Hedge funds: The steel wave

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Abstract During the recent underperformance of pension funds worldwide a great majority have opted to add, or even increase, current allocations to hedge funds. Pension fund managers who have not understood the benefits of hedge funds and funds of hedge funds over the last few years and have neglected to include them as part of a stock and bond portfolio have paid the price since the market bubble burst in spring 2000. Using descriptive statistics this paper will show the benefits and performance of selected hedge fund classifications.

Keywords: *hedge funds; downside risk; funds of funds; low volatility; risk-adjusted returns; performance*

Introduction

Many pension fund managers today understand the diversification benefits of hedge funds. Traditionally, diversification into stocks and bonds was the norm, but since the mid-1990s when hedge funds became more accepted by pension funds, controlling risk has been more complex. Since the bubble burst in early 2000, many pension funds have been left with underfunded plans and are pondering how to remedy the situation. These pension funds were not believers in hedge funds pre-2000 and have paid a hefty price with poor returns.

Even five years after the global meltdown in August 1998, investors still continue to criticise the collapse of Long-Term Capital Management and are wary about hedge funds because of their notorious speculation methods and excess leverage. However, savvy pension fund

managers have weathered the storm during these past three bearish years and have obtained positive returns with hedge funds and funds of hedge funds. In fact, many pension funds are now recognising that some exposure to various hedge fund strategies is necessary for portfolio diversification as well as for downside risk.¹ Nevertheless, many studies have shown that an optimal allocation to hedge funds is around 20 per cent and anything less is not effective or optimal.² Many hedge funds are now strongly urging their clients to accept hedge funds as a traditional asset class for downside equity risk management. Some pension funds are replacing portions of their bond portfolio with hedge funds and funds of hedge funds.³

During the 1990–1998 period, global macro hedge funds were very popular with pension funds, but now a great

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Table 1: Performance of selected hedge fund classifications 1993–2002

Classification	Annualised arithmetic average return (%)	Annualised arithmetic standard deviation(%)	Annualised arithmetic average Sharpe ratio	Compounded return (%)
Equity market neutral	6.71	3.79	0.65	93.83
Equity hedge	13.72	8.71	1.09	277.07
Event driven	12.44	6.65	1.23	234.04
Short sellers	21.70	7.94	0.17	65.38
Global macro	13.37	8.52	1.07	264.86
Fund of funds	8.23	7.42	0.54	119.65
Fixed income arbitrage	7.53	3.36	0.98	110.74
Market timing	12.27	7.17	1.12	230.74
Index				
S&P 500	10.18	15.51	0.38	144.35
MSCI World index	7.56	14.57	0.23	91.10
MS UK index	7.81	13.88	0.26	98.02
US Bond index	7.39	4.36	0.72	106.90
UK Bond index	8.80	5.35	0.85	136.97

Source: Hedge Fund Research (www.hfr.com)

Notes: The short seller classification begins in January of 1994.

The MSCI world index and UK indices are the Morgan Stanley Capital International Index and the bond indices are the Salomon Brothers Government Bond Indices (all maturities in USD and British pounds).

many funds have opted to stay with low volatile (non-directional) hedge fund strategies. Not including styles such as short sellers and global macro (directional) (see Table 1) may prove to be a fatal error. Of course, non-directional funds will stabilise and diversify a portfolio, but if there is another bull market, non-directional funds will have little exposure to an upside market increase.

Many pension funds have shunned short sellers and global macro funds due to their poor performance until 1999, but during the 2000–2003 period, both styles have produced double digit returns. The lesson to be learnt is that it is beneficial to diversify hedge fund strategies and not to grossly neglect strategies that have performed poorly in certain periods. For example, if a pension fund had exposure to short sellers and global macro during the last three years, the risk-adjusted returns of the pension fund portfolio would have increased and volatility would have decreased. Pension

funds must understand that some hedge fund strategies act as risk enhancers, risk reducers and risk diversifiers.

Could the movement into hedge funds have been ignited by the correction of stock markets at the start of the new millennium? Does more volatility lie ahead? With the effect of baby boomers retiring during the next two to three decades, assets in pension funds will certainly increase and will represent a greater portion of the capital invested in various world stock and bond markets. What is a pension fund to do and how can it protect itself as well as its capital in case of other calamities? The Yale University endowment fund has 26.5 per cent invested in hedge funds. Although the returns were flat for 2002, the fund did much better than other endowment funds.

