.045	0.1152	-5.39 **	-0.01
1993	1.6796	1.5959	0.6354	2.1804	2.546	0.6333	-2.77 **	0.03
1994	-0.5221	1.4513	-0.3667	-0.0939	1.894	-0.0729	-3.24 **	-5.36 **
1995	1.2451	1.1723	0.4085	1.9123	2.140	0.5097	-5.98 **	-2.33 *
1996	1.4135	1.6941	0.4634	1.9026	2.816	0.5227	-3.49 **	-1.39
1997	0.6654	1.3441	0.2358	1.0693	1.979	0.1455	-4.13 **	0.52
1998	-0.0248	1.9102	-0.0220	0.5336	3.245	0.0869	-3.94 **	-2.96 **
1999	1.6160	1.9333	0.4034	1.7471	3.265	0.2914	-0.89	2.01 *

\*\*Significant at 1% level. \*Significant at 5% level.

Table 3. Regression results of Sharpe ratio on management and incentive fees

Data is from Tremont TASS (Europe) Limited (TASS). The dependent variable in the regression is Sharpe ratio of each fund; the independent variables are management fee, incentive fee, fund age, and logarithm of fund assets.

variable	Fund of Funds			Hedge Funds		
	estimate	std error	t-value	estimate	std error	t-value
intercept	-0.6082	0.1531	-3.97 **	-0.9989	0.1088	-9.18 **
management	-0.0553	0.0205	-2.70 **	-0.0180	0.0133	-1.35
incentive	0.0011	0.0020	0.57	0.0050	0.0018	2.78 **
Fund age	-0.0009	0.0004	-2.15 *	-0.0009	0.0003	-3.09 **
log(assets)	0.0578	0.0089	6.52 **	0.0730	0.0061	12.06 **
	N	324		N	1232	
	R <sup>2</sup>	17.79%		R <sup>2</sup>	10.61%	
	Adj R <sup>2</sup>	16.76%		Adj R <sup>2</sup>	10.32%	

\*\*Significant at 1% level. \*Significant at 5% level

Table 4: Example of positive incentive fees due on negative fund of fund returns

In this hypothetical example, a fund of funds is established with \$1M invested in each of three hedge funds that earn (before fees) 20%, 40% and -75%. Each of these funds charge an incentive fee of 20 percent above a zero benchmark. For simplicity, none of the funds charge a management fee.

	Hedge Fund 1	Hedge Fund 2	Hedge Fund 3	Fund of Fund
Start of year (\$M)	\$1.00	\$1.00	\$1.00	\$3.00
Annual Return (before fee)	20%	40%	-75%	-5%
End of year (\$M)	\$1.20	\$1.40	\$0.25	\$2.85
Incentive fee (\$M)	\$0.04	\$0.08	\$0.00	\$0.12
Incentive fee ratio				4%
Annual return (after fee)	16%	32%	-75%	-9%

Table 5: Effect of alternative fee arrangements on average Sharpe ratios

This table reports the average Sharpe ratios computed for 811 hypothetical funds of funds created from an equal investment in 5, 10 and 20 hedge funds chosen at random as of December 1994. Failing funds were replaced in the portfolio by a random choice of funds active at that time. In the fee on fee case each case the hypothetical fund charges 1 percent management fee and a 10 percent incentive fee. The incentive is charged on the basis of after fee returns from the underlying hedge fund over and above a zero benchmark. In the alternative fee arrangement case, the underlying incentive fees charged by the hedge funds are paid for by the fund of funds manager in return for a 28 percent incentive fee (10 percent on top of 20 percent incentive above a zero benchmark) plus a 1.48 percent management fee. The Sharpe ratios are computed for each hypothetical fund on the basis of calculated returns after all management and incentive fees are paid. The reported differences are all significant at the 1 percent level. The actual results column gives the average Sharpe ratios for actual funds of funds, as reported in Table 2.

