DO INCENTIVE FEES SIGNAL SKILL?

EVIDENCE FROM THE HEDGE FUND

INDUSTRY

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Abstract

We examine whether fee structure acts as a reliable signal of hedge fund performance. Recent theoretical work suggests that, given the unique information asymmetries faced by hedge fund investors, managers will use performance-based incentive fees to signal skill. We test this hypothesis empirically and find little support for the notion that high incentive fee funds generate superior risk-adjusted returns during normal market conditions; rather, increases in incentive fee level are accompanied by an increased proclivity to take on risk and increased leverage. Consequently, higher incentive fee funds suffer higher rates of attrition. Higher incentive fee funds do demonstrate lower market correlations and thus provide enhanced diversification benefits. As a result, high fee funds exhibited remarkable outperformance during the recent global financial crisis.

1. Introduction

In theory, skilled fund managers will be attracted to funds that reward them with large incentives to generate good performance. Hedge fund incentive fees are very large, show considerable variation and do not change throughout the life of the fund. Therefore they provide a unique opportunity to test this theory.

Hedge fund managers may be paid a substantial portion of the profits they generate on behalf of the investor. Such large incentive fees should align manager and investor interests since large investor profits will result in large manager profits too. Furthermore, there exists considerable variation in incentive fees amongst hedge fund managers. This variation should signal skill because the largest incentive fees should belong to the most skilled managers who generate the largest risk adjusted profits and vice-versa.

Consistent with theory, we find that the higher a manager's incentive fee the (slightly) higher his average return. After all, hedge fund incentive fees are designed to incentivize managers to generate large, absolute returns. However, skill as measured by risk adjusted returns, is no greater for large incentive fee managers. It appears that the enhanced returns of high incentive fee funds are generated by increasing financial risk, not through skill. As a consequence, over the long-term, funds with higher incentive fees suffer from higher rates of attrition, consistent with the notion of increased financial risk.

The absense of skill amongst high incentive fee managers is consistent with the efficient market hypothesis which predicts that persistent, abnormal returns cannot be generated by fund managers, even when they are offered very large incentive fees. Nevertheless, we do find that high fee funds are able to offer remarkable outperformance during times of market volatility by taking on strategies that provide low market exposures.

2. Hedge Fund Incentive Fees and Performance

There exist several competing theories of incentive compensation contracts, which explain the positive relationship between fund incentive fees and performance. The first and, perhaps, the best known theory of incentive contract is the Principal-Agent Theory (Jensen & Meckling, 1976; Ross, 1973). It states that a principal (e.g. an investor) hires an agent (e.g. fund manager), but finds it costly to monitor the agent's effort. To reduce reliance on costly monitoring, one solution is to align the interests of the two parties and to base the agent's pay, at least partially, on output (investment return). By linking the agent's remuneration to output, even an unmonitored agent has an incentive to increase effort and deploy skill because this should lead to higher returns, and thus higher fee revenue (Golec, 1988).

Another theory, signaling theory, suggests that incentive contracts are used by employers to screen, or by employees to signal, certain characteristics that are important for a particular job (Golec, 1988). Thus, investors may look at fee structure for reference information regarding manager quality, in the belief that in a competitive market, funds with higher incentive-based fees should attract superior managerial talent.

The question of whether fees align investor's and manager's interests and act as a reliable signal of fund performance is of particular concern in the hedge fund industry. Substantial information asymmetry exists between hedge fund investors and managers. Hedge funds are not bound by disclosure requirements that apply to mutual fund investors. Hence, monitoring fund managers closely to ensure that fund strategy is in line with investor interests is complicated. Hedge funds, paradoxically, also exhibit poor performance persistence (Agarwal & Naik, 2000; Brown, Goetzmann, & Ibbotson, 1999; Capocci & Hubner, 2004; Harri & Brorsen, 2004). Thus, investors cannot rely on past performance as a reliable indicator of future performance, and they will increasingly look

to fee structure for signals of manager quality (Gil-Bazo & Ruiz-Verdú, 2008; Pan, Zhao, & Tang, 2009).

The relationship between incentive fees and performance has been investigated in several studies. However, the question of whether incentive fees signal superior performance is unresolved in the literature. Brown et al. (1999) explores the evidence for managerial skill in hedge funds. Using annual returns data, the authors are able to find positive excess returns for a variety of hedge fund styles. However, the outperformance is likely to be due to stylistic factors, rather than managerial skill. They do not support the hypothesis that high-fee funds have skill when compared to low-fee funds. Ackermann, McEnally, and Ravenscraft (1999) extend the performance analysis of hedge funds and use monthly rather than annual data. They are also the first to examine the link between fee structure and performance using risk-adjusted returns. The authors find a positive and statistically significant relationship between the Sharpe ratio and incentive fee. This relationship is economically significant too: an increase in incentive fee from 0 to 20 (the median value) increases an average Sharpe ratio by 66%. This result is important as it suggests skill among high-fee fund managers. Liang (1999) confirms the results of Ackermann et al. (1999). Incentive fees show a positive relationship to hedge fund performance: a 1% increase in incentive fee increases average monthly return by 1.3%. Edwards and Caglayan (2001) is another study which provides evidence of a positive relationship between incentive fee and risk-adjusted returns. Unlike previous studies, Edwards and Caglayan (2001) employ individual, rather than average hedge fund returns.

Although these studies have found a positive relation between hedge fund incentive fees and risk adjusted performance, more recent studies by Kouwenberg and Ziemba (2007) and Agarwal, Daniel, and Naik (2009) yield different results. Kouwenberg and Ziemba (2007) develop a theoretical model of fund manager's optimal investment strategy as a

function of a fund's fee and ownership structure. Their model shows that a manager without any investment or only with a small stake (<10%) in the fund they manage takes more risk in response to increases in incentive fees. However, risk taking is reduced considerably when a manager's own stake in the fund is substantial (e.g. > 30%). Recently, in a more general theoretical setting, Aivaliotis and Palczewski (2014) have reached the same conclusions as Kouwenberg and Ziemba (2007): that an asymmetric incentive contract should theoretically induce less managerial risk aversion. The empirical analysis in Kouwenberg and Ziemba (2007) provides mixed results, with various risk measures, such as maximum drawdown and first downside moment (but excluding volatility), positively related to the incentive fee level. Furthermore, Agarwal et al. (2009) examine the relationship between hedge fund performance, managerial incentives, and managerial discretion. The authors calculate a 'delta', analogous to an option's delta, as a proxy for the incentive fee. The delta is supposed to capture more fully managerial incentives, given that incentives depend not only on the level of the rate but also on investors' capital flows, the funds' return history, and other contractual features. Consistent with the Principal-Agent Theory, Agarwal et al. (2009) find that hedge fund performance and delta are positively related. However, no significant relationship is found between incentive fee and performance. Thus, these results support the findings of Kouwenberg and Ziemba (2007) that incentive fees do not, in and of themselves, affect higher returns.

This inconclusive research means that the question of whether hedge funds with higher incentive fees exhibit superior performance remains open. Accordingly, this study aims to re-examine the issue and extend the literature in a number of ways. We utilize several alternate performance proxies. Specifically, besides raw returns and the Sharpe ratio, we employ the modified Sharpe ratio, as well as two other performance related

characteristics (diversification and fund survival). The modified Sharpe ratio (Gregoriou & Gueyie, 2003) accounts for higher moments of the return distribution and should provide more accurate information on hedge fund performance, because hedge funds are known to have significantly non-normal distributions with high tail risk (Gupta & Liang, 2005; Lo, 2001; Malkiel & Saha, 2005). The benefit of hedge funds' low market correlation and diversification potential is often used in marketing alternative investments. [1] Therefore, it is interesting to check whether high fee funds at least provide investors with superior diversification benefits if not with superior absolute returns. Finally, in light of the notoriously high attrition rate within the hedge fund industry,[2] we recognize the importance of fund survival and the risk of potential losses should the fund become defunct. Thus, we account for the risk of fund attrition and examine the relationship between survivorship and fee structure. If high fee funds do indeed signal superior performance and offer investors enhanced value, we would expect these funds to survive longer. This study also contributes to the literature as it focuses on the 2000-2009 dataset and therefore updates earlier research.[3] This decade is important and different from the earlier period in several ways. The hedge fund industry has experienced extraordinary growth over the past decade[4], which resulted in intensified competition for investors' funds (Getmansky, 2012). Simultaneously, the ability of hedge funds to generate significant absolute returns has decreased due to capacity constraints and limited arbitrage opportunities (Naik, Ramadorai, & Stromqvist, 2007). Accordingly, it is expected that managers with skill will be able to more clearly distinguish themselves in

[1] From a purely diversification perspective a casino also represents an ideal investment, being "completely" market-neutral.
[2] The attrition rate of hedge funds is around 20% per year (Brown et al., 1999; Goetzmann, Ingersoll, & Ross, 2003), while the half-life is 30 months (Brown, Goetzmann, & Park, 2001).
[3] Earlier studies analyzed the data until 2002. Ackermann et al. (1999) utilize data from 1987 to 1995; Kouwenberg and Ziemba (2007) dataset covers 1995-2000; Agarwal et al. (2009) use the data over 1994-2002
[4] The global assets under management have increased more than ten-fold from around US$200 billion in 1997 (Ackermann et al. 1999) to US2.3 trillion in 2013 (Preqin, "The 2013 Global Hedge Fund Report")

this period. Also, our dataset includes a sub-sample that covers the global financial crisis period of 2008-2009. It enables us to perform a comparison of the relationship between fee structure and the diversification benefits that hedge funds offer during a stable market environment (pre-crisis period), as well as a period that includes a severe market downturn (crisis period).We deliberately exclude the post crisis (after 2009) period as we want to focus our analysis on the performance of high incentive fee funds during the crisis and ascertain if diversification benefits exist when they are most needed.

