On the Performance of Hedge Funds

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Abstract

This paper investigates hedge fund performance and risk. The empirical evidence indicates that hedge funds differ substantially from traditional investment vehicles such as mutual funds. The funds with watermarks significantly outperform the funds without watermarks. The average hedge fund returns are related positively to incentive fees, the size of the fund, and the lockup period. Hedge funds follow dynamic trading strategies and have low systematic risk. There are low correlations among different strategies. Compared with mutual funds, hedge funds offer better risk-return trade-offs: they have higher Sharpe ratios, lower market risks, and higher abnormal returns. In the period of January 1994 to December 1996, most hedge funds provide positive abnormal returns. Overall, hedge fund strategies dominate mutual fund strategies, hence hedge funds provide a more efficient investment opportunity set for investors.

1. Introduction

Hedge funds are private investment partnerships in which the general partners make a substantial personal investment. The general partners' offering memorandum usually allows for the fund to take both long and short positions, use leverage and derivatives, invest in concentrated portfolios, and move quickly between different markets. Hedge funds often take large risks on speculative strategies, including program trading, short sale, swap, and arbitrage.

There are two major types of hedge funds: U.S. (or onshore) and offshore. U.S. hedge funds are limited partnerships of no more than 500 investors. Offshore funds are limited liability corporations or partnerships established in tax neutral jurisdictions that allow investors an opportunity to invest outside their own country and minimize their tax liabilities. Offshore fund investors are either non-U.S. or U.S. tax-exempt investors. The advantage for foreign investors is that they can invest in the U.S. market through an offshore fund while avoiding the U.S. income tax. By investing in offshore funds, the U.S. tax-exempt investors can get some relief from unrelated business taxes. Generally, offshore funds are more flexible than onshore funds because they offer more privacy, enjoy certain tax advantages, and are not restricted as to the number of investors.[1]

Unlike mutual funds, hedge funds are not required to register with the SEC and disclose their asset holdings. This is largely because hedge funds are either limited partnerships with no more than 500 investors or offshore corporations. The limited regulatory oversight gives hedge fund managers tremendous flexibility in making their

investment decisions. Because of the nature of private partnerships, hedge funds are not allowed to advertise to the public. Instead, hedge funds require that 65% of all investors be accredited; i.e., they must be individuals with each having a net worth of at least $1 million. The minimum investment requirement is typically $250,000. A lockup period is required for the first time investors.

Hedge funds have special fee structures designed to motivate managers. First, a management fee is setup to pay the manager a wage that is fair, but not sufficient to make him wealthy. An incentive fee is established separately to align the manager's interest with the fund's performance. The incentive fee is usually paid only after a hurdle rate is achieved. In addition, a majority of hedge funds have a "high watermark" provision. Under such a provision, the manager is required to make up any previous losses before an incentive fee is paid; in other words, the cumulative returns have to be above the hurdle rate. Further, it is possible that the manager could "owe" the investors a rebate of fees charged in previous years. All these features, together with the fact that the hedge fund manager is a partner himself and that his personal wealth is closely tied to his performance, give him better incentive schemes compared to mutual funds and other traditional investment vehicles.

As a result of flexible investment strategies, a better manager-incentive alignment, sophisticated investors, and limited SEC regulations, hedge funds have gained tremendous popularity. The first hedge fund was established in 1949. By the late 1980's the number of hedge funds has increased to around 100, and the explosive growth in the hedge fund market during the early 1990's has resulted in more than 1,000 funds available to

investors today (see Figure 1). Moreover, in June 1997, in order to encourage investment in hedge funds, the SEC allowed hedge funds to exceed their previous limit of 100 investors while still avoiding the kind of registration and disclosure required of mutual funds.[2] This change in SEC regulations will allow hedge funds to grow more quickly in the future. It is believed that the new SEC rules could be a draw for pension funds and other institutional investors.

Despite the popularity of hedge funds, there are very few academic studies in this area. Fung and Hsieh (1997) extend Sharpe's (1992) asset class factor model to include more diversified hedge fund strategies. By focusing on both hedge fund managers and commodity trading advisors (CTAs), Fung and Hsieh conclude that hedge fund strategies are dramatically different from mutual funds and that they are highly dynamic. These non-traditional and dynamic investment strategies can provide an integrated framework for style analysis. Brown, Goetzmann, and Ibbotson (1997) examine the performance of offshore hedge funds. They attribute offshore hedge fund performance to the style effects rather than manager skills. Ackermann, McEnally, and Ravenscraft (1997) report that comparisons of hedge funds and market indexes yields mixed findings. They conclude that hedge funds outperform mutual funds.

In strong contrast, a substantial amount of work has been done in the area of mutual funds. The lack of work in the area of hedge funds is due to the difficulty in accessing private hedge fund data. In this paper, I use a comprehensive hedge fund database that consists of over 1,000 hedge funds to study the performance, risk, and fee structure of the hedge fund industry. The empirical results of this paper reveal several interesting aspects

of hedge funds. The paper sheds light on issues such as the relationship between hedge fund performance and fund characteristics, the nature of watermark, hurdle rate, and leverage, and the comparison between hedge funds and mutual funds. Using an asset class factor model and a mean-variance efficient analysis framework, this paper provides a comprehensive evaluation of hedge fund performance and risk.

The rest of the paper is organized as follows. Section 2 describes the data and basic hedge fund statistics. Section 3 evaluates hedge fund performance and risk. Section 4 compares hedge funds with mutual funds. Section 5 summarizes the paper.

2. Data and Basic Fund Features

2.1. Data

The hedge fund data is obtained from Hedge Fund Research Inc. (hereafter HFR). It has 1,162 funds with over $190 billion total assets under management. It contains not only the survived funds but also 108 disappeared funds. This database is by far one of the largest hedge fund databases available for academic research. According to HFR, there are 16 different hedge fund categories based on the fund's main investment strategy. These categories are: composite, convertible arbitrage, distressed securities, emerging markets, fixed income, foreign exchange, growth, macro, market neutral, market timing, merger arbitrage, opportunistic, sector, short selling, value, and fund of funds. The definition of these strategies can be found in the Appendix.

Among these 1,162 funds, most report returns to their investors on a monthly basis; only a few report returns on a quarterly basis. A majority of the funds report returns net

of all fees, including incentive fees, management fees, sales/commission fees, and other fees. After deleting the funds which report returns on a quarterly basis, the funds which report returns with different fees, and the 48 HFR indexes, there remain 921 hedge funds in the sample, of which 92 are disappeared funds. These 921 hedge funds are used to describe the basic fund statistics in this section.

To study the fund performance and risk characteristics, I further require all funds to have consecutive monthly return history for at least three years from January 1994 to December 1996, so that relatively accurate risk measures like betas can be estimated. The three-year requirement is a trade-off between the number of funds available and the number of monthly return observations. Upon this requirement, the 921 funds have been reduced to 385.[3] This sample is used to evaluate fund performance and risk in Sections 3 and 4.

The HFR database provides comprehensive information about fund performance, asset size, fee structure, and other fund characteristics such as investment strategy, inception date, and minimum investment. The data also describes whether a fund has a watermark provision, the level of the hurdle rate, and the fund's leverage ratio.[4]

I obtain mutual fund data from Morningstar, Inc. The Morningstar OnDisc database has 7,746 mutual funds as of December 31, 1996. After deleting the funds with consecutive monthly return history of less than three years, I have 4,776 funds left in the sample. The time period is from January 1994 to December 1996, which matches the hedge fund sample period. Monthly mutual fund returns are adjusted for management fee, 12b-1 fee, and other costs automatically deducted from fund assets. However, returns are

not adjusted for front load, back-end load, and redemption fees. According to Morningstar, there are 18 different styles based on the investment strategy. In fact, the mutual funds are classified by equity investment style, bond investment style, or both. Combining funds' investment methodology (growth, value, or blend) and the sizes (small medium, and large-cap) of the companies in which the funds invest, Morningstar classifies equity funds in nine groups. Similarly, Morningstar splits bond funds into three maturity groups (short, intermediate, and long) and three credit-quality groups (high, medium, and low).[5]

2.2. Summary statistics

Table 1 provides basic statistics for the 921 hedge funds, including the 92 disappeared funds. Note that some funds do not report relevant information. The average fund asset is $94 million (median $21 million). Compared to the traditional investment vehicles such as mutual funds, hedge funds tend to be smaller.[6] The small fund asset allows hedge fund managers to move quickly among different markets and invest heavily in a concentrated portfolio to take advantage of small pockets of market inefficiency. The average firm assets are much higher than the average fund assets, indicating that a firm may manage more than one fund or managed account. An average annual management fee of 1.36% (median 1%) is charged based on the fund size, but independently of fund performance.

An average annual incentive fee of 16.24% (median 20%) based on annual profits is usually charged above the hurdle rate.[7] The incentive fee gives the fund manager a strong incentive to outperform the specified hurdle rate. The highest incentive fee is 50% in my

sample. The average (median) minimum investment of $598,000 ($250,000) is substantially above the affordability of most small investors. This is consistent with the fact that hedge funds are designed primarily for wealthy or institutional investors. An average lockup period of about three months exists to prevent early redemption, and on average a one month advanced notice period for withdrawing is also required.

2.3. Fund features and average fund performance

The relationship between some important fund features and average fund performance is shown in Table 2. In Panel A, I compare the average monthly returns of levered funds with unlevered funds. As of June 1997, about 83% of the funds use leverage. Although borrowing gives fund managers more capital to invest and the levered funds slightly outperform the unlevered funds, I do not find that the difference is significant (t=0.45). However, leverage does increase volatility: both the standard deviation and the spread between the two extreme returns for the levered funds are much higher than those for the unlevered fund. Further examination by investment strategy reveals that leverage benefits some specific funds such as convertible arbitrage and merger arbitrage funds but hurts emerging market funds.

In Panel B, the performance differences between the onshore funds and offshore funds are reported. There are more offshore funds than onshore funds. This may be because of the tax advantages, the benefits from fewer regulations enjoyed by offshore funds, the globalization in the world financial markets, and the growing need for cross-border investments. Although offshore funds are more volatile, U.S. hedge funds and offshore

hedge funds offer very similar returns in the period from January 1994 to December 1996. However, funds in the category "both", which represents an onshore fund with an offshore equivalent, have significantly outperformed the onshore-only funds (t=3.12) and the offshore-only funds (t=2.82). These funds usually start as onshore-only funds. When the funds perform well, they attract more clients and the assets grow. Then, the managers establish equivalent offshore funds to attract foreign investors. Therefore, the onshore funds with offshore vehicles tend to be larger and the fund managers tend to have more expertise than managers of other funds. These may help to explain the superior fund performance.

Panel C reveals another interesting feature: the majority of funds (79%) have watermark provisions. Funds with high watermarks outperform the funds without watermarks (t=1.88) at a significance level of 6%. We know that a watermark is designed to align a manager's incentive with a fund's performance. With the existence of a watermark, managers collect incentive fees only if they can make up all past losses, such that the cumulative returns are above the hurdle rates. This design seems to achieve its purpose.

In Panel D, the effectiveness of a hurdle rate is examined. We can see that the majority of the funds (84%) do not have hurdle rates.[8] However, the performance of the funds with hurdle rates and the funds without hurdle rates are similar: both are around 1.4% per month. It seems that the existence of a hurdle rate is not critical for fund performance. Further examination of the compounding effect between the hurdle rate and the watermark may help us understand the issue better. Therefore, in Panel E, I list a two-way table of

hurdle rates and watermarks. Note that the hurdle rate and the watermark serve different purposes. The hurdle rate is used for collecting incentive fees, whereas the purpose of a watermark is to recover the past losses. They are independent.[9]

From Panel E, we can see that the majority of funds (520) have watermark provisions but no hurdle rates. In contrast, only a small number of funds (22) have hurdle rates but no watermarks. This indicates that funds are more concerned about past losses, which is consistent with the loss-averse behavior of investors. In fact, the watermark is a more critical factor than the hurdle rate in determining fund returns: if the hurdle rate is not specified, then the return difference between the funds with watermarks and those without watermarks is 0.26% and significant (t=2.26). However, if the watermark is not specified, then the return difference between the funds with hurdle rates and those without hurdle rates is 0.26% (t=0.96), which is not significantly different from zero. Of course, a fund with neither a hurdle rate nor a watermark cannot motivate the manager appropriately. Such a fund yields the lowest average return of 1.20%. On the other hand, a fund with both a hurdle rate and a watermark may be too burdensome and may not attract the better managers. This is confirmed by the average monthly return of 1.30%. The funds with either a hurdle rate or a watermark provide the highest average return of 1.46%.

2.4. Investment intervals and redemption intervals

Table 3 describes the relationship between fund performance and investment interval and redemption interval. It shows that returns are positively related to investment and

redemption intervals. Relatively longer investment and redemption periods can reduce daily managing costs and reduce cash holdings that are reserved for frequent redemption. In addition, longer investment and redemption periods can allow managers to aim for long-term horizons and to invest in relatively illiquid assets such as derivatives, distressed securities, and private securities.

Overall, hedge funds differ from the traditional investment vehicles such as mutual funds in the existence of incentive fees, large investment requirements, long lockup and advance notice periods, hurdle rates, watermark provisions, and the leverage privilege.

3. Hedge Fund Performance and Risk

3.1. Raw returns

Figure 2 shows the monthly cumulative returns for hedge funds versus the S&P 500 index from January 1990 to December 1996. Monthly hedge fund returns are calculated based on equally weighted portfolios. Since most of the funds started after 1990, the figure captures the majority of hedge funds. As we can see, a $1 investment in January 1990 can turn into $3.08 from investing in hedge funds and $2.56 from investing in S&P 500 by the end of December 1996. In terms of total returns, hedge funds earn 208% while S&P 500 earns 156% during the seven-year period. However, hedge funds are not necessarily riskier than the stock market index. The plot of hedge funds is smoother than that of S&P 500. In fact, the standard deviation of monthly returns is 3.37% for S&P 500 but only 1.38% for hedge funds. Although the use of leverage, going short, and employing

derivatives can increase the volatility of returns, total risk can be reduced by different hedging techniques. Further, averaging across different fund strategies can achieve sufficient diversification especially when these fund strategies are less correlated. Finally, the S&P 500 is an equity index, while hedge funds can hold cash, bond, stock, and other securities. These may explain why hedge funds have a relatively low total risk.

