10 Things That Investors Should Know About Hedge Funds

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Over the last decade hedge funds have become more and more popular with institutional and especially high-net-worth investors. As a result, the amount of assets under management by hedge funds has grown from around $40 billion in 1990 to an estimated $600 billion in 2002. In line with this, the number of hedge funds worldwide has grown to around 6,000. In the early days not much was known about hedge funds. Since 1994, however, a number of data vendors, hedge fund advisors, and fund of funds operators have been collecting performance and other data on hedge funds. This has allowed researchers to take a more serious look at hedge funds. Of course, research in this area is still in its early days. However, it has become clear that hedge funds are a lot more complicated than common stocks and bonds and may not be as phenomenally attractive as many hedge fund managers and marketers want investors to believe. In this article we briefly review some of the most important findings so far. More specifically, we make the following 10 points:

1. The available data on hedge funds are far from perfect.
2 Funds following the same type of strategy may still behave very differently.
3. Similar indices from different index providers may behave very differently.
4. The true risks of hedge funds tend to be seriously underestimated.
5. Sharpe ratios and alphas of hedge funds can be highly misleading.
6. There are no shortcuts in hedge fund selection.
7. Hedge fund diversification is not a free lunch.
8. Hedge funds do not combine very well with equity.
9. Modern portfolio theory is too simplistic to deal with hedge funds.
10. One has to invest at least 20% in hedge funds for it to make a difference.

From this it will become clear that hedge fund investing requires a much more elaborate approach than what most stock and bond investors are used to. Mechanically applying the same decision-making processes as typically used for stock and bond investing may lead to nasty surprises.

THE AVAILABLE DATA ON HEDGE FUNDS ARE FAR FROM PERFECT

With the industry still in its infancy and hedge funds under no formal obligation to disclose their results, gaining insight into the performance characteristics of hedge funds is not straightforward. Fortunately, many funds nowadays release performance as well as other administrative data to attract new and to accommodate existing investors. These data are collected by a small number of data vendors and fund advisors, some of which make their data available

to qualifying investors and researchers. Although better than nothing, the available data are not without problems:

- Most databases are of relatively low quality as most data vendors simply pass on the data supplied by the fund managers and their administrators without any independent verification. This means that before any serious research can take place, one must check the data for a number of possible errors and either correct these or delete the funds in question altogether.
- Most hedge funds report into only one or two databases. As a result, every database covers a different subset of the hedge fund universe and different researchers may arrive at quite different conclusions simply because different databases were used.
- Most data vendors only supply data on funds that are still in operation. Since disappointing performance is a major reason for hedge funds to close down, this means that the data available to investors will overestimate the returns that investors can realistically expect from investing in hedge funds by 2%–4% per annum. In addition, concentrating on survivors only will lead investors to underestimate the risk of hedge funds by 10%–20%.
- Since many hedge funds invest in illiquid assets, their administrators have great difficulty generating up-to-date valuations of their positions. When confronted with this problem, administrators either use the last reported transaction price or a conservative estimate of the current market price, which creates artificial lags in the evolution of these funds' net asset values.
- Since most data vendors only started collecting data on hedge funds around 1994, the available data set on hedge funds is very limited. Apart from spanning a very short period of time, the available data on hedge funds also span a very special period: the bull market of the 1990s and the various crises that followed. This sharply contrasts with the situation for stocks and bonds. Not only do we have return data over differencing intervals much shorter than one month, we also have those data available over a period that extends over many business cycles. This has allowed us to gain insight into the main factors behind stock and bond returns and also allows us to distinguish between normal and abnormal market behavior. The return-generating process behind hedge funds on the other hand is still very much a mystery and so far we have little idea what constitutes normal behavior and what not.

FUNDS FOLLOWING THE SAME TYPE OF STRATEGY MAY STILL BEHAVE VERY DIFFERENTLY

Hedge fund investment strategies tend to be quite different from the strategies followed by traditional money managers. In principle every fund follows its own proprietary strategy, which means that hedge funds are an extremely heterogeneous group. It is common practice, however, to classify hedge funds depending on the main type of strategy that funds claim to follow. One popular classification is as follows:

Long/Short Equity: Funds that invest on both the long and the short side of the equity market. Unlike equity market neutral funds (see below), the portfolio may not always have zero market risk. Most funds have a long bias.

Equity Market Neutral: Funds that simultaneously take long and short positions of the same size within the same market, i.e., portfolios are designed to have zero market risk. Leverage is often applied to enhance returns.

Convertible Arbitrage: Funds that buy undervalued convertible securities, while hedging (most of) the intrinsic risks.

Distressed Securities: Funds that trade the securities of companies in reorganization and/or bankruptcy, ranging from senior secured debt to common stock.

Merger Arbitrage: Funds that trade the securities of companies involved in a merger or acquisition, buying the stocks of the company being acquired while shorting the stocks of its acquirer.

Global Macro: Funds that aim to profit from major economic trends and events in the global economy, typically large currency and interest rate shifts. These funds make extensive use of leverage and derivatives.

Emerging Markets: Funds that focus on emerging and less mature markets. These funds tend to be long only because in many emerging markets short selling is not permitted and futures and options are not available.

Given the above classification, the question arises whether funds classified as following the same type of strategy indeed generate similar returns. We can easily investigate this by calculating the correlation between the returns of funds within each strategy group. Exhibit 1 shows the average correlations between individual hedge funds belonging to the above strategy groups. From the diagonal we see that the average correlations between funds within the same strategy group are quite low. This makes it clear that although funds may be classified in the same strategy group, this does in no way mean that they will produce similar returns. The correlation coefficients between funds belonging to different

EXHIBIT 1

Average Correlations Between Individual Hedge Funds 1994-2001

	MA	DS	EMN	CA	GM	L/S	EM
Merger Arbitrage	**0.45**	0.30	-0.04	0.18	0.07	0.24	0.29
Distressed Securities	0.30	**0.39**	0.18	0.28	0.15	0.32	0.14
Equity Mkt. Neutral	-0.04	0.18	**0.23**	0.09	0.03	-0.02	0.05
Convertible Arbitrage	0.18	0.28	0.09	**0.28**	0.09	0.23	0.08
Global Macro	0.07	0.15	0.03	0.09	**0.26**	0.09	0.10
Long/Short Equity	0.24	0.32	-0.02	0.23	0.09	**0.24**	0.27
Emerging Markets	0.29	0.14	0.05	0.08	0.10	0.27	**0.52**

strategy groups are low as well. The fact that the average correlation between funds of the same type and between different types of funds is of a similar order of magnitude is an interesting finding. It suggests that it may not make too much difference whether an investor diversifies within a given strategy group or between strategy groups.

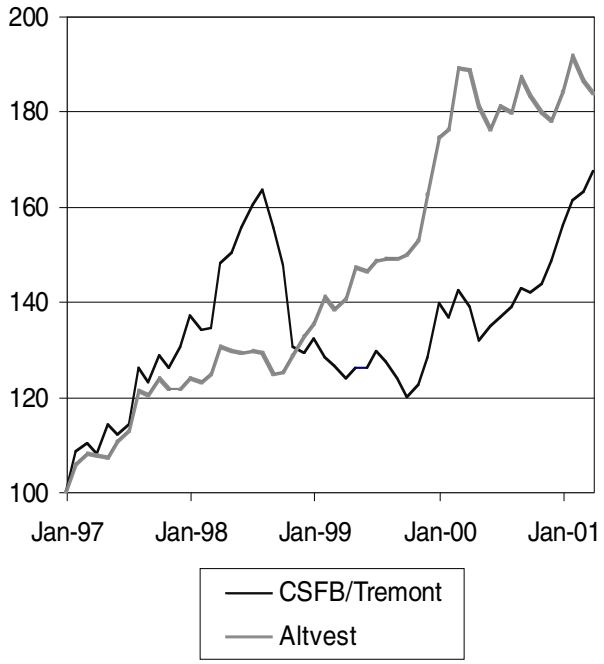
SIMILAR INDICES FROM DIFFERENT INDEX PROVIDERS MAY BEHAVE VERY DIFFERENTLY

Most data vendors use their databases to calculate one overall or aggregate index as well as a number of subindices, corresponding to the various types of hedge fund strategies mentioned earlier. Given the heterogeneity of each style group and the fact that different databases contain many different funds, however, one can expect substantial differences between indices that aim to cover the same type of strategy. Exhibit 2 for example shows the evolution of the CSFB/Tremont and Altvest global macro indices over the period January 1997–May 2001. From the graph it is clear that both indices paint a completely different picture and that it is very well possible for one index to go up while at the same time the other index goes down.