3. Data

We source data on hedge funds from the TASS database. The TASS database is recognized for its broad coverage and comprehensive data on existing and defunct funds (Schneeweis, Kazemi and Martin, 2002) and has been widely used in academic research. The period spans from December 2001 to June 2009. While the TASS database includes data on live and defunct funds since 1994, fund performance characteristics, such as assets under management are unreported for a considerable proportion of funds over the 1994-2000 period.[5] Hence, we restrict the study to 2001-2009. The starting and ending dates (December 1, 2001 and June 30, 2009) are also selected to correspond to the NBER (National Bureau of Economic Research) business cycle dates. Our first sub-sample covers the period from December 2001 – December 2007, which is classified as an expansion phase of the business cycle by the NBER, while the second sub-sample covers the period from January 2008 – June 2009, classified as the contractionary phase. We exploit the pre-crisis and crisis period to test the ability of hedge funds to provide diversification benefits when most needed, during a severe market downturn.

[5] Over the 1994-2000 period, 28.46% of funds do not provide the minimum of 24 months of assets under management data required for the present study.

Further, we filter out funds which (i) have fewer than 24 months of history for the pre-crisis period sample and 12 months for the crisis period sample; and (ii) have less than USD 10 million of assets under management (AUM). The latter constraint mitigates the bias which can arise due to small funds which are unable to grow assets and are 'still born'. We also carefully eliminate 11 outlier funds with improbable or erroneous information[6] and winsorize the remaining data on returns, AUMs, managerial flexibility[7], age and leverage variables at the 1% level. The final sample includes 2,742 funds for 2001-2007 sub-sample, and 2,182 for the 2008-2009 sub-sample.

We acknowledge that due to voluntary reporting hedge fund data suffer from a number of biases that can potentially skew accurate performance measurement. These biases include self-selection, instant history or backfilling bias, survivorship bias, and return smoothing bias (see, among others, (Baquero, Horst, & Verbeek, 2005; Brown, Goetzmann, Ibbotson, & Ross, 1992; Fung & Hsieh, 1997, 2000, 2002; Getmansky, Lo, & Makarov, 2004; Liang, 2000; Park, 1995). Self-selection and instant history biases arise because only successful funds tend to report their performance to the database after a trial period and some of these funds also backfill their past performance information. Unsuccessful funds are unlikely to disclose any information at all. This practice may create an upward bias in performance analysis. Survivorship bias occurs when funds that no longer exist are excluded from the database. TASS maintains the history of defunct funds from 1994. Therefore, to mitigate survivorship bias we include defunct funds from the Graveyard TASS database. Finally, return smoothing bias is a consequence of serial correlation and stale prices (Asness, Krail, & Liew, 2001; Getmansky et al., 2004). Lo (2002) demonstrates that return smoothing bias may lead to overestimation of the Sharpe ratios. Accordingly, our findings are subject to these potential caveats.

[6] Details are available from the authors on request.
[7] See variable definitions further.

To study the fee-performance relationship we calculated the following variables using monthly performance data: (1) *Average Returns*; (2) *Sharpe ratio*[8]; (3) *Modified Sharpe ratio*; and (4) *MSCI_Correl*, correlation of fund's returns with the returns of the MSCI World Index. These variables measure manager's ability to generate raw returns, risk-adjusted returns, returns adjusted for risk and asymmetry (i.e. skewness and kurtosis), and fund's diversification benefits for investor's portfolio.[9]

Also, we created a number of control variables: (1) *Age*, measured in days (performance date minus fund inception date); (2) *Mflex* – managerial flexibility, measured in days (lock up period plus redemption period plus notice period); (3) *PercentileAUM* (percentile ranking of the average AUM of each fund across the sample period, relative to all funds); and (4) *Risk* (standard deviation of returns).

Other variables used in the analysis come directly from the TASS database and include: *IncentiveFee* (fund's incentive fee in % terms), *ManagementFee* (fund's management fee in % terms) *HighWaterMark* (Dummy variable set to 1 if high water mark provision is in place, 0 otherwise), *AvgLeverage* (average leverage used by the fund, defined as the ratio of fund portfolio-to-equity, multiplied by a factor of 100[10]); and *Style* (hedge fund style category).[11]

[8] Risk free rate is proxied by the one-month Treasury bill rate.
[9] We define diversification benefits variable under the implicit assumption that many investors in hedge funds also hold long positions in world equities.
[10] TASS does not provide information regarding time period during which leverage is calculated. Further, the 'portfolio-to-equity' definition is quite broad, and allows for different fund managers to employ varying interpretations.
[11] We construct dummy variables for the following TASS styles: Long/Short Equity Hedge, Event Driven, Fund of Funds, Managed Futures, Emerging Markets, Multi-Strategy, and 'Equity Market Neutral. Other TASS styles, i.e. Convertible Arbitrage, Dedicated Short Bias, Global Macro, and Options Strategy are considerably less represented in the database and combined make up only 7.24% of database. In our analysis they form a 'base category', to eschew the dummy variable trap.

4. Research Method

We focus on three dimensions of performance (see section 2): return related performance characteristics, diversification benefits, and fund survival. To test that a relation exists between fund fees and returns the following Ordinary Least Squares (OLS) regression model is estimated:

$$\begin{aligned} Returns_i = \alpha + \beta_1 IncentiveFee_i + \beta_2 ManagementFee_i + \beta_3 HighWaterMark_i \\ + \beta_4 Age_i + \beta_5 PercentileAUM_i + \beta_6 Mflex_i + \beta_7 MSCI\_Correl_i \\ + \beta_8 AvgLeverage + \sum_{s=1}^{7} Style_{i,s} + \varepsilon_i \end{aligned} \quad (1)$$

Under the null hypothesis that funds with higher incentive fees should exhibit superior returns, we expect the coefficient on β_1 to be positive and statistically significant. We estimate three versions of Equation (1) utilizing three different (dependent) return variables: average returns, the Sharpe ratio, and the modified Sharpe ratio.

Equation (1) extends the models utilized by Ackermann et al. (1999) and Kouwenberg and Ziemba (2007), who regress a range of return measures on incentive fee, management fee, fund age, AUM[12], as well as fund style dummies. In order to normalize AUM, we utilize a percentile ranking of each fund calculated in relation to the category to which it belongs. The dummy variable for high-water mark provision of incentive contract is included because the extant theoretical and empirical literature suggests that it may act to better align investor/manager interests, and further serve as an important signal for managerial ability (Agarwal et al., 2009; Pan et al., 2009). Managerial flexibility calculated, as the sum of the lockup, notice and redemption periods, is added in light of work by Liang (1999) and Agarwal et al. (2009) that suggests that this variable

[12] Kouwenberg and Ziemba (2007) use the net asset value of a fund to proxy for size. Ackermann et al. (1999) do not control for size in their regressions.

is a positive driver of returns. So, fund leverage is included too because it allows funds to enhance returns by amplifying or dampening their risk exposure. Within the asset management industry, the hedge fund sector is known to make the most use of leverage (Ang, Gorovyy, & Van Inwegen, 2011). Finally, we include a variable that reflects fund's correlation with the market proxied by the return of the MSCI World Index[13]. This variable enables us to better analyze the trade-off between diversification benefits and return performance during an expansionary economic cycle. Thus, we are able to ascertain whether funds that generate higher returns are doing so by simply increasing market exposure, or if outperforming funds exhibit superior performance irrespective of market movements.

To get a deeper insight about the fee structure and diversification benefits of hedge funds we reverse the formulation in the above Equation (1), and place the incentive fee as the dependent variable and estimate the following model:

$$\begin{aligned} IncentiveFee_i = \alpha + \beta_1 Returns_i + \beta_2 ManagementFee_i + \beta_3 HighWaterMark_i \\ + \beta_4 Age + \beta_5 PercentileAUM_i + \beta_6 Mflex + \beta_7 MSCI\_Correl_i \\ + \beta_8 AvgLeverage_i + (\beta_9 Risk_i) + \sum_{s=1}^{7} Style_{i,s} + \varepsilon_i \end{aligned} \quad (2)$$

The primary aim of estimating Equation (2) is to test the relation between incentive fee level and returns correlation with the market. We retain the control variables utilized in the previous regression to account for the effect of other factors on incentive fee. By analogy with Equation (1) three versions of Equation (2) are estimated incorporating average return, the Sharpe ratio and the modified Sharpe ratio as return measures. However, the risk variable (standard deviation of fund returns) is added only into the regression with the average return variable. The purpose of adding fund volatility is to

[13] We use the MSCI world index as an alternative to the S&P500 index because it proxies for the entire international stock market; it also correlates highly to the S&P500.

gauge explicitly the relationship between incentive fees and risk-taking. In light of previous literature that suggests that fees may in fact provide a signal concerning managerial risk aversion (Golec, 1988; Kouwenberg & Ziemba, 2007) we believe a more detailed analysis of this relationship is warranted.

In Equation (2) under the null hypothesis that funds with higher incentive fees should exhibit lower return correlations with the market, we expect the coefficient on β_7 to be negative and statistically significant within the 2008-2009 sub-sample. Given that positive market correlations may indicate a legitimate 'market-timing' strategy, we cannot extend this expectation to the 2001-2007 sub-sample. Stocks gained considerable value during this period and managers may have deliberately increased their equity exposures in anticipation of a rising market; thus exhibiting temporarily high market correlations during this period may not necessarily preclude these funds from generating diversification benefits during market downturns (provided mangers have skill in anticipating these downturns and adjusting market exposure accordingly).

Alternating return measures and incentive fee variables as dependent and independent variables in Equation (1) and Equation (2) may raise concerns about causality and pose a potential endogeneity problem: Do higher fees affect superior returns, or do superior returns enable managers to renegotiate higher fees? Empirically, Deuskar, Wang, Wu, and Nguyen (2011) find that less than 2% of the funds (139 out of 7,613) from the TASS database have ever changed their incentive fee and there is no significant impact of past performance and fund flows on incentive fee changes. Therefore, we argue, since with very few exceptions hedge fund compensation contracts are set at the inception of a fund and do not change throughout the fund's life (Ackermann et al., 1999), in practice, no

endogeneity problem exists. Managers are unable to renegotiate a higher fee subsequent to superior performance without closing down the current fund and starting a new one:[14]

The fact that hedge fund fees do not change throughout the life of the fund renders the hedge fund industry an ideal arena to test the relationship between fee structure and performance. For example, Agarwal et al. (2009) contrast hedge fund studies with extant literature concerning the relationship between executive compensation and performance, and note that the latter is vulnerable to endogeneity concerns given the ability of executives to influence remuneration.

The final dimension of performance which we examine is fund's survival. We argue that it is important to compare the attrition rate of funds based on fee level. Relying on fund's volatility as the only measure of risk may not adequately reflect the danger of a fund becoming defunct, since the final months of a fund's life prior to the closure often remain unreported (Fung & Hsieh, 2002). If high fee funds do indeed offer investors a superior value proposition, one may suppose that high fee funds will also survive longer. In testing this, we construct two ratios designed to reflect fund survival throughout the relevant time period.

The first ratio is calculated as:

No. of live funds / [No. of live funds + No. of defunct funds] (3)

In order to add robustness to our findings, we calculate the second ratio that incorporates the number of days survived by both live and dead funds:

Sum of live fund days / [Sum of live funds days + Sum of dead fund days[15]*]* (4)

[14] Technically, contractual fees can be changed by a vote of interested parties, however as Ackermann et al. (1999) point out, 'this almost never occurs'.
[15] That is, the sum of days survived before becoming defunct.

Utilizing this ratio helps guard against two potential sources of bias. Firstly, it may be that high attrition rates amongst high fee funds are caused by young (high fee) funds that become defunct shortly after entering the database, and should therefore be omitted from the analysis (since presumably investors will only consider high fee funds with an adequate track record). Secondly, it may be that the high proportion of live funds in lower fee deciles is caused by a large number of new, low fee funds that have very recently entered the database, and have not had the time to prove their ability to survive. The second ratio allows control for these potential biases.

We calculate the above ratios conditional on incentive fee deciles, and present the results using scatter plots (see section 5.5). Since there are relatively few funds in the top two incentive fee deciles we calculate this ratio over the entire period of the TASS database (1977-2009), in addition to the overall sample period 2001-2009.

5. Results

The results, presented below, are divided into five sections: The first provides a description of summary statistics; next, evidence of 'fee herding' is presented which shows that most funds set incentive fees at 20% of profits and do not change them; then the main results are discussed which show that although slightly larger returns are obtained, larger incentive fees fail to attract superior risk adjusted performance; the evidence of diversification during the financial crisis of 2008-2009 amongst high incentive fee funds is presented next; and finally, the last section considers the consequences of reduced survival as a consequence of increased leverage.

5.1. Descriptive Statistics

Descriptive statistics of hedge funds' characteristics are presented in Table 1 for the 2001-2007 sub-sample and in Table 2 for the 2008-2009 sub-sample. We begin by examining fee characteristics in the first period. Funds have a median management fee of 1.5%, and a median incentive fee of 20%. Notably, the high-water mark provision seems to be widespread within the industry with 75.1% of funds adopting it. The omnipresence of this provision emphasizes the performance-based asymmetric nature of the typical hedge fund contract. Within this sample the average monthly return is 0.837% (median, 0.713%), the mean Sharpe ratio is 0.275 (median, 0.257), and the mean Modified Sharpe Ratio is 0.116 (median, 0.113). Overall these statistics are similar to those of Ackermann et al. (1999). The high figures for skewness and kurtosis of 6.981 and 1.905 respectively indicate that hedge fund return distribution exhibit non-normal features and highlight the importance of using the modified Sharpe ratio for performance measurement. Interestingly, the value of skewness is positive, in contrast to other studies which usually document negatively skewed distribution (see, for example, Malkiel and Saha (2005) and Bali, Brown, and Demirtas (2013)). Probably this is because the sample period (2001-2007) falls exactly in between two crises: the 'dotcom' crash in 2000 and the beginning of the global financial crisis at the end of 2007.

<<Insert Table 1 Here>>

Table 2 provides descriptive statistics for the 2008-2009 sub-sample. This sample exhibits an average return of -0.585% (median, -0.612%), a mean Sharpe ratio of -0.133 (median, -0.188) and a mean modified Sharpe ratio of -0.099 (median, -0.107). A comparison of these results to those outlined in Table 1 underlines the severity of the recent global financial crisis. Further, a comparison of the risk variable highlights the increased market volatility within the 2008-2009 sub-sample; mean risk is 4.6% (median,

3.5) compared with 2.5% (median, 1.9) for the 2001-2007 sample. Interestingly, the distribution for the latter sample more closely resembles a normal distribution, although the skewness slightly is negative (-0.35) in line with expectations. Fee variables remain largely consistent with the 2001-2007 sub-sample. Funds exhibit a mean market correlation of 0.345 (median, 0.399) and 0.382 (median, 0.505) for the 2001-2007 and 2008-2009 sub-samples, respectively. Relatively low correlation is consistent with the notion that some of the hedge fund strategies provide diversification benefits.

<<Insert Table 2 Here>>

5.2. Fee Distributions - Evidence of Herding

Before commencing the analysis of the regression models (discussed in section 4), a further discussion of the fee variables is required. As discussed in Sections 1 and 2, the information asymmetries faced by hedge fund investors are severe; thus, we expect the role of fees in signaling fund performance to be particularly pronounced. In an environment where any deviation from the median fee level is interpreted as a substantial signal of fund quality (e.g. pertaining to performance, risk, or other fund traits) one may logically expect a self-sustaining 'herding' equilibrium to arise, where the majority of funds 'lump' at the median. This is because, on the one hand, managers will be hesitant to set fees below this point in order to avoid the perception of inferior quality (Gil-Bazo & Ruiz-Verdú, 2008); and on the other, only managers who are confident in their abilities (or are sufficiently risk-seeking) will take on fees above the median, since they need to generate far higher before-fee returns in order to remain competitive. Given the dire career consequences for managers who are unsuccessful (Brown et al., 2001) and that incentive fees are set at fund inception and not changed (see section 4) we expect only the boldest to set their fees above the 'herd'.

To examine whether a 'herding' equilibrium exists we create histograms of management and incentive fees, which are presented in Figure 1 and Figure 2. Clearly, the evidence supports our conjecture: around 70% of funds in our sample adopt an incentive fee of 20%. Greater flexibility is evidenced in regards to the management fee; however management fee levels are still concentrated into three main groups (1%, 1.5% and 2%). Thus, as discussed (above), the herding exhibited in fees supports the notion that large information asymmetries cause fee levels to be interpreted by investors as signals of fund quality.

<<Insert Figure 1 and Figure 2 Here>>

5.3. Fund Fees and Returns

In examining whether high fee funds generate superior returns, we regress average and risk-adjusted returns on a range of fund characteristics over the 2001-2007 period. Results from Equation (1) are presented in Table 3 and for 2008-2009 in Table 4. It is important to note that in both tables, the column headings represent different dependent variables in Equation (1). When regressed against average returns, coefficients on incentive fee and high water mark variables are positive and significant, albeit only at a 10% level. Further, the coefficient on incentive fee is quite small; a 1% increase in incentive fee leads to only a 0.0048% average increase in monthly returns (0.0576% annually). This result is noteworthy as it means that despite their intent, extremely large incentive fees do not guarantee large returns to the investor.

Surprisingly, the coefficient on management fee is far more significant, both statistically and economically; a 1% increase in management fee affects a 0.1427% increase in monthly returns. This result contradicts previous studies that find management fee to be an insignificant (or slightly negative) driver of performance (Ackermann et al., 1999;

Agarwal et al., 2009; Kouwenberg & Ziemba, 2007). It is likely that, given the reputation-driven nature of the hedge fund industry, management fee may proxy for managerial experience or track record. Indeed, anecdotally, whilst incentive fees do not change, inexperienced managers may reduce their management fees to attract startup funds. Given that hedge fund contracts are set at inception and do not change throughout the life of the contract, presumably only experienced and reputed managers can demand high management fees. While this is a similar argument to the one made in support of higher incentive fees, there is one important difference: we would not expect higher management fees to be conducive to greater risk-taking.

When we employ the Sharpe ratio and the modified Sharpe ratio as the dependent variable in Equation 1, from Table 3 we can see that the management fee coefficient remains positive and statistically significant; however, the incentive fee is no longer statistically significant. Thus, on a risk-adjusted basis funds higher incentive fees do not generate superior performance. This finding is an important one. In an industry that relies on outcomes-based contracting to mitigate agency costs, it would seem that even very large incentive-based fees fail to accurately signal performance as proxied by a fund's ability to generate superior risk adjusted returns. Furthermore, the fact that any significance exhibited in the incentive fee variable disappears when utilizing risk-adjusted returns[16] suggests that rather than implementing more profitable strategies (and thus evidencing superior managerial ability), funds with higher incentive fees compete by taking on more risk. Additionally, it seems that the risks taken on by high fee funds are not proportionate to the additional returns generated. Thus managers who adopt higher incentive fees seem to be less risk-averse, consistent with the conjecture put forth by Golec (1988); however, they do not seem to exhibit superior managerial ability. This is

[16] In Table 3, incentive fees are significant at 10% when the 'average return' (not risk adjusted) is the dependent variable.

consistent with the efficient market hypothesis which predicts that persistent, abnormal returns cannot be generated by fund managers.

<<Insert Table 3 Here>>

The notion that high fee funds undertake riskier strategies has crucial implications for investors who rely on fee structure as a signaler of information, and thus requires further examination. A relationship between incentive-based fees and risk is explicitly supported by the Equation (2) regression results, presented in Tables 5&6[17]. This is in contrast with tables that display Equation (1) results, where the columns represent the dependent variable utilized in regression iterations.

Consistent with our previous findings, when the incentive fee is regressed on risk, the coefficient on the risk variable is positive and significant at the 1% level. Interestingly, while previous theoretical work suggests that the higher incentive fees of the asymmetric compensation contract should encourage risk-taking (Aivaliotis & Palczewski, 2014; Kouwenberg & Ziemba, 2007) empirical studies do not find a positive relation between incentive fee and risk-taking within the hedge fund industry (Ackermann et al., 1999; Kouwenberg & Ziemba, 2007). These findings are consistent with theory but not prior literature. There are numerous possible explanations for this discrepancy: One explanation can be deduced from the recent work by Naik et al. (2007), who present evidence that the aggregate level of hedge fund alpha has decreased over the past decade. Arbitrage opportunities available for hedge funds are not infinitely scalable (Goetzmann et al., 2003); thus the drastic increase in the number of operating hedge funds (and aggregate assets under management) over the previous years has been followed by a

[17] It is important to note that, in all tables that display Equation (2) results, the column headings represent independent risk/return variables used in various regression iterations, while incentive fee is always the dependent variable.

decrease in excess returns generated by the industry as a whole. Given the decreased level of exploitable arbitrage opportunities, it may be increasingly difficult for managers with high incentive fees to generate sufficient returns through unique investment strategies. Thus, high fee funds may have no other choice but to take on more risk in order to generate a sufficient level of before-fee returns required to remain competitive.

Ackermann et al. (1999) and Kouwenberg and Ziemba (2007) use relatively old datasets[18]; hence contradictions with the present study could possibly be explained by the aforementioned 'decreasing alpha' hypothesis. This hypothesis would also explain why the coefficients on the market correlation variables in Table 3 are positive and highly significant. The fact that funds with higher market exposure performed better supports the notion that unique arbitrage opportunities available to hedge funds are increasingly elusive and of diminishing magnitudes. Thus, the most successful funds during 2001-2007 were those that 'rode' the market (i.e. had the highest correlations), rather than those that employed specialized arbitrage strategies.

Other control variables which appear to be important in determining hedge funds returns are managerial flexibility, fund size, age, and leverage. Positive and significant relationship between managerial flexibility and returns (both raw and risk-adjusted) is consistent with findings of Agarwal et al. (2009) and suggest that longer lockup, notice, and redemption periods give managers greater discretion and allow them to better exploit illiquidity risk premia. Fund size (i.e. AUM) demonstrates a positive and significant relationship with fund returns; these findings are consistent with Edwards and Caglayan (2001) and Liang (1999), and suggest that funds with larger assets under management may be able to take advantage of economies of scale. It should be noted however, that in

[18] See footnote 8.

light of recent studies that highlight the adverse effect of capacity constraints on excessively large funds (Getmansky(2012)) this relationship may be nonlinear. Age is also positively and significantly related to risk-adjusted (albeit, not raw) returns; however, the coefficient presented in Table 3 is miniscule; thus the effect of fund age on fund performance does not seem to be economically significant. In contrast to Diz (2003), we do not find a positive and significant relationship between risk-adjusted returns and leverage. Leverage is found to be negatively related to average returns; however the coefficient is small[19]. Interestingly, when leverage is regressed against incentive fee (see Table 5 and Table 6 in the next section), the coefficient is positive and highly significant in both sub-samples. Thus, funds with higher incentive fees take on greater leverage. This finding is consistent with the notion, previously discussed, that in light of diminishing levels of alphas within the hedge fund industry high fee funds must increasingly look to riskier strategies (facilitated by greater leverage) in order to remain competitive.The results pertaining to the 2008-2009 period are discussed in the next section together with the results on diversification benefits offered by hedge funds.

<<Insert Table 4 Here>>

5.4. Fund Fees and Diversification Benefits

In the previous section we found a positive but weak relationship between incentive fee and raw returns which becomes insignificant after accounting for risk during the normal market environment. Given that investing in high fee funds does not generate superior risk-adjusted returns, we investigate whether high fee funds exhibit lower market

[19] Increased leverage will result in lower returns when (on average) managers do not possess skill.

correlations. It may be that these funds offer superior value by generating considerable diversification benefits[20].

Table 5 reports regression estimates of incentive fee on a number of return measures and other fund characteristics including the market correlation variable. In all regressions, the coefficient is negative and highly significant. Thus, results from the 2001-2007 sub-sample support the hypothesis that high fee funds do generate superior diversification benefits. The true test of this hypothesis lies, however, in regression results from the 2008-2009 sub-sample, presented in Table 6. As previously stated, it is essential that high fee funds generate diversification benefits when investors need them most, such as during severe market downturns such as the 2008-2009 period. If, as Amin and Kat (2003) argue, these benefits do not materialize at the very moment that investors are in most need of insulation from market movements, the case for investing in high fee funds may be weakened.

Results from the 2008-2009 period in Table 6 are consistent with the 2001-2007 sub-sample. The coefficient on the market correlation variable remains negative and highly significant. Thus, high fee hedge funds realize lower market correlations during periods of extreme market volatility. The fact that these results are consistent across both sub-samples suggests that, contrary to the assertions of Bacmann, Jeanneret, and Scholz (2008), there is scant evidence of 'market timing' during these two periods. Thus, rather than increasing market exposures during market upswings and adopting low-correlation strategies during or just before market downturns, it seems that high fee funds favor relatively market neutral strategies that remain stable over time.

[20] It should be noted that low correlation with markets in and of itself does not represent skill. A fund many have low correlation with the market but generate negative returns.

In addition to the market correlation variable, several other results presented in Table 6 are noteworthy. Firstly, the coefficients on the high-water mark dummies are all positive and statistically significant, suggesting that the higher the incentive fee, the greater the proclivity to adopt this provision. These findings are consistent with the theoretical predictions of Pan et al. (2009) that state that managers who wish to convey a signal of skill to the market will adopt a high-water mark provision and a higher incentive fee simultaneously. A positive and significant relationship is evidenced between incentive fee and management fee. Further, consistent with our findings from the 2001-2007 sub-sample in Table 5, risk is positively and significantly related to incentive fee. Perhaps most importantly, however, are the results pertaining to the return variables. In contrast to the earlier sub-sample, funds with higher incentive fees generate superior raw and risk-adjusted returns over the 2008-2009 period. The effects are both statistically and (extremely) economically significant; a 1% increase in incentive fee affects a 0.46% increase in average monthly returns after controlling for risk. These findings are also supported by Equation (1), 2008-2009 results which are presented in Table 4. Here, the coefficients on all return variables are positive and statistically significant. Thus, high fee funds are able to offer remarkable outperformance during times of market volatility by taking on strategies that provide low market exposures; however, during stable market conditions evidence of outperformance is scant.

<<Insert Table 5 & Table 6 Here>>

5.5. Survival Analysis

This section discusses the results pertaining to the relationship between the level of incentive fees and funds' survival. Figure 3 illustrates the survival rate of funds using the

ratio from Equation (3) (i.e. rate in terms of the number of surviving funds) conditional on incentive fee decile across the entire time period of the TASS database (1977-2009). [21]

<<Insert Figure 3 Here>>

Figure 3 demonstrates a clear negative relationship between survival and incentive fee deciles. In light of our finding of a positive relationship between incentive fee and risk in both our sub-samples, this relationship is to be expected. It seems that higher fee funds, in taking more risk, are doing so at the expense of survival. These findings are consistent with Brown et al. (2001) who finds that riskier funds are less likely to survive another year.

<<Insert Figure 4 Here>>

Figure 4 present the survival rate using the ratio from Equation (4) (i.e. rate in terms of the number days funds survive). It suggests a more complicated relationship than Figure 3. Interestingly, using this metric, funds with the median (20%) incentive fee experience the highest rate of attrition (i.e. the lowest survival rate). To interpret this unexpected result, a comparison of Figures 3 and 4 suggests that a large proportion of managers who establish high fee funds are unable to make them survive. However, those that do survive seem to survive longer than funds at the median (20%) level. These findings support the notion that a small proportion of high fee funds do demonstrate superior quality, as measured by the ability to mitigate the risk of extreme losses that may lead to fund closure. Nevertheless, funds with incentive fees set beneath the median demonstrate a higher probability of survival, consistent with finding that they take on less risk relative to their high fee counterparts.

[21] Note, we include a non-decile category "20%", in light of the fact that over two thirds of funds adopt this incentive fee level.

To be consistent with the results in the previous sections which cover the period from 2001-2009, we repeat the above analysis using only funds from the 2001-2009 sample period. Before presenting results, several caveats are in order. Firstly, given the reduced time period over which attrition is calculated, we expect the 2001-2009 results to be less accurate. Secondly, reducing the analysis to a much shorter time period also reduces the amount of funds analyzed; this reduction has particularly severe effects when analyzing the top two incentive fee deciles. There are only 19 funds in the 31-40% deciles and a further 12 funds in the 41-50% decile; thus any ratios derived for the top fee deciles may not be as accurate as those for lower deciles, where the sample of funds is drastically increased. Figure 5 and Figure 6 show the survival rate based on the two ratios.

<<Insert Figure 5 & Figure 6 Here>>

Figures 5 exhibits a negative (albeit seemingly non-linear) relationship between survival and incentive fee, consistent with prior results. Funds in the top incentive fee decile demonstrated (by a considerable margin) the worst survival rate as measured by both ratios. This suggests that funds with the highest incentive fees may be taking on unique risks that put them at greater risk of extreme losses. Alternately, given the relatively small number of funds analyzed, this extremely low survival rate may be an artefact of data limitations. From Figure 5 it can also be seen that funds with incentives fees from 21-40% experienced lower attrition than funds at the median (20%), however they suffered higher attrition than funds with incentive fee below 20%.

The results pertaining to Figure 6, however, tell a slightly different story. While comparable to the 1977-2009 results in that 21-40% incentive fee funds did better than the median, they also peformed well when compared to funds with incentive fees below 20%. In fact, funds in the 31-40% decile demonstrate the highest survival rate of any incentive fee level. These results are consistent with the findings relating to the

diversification benefits of high fee funds. Given that higher fee funds demonstrated considerable outperformance during the global financial crises, due to their relatively low market exposures, it makes sense that they would also exhibit lower rates of attrition over this same period.

In order to more closely examine the aforementioned notion we analyze survival ratios pertaining to the 2008-2009 period alone. The results are shown in Figure 7 and Figure 8.

<<Insert Figure 7 & Figure 8 Here>>

Figures 7 and Figure 8 confirm our findings; with the exception of the 41-50% decile[22], the shape of the graph represents a shallow trough; thus there seems to be a trade-off between added risk taken on by higher fee funds, and the superior diversification benefits realized. In a period of extreme market volatility, the positive influence of low market correlations on survival seems to be the dominant effect; thus funds with 21-40% incentive fee levels demonstrated higher rates of survival during the 2008-009 period.

[22] Which has very few funds and is therefore vulnerable to greater imprecision in measurement.

6. Conclusions

We examine the relation between incentive fees and hedge fund performance. In an industry where information asymmetries (and the consequent risk of agency problems) are severe, the efficacy of such outcomes-based contracting to align investor and manager interests is of fundamental importance to investors.

Consistent with theory, we find that the higher a hedge fund's incentive fee the higher its average returns. Although the incentive fee is positively linked to average returns, the relationship is economically small. Crucially, those managers with greater incentive fees do not generate superior risk adjusted returns. Rather, we find that higher incentive fee funds take on more leverage, and most importantly, take on considerably more financial risk.

Our findings contrast with those of Ackermann et al. (1999) who assert that managerial co-investment and reputational concerns mitigate the incentives for excessive risk-taking presented by the asymmetric, option-like compensation. We believe this discrepancy may be explained by diminishing levels of aggregate alpha within the hedge fund industry over the past decade (Naik et al., 2007); as competition increases and opportunities to exploit unique arbitrage opportunities decrease, we posit that high fee funds may be forced to take on riskier strategies in order to sustain the level of before-fee returns needed to compete with their low fee counterparts. On the other hand, our findings validate the theoretical model of Kouwenberg and Ziemba (2007), as we are able to find a positive relationship between fees and risk-taking.

Importantly, high fee funds exhibit low market correlations during both 'normal' market conditions and periods of extreme market volatility. Thus, high fee funds demonstrated considerable outperformance in generating both raw and risk-adjusted returns during the

recent global financial crisis. The results reject the notion that high fee hedge funds exhibit 'market timing' ability; that is, that they increase their exposure to the market during upswings, and decrease market exposure just before market downturns.

Finally, our analysis suggests that, over a long-term period funds with higher incentive fees also suffer from higher rates of attrition. However, when we account for the number of days survived before liquidation, our findings demonstrate that high fee funds that do survive, exhibit comparable longevity with their low-fee counterparts. Further, during the global financial crises period of 2008-2009 and with the exception of funds in the top incentive fee decile, funds with higher incentive fees demonstrated higher survival rates than their low-fee counterparts thus confirming the competitive advantage that these fee funds exhibit during periods of severe market instability.

Overall, our findings do not support the notion that incentive based fees act as a signal of superior skill. The information that investors can elicit from incentive-based fees relates more to the manager's propensity for risk, rather than her ability to generate superior returns. This is consistent with the notion that those markets in which hedge funds operate are efficient and that as a consequence persistent, abnormal returns cannot be easily generated, even when very large incentive fees are offered.

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TABLE 1 – *Descriptive Statistics, 2001-2007*

Variable	*Mean(%)*	*Median(%)*	*Std. (%)*	*Kurt.*	*Skew.*	*Min.*	*Max.*
Average Returns	0.837	0.713	0.709	6.981	1.905	-1.533	5.896
Sharpe ratio	0.275	0.257	0.254	6.772	1.358	-0.818	2.291
Modified Sharpe ratio	0.116	0.113	0.106	2.557	0.407	-0.359	0.623
Incentive Fee (%)	17.109	20	6.435	2.345	-1.25	0	50
Management Fee (%)	1.444	1.5	0.577	8.507	1.567	0	6
HighWaterMark	0.751	1	0.432	-0.647	-1.163	0	1
AUM ($000,000)	211.447	60.175	803.72	164.23	11.576	10.001	15610.408
Age (days)	2812.854	2400	1518.108	0.709	1.028	730	8987
Mflex (days)	44.437	36	29.846	1.963	0.991	0	216
Average Leverage	61.478	0	145.127	53.272	5.832	0	2000
MSCI_Correl	0.345	0.399	0.305	0.196	-0.701	-0.921	0.915
Risk (std. deviation of returns)	2.572	1.965	1.891	4.267	1.852	0.136	13.6

TABLE 2 – *Descriptive Statistics, 2008-2009*

Variable	*Mean(%)*	*Median(%)*	*Std. (%)*	*Kurt.*	*Skew.*	*Min.*	*Max.*
Average Returns	-0.585	-0.612	1.483	2.256	-0.35	-7.69	5.839
Sharpe ratio	-0.133	-0.188	0.368	6.408	1.54	-0.981	2.845
Modified Sharpe ratio	-0.099	-0.107	0.212	1.371	0.022	-0.933	0.997
Incentive Fee (%)	15.435	20	7.289	0.228	-0.799	0	50
Management Fee (%)	1.495	1.5	0.585	5.356	0.897	0	6
HighWaterMark	0.725	1	0.447	-0.989	-1.006	0	1
AUM ($000,000)	270.627	64.886	1055.023	108.43	9.57	10.012	16542.404
Age (days)	2509.198	2008.5	2132.738	121.57	7.691	360	11670
Mflex (days)	40.683	31	33.386	2.503	1.18	0	216
Average Leverage	43.26	0	130.274	87.91	7.756	0	2000
MSCI_Correl	0.382	0.505	0.411	0.163	-0.988	-0.935	0.98
Risk (std. deviation of returns)	4.646	3.517	3.56	6.85	2.209	0.103	29.094

TABLE 3 – *OLS Regression, Eq. (1) - Returns vs. Fund Characteristics, 2001-2007*

	Average Return		***Sharpe***		***Modified Sharpe***	
Intercept	-0.0109	(0.89)	0.0053	(0.85)	0.0068	(0.58)
Incentive Fee	0.0048*	(0.06)	0.0004	(0.66)	0.0002	(0.66)
Management Fee	0.1427***	(0.00)	0.0190**	(0.02)	0.0110***	(0.00)
HighWaterMark	0.0530*	(0.09)	0.0128	(0.27)	0.0067	(0.18)
Age	0.0000	(0.83)	0.0000*	(0.09)	0.0000***	(0.01)
Percentile AUM	0.2092***	(0.00)	0.1361***	(0.00)	0.0515***	(0.00)
Average Leverage	-0.0002**	(0.05)	0.0000	(0.20)	0.0000	(0.30)
Mflex	0.0029***	(0.00)	0.0019***	(0.00)	0.0006***	(0.00)
MSCI_Correl	0.4380***	(0.00)	0.0423***	(0.01)	0.0168**	(0.02)
Long Short Equity	0.1907***	(0.00)	0.0152	(0.33)	0.0086	(0.20)
Event Driven	0.0889*	(0.10)	0.1168***	(0.00)	0.0407***	(0.00)
Fund of Funds	-0.0486	(0.36)	0.0873***	(0.00)	0.0262***	(0.00)
Managed Futures	0.2735***	(0.00)	-0.0169	(0.46)	-0.0058	(0.55)
Emerging Markets	1.0808***	(0.00)	0.1847***	(0.00)	0.0706***	(0.00)
Multi-Strategy	0.0954	(0.11)	0.0579***	(0.01)	0.0245***	(0.01)
Equity Market Neutral	-0.0543	(0.35)	0.0039	(0.86)	-0.0065	(0.48)
Adjusted R^2	.23		.16		.12	
Observations	2742		2742		2742	

Table 3 reports the OLS regression results of Eq. (1) where raw and risk-adjusted returns are regressed on eight hedge fund characteristics and seven style dummy variables. The p-values are presented in parentheses test whether $\beta_i \neq 0$. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. In tables that report Equation 1 results, column headings represent the dependent variable against which variables in the leftmost column are regressed.

TABLE 4 – *OLS Regression, Eq. (1) - Returns vs. Fund Characteristics, 2008-2009*

	Average Return		***Sharpe***		***Modified Sharpe***	
Intercept	0.4567	0.00	0.1597	0.00	0.0520	0.02
Incentive Fee	0.0176***	0.00	0.0061***	0.00	0.0032***	0.00
Management Fee	-0.0478	0.32	-0.0276**	0.02	- 0.0100	0.14
HighWaterMark	0.0009	0.99	-0.0062	0.70	-0.0078	0.40
Age	0.0000	0.35	0.0000	0.34	0.0000	0.75
Percentile AUM	-0.1193	0.21	-0.0391*	0.08	-0.0072	0.59
Average Leverage	-0.0007***	0.00	-0.0001	0.16	0.0000	0.30
Mflex	-0.0008	0.38	0.0007***	0.00	0.0001	0.27
MSCI_Correl	-1.3316***	0.00	-0.3128***	0.00	-0.1716***	0.00
Long Short Equity	-0.5932***	0.00	-0.2083***	0.00	-0.1037***	0.00
Event Driven	-0.6668***	0.00	-0.2422***	0.00	-0.1190***	0.00
Fund of Funds	-0.8167***	0.00	-0.3652***	0.00	-0.1962***	0.00
Managed Futures	0.0815	0.56	-0.1194***	0.00	-0.0462**	0.02
Emerging Markets	-0.9647***	0.00	-0.1852***	0.00	-0.0929***	0.00
Multi-Strategy	-0.5604***	0.00	-0.1691***	0.00	-0.0893***	0.00
Equity Market Neutral	-0.5972***	0.00	-0.1694***	0.00	-0.0643***	0.00
Adjusted R^2	.27		.33		.31	
Observations	2182		2182		2182	

Table 4 reports the OLS regression results of Eq. (1) where raw and risk-adjusted returns are regressed on eight hedge fund characteristics and seven style dummy variables. The p-values are presented in parentheses test whether $\beta i \neq 0$. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. In tables that report Equation 1 results, column headings represent the dependent variable against which variables in the leftmost column are regressed.

TABLE 5 – *OLS Regression, Eq. (2) - Incentive Fee vs. Fund Characteristics, 2001-2007*

	Average Return		***Sharpe***		***Modified Sharpe***	
Intercept	15.5979	(0.00)	16.0050	(0.00)	16.0033	(0.00)
Return Variable^	-0.0057	(0.97)	0.1724	(0.66)	0.3942	(0.66)
Management Fee	0.6704***	(0.00)	0.7641***	(0.00)	0.7630***	(0.00)
HighWaterMark	2.8235***	(0.00)	2.8499***	(0.00)	2.8495***	(0.00)
Age	0.0000	(0.52)	0.0000	(0.73)	0.0000	(0.73)
Percentile AUM	0.0195	(0.95)	-0.1941	(0.55)	-0.1909	(0.55)
Average Leverage	0.0023***	(0.00)	0.0022***	(0.00)	0.0022***	(0.00)
Mflex	0.0033	(0.33)	0.0027	(0.42)	0.0028	(0.41)
MSCI_Correl	-1.3943***	(0.00)	-1.1756***	(0.00)	-1.1749***	(0.00)
Long Short Equity	0.3338	(0.29)	0.4827	(0.13)	0.4819	(0.13)
Event Driven	0.6602*	(0.10)	0.4907	(0.22)	0.4947	(0.22)
Fund of Funds	-8.8800***	(0.00)	-9.1485***	(0.00)	-9.1438***	(0.00)
Managed Futures	0.3163	(0.51)	0.8711*	(0.06)	0.8704*	(0.06)
Emerging Markets	-0.9988**	(0.04)	-0.6855	(0.14)	-0.6815	(0.14)
Multi-Strategy	-1.7771***	(0.00)	-1.8625***	(0.00)	-1.8621***	(0.00)
Equity Market Neutral	-1.0143**	(0.02)	-1.1376***	(0.01)	-1.1344***	(0.01)
Risk	0.2501***	(0.00)				
Adjusted R^2	.47		.47		.47	
Observations	2742		2742		2742	

Table 5 reports the OLS regression results of Eq. (2) where incentive fee is regressed on nine hedge fund characteristics and seven style dummy variables. The p-values presented in parentheses test whether $\beta i \neq 0$. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. ^ The 'Return Variable' coefficient relates to each of the return variables denoted in the column headings. In tables that report Equation 2 results, column headings represent the return measure employed (as an independent variable) in each regression iteration, where incentive fee is the dependent variable.

TABLE 6 – *OLS Regression, Eq. (2) - Incentive Fee vs. Fund Characteristics, 2008-2009*

	Average Return		***Sharpe***		***Modified Sharpe***	
Intercept	12.3641	(0.00)	13.0023	(0.00)	13.1858	(0.00)
Return Variable^	0.4612***	(0.00)	1.8979***	(0.00)	2.8936***	(0.00)
Management Fee	0.7051***	(0.00)	0.7830***	(0.00)	0.7613***	(0.00)
HighWaterMark	4.2419***	(0.00)	4.2196***	(0.00)	4.2401***	(0.00)
Age	0.0002***	(0.00)	0.0002***	(0.00)	0.0002***	(0.00)
Percentile AUM	0.0609	(0.88)	-0.0617	(0.88)	-0.1154	(0.77)
Average Leverage	0.0047***	(0.00)	0.0046***	(0.00)	0.0046***	(0.00)
Mflex	0.0059*	(0.10)	0.0037	(0.31)	0.0047	(0.19)
MSCI_Correl	-1.8607***	(0.00)	-1.5314***	(0.00)	-1.6334***	(0.00)
Long Short Equity	1.1382***	(0.01)	1.3163***	(0.00)	1.2231***	(0.01)
Event Driven	1.6582***	(0.01)	1.7722***	(0.00)	1.6599***	(0.01)
Fund of Funds	-7.2433***	(0.00)	-7.2064***	(0.00)	-7.3502***	(0.00)
Managed Futures	0.1296	(0.83)	0.6833	(0.25)	0.5914	(0.32)
Emerging Markets	-0.0447	(0.93)	0.2960	(0.59)	0.2132	(0.69)
Multi-Strategy	-1.1784**	(0.04)	-1.1929**	(0.03)	-1.2588**	(0.02)
Equity Market Neutral	-0.4440	(0.49)	-0.4914	(0.45)	-0.6286	(0.33)
Risk	0.1847***	(0.00)				
Adjusted R^2	.47		.47		.47	
Observations	2182		2182		2182	

Table 6 reports the OLS regression results of Eq. (2) where incentive fee is regressed on nine hedge fund characteristics and seven style dummy variables. The p-values presented in parentheses test whether $\beta i \neq 0$. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. ^ The 'Return Variable' coefficient relates to each of the return variables denoted in the column headings. Column headings represent the return measure employed (as an independent variable) in each regression iteration, where incentive fee is the dependent variable.

Figure 1 –Histogram of Incentive Fee, 2001-2009

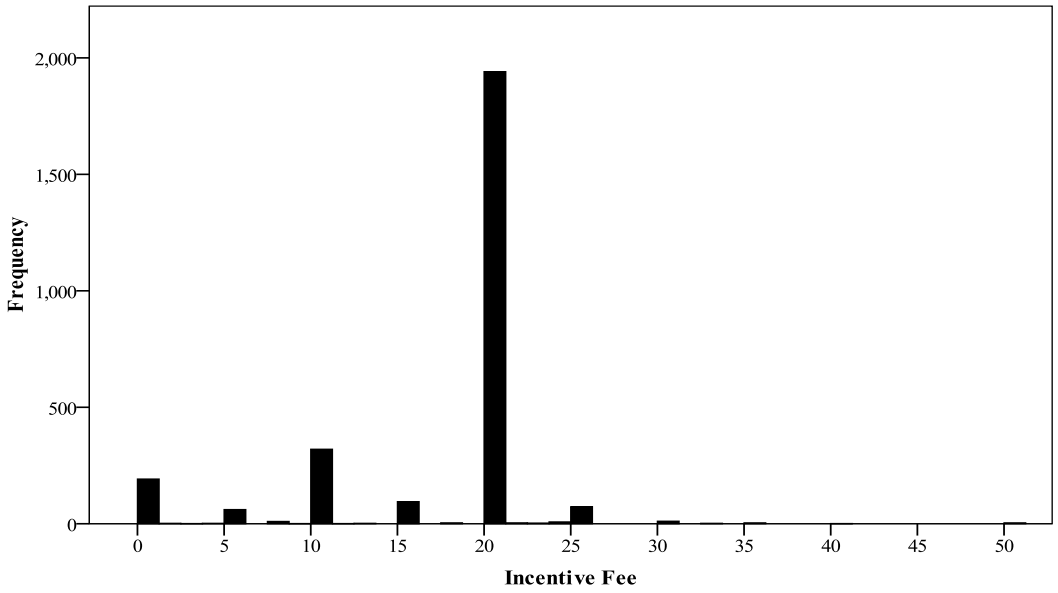

Figure 2 –Histogram of Management Fee, 2001-2009

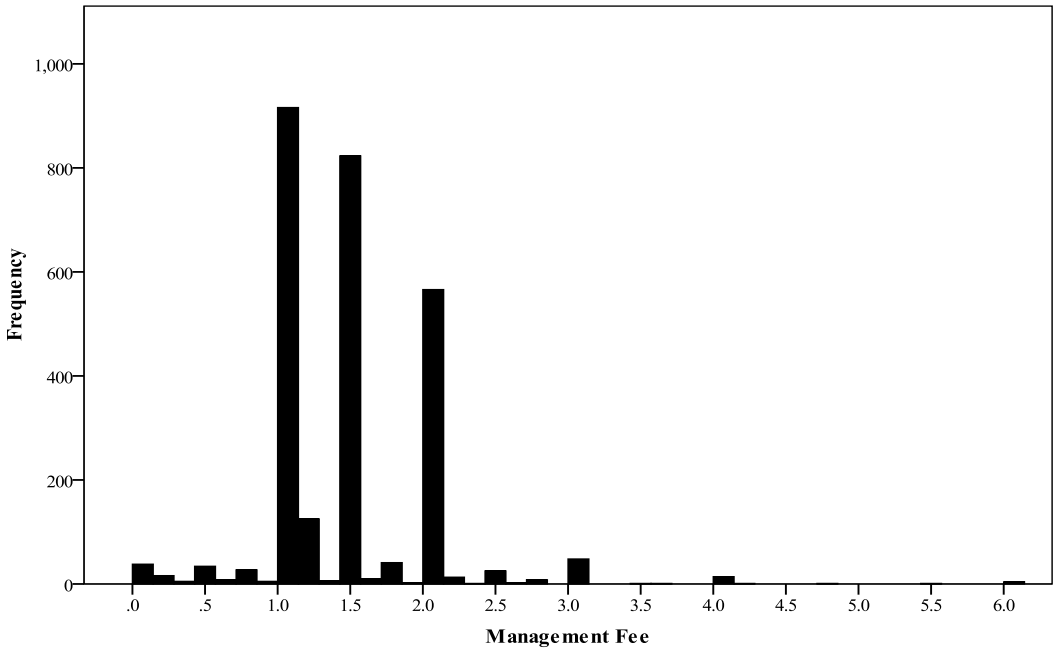

Figure 3: Survival Ratio Equation (3), 1977-2009

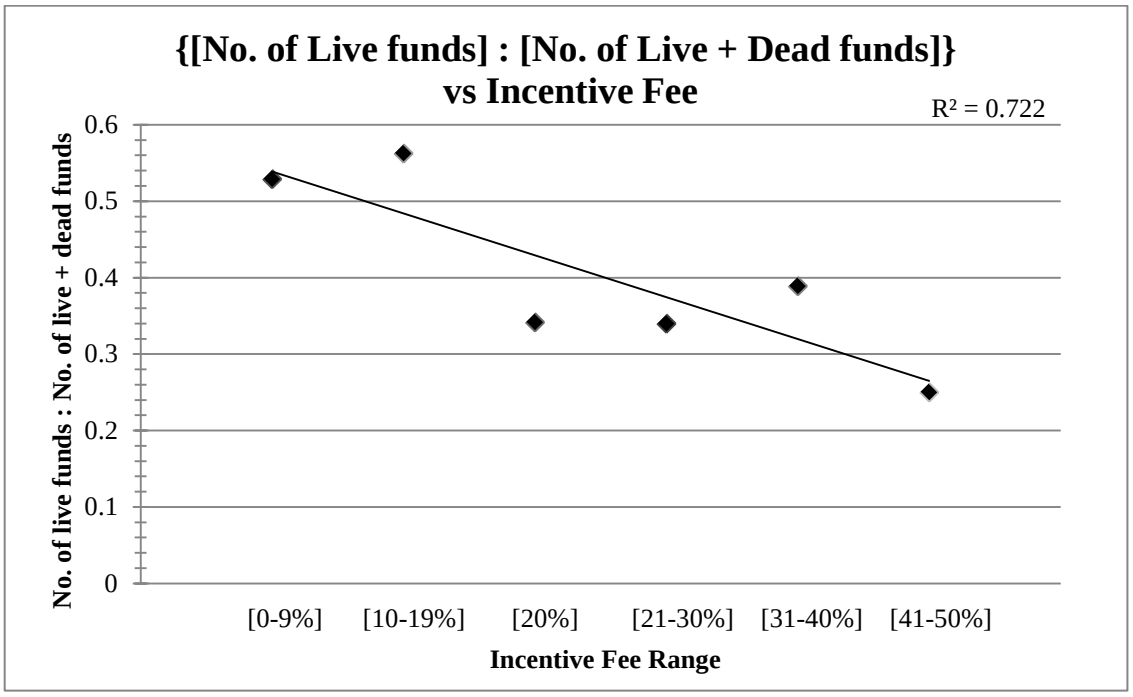

Figure 4: Survival Ratio Equation (4), 1977-2009

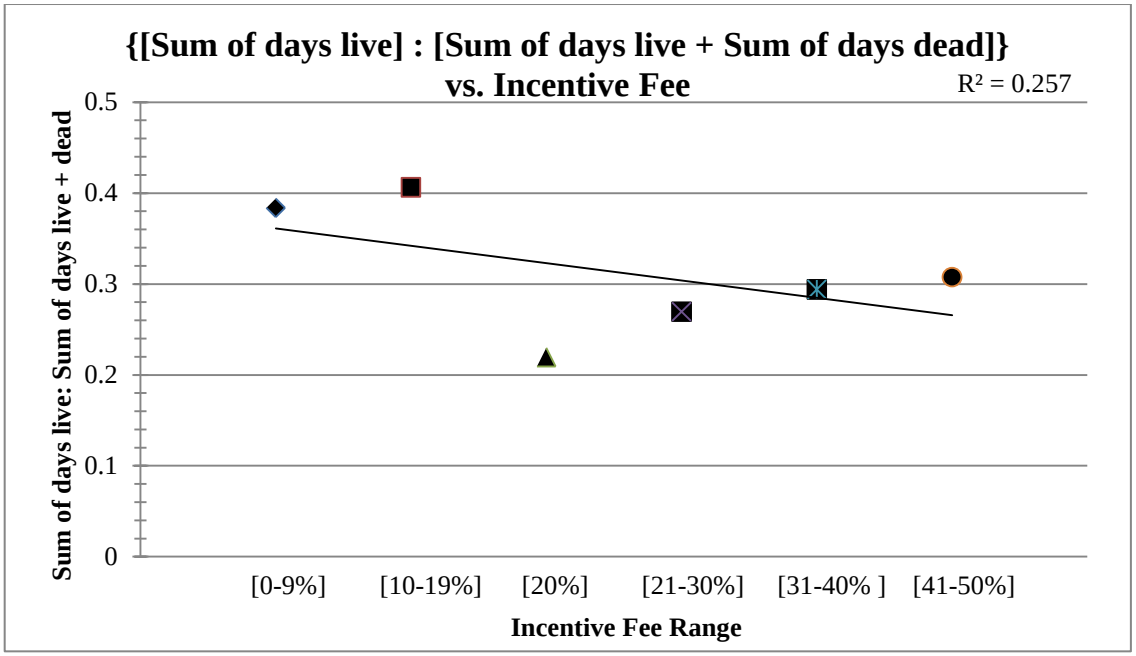

Figure 5: Survival Ratio Equation (3), 2001-2009

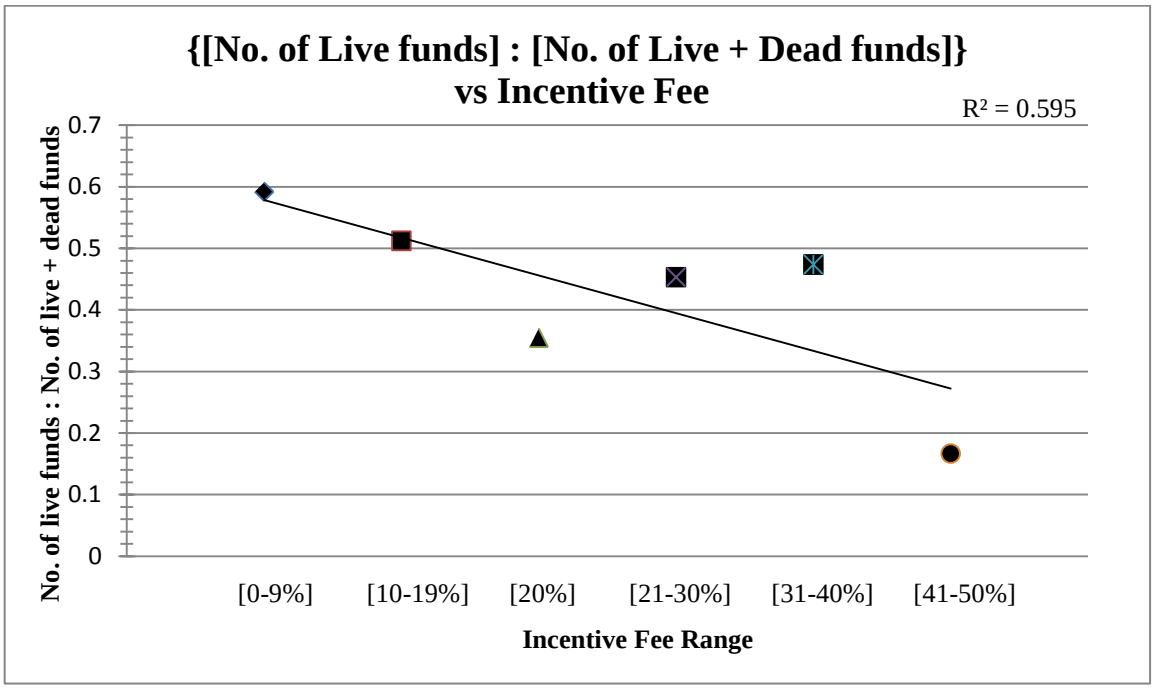

Figure 6: Survival Ratio Equation (4), 2001-2009

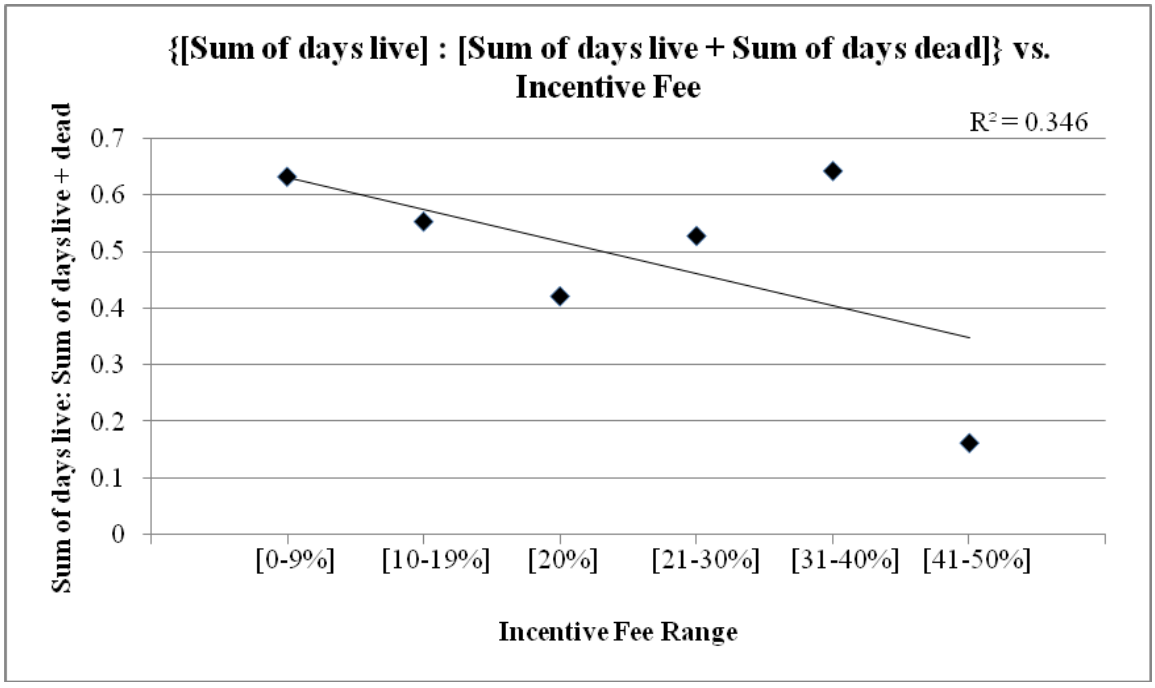

Figure 7: Survival Ratio Equation (3), 2008-2009

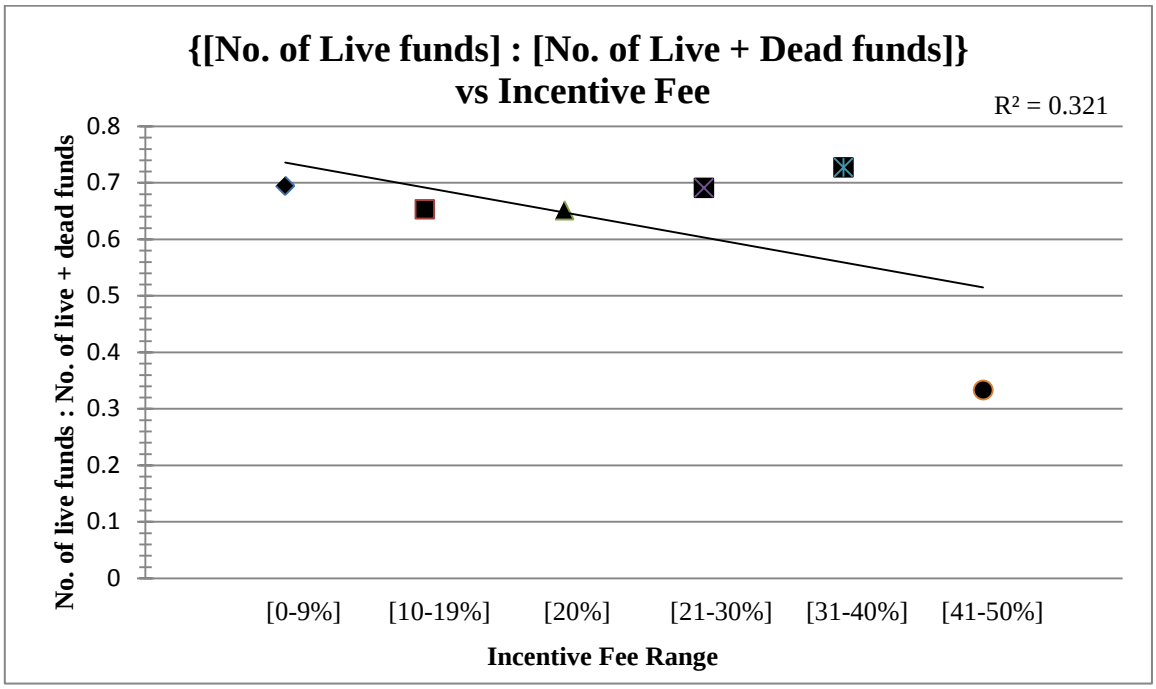

Figure 8: Survival Ratio Equation (4), 2008-2009