3.2. Asset class factor model and abnormal returns

Following Sharpe (1992) and Fung and Hsieh (1997), we adopt an asset class factor model to evaluate performance and analyze styles for hedge funds. The eight assets classes are: the S&P 500 index, MSCI world equity index, and MSCI emerging market index for equity markets, Salomon Brothers world government bond index and Salomon Brothers government and corporate bond index for bond markets, Federal Reserve Bank trade-weighted dollar index for currency, gold price for commodities, and one-month Eurodollar deposit for cash. The asset class factor model can be expressed as:

$$R_t = \alpha + \sum_k \beta_k F_{kt} + \varepsilon_t. \quad (1)$$

Some of the above factors are highly correlated. For example, the correlation coefficient between the S&P 500 index and MSCI world equity index is 0.82. To mitigate the potential collinearity problem among different factors, we use a stepwise regression to select variables according to the standard AIC criterion. By doing this, we can pick up the most relevant factors while avoiding the redundant ones, and significantly simplify the regression results.

The stepwise regression results are reported in Table 4 for the 385 funds with consecutive monthly returns from January 1994 to December 1996. Table 4 shows that factor loadings are scattered around different asset classes and different strategies. No single asset class is dominating in the regression. Although eight hedge fund strategies are involved in investing U.S. equity, the other eight are not correlated with the S&P 500 index. The R-squared ranges from 0.23 to 0.77, indicating a relatively low correlation between hedge fund returns and the standard asset classes. This evidence is consistent with Fung and Hsieh (1997), who state that hedge funds follow dynamic trading strategies rather than buy-and-hold strategies.

Convertible arbitrage funds have a high factor loading of 0.21 with the U.S. government and corporate bond index, consistent with the fact that these funds hold convertible bonds. Distressed securities have a beta of 0.22 with the S&P 500 index, indicating that these funds long U.S. stocks. Emerging market funds invest heavily in currencies and emerging market securities, with a high factor loading of 0.58 with the emerging market index. Fund of funds has a broad exposure to world equity, emerging market securities, currency, commodity, and cash, reflecting that fund of funds invest in different hedge funds with various investment strategies. The growth and value funds have relatively high market betas of 0.56 and 0.46, respectively. Macro funds invest in world equity, currency, and commodities, following a top-down global approach. Finally, the short selling funds have a beta of -1.41 with the S&P 500 index. This large negative beta reflects that the managers of short selling funds move against the broad market movement. Betas with S&P 500 range from –1.41 to 0.88, which are significantly

different from zero and below one.[10] In general, hedge funds are generally not traditional investment vehicles and are less correlated with the market.

We can think of the intercept term of the regression as being the unexplained return by the asset class factor model. The unexplained returns are from managers' selection skills, which cannot be explained by the style factors from passive portfolios. There are seven hedge fund groups that earn significantly positive abnormal returns. They are the distressed securities, emerging market, fixed income, merger arbitrage, opportunistic, short selling, and value funds. Positive abnormal returns are observed for 11 out of 16 groups. Only two groups (growth and market neutral) have significantly negative abnormal returns. The unexplained returns range from –5.22% to 1.26% per month.

Overall, the low beta values for hedge fund groups indicate that hedge funds have low systematic risk because of the combination of long and short strategies, concentrated investments in small asset bases, use of derivatives, and holdings of broad asset classes in different markets. On the other hand, most fund groups display positive abnormal returns, seven of which are statistically significant. The results indicate that there is some evidence of manager skills.

3.3. Regression results of average returns on fund characteristics

To further examine the determinants of hedge fund returns, I run a cross-sectional regression of average monthly returns on fund characteristics such as incentive fees, management fees, fund assets, lockup periods, and fund ages as follows:

$$\overline{R}_i = \alpha_{0i} + \alpha_{1i}(IFEE) + \alpha_{2i}(MFEE) + \alpha_{3i}[LN(ASSETS)] + \alpha_{4i}(LOCKUP) + \alpha_{5i}(AGE) \quad (2)$$

where

$\overline{R}_i$ =the average monthly return over 36 months for fund *i*,

IFEE =the incentive fee in percentage,

MFEE =the management fee in percentage,

LN(ASSETS) =the natural logarithm of fund assets as of June 1997,

LOCKUP =the lockup period in number of days,

AGE =total number of months since inception.

The regression result is reported in Table 5. The coefficient for the incentive fee is significantly positive, indicating that a high incentive fee is indeed able to align the manager's incentive with fund performance. In fact, a 1% increase in the incentive fee will increase the average monthly return by 1.3%. This is consistent with the fact that the manager is a partner himself, and will collect an incentive fee only if he performs well. However, the management fee is not significant in explaining average returns. This is not surprising because the management fee charged is independent of performance. The coefficient on the variable of natural logarithm of fund assets is significantly positive. Remember that the median fund asset is about $20 million. For most of the hedge funds, the assets have not been too big to manage yet. It is suggested that a fund needs a critical mass of $10 to 20 million to support its operating expenses. The positive coefficient indicates that large funds realize economies of scales. It may also indicate that successful funds attract more money. The lockup period is critical in determining fund returns. The longer the lockup period, the better the fund performance. Lockup periods can effectively prevent early redemption, reduce the cash holding, and allow managers to focus on

relatively long-term horizons. Finally, the age of the fund is negatively related to average performance. Long survived funds do not necessarily outperform the younger funds during the three-year time period. One explanation is that the older funds have become too big to manage for the managers.

4. Hedge Funds versus Mutual Funds

Many mutual fund studies have demonstrated that fund managers cannot consistently outperform the market (see Malkiel (1995) and Carhart (1997)). Other scholars have found evidence of persistence in mutual fund performance and attributed the persistence to "hot hand" or common investment strategies (see Hendricks, Patel, and Zeckhauser (1993)). The purpose of this study is not to reconcile the above conflicting results but rather to compare hedge fund performance with that of mutual funds.

The incentive scheme is different for hedge funds than for mutual funds. Mutual fund fees are usually based on the fund size independent of performance. On the other hand, as long as there exists a hurdle rate and a watermark, hedge fund managers will try their best to perform, collect incentive fees, and protect their own investments in the fund. Another difference between hedge funds and mutual funds is that mutual funds are traditional investment vehicles whose returns tend to move together while hedge funds are alternative investment strategies that are less correlated with standard asset classes. Hedge funds can use more flexible investment strategies like leverage, derivatives, short selling, and swap. In addition, hedge funds require a large minimum investment, and a long lockup period.

Managers can move quickly between different markets. All of these features make hedge funds more likely to outperform mutual funds.

4.1. Correlation structure and the mean-variance efficient frontier

Tables 6 and 7 reveal an interesting difference of correlation structures between mutual fund and hedge fund returns. Mutual fund styles are highly correlated. There are 153 covariance terms among 18 mutual fund styles, and 142 out of 153 (or 93%) are significantly positive at the 5% level. There is no negative correlation for returns. In strong contrast, among the 16 hedge fund groups, there are 19 negative correlation coefficients, 11 of them are significantly negative. 87 out of 120 (or 73%) covariance terms are significantly different from zero. The short selling funds are negatively correlated with the other hedge fund strategies. Overall, the average correlation of 0.369 for different hedge fund strategies is much lower than the average correlation coefficient of 0.755 for mutual funds.

The above correlation structures indicate that hedge funds are better diversified as a result of flexible investment strategies and non-traditional asset classes involved. For diversification purposes, investors will benefit more from holding a general hedge fund portfolio than a mutual fund portfolio. The mean-variance efficient frontiers plotted in Figure 3 confirm this argument: the efficient frontier of 16 hedge fund groups has a smaller minimum variance and overwhelmingly dominates the mutual fund efficient frontier for all feasible standard deviations.[11] For a given standard deviation, investors can do much better by investing in hedge funds than investing in mutual funds. Given the fact that

there are only 385 hedge funds compared with 4,776 mutual funds in my sample and that hedge fund returns are net of all fees while mutual fund returns do not adjust loads, the dominance of hedge funds over mutual funds may be understated.[12]

4.2. Sharpe's measure and return distribution

Another difference between hedge funds and mutual funds is that mutual funds are relative performers with a relative target like the S&P 500 index, while hedge funds are absolute performers with no relative benchmark. The equity market index is not necessarily the right benchmark for hedge funds. Therefore, market betas and abnormal returns may not be the appropriate measures for risks and profits. To mitigate this problem, I calculate Sharpe ratios, which are defined as the ratio of the average excess fund returns over the standard deviation.