Year	Actual results	Fee on fee arrangement			Alternative fee arrangement			Difference		
		5 funds	10 funds	20 funds	5 funds	10 funds	20 funds	5 funds	10 funds	20 funds
1995	0.4085	0.4093	0.5136	0.6447	0.4664	0.5885	0.7412	0.0571	0.0749	0.0965
1996	0.4634	0.2724	0.3312	0.3540	0.3384	0.4084	0.4398	0.0660	0.0772	0.0858
1997	0.2358	0.1197	0.1239	0.1192	0.1761	0.1836	0.1864	0.0564	0.0597	0.0672
1998	-0.0220	-0.0214	-0.0654	-0.0639	0.0369	0.0054	0.0239	0.0583	0.0708	0.0878
1999	0.4034	0.3234	0.3529	0.4032	0.4249	0.4659	0.5320	0.1016	0.1130	0.1287

Figure 1: Incentive Fees and Performance

### Fund of funds with one fund 1995-2000

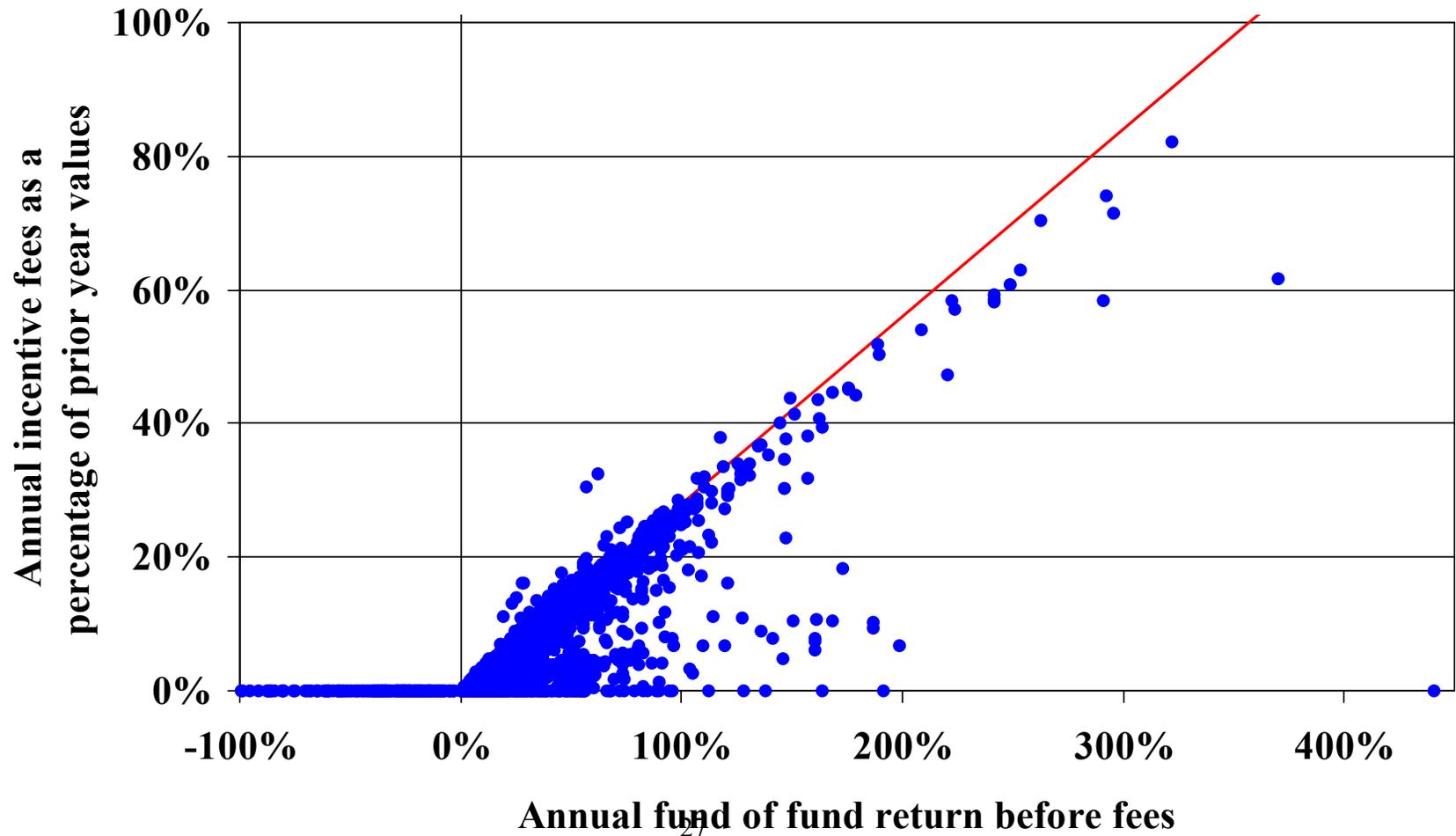


Figure 2: Incentive Fees and Performance

### Funds of Funds with five funds 1995-2000

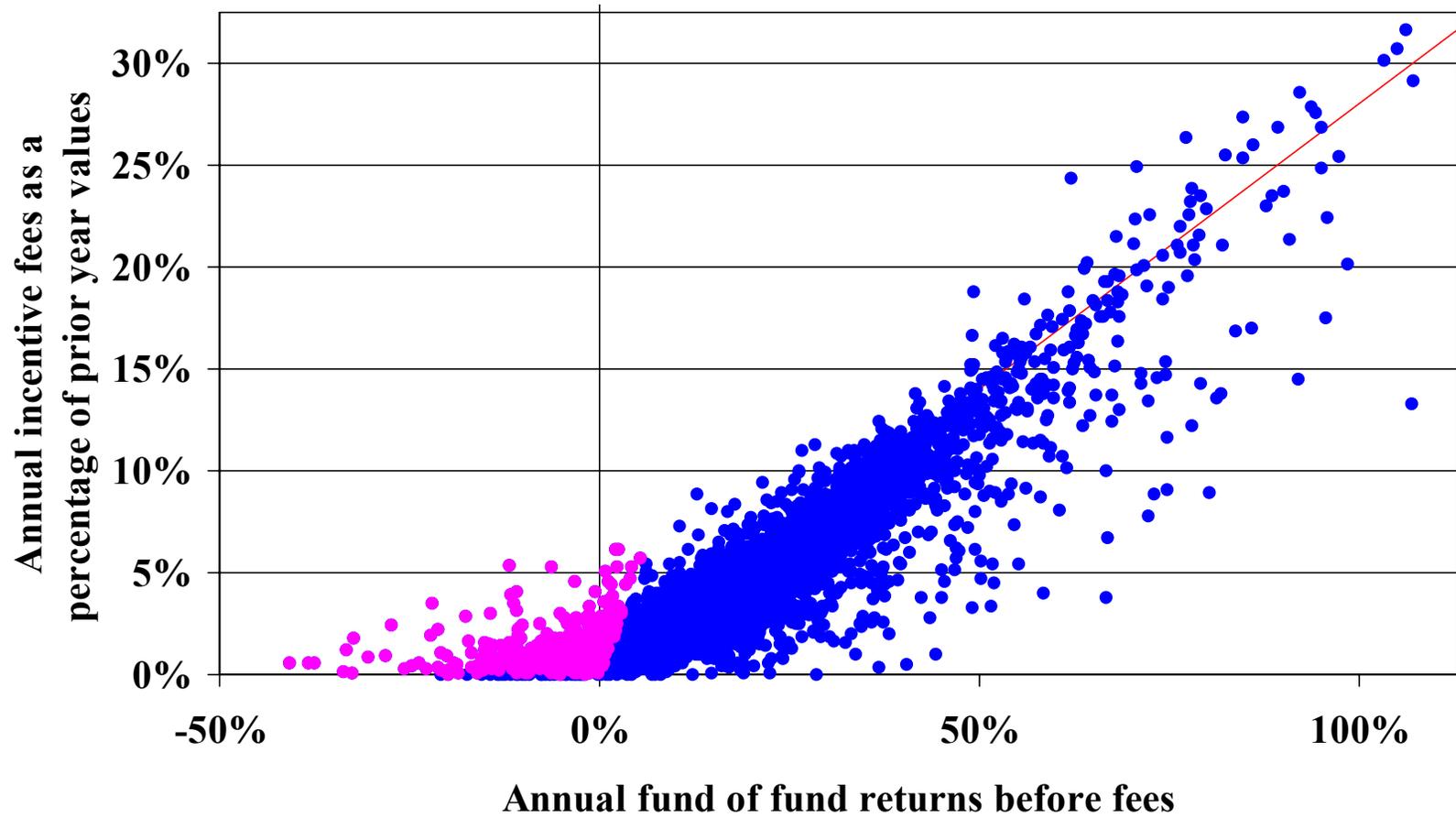


Figure 3: Incentive Fees and Performance

### Funds of Funds with ten funds 1995-2000

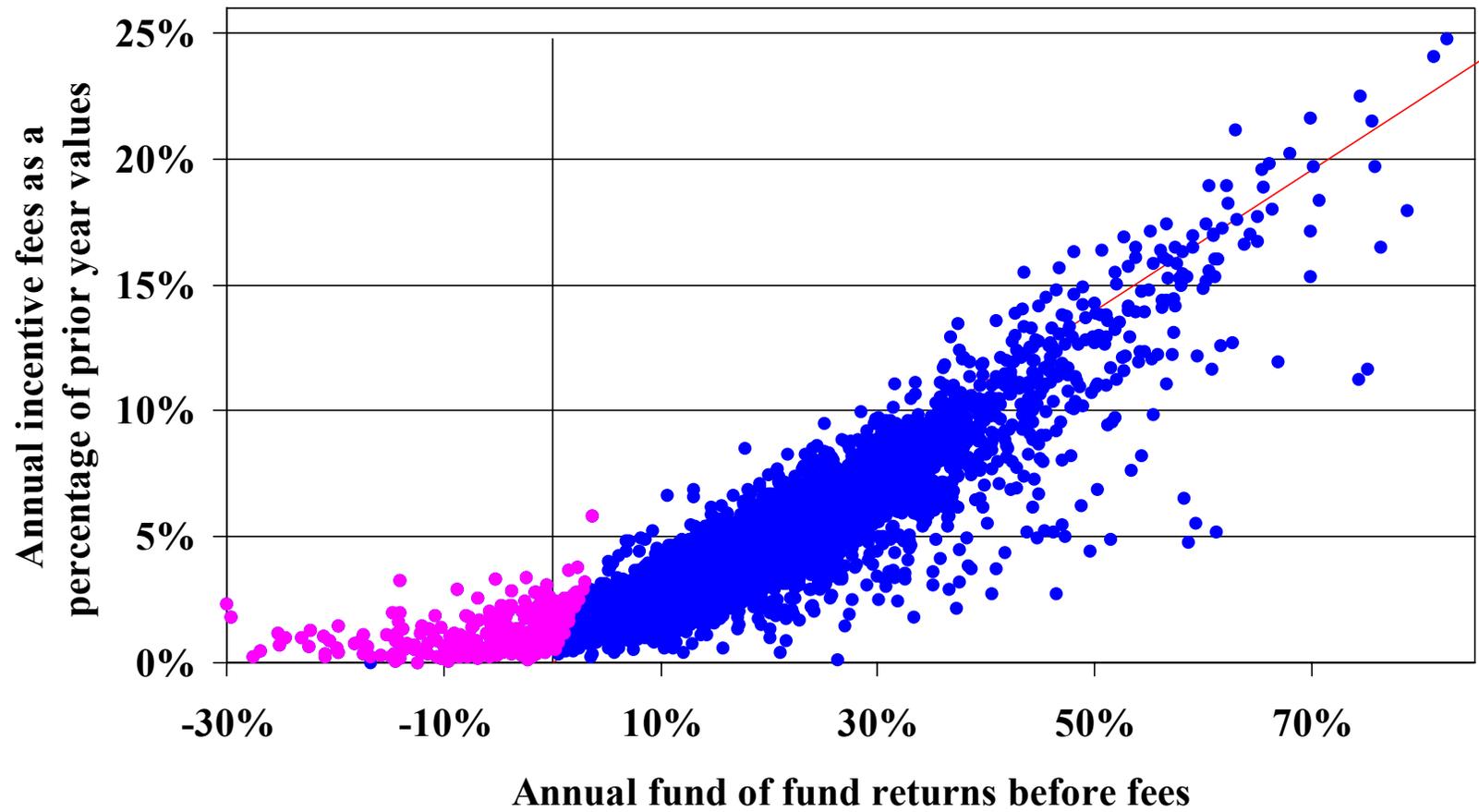


Figure 4:

