# PERFORMANCE ANALYSIS OF HEDGE FUND INDICES

**Dr. Manu Sharma**[1]
***Panjab University, India***
E-mail: manumba2000@yahoo.com

**Rajnish Aggarwal**[2]
***Panjab University, India***
Email: aggarwalrajnish@gmail.com

## Abstract

This research examined the performance of the 14 hedge funds indices relative to the market in the last 17 years. The study first looked at the characteristics of the equity return series of S&P500 index and 14 hedge fund returns using the first four moments i.e. mean (first moment), variance or standard deviation (second), skewness (third), and kurtosis(fourth), and then employed the Sharpe ratio to analyze relative performance and a regression model to further investigate the research question. The study has shown that the most of the hedge funds indices returns were highly correlated with S&P 500 index returns. The study has also shown that most of the hedge fund indices has higher Sharpe ratio as compared with the S&P 500 index and were performing better than the market.

**JEL codes:** G 23
**Key words:** Hedge funds, Sharpe Ratio, Skewness, Kurtosis

[1] Dr. Manu Sharma, University Institute of Applied Management Science, Panjab University, 1580 Pushpac Complex Sector 49 B, Chandigarh, India 160047, Phone: 91-98780-5424.

[2] Rajnish Aggarwal, University Institute of Applied Management Science, Panjab University, India, 1580 Pushpac Complex Sector 49 B, Chandigarh, India 160047, Phone: 91-98729-03721.

# I. INTRODUCTION

A hedge fund is usually known as an unregulated pooled investment vehicle which is privately organized, administered by professional investment managers, used by wealthy individuals and not widely available to the public. The theory is that the freedom allows hedge funds to have a positive return when the market is up, down or even sideways. Due to their private nature, hedge funds have less restrictions on the use of leverage, short-selling, and derivatives than more regulated vehicles such as mutual funds. This allows for investment strategies that differ significantly from traditional non-leveraged, long-only strategies.

Traditionally, wealthy individuals have been the largest investors in hedge funds. Lately, however, institutional investment into hedge funds has picked up as well. Due to its private nature, it is difficult to estimate the current size of the hedge fund industry. So far, hedge funds have primarily been an American phenomenon. About 89% of hedge fund managers are based in the US, 9% in Europe and 2% in Asia and elsewhere. Most funds have not been in existence for long. In the last five years the number of hedge funds has increased by at least 155%.

The 14 hedge fund indices used in the research were Dow Jones Credit Suisse Hedge Fund Index, Dow Jones Credit Suisse Convertible Arbitrage Hedge Fund Index, Dow Jones Credit Suisse Dedicated Short Bias Hedge Fund Index, Dow Jones Credit Suisse Emerging Markets Hedge Fund Index, Dow Jones Credit Suisse Equity Market Neutral Hedge Fund Index, Dow Jones Credit Suisse Event Driven Hedge Fund Index, Dow Jones Credit Suisse Event Driven Distressed Hedge Fund Index, Dow Jones Credit Suisse Event Driven Multi-Strategy Hedge Fund Index, Dow Jones Credit Suisse Event Driven Risk Arbitrage Hedge Fund Index, Dow Jones Credit Suisse Fixed Income Arbitrage Hedge Fund Index, Dow Jones Credit Suisse Global Macro Hedge Fund Index, Dow Jones Credit Suisse Long/Short Equity Hedge Fund Index, Dow Jones Credit Suisse Managed Futures Hedge Fund Index & Dow Jones Credit Suisse Multi-Strategy Hedge Fund Index. The yearly returns were calculated for each of the 14 hedge fund indices and were compared with the yearly returns of the S&P 500 index. The correlation & regression between the hedge fund indices and with the S&P 500 index was found out in this study. The Sharpe ratio was also found out to analyze the performance of the Hedge fund indices.

## II. DATA AND METHODOLOGY

The data included the NAV's and monthly returns of 14 hedge fund indices over the last 17 years from Dec 1993 to Jan 2011. The monthly returns were converted into yearly returns to study the yearly performance of the hedge fund indices.

The Sharpe Ratio was used to analyze the performance of Hedge fund Indices. The Sharpe Ratio, or Sharpe Index, measures the mean excess return per unit of risk in an investment asset or a trading strategy. The Sharpe Ratio is defined as:

$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R - R_f]}{\sqrt{Var[R - R_f]}}$$

where *R* is the asset return, *Rf* is the return on a benchmark asset, such as the risk free rate of return, *E*[*R* − *Rf*] is the expected value of the excess of the asset return over the benchmark return, and σ is the standard deviation of the excess return (Sharpe 1994). The Sharpe Ratio is used to characterize how well the return of an asset compensates the investor for the risk taken. When comparing two assets each with the expected return *E*[*R*] against the same benchmark with return *Rf*, the asset with the higher Sharpe Ratio gives more return for the same risk.

The alpha (equals the intercept of the regression) measures the excess return that cannot be explained by a fund's beta. An alpha higher than zero indicates superior performance. Like the Sharpe ratio, Jensen's alpha is deeply rooted in the CAPM and therefore relies heavily on the assumption of normally distributed returns.