In Table 8, the largest Sharpe ratio is 1.11 for the merger arbitrage fund, followed by the opportunistic fund with a Sharpe ratio of 0.67. Both funds are arbitrage and opportunity seeking funds. They are more successful than the other funds. The average Sharpe ratio for the 16 hedge fund groups is 0.364, compared with the average Sharpe ratio of 0.168 for all mutual fund groups. The *t*-ratio for the difference is 2.58, indicating that hedge funds, on average, offer better risk-to-reward compensation. The largest Sharpe ratio is 0.31 for the mutual fund style "large-value", consistent with the literature supporting value investment styles (see Lakonishok, Shleifer, and Vishny (1994)). It is interesting that there exists a value style in hedge fund strategies. Hedge funds following the value style earn a Sharpe ratio of 0.45 while the average Sharpe ratio is only 0.26 for

all three mutual fund groups following value styles. The same is true for the growth style: hedge funds following growth strategies have a Sharpe ratio of 0.38 while the average Sharpe ratio for all three mutual funds with growth styles is only 0.22. In fact, both growth and value style hedge funds offer higher returns and lower standard deviations relative to their mutual fund peers. Note that the standard deviation for all hedge funds is 2.1%, which is only slightly higher than 2.04% for all mutual funds. Hedge funds are no more risky than their mutual fund peers.

It is possible that the return distribution of hedge funds is positively skewed because downside risk can be effectively reduced by various hedging strategies. Table 8 provides the skewness of returns for hedge funds and mutual funds. We can see that most of the numbers are very close to zero although the average skewness for hedge funds is slightly less negative than that for mutual funds. The average skewness for hedge funds is not significant, so we should not concern ourselves with skewness for the returns of hedge funds.

Additionally, I use an alternative measure, the semi-deviation below zero, to calculate downside risk. The semi-deviation below zero is defined as follows:

$$S_i = \sqrt{\sum_{t=1}^{36} L_{it}^2}\,, \tag{3}$$

where $L_{it} = r_{it}$ if $r_{it} < 0$ and $L_{it} = 0$ if $r_{it} \geq 0$, r_{it} is the monthly return for the *i*th fund group in month *t*. The cutoff point of zero is obvious because returns below zero represent losses. Unlike the standard deviation, the semi-deviation below zero measures downside risk rather than the total deviation from the mean. In Table 8 the average semi-deviation

below zero for hedge funds is slightly below that of mutual funds, consistent with the skewness measure. The difference of –0.93 (6.191-7.119) is not significant (t=0.62). Therefore, I conclude that hedge fund returns are not positively skewed relative to mutual funds.

4.3. Abnormal returns for mutual funds

Again, the stepwise regression is employed to extract useful factors for mutual fund returns. The regression results are presented in Table 9. In a strong contrast to the results of hedge funds, there are four dominating factors in the mutual fund regressions. These factors are the emerging market, S&P 500, Eurodollar, and U.S. bond indexes, representing equity, cash, and bond, respectively. The other four factors are less correlated with mutual fund styles. The four dominating factors explain the majority of mutual fund returns. In fact, 9 out of 18 fund groups have R-squares above 0.90. It seems that most mutual funds follow buy-and-hold strategies. Therefore, mutual fund returns can be explained by passive portfolios or styles.

Abnormal returns are negative for all but 3 mutual fund groups. 10 of 18 alphas are significantly different from zero, in which only one is positive for the high quality short-term bond. The largest negative abnormal return is -7.78% for the small growth funds. This result is in sharp contrast with the corresponding hedge fund results in Table 4: most of the hedge fund groups have earned positive abnormal returns, and 7 of 16 alphas are significantly above zero.

In general, mutual funds have higher market betas than those of hedge funds. All mutual fund betas are positive with respect to the S&P 500 index. The highest beta is 1.12 for the medium-growth fund and the lowest beta is 0.04 for the high quality short-term bond fund. Generally speaking, equity funds (especially growth funds) have higher equity market betas than bond funds while bond funds (especially intermediate to long term bonds) have higher bond market betas than equity funds.

Overall, hedge funds offer higher Sharpe ratios, higher abnormal returns, and lower systematic risks than mutual funds. Even for the same investment styles like value or growth, hedge funds can do better than their mutual fund peers.

5. Summary

In this paper, I use a unique hedge fund database to investigate hedge fund performance, risk, and fee structures. The empirical evidence reveals several interesting aspects of hedge funds. First, unlike the flat-fee structure of mutual funds, hedge funds have a special fee structure to align manager's incentive with fund performance. A hurdle rate is established above which the incentive fee is calculated. Managers are awarded an average (median) incentive fee of 16.2% (20%) above the hurdle rate. In most cases, a high watermark is combined with the hurdle rate. Managers can collect incentive fees only if the cumulative returns can make up for previous losses and exceed the hurdle rate. I find significant return differences between the funds with high watermarks and those without watermarks. However, the existence of an above-zero hurdle rate is less common and less important than the watermark provision in aligning managers' interests with fund

performance. The results indicate that the incentive fee indeed provides managers with strong incentive schemes: the higher the incentive fee, the better the fund performance. In fact, a 1% increase in the incentive fee will increase the average monthly return by 1.3%.

Second, the average hedge fund returns can be determined by factors like fund assets, lockup period, and fund age. Average monthly returns are related positively to fund assets and a lockup period; they are related negatively to fund age. Funds with large fund assets, long lockup periods, and short histories outperform the other funds. The onshore funds with offshore equivalent outperform the onshore-only and offshore-only funds.

Third, unlike the traditional investment vehicles that are highly correlated with the market, hedge funds have relatively low correlations with the traditional asset classes. In general, hedge funds follow dynamic trading strategies rather than buy-and-hold strategies. The stepwise regression picks up four dominating factors for mutual fund returns but factor loadings are scattered around for hedge funds strategies. On a risk-adjusted basis, most hedge funds earn positive abnormal returns and some of them are statistically significant during the period of January 1994 to December 1996.

Finally, correlations among different hedge fund strategies are low. These low correlation structures make hedge funds better investment vehicles in terms of diversification. Compared with mutual funds as a whole, hedge funds offer a better risk-return trade-off: they have higher Sharpe ratios and higher abnormal returns. Hedge funds have lower correlations and market betas than their mutual fund peers. On a risk-adjusted basis, the average hedge fund outperforms the average mutual fund. In general, hedge

funds dominate mutual funds and provide a more efficient investment opportunity set for investors in the period of January 1994 to December 1996.

Appendix : Hedge Fund Strategy Definitions

Composite: Managers run more than one fund using one or multi-strategies. Returns are calculated across all funds and managed accounts.

Convertible arbitrage: Involves purchasing a portfolio of convertible securities and hedging a portion of the equity risk by selling short the underlying common stocks.

Distressed securities: Strategies invest in, and may sell short, the securities of companies where the security's price has been affected by a distressed situation like reorganization, bankruptcy, distressed sales and other corporate restructuring.

Emerging markets: Involve investing in securities of companies or the sovereign debt of developing or "emerging" countries. Investments are primarily long.

Fixed income: Investment strategies are based on public and private debt instruments with fixed rates and maturities, and their derivatives.

Foreign exchange: Investing in currency futures or currency interbank products.

Growth: Strategy involves investing in securities of companies exhibiting earnings acceleration, sustainable and rapid revenue growth, and positive relative price strength. Portfolios are often hedged with short selling and options.

Macro: Involves investing by making leverage bets on anticipated price movements of stock markets, interest rates, foreign exchange and physical commodities. Macro managers employ a "top-down" global approach.

Market neutral: Investing seeks to profit by exploiting pricing inefficiencies between related securities neutralizing exposure to market risk by combining long and short positions.

Market timing: Involves allocating assets among investments by switching into investments that appear to be beginning an uptrend and switching out of investments that appear to be beginning a downtrend.

Merger arbitrage: Also called risk arbitrage, involves investment in event-driven situations such as leveraged buy-outs, mergers and hostile takeovers.

Opportunistic: Is also known as "corporate life cycle" or "event driven" investing. This involves investing in opportunities created by significant transactional events, such as spin-offs, mergers and acquisitions, bankruptcy reorganizations, recapitalizations and share buybacks.

Sector: Funds invest in companies in sectors of the economy, e.g., financial institutions or biotechnologies. These funds invest both long and short, incorporating one or more of the other strategies, such as Value, Growth or Opportunistic, and may use options.

Short selling: Involves the sale of a security not owned by the seller; a technique used to take advantage of an anticipated price decline.

Value: Strategy involves investing in securities that are fundamentally undervalued. Value investors generally take a bottom-up approach whereby fundamental research is performed on individual companies.

Fund of Funds: Invest with multiple managers through funds or managed accounts. The strategy designs a diversified portfolio of managers with the objective of significantly lowering the risk (volatility) of investing with an individual manager.

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Footnotes

1. One of the more innovative offshore fund structures which allows for the commingling of offshore and onshore investors in the same fund vehicle is a Passive Foreign Investment Company (PFIC). Here the offshore fund can accept both offshore and onshore investors but must maintain at least a majority of offshore investors' assets in the fund at all times.
2. At the same time, the investor's net worth must be no less than $5 million.
3. I replicate the study by requiring all funds to have two-year consecutive monthly return history from January 1995 to December 1996. Under this requirement, the number of funds has increased to 541. The results from these 541 funds are similar to those of 385 funds. Only the latter is reported.
4. The majority of the funds states "yes" or "no" for hurdle rate and leverage. Therefore, I use binary variables instead of numerical variables to describe hurdle rate and leverage in this study.
5. The nine equity fund styles are: small growth, small value, small blend, medium growth, medium value, medium blend, large growth, large value, and large blend; the nine bond fund styles are: high short, high intermediate, high long, medium short, medium intermediate, medium long, low short, low intermediate, and low long; the low short style has no fund left after I require three-year consecutive monthly returns from January 1994 to December 1996. There is one more style that is classified according to both the equity and bond styles. I call it "bond stock".

6. The average (median) net fund assets for all mutual funds is $306 million ($38 million) as of December 31, 1996.
7. The hurdle rate could be zero or some positive numbers such as 10%, T-bill rate plus 2%, or LIBOR rate. The highest hurdle rate can be as high as 100%.
8. If a fund specifies that it does not have a hurdle rate, a hurdle rate of zero is assumed.
9. For example, assume that a fund has a hurdle rate of 5% and an incentive fee of 20%. If the annual fund return is 15% (after the fees automatically deducted from fund assets) and the fund has no watermark provision, then the manager can collect 20% of the 10% (15%-5%) profits as an incentive fee. On the other hand, if the fund has a watermark and it lost 10% last year, then the manager collects nothing because the 15% annual return just covers the 10% loss and the 5% hurdle rate. I assume that a 10% loss last year is the same as a 10% profit this year in dollar amount.
10. Exceptions are distressed securities and sector funds. The former has a beta of 0.223, not significantly different from zero; while the latter has a beta of 0.879, not significantly different from one.
11. The efficient frontiers are constructed in such a way that short selling is not allowed among different hedge fund or mutual fund strategies.
12. The average front load and back-end load for all mutual funds are 1.4% and 0.9% per year, respectively. Hedge funds rarely charge these fees.

Table 1
Hedge Fund Descriptive Statistics

All 921 hedge funds have monthly returns that are net of all fees. There are 92 disappeared funds. Not all funds report the following descriptive statistics. 48 hedge fund indexes are excluded from the sample. All the information is as of June 1997.

Variable	Funds	Mean	Standard deviation	Median
Fund assets	850	$93.6 million	$329.4 million	$21 million
Firm assets	781	$2.04 billion	$11.03 billion	$181 million
Management fee	839	1.36%	0.8%	1%
Incentive fee	821	16.24%	7.96%	20%
Minimum investment	839	$597,917	$1.2 million	$250,000
Lockup period	749	84 Day	164 Day	0 Day
Advance notice	768	35.12 Day	24.94 Day	30 Day
Additional investment	126	$103,509	$153,122	$100,000

Table 2

Hedge Fund Characteristics and Average Monthly Returns (%)

All 921 hedge funds have monthly returns that are net of all fees. There are 92 disappeared funds. Not all funds report the following descriptive statistics. 48 hedge fund indexes are excluded from the sample. All information is as of June 1997. Standard deviations are in parentheses.

Panel A: Leverage

	Funds	Return	Std. dev.	Minimum	Maximum
No	135	1.26	0.62	-1.74	7.78
Yes	639	1.29	1.02	-4.64	10.00
$\text{Difference}_{\text{Yes-No}}$		0.03 (0.07)			

Panel B: Offshore funds versus onshore funds

	Funds	Return	Std. dev.	Minimum	Maximum
Onshore	208	1.31	1.03	-3.52	6.77
Both[a]	136	1.71	1.29	-3.60	7.24
Offshore	471	1.34	1.54	-4.64	15.42
$\text{Difference}_{\text{Off-On}}$		0.03 (0.10)			

Panel C: Watermark

	Funds	Return	Std. dev.	Minimum	Maximum
No	169	1.23	1.19	-4.64	5.55
Yes	623	1.43	1.36	-3.60	10.00
$\text{Difference}_{\text{Yes-No}}$		0.20* (0.11)			

Panel D: Hurdle rate

	Funds	Return	Std. dev.	Minimum	Maximum
No	668	1.40	1.33	-4.64	10.00
Yes	125	1.43	1.83	-2.45	15.42
$\text{Difference}_{\text{Yes-No}}$		0.03 (0.18)			

Panel E: Hurdle rate and watermark

		Hurdle rate			
		Yes		No	
		Return	Funds	Return	Funds
Watermark	Yes	1.30	99	1.46	520
		(1.38)		(1.36)	
	No	1.46	22	1.20	147
		(1.18)		(1.19)	

[a]An onshore fund with an offshore equivalent.

*Significant at 6% level.

Table 3
Monthly Returns and Investment Intervals and Redemption Intervals

All 921 hedge funds have monthly returns that are net of all fees. There are 92 disappeared funds. Not all funds report the following descriptive statistics. 48 hedge fund indexes are excluded from the sample. All information is as of June 1997.

Panel A: Redemption interval

Redemption interval	Funds	Return	Std. dev.
Semi-annual	33	1.96	1.69
Quarterly	269	1.53	1.66
Monthly	308	1.26	1.09
Weekly	48	0.79	0.96

Panel B: Investment interval

Investment interval	Funds	Return	Std. dev.
Quarterly	198	1.57	1.10
Monthly	473	1.39	1.30
Weekly	49	1.17	2.31

Table 4
Stepwise Regression Results for 16 Hedge Fund Strategies

All 385 hedge funds have 36 consecutive monthly returns from January 1994 to December 1996. A stepwise regression is conducted to extract useful factors for hedge fund returns. The eight asset class factors are: the S&P 500 index, MSCI world equity index, and MSCI emerging market index for equity markets, Salomon Brothers world government bond index and Salomon Brothers government and corporate bond index for bond markets, Federal Reserve Bank trade-weighted dollar index for currency, gold price for commodities, and one-month Eurodollar deposit for cash. The dependent variable is the average monthly return over 36 months.

Strategy	alpha	Equity-wld	Gov-wld	Currency	Gold	Emerging	S&P500	Eurodollar	Gov/corp	R-squared
Composite	0.68		0.68*		0.68*					0.23
Convertible arbitrage	-1.14				0.19*	0.08*		0.35	0.21**	0.40
Distressed securities	0.64*						0.22*			0.29
Emerging markets	0.75*			0.29*		0.58*				0.77
Fixed income	0.73*	0.12*		0.15*						0.33
Foreign exchange	0.49		0.76*		0.55**					0.20
Fund of funds	-1.51	0.23*		0.31*	0.20*	0.10*		0.37*		0.67
Growth	-5.22*					0.16*	0.56*	1.13*	-0.79*	0.71
Macro	0.24	0.64*		0.72*	0.64*				0.59*	0.71
Market neutral	-1.56**	0.13*						0.43*		0.27
Market timing	-0.08						0.67*		-0.32**	0.67
Merger arbitrage	0.94*				0.14*		0.13*			0.33
Opportunistic	0.98*		-0.22*		0.16*	0.07	0.29*			0.53
Sector	0.52			0.43*	0.31**		0.88*		-0.81*	0.60
Short selling	1.26**			-0.57**			-1.41*	1.40*		0.48
Value	0.69*		-0.24**			0.11*	0.46*			0.68
Average										

*Significant at 5% level
**Significant at 10% level

Table 5

Regression Result of Average Fund Returns on Fund Characteristics

All 385 hedge funds have 36 consecutive monthly returns from January 1994 to December 1996. The following cross-sectional regression is conducted:

$$\overline{R}_i = \alpha_{0i} + \alpha_{1i}(IFEE) + \alpha_{2i}(MFEE) + \alpha_{3i}[LN(ASSETS)] + \alpha_{4i}(LOCKUP) + \alpha_{5i}(AGE).$$

$\overline{R}$ is the average monthly return. *IFEE* is the incentive fee in percentage, *MFEE* is the management fee in percentage, *LN(ASSETS)* is the natural logarithm of fund asset, *LOCKUP* is the lockup period in number of days, and *AGE* is the total number of months since inception as of June 1997.

Independent Variables	Parameter Estimate	*t*-ratio
α_0	-0.772*	-2.621
α_1	0.013*	3.157
α_2	0.030	0.518
α_3	0.090*	5.665
α_4	0.202*	2.243
α_5	-0.020*	-2.062
R^2	0.140	
Adjusted R^2	0.127	

*Significant at 5% level.

Table 6

Correlation Coefficients among 16 Hedge Fund Strategies

All 385 hedge funds have 36 consecutive monthly returns from January 1994 to December 1996. Strategy codes: Co: composite. Ca: convertible arbitrage. Ds: distressed securities. Em: emerging markets. Fi: fixed income. Fe: foreign exchange. Ff: fund of funds. Gr: growth. Mo: macro. Mn: market neutral. Mt: market timing. Ma: merger arbitrage. Op: opportunistic. Se: sector. Ss: short selling. Va: value.

	un	co	ca	ds	em	fi	fe	f	gr	mo	mn	mt	ma	op	se	ss	va
co		1.000	0.713	-0.047	-0.003	0.226	0.842*	0.328	0.148	0.347*	0.236	-0.100	0.147	0.049	0.138	0.094	0.069
ca			1.000	0.461*	0.463*	0.355*	0.188	0.492*	0.425*	0.366*	0.413*	0.338*	0.527*	0.591*	0.399*	-0.163	0.396*
ds				1.000	0.457*	0.463*	0.143	0.551*	0.667*	0.469*	0.423*	0.482*	0.583*	0.785*	0.653*	-0.496*	0.760*
em					1.000	0.519*	-0.068	0.708*	0.525*	0.544*	0.089	0.444*	0.368*	0.626*	0.559*	-0.443*	0.536*
fi						1.000	0.173	0.656*	0.491*	0.516*	0.077	0.399*	0.166	0.510*	0.473*	-0.410*	0.562*
fe							1.000	0.301	0.117	0.336*	0.408*	-0.028	0.148	0.124	0.067	0.286	0.124
f								1.000	0.660*	0.896*	0.296	0.501*	0.548*	0.739*	0.659*	-0.366*	0.716*
gr									1.000	0.539*	0.382*	0.588*	0.581*	0.774*	0.871*	-0.694*	0.874*
mo										1.000	0.290	0.563*	0.552*	0.647*	0.651*	-0.322	0.643*
mn											1.000	0.070	0.389*	0.382*	0.274	-0.010	0.373*
mt												1.000	0.412*	0.567*	0.620*	-0.563*	0.650*
ma													1.000	0.749*	0.669*	-0.376*	0.569*
mf														0.203	0.254	-0.332*	0.409*
op														1.000	0.815*	-0.542*	0.831*
se															1.000	-0.722*	0.806*
ss																1.000	-0.634*
va																	1.000

*Significant at 5% level.

Table 7

Correlation Coefficients among 18 Mutual Fund Strategies

All 4,776 mutual funds have 36 consecutive monthly returns from January 1994 to December 1996. Strategy codes: Equity styles: Sv: small value. Sb: small blend. Sg: small growth. Mv: medium value. Mb: medium blend. Mg: medium growth. Lv: large value. Lb: large blend. Lg: large growth. Bond styles: Hs: high short. Hi: high intermediate. Ho: high long. Ms: medium short. Mi: medium intermediate. Mo: medium long. Li: low intermediate. Lo: low long. Mixed style: Bs: bond and stock.

	sv	sb	sg	mv	mb	mg	lv	lb	lg	hs	hi	ho	ms	mi	mo	li	lo	bs
sv	1.000	0.962*	0.899*	0.899*	0.921*	0.907*	0.815*	0.826*	0.851*	0.423*	0.431*	0.335*	0.566*	0.465	0.385*	0.648*	0.566*	0.763*
sb		1.000	0.973*	0.937*	0.916*	0.963*	0.741*	0.776*	0.849*	0.308	0.320	0.228	0.455*	0.351*	0.271	0.569*	0.480*	0.681*
sg			1.000	0.757*	0.876*	0.973*	0.654*	0.714*	0.832*	0.226	0.225	0.119	0.364*	0.263	0.163	0.499*	0.402*	0.599*
mv				1.000	0.955*	0.834*	0.959*	0.952*	0.908*	0.659*	0.647*	0.505*	0.761*	0.682*	0.569*	0.718*	0.764*	0.910*
mb					1.000	0.932*	0.885*	0.914*	0.931*	0.499*	0.484*	0.347*	0.615*	0.519*	0.407*	0.647*	0.653*	0.815*
mg						1.000	0.759*	0.819*	0.923*	0.346*	0.351*	0.230	0.483*	0.378*	0.274	0.559*	0.486*	0.709*
lv							1.000	0.987*	0.906*	0.737*	0.767*	0.638*	0.836*	0.781*	0.688*	0.720*	0.760*	0.969*
lb								1.000	0.952*	0.691*	0.719*	0.583*	0.797*	0.735*	0.633*	0.710*	0.737*	0.956*
lg									1.000	0.569*	0.584*	0.433*	0.688*	0.606*	0.482*	0.655*	0.646*	0.876*
hs										1.000	0.949*	0.828*	0.969*	0.968*	0.883*	0.761*	0.845*	0.851*
hi											1.000	0.940*	0.967*	0.988*	0.965*	0.725*	0.792*	0.876*
ho												1.000	0.857*	0.901*	0.992*	0.654*	0.694*	0.751*
ms													1.000	0.980*	0.904*	0.804*	0.864*	0.931*
mi														1.000	0.942*	0.780*	0.850*	0.891*
mo															1.000	0.711*	0.765*	0.802*
li																1.000	0.824*	0.800*
lo																	1.000	0.830*
bs																		1.000

*Significant at 5% level.

Table 8
Distribution Statistics for Hedge Funds and Mutual Funds

All 385 hedge funds and 4,776 mutual funds have 36 consecutive monthly returns from January 1994 to December 1996. Undefined hedge fund strategy represents funds that did not report their investment strategies. Semi-deviation below zero is defined as $s_i = \sqrt{\sum_{t=1}^{36} L_{it}^2}$, where $L_{it} = r_{it}$ if $r_{it} < 0$ and $L_{it} = 0$ if $r_{it} \geq 0$, r_{it} is the monthly return for the *i*th fund group in month *t*.

	Hedge Fund						Mutual Fund				
Strategy	mean	std. dev.	Sharpe	skewness	*s*	Strategy	mean	std. dev.	Sharpe	skewness	*s*
Composite	1.06	3.35	0.20	1.48	8.27	Bond-stock	0.86	1.66	0.28	-0.69	5.31
Convertible arbitrage	0.77	1.06	0.36	-2.35	4.01	High-intermediate	0.47	1.17	0.06	-0.43	3.81
Distressed securities	0.99	1.16	0.52	0.14	2.18	High-long	0.38	1.64	-0.01	-0.60	6.30
Emerging markets	0.57	2.96	0.06	0.08	10.42	High-short	0.36	0.58	-0.08	-0.28	1.52
Fixed income	0.83	0.71	0.61	0.10	0.73	Large-blend	1.07	2.38	0.28	-0.65	8.04
Foreign exchange	0.93	3.44	0.16	1.63	8.46	Large-growth	1.15	2.89	0.26	-0.49	9.56
Fund of funds	0.60	1.42	0.15	-0.20	4.29	Low-intermediate	0.68	1.22	0.24	-0.77	3.81
Growth	1.24	2.21	0.38	-0.45	6.41	Low-long	0.65	1.84	0.14	-1.26	7.04
Macro	0.97	2.90	0.20	-0.28	9.77	Large-value	1.08	2.20	0.31	-0.66	7.26
Market neutral	0.86	0.92	0.51	-0.07	1.63	Medium-blend	0.86	2.72	0.17	-0.74	10.18
Market timing	0.80	2.00	0.20	-0.03	5.96	Medium-growth	1.08	3.58	0.19	-0.52	12.92
Merger arbitrage	1.13	0.68	1.11	-0.58	0.63	Medium-intermediate	0.53	1.22	0.11	-0.48	3.96
Opportunistic	1.25	1.31	0.67	-0.36	2.20	Medium-long	0.41	1.57	0.01	-0.73	6.00
Sector	1.35	2.79	0.34	-0.22	7.97	Medium-short	0.48	0.60	0.15	-0.51	1.42
Short selling	-0.10	4.91	-0.10	0.32	20.21	Medium-value	0.87	2.16	0.22	-0.71	7.49
Value	1.22	1.84	0.45	-1.19	5.91	Small-blend	1.03	3.00	0.21	-0.79	11.16
						Small-growth	1.24	3.96	0.21	-0.49	14.16
						Small-value	1.00	2.31	0.26	-0.94	8.22
Average	0.9044	2.1038	0.3638	-0.1238	6.1906	Average	0.7889	2.0389	0.1680	-0.6522	7.1190

Table 9
Stepwise Regression Results for 18 Mutual Fund Strategies

All 4,776 hedge funds have 36 consecutive monthly returns from January 1994 to December 1996. A stepwise regression is conducted to extract useful factors for mutual fund returns. The eight asset class factors are: the S&P 500 index, MSCI world equity index, and MSCI emerging market index for equity markets, Salomon Brothers world government bond index and Salomon Brothers government and corporate bond index for bond markets, Federal Reserve Bank trade-weighted dollar index for currency, gold price for commodities, and one-month Eurodollar deposit for cash. The dependent variable is the average monthly return over 36 months.

Strategy	alpha	Equity-wld	Gov-wld	Currency	Gold	Emerging	S&P500	Eurodollar	Gov/corp	R-Squared
Bond-stock	-1.28*	0.10*	-0.06			0.03*	0.36*	0.26*	0.31*	0.97
High-intermediate	-0.68*	0.05*					0.08*	0.13*	0.61*	0.97
High-long	-0.20						0.11**		0.87*	0.77
High-short	0.14*				0.03	0.02**	0.04*		0.33*	0.91
Large-blend	-0.99*	0.19*	-0.07*			0.06*	0.64*	0.17*		0.99
Large-growth	-2.12**					0.11*	1.00*	0.38**	-0.52*	0.91
Low-intermediate	-1.62						0.27*	0.35**		0.50
Low-long	-2.24*			0.15**		0.19*	0.13**	0.47*	0.55*	0.83
Large-value	0.00	0.20*		0.06		0.04*	0.54*		0.11**	0.97
Medium-blend	-0.07					0.25*	0.79*		-0.51*	0.90
Medium-growth	-5.60*					0.22*	1.12*	1.06*	-1.32*	0.78
Medium-intermediate	-1.06*	0.10*				0.03*		0.22*	0.68*	0.97
Medium-long	-0.18						0.12*		0.83*	0.83
Medium-short	-0.23					0.02*	0.08*	0.09*	0.25*	0.95
Medium-value	0.03					0.17*	0.57*			0.89
Small-blend	-4.64*					0.20*	0.88*	0.92*	-1.11*	0.72
Small-growth	-7.78*					0.29*	1.08*	1.54*	-1.70*	0.70
Small-value	-2.67					0.12*	0.69*	0.55**	-0.64*	0.71

*Significant at 5% level
**Significant at 10% level

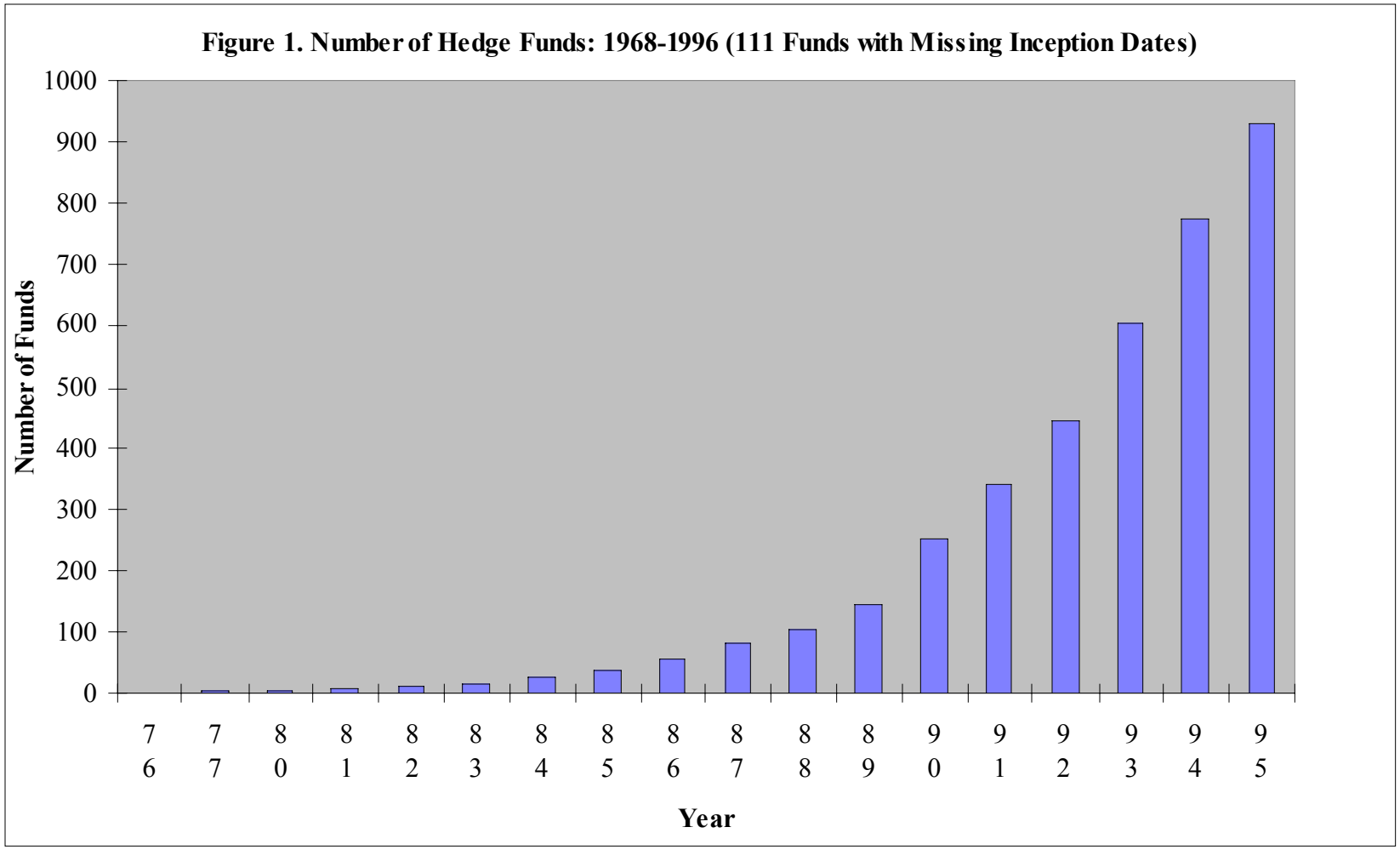
Figure 1. Number of Hedge Funds: 1968-1996 (111 Funds with Missing Inception Dates)
Number of Funds
1000
900
800
700
600
500
400
300
200
100
0
76
77
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
Year

Figure 2. The Cumulative Monthly Returns: Hedge Fund versus S&P 500 (1990:01-1996:12)

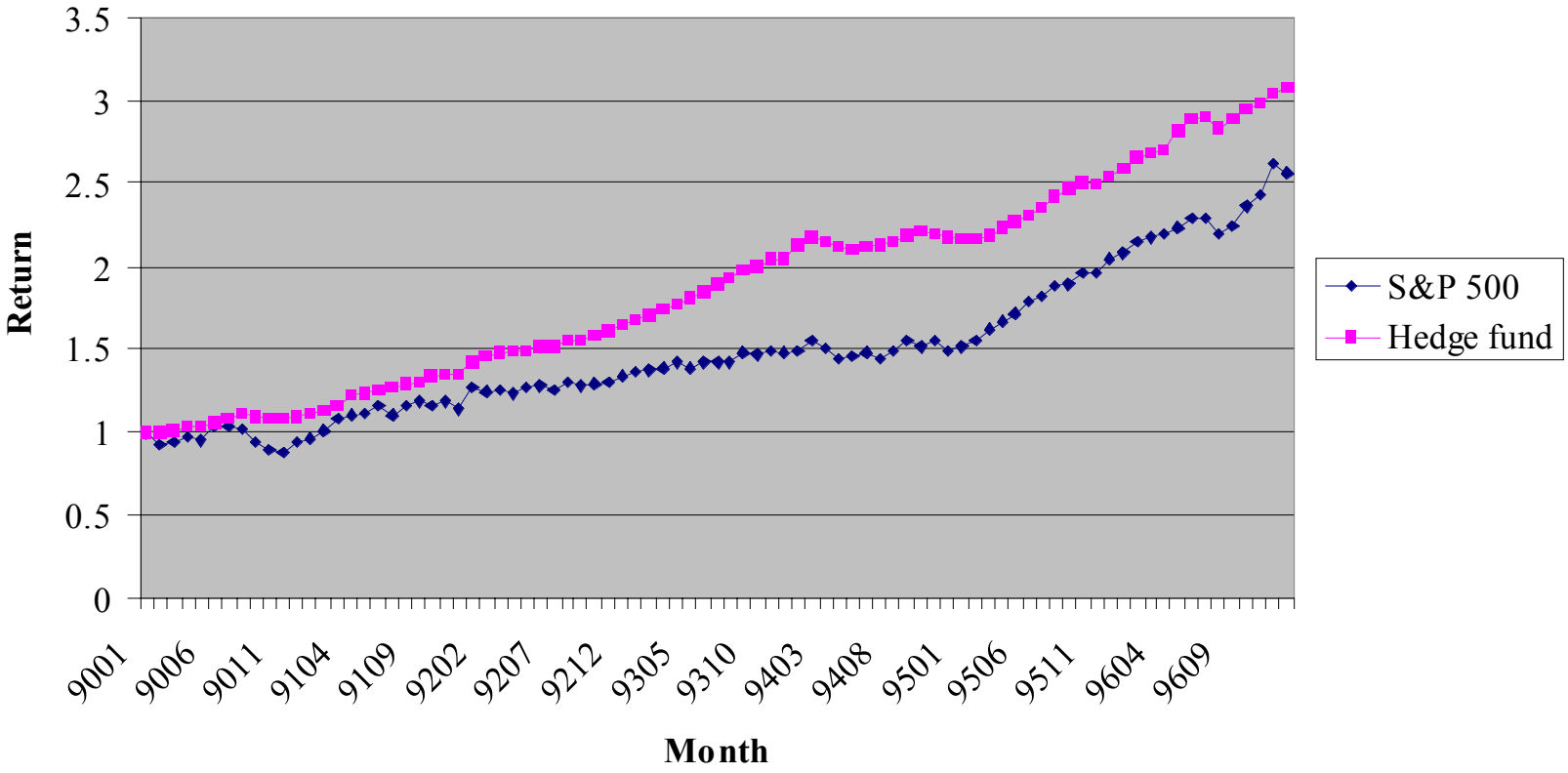

Figure 3. The Efficient Frontiers: Hedge Fund versus Mutual Fund