The easiest way for a pension fund to quickly diversify with hedge funds is to allocate a portion of money into several hedge fund strategies to achieve some degree of risk control in down markets.

Figure 1: Yale University Endowment Fund (2002)

In addition, due to the low correlation feature between hedge fund strategies among themselves (see Table 2) a diverse combination of strategies can further reduce the volatility of a traditional stock and bond portfolio. Combining both of the above methods to control for risk will permit pension funds to create a portfolio based on a precise risk-reward profile. Due to the fast growth of hedge funds and funds of hedge funds, it is crucial that pension funds perform proper due diligence on a continual bi-monthly or monthly basis, with on-site visits to assess the performance and monitor the hedge fund's strategies to assure that the manager does not deviate from his strategy. There has been limited understanding of the different styles of hedge funds, the risk diversification and the return enhancement potential they can provide.

Hedge funds are frequently considered as high risk and speculative investments and many pension funds have neglected them in the past for fear of producing

big losses. Many hedge fund managers have attempted to explain that hedge funds as an asset class could considerably decrease the risk levels of traditional stock and bond portfolios. This point is gradually beginning to reach pension fund managers. Over the past three years, various hedge fund classifications have substantially outperformed stock and market indices with less volatility (see Tables 3–10). But when combined with other hedge fund strategies in a stock and bond portfolio, this will help a fund achieve stability in returns as well as reduce volatility. Pension funds are now actively searching to find good hedge fund and fund of funds (FOF) managers to add to their portfolios. This will protect and provide a cushion for pension funds on the downside in case of forthcoming extreme market events. Due to their unique selling point, hedge funds have low correlations to various stock and bond market indices and have constantly outperformed traditional asset classes during this past decade. As a result

Table 2: Correlation matrix of selected hedge fund indices 1993–2002

Strategy	Market neutral	Equity hedge	Event driven	Short sellers	Global macro	Funds of funds	Fixed income arbitrage	Market timing
Equity market neutral	1.00	0.31	0.31	-0.11	0.24	0.26	0.22	0.13
Equity hedge		1.00	0.71	-0.79	0.66	0.83	0.03	0.73
Event driven			1.00	-0.56	0.57	0.69	0.17	0.46
Short sellers				1.00	-0.45	-0.62	-0.01	-0.72
Global macro					1.00	0.81	0.17	0.49
Fund of funds						1.00	0.32	0.55
Fixed income arbitrage							1.00	-0.10
Market timing								1.00

Source: Hedge Fund Research (www.hfr.com)

Note: The Short sellers classification begins in 1994

of their low volatility, which is similar to bonds, hedge funds offer returns comparable to equities.

Hedge funds provide a means of diversification while reducing the total risk of a traditional investment portfolio. Non-directional strategies can diminish volatility and provide shelter in down markets due to the low correlation different hedge fund strategies have among themselves, as well as with other traditional asset classes. Adding hedge funds to a typical pension fund portfolio will cause the efficient frontier to shift to the left, obtaining the highest return possible for the lowest amount of risk. When combined with traditional asset classes, hedge funds offer excellent potential for portfolio construction and diversification benefits.

Many well-known investment pioneers such as Sir John Templeton and John Bogle have suggested that over the next ten years the market will probably produce single digit returns. Adding hedge funds or funds of hedge funds to a pension fund portfolio can produce greater average returns than a portfolio which does not include these funds. However, a pension fund manager must understand that if no internal expertise is available to select and monitor hedge funds, accredited hedge fund consultants must be called upon to provide

assistance. As managers become more knowledgeable of the value-added benefits of hedge funds, they will probably decide to include hedge funds, or even increase their current holdings in hedge funds.

Literature review

The benefits of diversifying traditional stock and bond portfolios with FOFs is discussed by numerous authors.^{4–12} FOFs provide a better risk–return trade-off with reduced volatility and can offer higher returns than bond and equity mutual funds.¹³ Furthermore, the low correlation of FOFs to traditional markets provides investors with added value, especially in down markets.^{14–16}

The goal of hedge fund strategies or ‘styles’ is to maximise absolute return in all types of market environments using differing levels of risk and return. Although three major database providers (Zurich Capital Markets, Hedge Fund Research and TASS) maintain their own classification of hedge fund strategies, they can be grouped into two major categories, directional and non-directional. Hedge fund strategies having low correlation to stock markets are classified as non-directional (market neutral and event-driven) while those having high correlation to stock markets

Table 3: Performance of HFR FOF Index (Offshore)

	1993–1997	1994–1998	1995–1999	1996–2000	1997–2001	1998–2002	1993–2002	1998	1999	2000	2001	2002
Compounded return	82.82	27.61	72.07	53.32	37.08	20.47	119.65	-8.59	27.97	0.20	1.42	1.33
Sharpe ratio	1.30	0.12	0.84	0.52	0.28	-1.00	0.54	-1.00	2.40	-1.00	-1.00	-1.00
Annualised arithmetic standard deviation	6.14	7.56	8.36	9.09	8.97	8.42	7.42	11.61	8.76	9.13	4.07	2.43
Annualised arithmetic average	12.26	5.17	11.25	8.98	6.72	4.14	8.23	-8.31	25.26	0.58	1.49	1.47
Average loss in a losing period	-1.22	-1.66	-1.60	-1.76	-1.62	-1.49	-1.39	-2.69	-0.41	-1.78	-1.02	-0.52
Average gain in a gain period	1.84	1.73	2.11	2.31	2.23	1.89	1.86	2.10	2.94	2.60	0.94	0.66
Correlation to S&P 500	0.51	0.37	0.57	0.55	0.54	0.46	0.48	0.66	0.64	0.30	0.77	0.46
Correlation to Morgan Stanley UK Index	0.40	0.49	0.49	0.41	0.44	0.39	0.41	0.68	0.56	0.14	0.64	0.48
Correlation to US Govt Bonds all maturities	0.35	0.04	-0.17	-0.11	-0.17	-0.28	-0.01	-0.75	0.01	0.50	-0.29	-0.43
Correlation to UK Govt Bonds all maturities	0.52	0.18	-0.01	-0.06	-0.08	-0.21	0.13	-0.29	0.19	-0.18	-0.07	-0.43

Table 4: Performance of HFR Macro Index (Offshore)

	1993–1997	1994–1998	1995–1999	1996–2000	1997–2001	1998–2002	1993–2002	1998	1999	2000	2001	2002
Compounded return	146.44	70.70	109.81	65.43	61.66	48.05	264.86	6.19	17.62	1.97	6.83	8.81
Sharpe ratio	1.51	0.80	1.34	0.73	0.75	0.54	1.07	0.27	1.48	-1.00	0.60	0.67
Annualised arithmetic standard deviation	9.54	8.55	8.18	8.45	7.58	7.10	8.52	7.63	8.36	8.52	4.06	6.57
Annualised arithmetic average	18.62	11.10	15.24	10.46	9.92	8.12	13.37	6.29	16.65	2.28	6.70	8.67
Average loss in a losing period	-1.41	-1.54	-1.24	-1.44	-1.22	-1.24	-1.32	-1.54	-0.86	-2.08	-0.56	-0.95
Average gain in a gain period	2.92	2.25	2.43	2.31	2.01	1.71	2.33	1.56	2.51	1.81	1.12	1.56
Correlation to S&P 500	0.50	0.60	0.55	0.50	0.47	0.22	0.33	0.59	0.52	0.05	0.29	-0.30
Correlation to Morgan Stanley UK Index	0.39	0.42	0.40	0.39	0.41	0.27	0.35	0.60	0.56	0.16	0.28	-0.18
Correlation to US Govt Bonds all maturities	0.48	0.37	0.18	0.18	0.09	0.03	0.28	-0.52	0.18	0.57	0.16	0.22
Correlation to UK Govt Bonds all maturities	0.14	0.08	-0.08	0.01	0.01	0.17	0.16	0.01	0.50	0.27	0.14	0.48

are directional (global macro, equity hedge, market timing and short sellers).¹⁷

Recent studies, such as Edwards and Caglayan,⁸ investigate hedge fund alphas using multifactor models, while Liang¹⁸ examines survivorship bias of hedge funds. Agarwal and Naik *et al.*¹⁷ find significant quarterly performance persistence in hedge funds, while Edwards and Caglayan⁸ observe performance persistence for winners and losers. Conversely, Brown *et al.*,¹⁹ Peskin *et al.*,²⁰ and Ackerman *et al.*,²¹ uncover slight significant performance persistence, relative to traditional asset classes.

Can hedge funds consistently add value? This is a crucial issue because some hedge funds have lock-up periods of up to three years and redemptions may require 30–90 days' notice. This presumes that investors must possess a great deal of information about the performance returns of hedge funds over a long period before allocating money to them. Furthermore, as hedge funds display a higher attrition rate when compared to mutual funds, the problem of performance persistence is crucial. Most of the literature and analysis of hedge funds focuses on assessing performance.^{18,19}

Brown *et al.*¹⁹ used the annual returns of US offshore hedge funds from 1989–1995 to investigate performance and found no performance persistence in their sample and attribute their performance to the various styles as opposed to the manager skills. However, contrary to what theory suggests they find that hedge fund managers do not increase their volatility after negative performance returns. If they did, they would increase their chances of having further negative returns along with ruining the reputation of the manager and his performance record.

Whether raw returns or risk-adjusted returns are classified using a style-based classification Brown *et al.*¹⁹ concluded

that there is no evidence that the past performance of hedge funds forecasts the future performance and that there is no managerial skill in a particular hedge fund classification. However, Brorsen and Harri,²² using overlapping observations to add power to their estimation procedure to acquire better estimates, find evidence of a small amount of performance persistence in the hedge fund industry while using a longer period and a greater number of funds than Agarwal and Naik.²³

Schneeweis and Spurgin⁶ have concluded that the level of volatility within each hedge fund classification is more predictable than the performance and argues that future performance is consistent with past volatility and not with past returns. Another drawback of rebalancing portfolios with hedge funds periodically is that due to the limitations of lock up periods, a longer holding period is required. Since the majority of investors in hedge funds are institutions, pension funds and endowments, they invest on a long-term basis.

Many have used cluster and factor analysis to group hedge fund managers together.^{5,24} Martin and Spurgin²⁵ examined return patterns of different hedge funds to classify them using the Zurich Capital Markets database (ZCM) and the Hedge Fund Research database (HFR). They discovered that eight separate clusters generate the most useful results. However, Martin and Spurgin²⁵ find that there is considerable variation in the sensitivities of individual funds within a cluster.

Table 1 provides the hedge fund performance from 1993–2002 using the HFR database along with pertinent statistics such as annualised returns, standard deviation, the Sharpe ratio and compounded returns by classification. Over the period 1993–2002, all eight classifications achieved positive returns.

Table 5: Performance of HFR event driven index (Offshore)

	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1993-2002	1998	1999	2000	2001	2002
Compounded return	136.47	94.59	131.41	90.32	77.34	41.26	234.04	1.98	22.42	4.91	13.05	-4.60
Sharpe ratio	2.43	1.34	1.89	1.36	1.10	0.41	1.23	-1.00	3.40	0.12	1.21	-1.00
Annualised arithmetic standard deviation	5.43	6.98	6.80	6.53	6.83	7.45	6.65	2.86	4.77	6.19	6.83	7.64
Annualised arithmetic average	17.48	13.63	17.13	13.15	11.74	7.32	12.44	0.20	20.50	4.98	12.54	-4.85
Average loss in a losing period	-0.71	-1.21	-1.20	-1.20	-1.31	-1.53	-1.26	-2.47	-0.23	-1.22	-1.07	-1.83
Average gain in a gain period	1.89	1.85	1.95	1.86	1.81	1.71	1.81	1.54	2.10	1.58	1.75	1.31
Correlation to S&P 500	0.41	0.60	0.54	0.55	0.55	0.58	0.54	0.87	0.40	0.29	0.47	0.62
Correlation to Morgan Stanley UK index	0.37	0.14	-0.01	-0.16	-0.13	-0.29	0.03	-0.36	-0.07	-0.27	0.10	-0.47
Correlation to US Govt Bonds all maturities	0.33	0.04	-0.12	-0.23	-0.19	-0.35	-0.06	-0.76	0.31	0.27	-0.07	-0.57
Correlation to UK Govt Bonds all maturities	0.03	0.14	-0.01	-0.16	-0.13	-0.29	0.03	-0.36	-0.07	-0.27	0.10	-0.47

Table 6: Performance of HFR equity market neutral index (Offshore)

	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1993-2002	1998	1999	2000	2001	2002
Compounded return	45.01	42.32	58.74	46.97	47.28	33.67	93.83	6.95	5.45	9.55	7.70	0.40
Sharpe ratio	0.80	0.71	1.44	0.99	1.04	0.50	0.66	0.50	0.32	1.29	1.80	-1.00
Annualised arithmetic standard deviation	4.11	4.08	3.52	3.58	3.43	3.48	3.80	1.52	3.47	3.86	1.82	1.45
Annualised arithmetic average	7.54	7.16	9.34	7.79	7.83	5.98	6.76	0.57	5.37	9.22	7.52	1.53
Average loss in a losing period	-1.06	-1.11	-0.95	-0.79	-0.69	-0.59	-0.80	-1.24	-0.79	-0.48	-0.12	-0.36
Average gain in a gain period	1.14	1.07	1.04	1.01	0.99	0.94	1.04	1.17	0.86	1.39	0.78	0.37
Correlation to S&P 500	0.14	0.23	0.19	0.23	0.20	0.16	0.15	0.37	0.05	0.48	-0.54	-0.22
Correlation to Morgan Stanley UK index	0.12	0.20	0.13	0.14	0.15	0.11	0.12	0.21	-0.29	0.35	-0.42	-0.11
Correlation to US Govt Bonds all maturities	0.26	0.13	0.05	0.10	0.14	0.10	0.19	-0.14	0.19	0.33	0.18	0.29
Correlation to UK Govt Bonds all maturities	0.08	0.12	0.13	0.06	0.14	0.07	0.08	0.17	0.31	0.09	-0.17	0.03

Equity hedge posted the highest compound return, while the fixed-income arbitrage classification has the lowest volatility. Due to the strong bull market of the 1990s, short sellers had the worst returns and the lowest risk-adjusted returns from 1993–2002.

Clearly, these performance measures depend on the particular period examined and which database is used. On a risk-adjusted basis, the market-neutral classification performed the best. One striking feature of hedge fund returns in the past ten years is that four styles have outperformed the S&P 500 Index and seven have outperformed the Morgan Stanley Capital International (MSCI) Index according to ZCM data. Agarwal and Naik²³ demonstrate that a mixture of alternative investments and passive indexing yields a superior risk-return tradeoff than strictly passive investing in the different asset classes.

The returns on global stock markets in the second half of the 1990s were extremely high and will probably not be reproduced. Using ZCM data, Chadha and Jansen²⁶ report that most classifications of hedge funds outperformed the S&P 500 during the first half of the 1990s, prior to the major rally of the stock markets. Moreover, the volatility of global stock markets has increased during the last seven years, suggesting that risk-adjusted returns of hedge funds have been higher than traditional stock and bond market indices.¹⁷

Ackermann *et al.*²¹ report that while hedge funds do not consistently outperform stock market indices in absolute returns, they outperform mutual funds on a risk-adjusted return basis during the 1988–1995 period. Moreover, their results suggest that hedge funds offer little advantage over indexing, when absolute or total risk-adjusted returns are considered, but the low beta

values on hedge funds make them a worthy addition to many investors' portfolios. They also conclude that the incentive fee is the variable that consistently explains improved adjusted performance, yet has a negligible impact on the volatility of returns. At the same time the organisational structure of hedge funds maintains the interests of both the managers and the investors.

Data

We used eight indices supplied by Hedge Fund Research starting from January 1993 and ending in December 2002 totalling 120 monthly data points. We used this particular period to see how hedge funds performed in both bull and bear markets. Descriptive statistics such as compounded return, the Sharpe ratio, standard deviation, arithmetic average, average loss and average gain in a period are examined. We also investigate the various correlations of hedge fund classifications with the S&P 500, MSCI Index, and the US and UK Salomon Brothers Government Bond Index (all maturities).

Results

Four hedge fund classifications outperformed all market indices during the 1993–2002 period with higher risk-adjusted returns. Furthermore, this was achieved with low correlations to traditional stock and bond markets. By examining all the hedge fund indices (Tables 3–10) we observe that a great majority have a low or even negative correlation to traditional stock and market indices. Moreover, the classifications also maintain low and negative correlation between themselves, the essence of portfolio theory. In general, all classifications achieve better returns than stock market indices in the

Table 7: Performance of HFR fixed income: Arbitrage index (Offshore)

	1993–1997	1994–1998	1995–1999	1996–2000	1997–2001	1998–2002	1993–2002	1998	1999	2000	2001	2002
Compounded return	67.54	38.60	41.22	34.54	30.17	25.78	110.74	5.78	10.43	3.61	8.93	7.12
Sharpe ratio	3.63	0.62	0.69	0.43	0.26	0.10	0.98	-1.00	1.89	-1.00	1.41	0.96
Annualised arithmetic standard deviation	1.69	3.78	4.00	4.15	4.26	4.30	3.36	6.90	3.05	3.22	3.10	2.80
Annualised arithmetic average	10.38	6.62	7.00	6.03	5.38	4.69	7.53	-5.72	10.00	3.60	0.95	5.93
Average loss in a losing period	-0.33	-1.72	-1.52	-1.27	-1.14	-1.09	-0.97	-2.77	-0.13	-0.49	-0.43	-0.64
Average gain in a gain period	0.93	0.85	0.91	0.90	0.89	0.89	0.91	0.67	0.92	0.86	0.95	0.98
Correlation to S&P 500	0.24	0.10	0.16	0.18	0.21	0.12	0.17	0.08	0.36	0.24	0.48	0.08
Correlation to Morgan Stanley UK index	0.28	0.17	0.25	0.21	0.22	0.15	0.21	0.22	0.45	0.08	0.41	0.19
Correlation to US Govt Bonds all maturities	0.02	-0.14	-0.14	-0.15	-0.13	-0.16	-0.10	-0.32	0.08	0.20	-0.06	-0.17
Correlation to UK Govt Bonds all maturities	-0.01	-0.09	-0.11	-0.12	-0.15	-0.13	-0.07	-0.01	-0.17	-0.02	-0.14	-0.06

Table 8: Performance of HFR short sellers (Offshore)

	1994–1998	1995–1999	1996–2000	1997–2001	1998–2002	1993–2002	1998	1999	2000	2001	2002
Compounded return	-15.68	-21.17	18.90	34.55	61.47	65.38	12.94	-23.01	32.89	10.19	26.82
Sharpe ratio	-1.00	-1.00	0.09	0.19	0.34	0.17	0.54	-1.00	0.77	0.34	1.25
Annualised arithmetic standard deviation	15.10	15.98	24.67	25.52	26.06	7.94	17.37	19.52	43.90	23.59	16.77
Annualised arithmetic average	4.02	-3.49	6.47	9.17	12.98	21.70	13.55	-24.06	37.83	12.29	25.29
Average loss in a losing period	-3.28	-3.56	-4.85	-5.10	-5.57	-4.53	-2.72	-23.01	-14.83	-4.62	-5.40
Average gain in a gain period	3.50	3.45	5.25	5.56	5.84	4.82	3.88	25.37	9.15	6.67	4.61
Correlation to S&P 500	-0.66	-0.60	-0.54	-0.61	-0.66	-0.64	-0.87	-0.63	-0.51	-0.94	-0.92
Correlation to Morgan Stanley UK index	-0.48	-0.42	-0.37	-0.43	-0.52	0.49	-0.82	-0.41	-0.26	-0.79	-0.84
Correlation to US Govt Bonds all maturities	-0.05	0.05	0.06	0.30	0.24	0.10	0.36	-0.39	0.17	0.41	0.76
Correlation to UK Govt Bonds all maturities	-0.01	0.15	0.03	0.13	0.28	0.14	0.59	-0.32	-0.43	0.65	0.86

Table 9: Performance of HFR market timing index

	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1993-2002	1998	1999	2000	2001	2002
Compounded return	86.45	87.41	128.48	126.89	108.65	77.39	230.74	24.82	26.17	11.79	4.35	-3.45
Sharpe ratio	1.46	1.36	1.76	1.56	1.29	0.91	1.12	2.31	2.01	0.81	0.04	-1.00
Annualised arithmetic standard deviation	5.79	6.29	7.18	8.04	8.45	8.37	7.17	7.96	9.77	9.05	7.78	4.77
Annualised arithmetic average	12.69	12.82	16.89	16.81	15.15	11.86	12.27	22.66	23.91	11.57	4.54	-3.45
Average loss in a losing period	-0.89	-0.81	-0.95	-1.24	-1.39	-1.51	-1.23	-0.64	-1.96	-2.01	-1.85	-1.29
Average gain in a gain period	1.96	2.16	2.50	2.22	2.80	2.54	2.24	3.15	3.31	2.45	1.97	1.13
Correlation to S&P 500	0.67	0.67	0.65	0.39	0.67	0.67	0.67	0.51	0.73	0.49	0.87	0.70
Correlation to Morgan Stanley UK index	0.54	0.56	0.48	0.44	0.56	0.55	0.54	0.60	0.54	0.31	0.64	0.54
Correlation to US Govt Bonds all maturities	0.33	0.19	0.10	0.17	0.01	-0.22	0.01	-0.61	0.59	0.45	-0.51	-0.71
Correlation to UK Govt Bonds all maturities	0.34	0.29	0.21	0.19	0.11	-0.08	0.11	-0.34	0.51	-0.11	-0.28	-0.69

Table 10: Performance of HFR equity hedge index (Offshore)

	1993-1997	1994-1998	1995-1999	1996-2000	1997-2001	1998-2002	1993-2002	1998	1999	2000	2001	2002
Compounded return	116.15	100.49	199.21	163.02	117.39	111.02	74.45	14.54	44.17	8.54	0.27	-2.93
Sharpe ratio	1.73	1.28	2.05	1.51	1.13	0.87	0.72	0.86	2.89	0.36	-1.00	-1.00
Annualised arithmetic standard deviation	6.62	7.84	8.91	10.44	10.55	10.04	10.42	11.72	11.57	3.74	4.79	5.11
Annualised arithmetic average	15.73	14.30	22.51	20.03	16.17	13.00	11.71	14.30	37.73	0.75	0.38	-2.85
Average loss in a losing period	-1.17	-1.50	-1.70	-1.88	-1.82	-1.77	-1.93	-3.01	-1.93	-2.13	-1.35	-1.62
Average gain in a gain period	2.14	2.17	2.59	2.85	2.70	2.42	2.43	2.59	3.61	3.62	1.02	0.75
Correlation to S&P 500	0.60	0.77	0.69	0.64	0.66	0.66	0.64	0.95	0.71	0.42	0.86	0.73
Correlation to Morgan Stanley UK index	0.53	0.59	0.50	0.47	0.52	0.52	0.52	0.77	0.47	0.27	0.73	0.68
Correlation to US Govt Bonds all maturities	0.31	0.08	-0.15	-0.06	-0.08	-0.25	-0.03	-0.56	0.27	0.48	-0.60	-0.67
Correlation to UK Govt Bonds all maturities	0.40	0.24	0.01	0.03	0.04	-0.02	-0.13	-0.18	0.30	-0.03	-0.31	-0.63

last three years with low volatility levels similar to those of US and UK bonds. Although some classifications had slightly negative returns for the 2000–2002 period, combining them with other hedge fund strategies would have resulted in positive returns. Our portfolio simulations (not shown) indicate that neglecting to include certain hedge fund styles in a stock and bond portfolio will not provide optimal results.

Conclusion

We show that comparing hedge fund classifications during both bull and bear markets can help a pension fund portfolio reduce its volatility and increase its risk-adjusted returns. As always, proper due diligence and constant bi-monthly monitoring of hedge fund managers is the successful recipe to help bullet proof a traditional stock and bond portfolio in market downturns. Furthermore, each hedge fund classification must be considered to attain proper diversification because certain styles will outperform market indices and unit trusts in different types of market environments. Neglecting certain hedge fund styles could result in reduced performance for a traditional pension fund portfolio.

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