The mean-standard deviation space graph was also used for showing the relation between various indices. The Correlation matrix was used which showed the Correlation between each hedge fund indices & between hedge fund indices & S&P 500 index.

## III. EMPIRICAL RESULTS

The returns of the S&P 500 index and hedge fund indices over the last 17 years were shown in the following Table 1a & Table 1b. The Table 1a & Table 1b provided the yearly returns of the S&P 500 index and yearly returns of the 14 hedge fund indices for the period from Dec 1993 to Jan 2011. It was seen that during the year 2002 when IT bubble burst the market gave negative returns but in case of hedge funds only 3 out of 14 hedge funds shown negative returns and that too were less negative than that of the market. Even in the year 2008, all the hedge funds except Dow Jones Credit Suisse Equity Market Neutral Hedge Fund Index gave returns better than the market.

The mean, median, standard deviation, skewness & kurtosis were calculated on the returns of the S&P 500 index and hedge fund indices for the last 17 years and were shown in Table 2. It was seen from the table 2 and figure 1 that the mean returns of 9 out 14 hedge fund indices with maximum value of 13% was more than the mean returns of the S&P 500 index with a value of just 8% which showed that most of the hedge fund indices are performing better than the market. It was also seen that the mean standard deviation in the returns of 13 hedge funds was lower than the mean standard deviation of the S&P 500 index which was 20%. The maximum yearly return for hedge fund indices was 47.35% while that for S&P 500 index was 34.11%. This showed that hedge fund indices were less risky and were performing better than the market. The kurtosis values also suggested that distribution curves for the yearly returns for most of the hedge fund indices were more leptokurtic (which means that

more values were close to the mean yearly returns) as compared with the S&P 500 index. Skewness values suggested that distribution curves of returns of most of the Hedge fund indices as well as S&P 500 indices were negatively skewed.

The Columns 1 to 3 of Table 3 shown the alpha, beta and R square which were obtained from the results of the regression equation $(Rh - Rf) = a + \beta (RS\&P - Rf) + eh$ estimated from the yearly returns of 14 hedge funds over the period Dec 1993 to Jan 2011. *Rh* and *RS&P* denoted the hedge fund return and the S&P 500 return respectively. *Rf* denoted the short term USD interest rate (3-Month Treasury Constant Maturity Rate). The last column showed the funds' Sharpe ratios with a maximum value of 0.83. The table 3 also showed that alpha of all Hedge fund indices was positive with a maximum value of 0.6 which indicated superior performance by hedge funds.

The figure 2 showed that the Sharpe ratio of 11 out of 14 Hedge fund indices was more than that of S&P 500 index having the value of 0.23. Figure 3 showed that the Beta of all hedge funds with the maximum value of 0.6 was less than the beta of the S&P 500 index having value of 1 indicated that the hedge fund indices were conservative and were less risky. This also showed the superior performance as well as the conservative nature of Hedge fund indices over the S&P 500 index.

The figure 4 showed the means and standard deviations of the 14 indices & S&P 500 Index in mean-standard deviation space. From the graph it was clear that most of the hedge fund indices combined a relatively high mean return with a relatively low standard deviation. In terms of mean and standard deviation, the hedge fund indices were definitely more attractive than S&P 500 index, which was in line with the message from these indices alphas and Sharpe ratios.

The table 4a & 4b showed the Correlation matrix. It was seen that the most of the Hedge fund indices were positively correlated with the S&P 500 index because the coefficient of correlation for most of the funds was greater than 0.6. It was also seen that the most of the Hedge fund indices were also highly and positively correlated with each other i.e. having coefficient of correlation greater than 0.9.

This research examined that the performance of the 14 hedge funds indices was better than the market in the last 17 years. The study first looked at the characteristics of the equity return series of S&P500 index and 14 hedge fund returns using the first four moments i.e. mean (first moment), variance or standard deviation (second), skewness (third), and kurtosis (fourth), and then employed the Sharpe ratio and a regression model to show that the performance of hedge fund indices was superior to S&P 500 index. It was shown that the hedge funds indices were conservative and most of the hedge funds generated higher returns than the S&P 500 Index. The study has also shown that the most of the hedge funds indices returns were highly correlated with each other as well as with the S&P 500 index returns.

## Table 1a: Hedge Funds Indices & S&P 500 returns

| Year | S&P 500 | D J C S H F Index | D J C S Convertible Arbitrage H F I | D J C S Dedicated Short Bias H F I | D J C S Emerging Markets H F I | D J C S Equity Market Neutral H F I | D J C S Event Driven H F I | D J C S Event Driven Distressed H F I |
|---|---|---|---|---|---|---|---|---|
| 1994 | -0.0154 | -0.0436 | -0.0807 | 0.1491 | 0.1251 | -0.0200 | 0.0075 | 0.0067 |
| 1995 | 0.3411 | 0.2169 | 0.1657 | -0.0735 | -0.1691 | 0.1104 | 0.1834 | 0.2612 |
| 1996 | 0.2026 | 0.2222 | 0.1787 | -0.0548 | 0.3450 | 0.1660 | 0.2306 | 0.2555 |
| 1997 | 0.3101 | 0.2594 | 0.1448 | 0.0042 | 0.2659 | 0.1483 | 0.1996 | 0.2073 |
| 1998 | 0.2667 | -0.0036 | -0.0441 | -0.0600 | -0.3766 | 0.1331 | -0.0487 | -0.0168 |
| 1999 | 0.1953 | 0.2343 | 0.1604 | -0.1422 | 0.4482 | 0.1533 | 0.2226 | 0.2218 |
| 2000 | -0.1014 | 0.0485 | 0.2564 | 0.1576 | -0.0552 | 0.1499 | 0.0726 | 0.0195 |
| 2001 | -0.1304 | 0.0442 | 0.1458 | -0.0358 | 0.0584 | 0.0931 | 0.1150 | 0.2001 |
| 2002 | -0.2337 | 0.0304 | 0.0405 | 0.1814 | 0.0736 | 0.0742 | 0.0016 | -0.0069 |
| 2003 | 0.2638 | 0.1544 | 0.1290 | -0.3259 | 0.2875 | 0.0707 | 0.2002 | 0.2512 |
| 2004 | 0.0899 | 0.0964 | 0.0198 | -0.0772 | 0.1249 | 0.0648 | 0.1447 | 0.1562 |
| 2005 | 0.0300 | 0.0761 | -0.0255 | 0.1700 | 0.1739 | 0.0614 | 0.0895 | 0.1174 |
| 2006 | 0.1362 | 0.1386 | 0.1430 | -0.0661 | 0.2049 | 0.1115 | 0.1573 | 0.1558 |
| 2007 | 0.0353 | 0.1256 | 0.0517 | 0.0604 | 0.2026 | 0.0927 | 0.1320 | 0.0835 |
| 2008 | -0.3849 | -0.1907 | -0.3159 | 0.1487 | -0.3041 | -0.4032 | -0.1774 | -0.2048 |
| 2009 | 0.2345 | 0.1857 | 0.4735 | -0.2503 | 0.3003 | 0.0405 | 0.2038 | 0.2095 |
| 2010 | 0.1278 | 0.1095 | 0.1095 | -0.2247 | 0.1134 | -0.0085 | 0.1263 | 0.1026 |

## Table 1b

| Year | S&P 500 | D J C S Event Driven Multi-Strategy H F I | D J C S Event Driven Risk Arbitrage H F I | D J C S Fixed Income Arbitrage H F I | D J C S Global Macro H F I | D J C S Long/Short Equity H F I | D J C S Managed Futures H F I | D J C S Multi-Strategy H F I |
|---|---|---|---|---|---|---|---|---|
| 1994 | -0.0154 | 0.0062 | 0.0525 | 0.0031 | -0.0572 | -0.081 | 0.1195 | -0.029 |
| 1995 | 0.3411 | 0.1291 | 0.11905 | 0.125012 | 0.306746 | 0.23025 | -0.071 | 0.118744 |
| 1996 | 0.2026 | 0.22709 | 0.138139 | 0.159327 | 0.255844 | 0.17124 | 0.11971 | 0.140569 |
| 1997 | 0.3101 | 0.20529 | 0.098396 | 0.093404 | 0.371057 | 0.21462 | 0.03117 | 0.182809 |
| 1998 | 0.2667 | -0.08981 | 0.055827 | -0.08158 | -0.03644 | 0.17179 | 0.20645 | 0.076766 |
| 1999 | 0.1953 | 0.22996 | 0.132317 | 0.121099 | 0.058121 | 0.47233 | -0.0469 | 0.09379 |

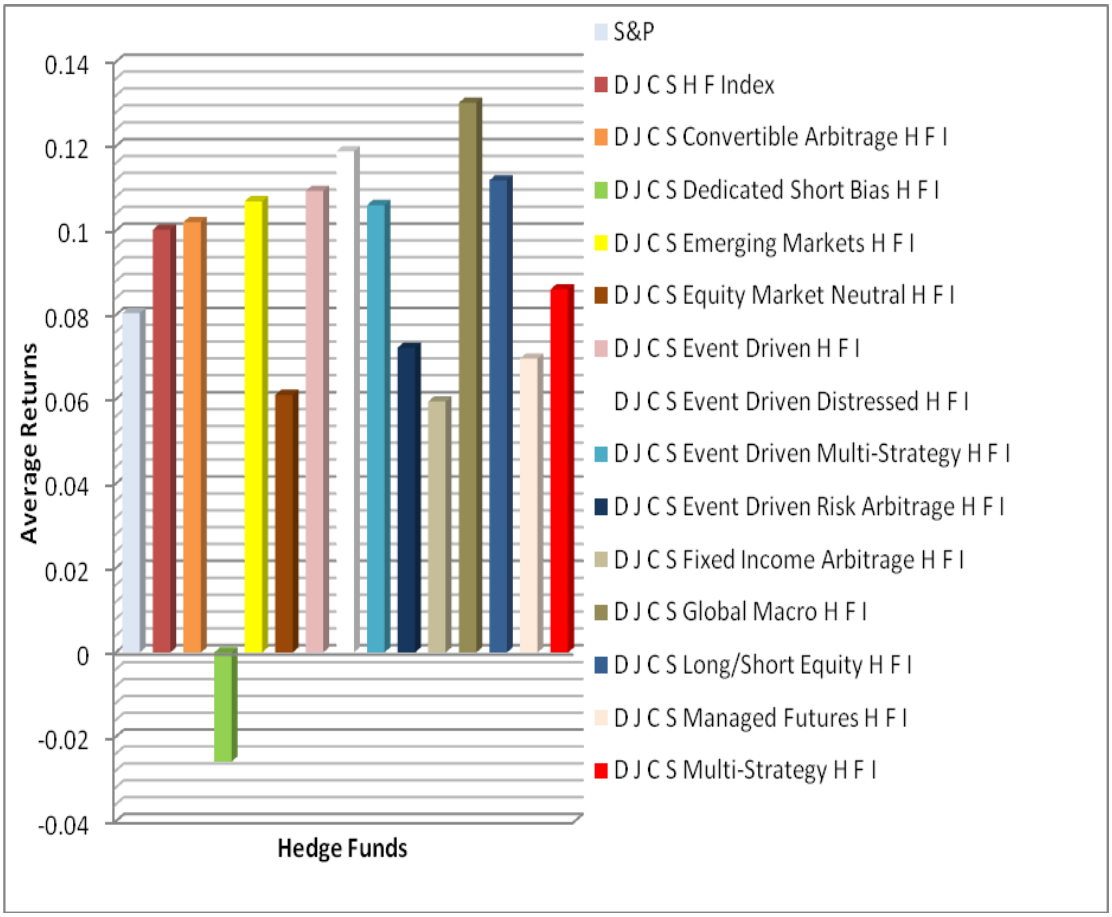
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2000 | -0.1014 | 0.11844 | 0.146907 | 0.062937 | 0.116701 | 0.02076 | 0.04244 | 0.111819 |
| 2001 | -0.1304 | 0.06787 | 0.056813 | 0.080416 | 0.183836 | -0.0365 | 0.01897 | 0.054977 |
| 2002 | -0.2337 | 0.01224 | -0.034589 | 0.057523 | 0.146614 | -0.01598 | 0.18335 | 0.063127 |
| 2003 | 0.2638 | 0.17188 | 0.089766 | 0.079718 | 0.179905 | 0.17271 | 0.14134 | 0.150444 |
| 2004 | 0.0899 | 0.14037 | 0.054528 | 0.068551 | 0.084949 | 0.11564 | 0.05967 | 0.07532 |
| 2005 | 0.0300 | 0.07212 | 0.030755 | 0.006299 | 0.092499 | 0.09683 | -0.0011 | 0.075377 |
| 2006 | 0.1362 | 0.16382 | 0.081479 | 0.086624 | 0.135333 | 0.14378 | 0.08051 | 0.145392 |
| 2007 | 0.0353 | 0.16821 | 0.087695 | 0.038286 | 0.173605 | 0.13658 | 0.06012 | 0.101049 |
| 2008 | -0.3849 | -0.16248 | -0.032682 | -0.28817 | -0.04621 | -0.19761 | 0.18334 | -0.23625 |
| 2009 | 0.2345 | 0.19936 | 0.11998 | 0.274057 | 0.115516 | 0.19466 | -0.0657 | 0.246238 |
| 2010 | 0.1278 | 0.14355 | 0.03171 | 0.125082 | 0.134738 | 0.09279 | 0.12218 | 0.092872 |

## Table 2: Hedge Funds Indices & S&P 500 Return Characteristics

| | Mean | Median | Standard Deviation | Min. | Max. | Kurtosis | Skewness |
|---|---|---|---|---|---|---|---|
| S&P | 0.08 | 0.13 | 0.20 | -0.38 | 0.34 | 3.20 | -0.85 |
| D J C S H F Index | 0.10 | 0.11 | 0.12 | -0.19 | 0.26 | 4.13 | -0.87 |
| D J C S Convertible Arbitrage H F I | 0.09 | 0.13 | 0.17 | -0.32 | 0.47 | 5.55 | -0.24 |
| D J C S Dedicated Short Bias H F I | -0.03 | -0.05 | 0.16 | -0.33 | 0.18 | 2.27 | -0.27 |
| D J C S Emerging Markets H F I | 0.11 | 0.13 | 0.22 | -0.38 | 0.45 | 3.33 | -0.86 |
| D J C S Equity Market Neutral H F I | 0.06 | 0.09 | 0.13 | -0.40 | 0.17 | 13.81 | -3.05 |
| D J C S Event Driven H F I | 0.11 | 0.13 | 0.11 | -0.18 | 0.23 | 4.48 | -1.27 |
| D J C S Event Driven Distressed H F I | 0.12 | 0.16 | 0.13 | -0.20 | 0.26 | 4.05 | -1.05 |
| D J C S Event Driven Multi-Strategy H F I | 0.11 | 0.14 | 0.11 | -0.16 | 0.23 | 3.95 | -1.18 |
| D J C S Event Driven Risk Arbitrage H F I | 0.07 | 0.08 | 0.05 | -0.03 | 0.15 | 2.94 | -0.63 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D J C S Fixed Income Arbitrage H F I | 0.06 | 0.08 | 0.12 | -0.29 | 0.27 | 7.79 | -1.48 |
| D J C S Global Macro H F I | 0.13 | 0.13 | 0.12 | -0.06 | 0.37 | 3.16 | 0.20 |
| D J C S Long/Short Equity H F I | 0.11 | 0.14 | 0.15 | -0.20 | 0.47 | 4.67 | 0.17 |
| D J C S Managed Futures H F I | 0.07 | 0.06 | 0.09 | -0.07 | 0.21 | 2.09 | -0.13 |
| D J C S Multi-Strategy H F I | 0.09 | 0.09 | 0.10 | -0.24 | 0.25 | 9.22 | -1.96 |

**Figure1: Performance of Hedge funds on the basis of Mean Yearly Returns**



## Table 3: Performance Measures of Hedge Fund Indices

| | alpha | beta | R^2 | Sharpe Ratio |
|---|---|---|---|---|
| S&P | 0.00 | 1.00 | 1.00 | 0.23 |
| D J C S H F Index | 0.06 | 0.45 | 0.63 | 0.57 |
| D J C S Convertible Arbitrage H F I | 0.06 | 0.43 | 0.28 | 0.34 |
| D J C S Dedicated Short Bias H F I | 0.03 | -0.52 | 0.45 | -0.39 |
| D J C S Emerging Markets H F I | 0.06 | 0.37 | 0.11 | 0.32 |
| D J C S Equity Market Neutral H F I | 0.03 | 0.40 | 0.39 | 0.20 |
| D J C S Event Driven H F I | 0.02 | 0.39 | 0.52 | 0.68 |
| D J C S Event Driven Distressed H F I | 0.02 | 0.47 | 0.55 | 0.67 |
| D J C S Event Driven Multi-Strategy H F I | 0.02 | 0.34 | 0.39 | 0.65 |
| D J C S Event Driven Risk Arbitrage H F I | 0.01 | 0.18 | 0.43 | 0.71 |
| D J C S Fixed Income Arbitrage H F I | 0.03 | 0.35 | 0.36 | 0.22 |
| D J C S Global Macro H F I | 0.03 | 0.26 | 0.21 | 0.83 |
| D J C S Long/Short Equity H F I | 0.02 | 0.60 | 0.66 | 0.52 |
| D J C S Managed Futures H F I | 0.02 | -0.16 | 0.14 | 0.41 |
| D J C S Multi-Strategy H F I | 0.02 | 0.38 | 0.56 | 0.51 |

**Figure 2: Performance of Hedge funds on the basis of Sharpe Ratio**

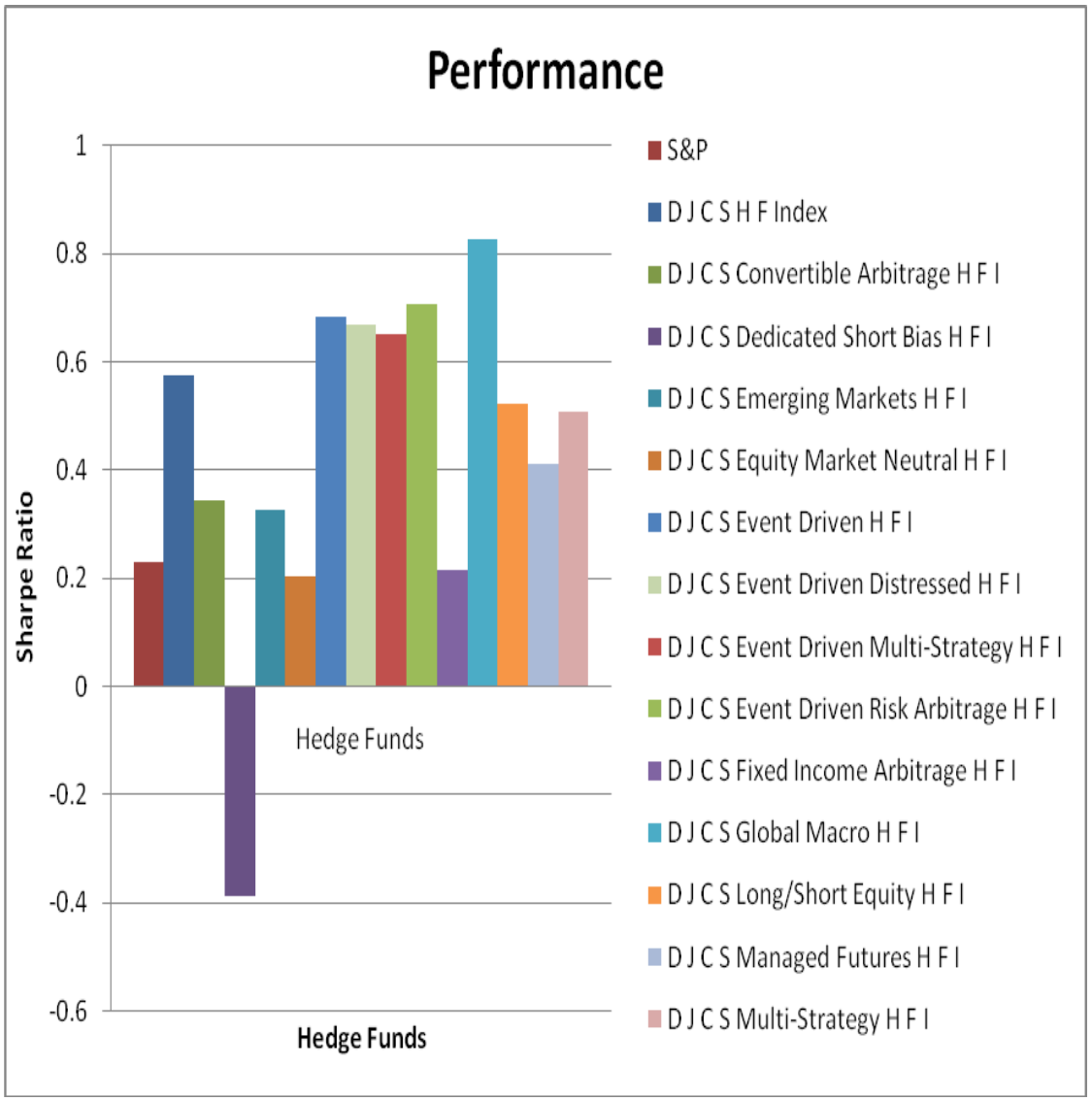


**Figure 3: Beta of Hedge fund Indices and S&P 500 index.**

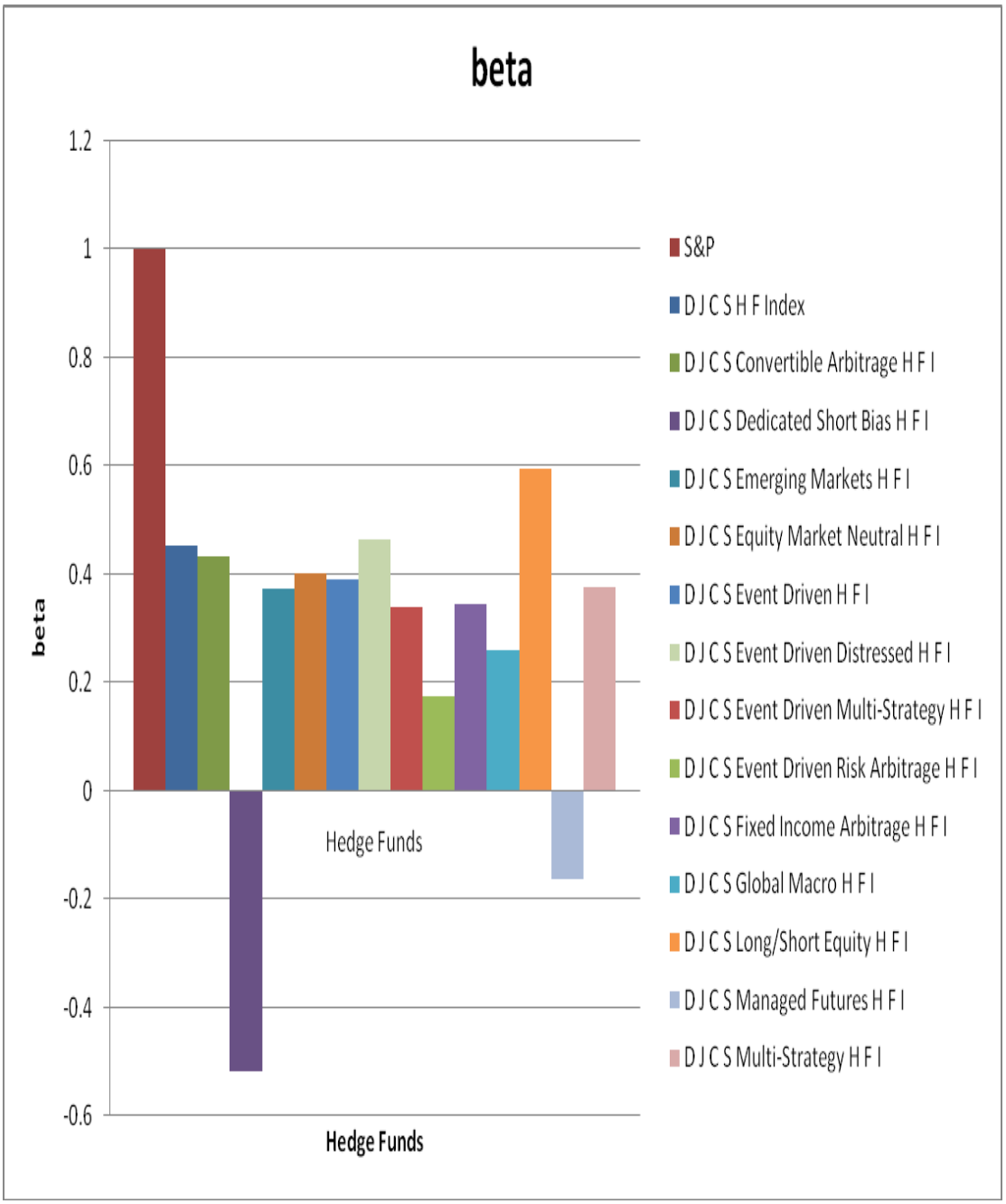
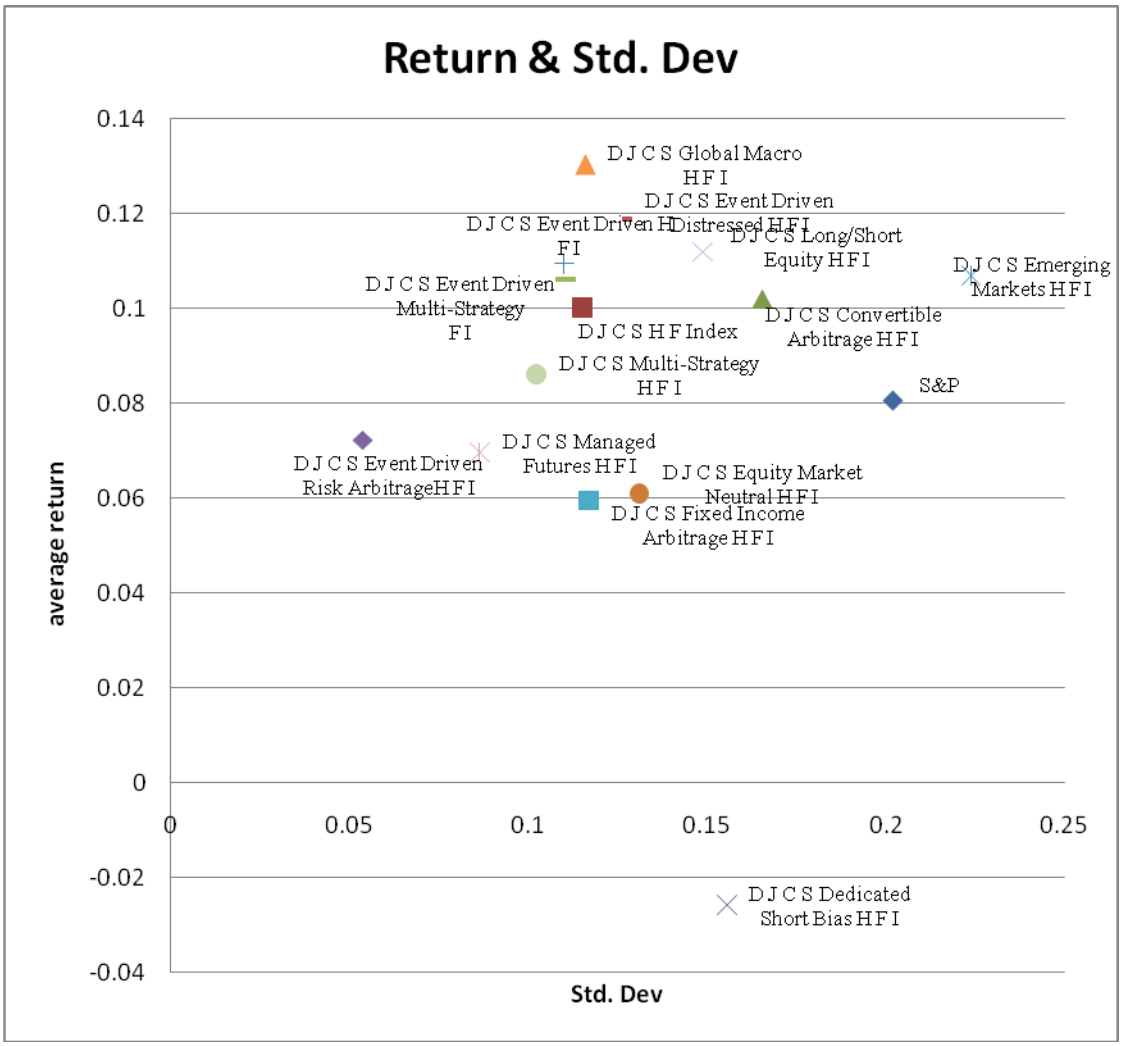


**Figure 4**


Return & Std. Dev
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
average return
0
0.05
0.1
0.15
0.2
0.25
Std. Dev
DJCS Global Macro HFI
DJCS Event Driven
DJCS Event Driven HFI
DJCS Distressed HFI
DJCS Long/Short Equity HFI
DJCS Emerging Markets HFI
DJCS Event Driven Multi-Strategy FI
DJCS HF Index
DJCS Convertible Arbitrage HFI
DJCS Multi-Strategy HFI
S&P
DJCS Event Driven Risk ArbitrageHFI
DJCS Managed Futures HFI
DJCS Equity Market Neutral HFI
DJCS Fixed Income Arbitrage HFI
DJCS Dedicated Short Bias HFI

## Table 4a: Hedge Fund Correlation Matrix

| | S&P Returns | D J C S H F Index | D J C S Convertible Arbitrage H F I | D J C S Dedicated Short Bias H F I | D J C S Emerging Markets H F I | D J C S Equity Market Neutral H F I | D J C S Event Driven H F I | D J C S Event Driven Distressed H F I |
|---|---|---|---|---|---|---|---|---|
| S&P Returns | 1.00 | | | | | | | |
| D J C S H F Index | 0.80 | 1.00 | | | | | | |
| D J C S Convertible Arbitrage H F I | 0.53 | 0.74 | 1.00 | | | | | |
| D J C S Dedicated Short Bias H F I | -0.67 | -0.55 | -0.52 | 1.00 | | | | |
| D J C S Emerging Markets H F I | 0.34 | 0.68 | 0.52 | -0.36 | 1.00 | | | |
| D J C S Equity Market Neutral H F I | 0.62 | 0.74 | 0.65 | -0.23 | 0.43 | 1.00 | | |
| D J C S Event Driven H F I | 0.72 | 0.95 | 0.77 | -0.61 | 0.77 | 0.70 | 1.00 | |
| D J C S Event Driven Distressed H F I | 0.74 | 0.90 | 0.71 | -0.64 | 0.66 | 0.69 | 0.96 | 1.00 |
| D J C S Event Driven Multi-Strategy H F I | 0.62 | 0.92 | 0.77 | -0.52 | 0.83 | 0.66 | 0.97 | 0.86 |
| D J C S Event Driven Risk Arbitrage H F I | 0.66 | 0.72 | 0.73 | -0.40 | 0.42 | 0.65 | 0.74 | 0.68 |
| D J C S Fixed Income Arbitrage H F I | 0.60 | 0.83 | 0.92 | -0.55 | 0.68 | 0.70 | 0.88 | 0.83 |
| D J C S Global Macro H F I | 0.45 | 0.75 | 0.52 | -0.24 | 0.36 | 0.51 | 0.69 | 0.69 |
| D J C S Long/Short Equity H F I | 0.81 | 0.85 | 0.54 | -0.58 | 0.51 | 0.66 | 0.75 | 0.71 |
| D J C S Managed Futures H F I | -0.38 | -0.60 | -0.62 | 0.21 | -0.39 | -0.36 | -0.63 | -0.62 |
| D J C S Multi-Strategy H F I | 0.75 | 0.85 | 0.88 | -0.54 | 0.56 | 0.82 | 0.83 | 0.78 |

## Table 4b

| | S&P Returns | D J C S Event Driven Multi-Strategy H F I | D J C S Event Driven Risk Arbitrage H F I | D J C S Fixed Income Arbitrage H F I | D J C S Global Macro H F I | D J C S Long/Short Equity H F I | D J C S Managed Futures H F I | D J C S Multi-Strategy H F I |
|---|---|---|---|---|---|---|---|---|
| S&P Returns | 1.00 | | | | | | | |
| D J C S H F Index | 0.80 | | | | | | | |
| D J C S Convertible Arbitrage H F I | 0.53 | | | | | | | |
| D J C S Dedicated Short Bias H F I | -0.67 | | | | | | | |
| D J C S Emerging Markets H F I | 0.34 | | | | | | | |
| D J C S Equity Market Neutral H F I | 0.62 | | | | | | | |
| D J C S Event Driven H F I | 0.72 | | | | | | | |
| D J C S Event Driven Distressed H F I | 0.74 | | | | | | | |
| D J C S Event Driven Multi-Strategy H F I | 0.62 | 1 | | | | | | |
| D J C S Event Driven Risk Arbitrage H F I | 0.66 | 0.74 | 1 | | | | | |
| D J C S Fixed Income Arbitrage H F I | 0.60 | 0.85 | 0.63 | 1 | | | | |
| D J C S Global Macro H F I | 0.45 | 0.65 | 0.42 | 0.56 | 1 | | | |
| D J C S Long/Short Equity H F I | 0.81 | 0.71 | 0.66 | 0.59 | 0.37 | 1 | | |
| D J C S Managed Futures H F I | -0.38 | -0.59 | -0.59 | -0.59 | -0.39 | -0.52 | 1 | |
| D J C S Multi-Strategy H F I | 0.75 | 0.80 | 0.67 | 0.88 | 0.61 | 0.68 | -0.47 | 1 |