Another way to see how different the available indices are is to calculate the correlation between the different hedge fund indices that claim to track the same strategy. The results for global macro can be found in Exhibit 3. The low correlation coefficients confirm that there is considerable heterogeneity between these indices despite the fact that they aim to reflect the same type of hedge fund strategy. In short, investors' perceptions of hedge fund performance and value added will heavily depend on the index studied.

EXHIBIT 2

CSFB/Tremont and Altvest Macro Indices
January 1997–May 2001



THE TRUE RISKS OF HEDGE FUNDS TEND TO BE SERIOUSLY UNDERESTIMATED

Marking-to-market problems tend to create lags in the evolution of hedge funds' net asset values, which statistically shows up as autocorrelation in hedge funds' returns. This autocorrelation causes estimates of the standard deviation of hedge fund returns to exhibit a systematic downward bias. Exhibit 4 shows the average autocorrelation

EXHIBIT 3

Correlations Between Global Macro Hedge Fund Indices 1994-2001

	HENNESSEE	HFR	CSFB/TREMONT	TUNA	ALTVEST	VAN
ZURICH	0.47	0.46	0.29	0.28	0.37	0.12
HENNESSEE		0.80	0.66	0.39	0.52	0.35
HFR			0.73	0.52	0.77	0.55
CSFB/TREMONT				0.52	0.50	0.35
TUNA					0.37	0.08
ALTVEST						0.51

EXHIBIT 4

Average One-Month Autocorrelation Individual Hedge Fund Returns 1994-2001

	AC (1)
Merger Arbitrage	0.13
Distressed Securities	0.25
Equity Mkt. Neutral	0.08
Convertible Arbitrage	0.30
Global Macro	0.03
Long/Short Equity	0.09
Emerging Markets	0.15

EXHIBIT 5

Average Standard Deviations Original and Unsmoothed Individual Hedge Fund Returns 1994-2001

	Original	Unsmoothed
Merger Arbitrage	1.75	2.02
Distressed Securities	2.37	3.05
Equity Mkt. Neutral	2.70	3.04
Convertible Arbitrage	3.01	4.00
Global Macro	5.23	5.37
Long/Short Equity	5.83	6.37
Emerging Markets	8.33	9.75

found in the returns of individual hedge funds from the various strategy groups. The exhibit shows that the problem is especially acute for convertible arbitrage and distressed securities funds, which makes sense as these funds' assets will typically be the most difficult to value. One way to correct for the observed autocorrelation is to "unsmooth" the observed returns by creating a new set of returns which are more volatile but whose other characteristics are unchanged. One method to do so stems from the real estate finance literature, where due to smoothing in appraisals and infrequent valuations of properties, the returns of direct property investment indices suffer from similar problems as hedge fund returns. Exhibit 5 shows the average standard deviations of the original as well as the unsmoothed returns on individual hedge funds belonging to the different strategy groups. From the exhibit we see that the difference between the observed and the true standard deviation can be very substantial. For distressed securities funds the true standard deviation is almost 30% higher than observed. For convertible arbitrage funds the difference is even higher.

A second reason why many investors think hedge funds are less risky than they really are results from the use of the standard deviation as the sole measure of risk. Generally speaking, risk is one word, but not one number. The returns on portfolios of stocks and bonds risk are more or less normally distributed. Because normal distributions are fully described by their mean and standard deviation, the risk of such portfolios can indeed be measured with one number. Confronted with non-normal distributions, however, it is no longer appropriate to use the standard deviation as the sole measure of risk. In that case investors should also look at the degree of symmetry of the distribution, as measured by its so-called "skewness," and the probability of extreme positive or negative outcomes, as measured by the distribution's "kurtosis." A symmetrical distribution will have a skewness equal to zero, while a distribution that implies a relatively high probability of a large loss (gain) is said to exhibit negative (positive) skewness. A normal distribution has a kurtosis of 3, while a kurtosis higher than 3 indicates a relatively high probability of a large loss or gain. Since most investors are in it for the longer run, they strongly rely on compounding effects. This means that negative skewness and high kurtosis are extremely undesirable features as one big loss may destroy years of careful compounding.

Exhibit 6 shows the average skewness and kurtosis found in the returns of individual hedge funds from various strategy groups. From the exhibit it is clear that hedge fund returns tend to be far from normally distributed and exhibit

significant negative skewness as well as substantial kurtosis. Put another way, hedge fund returns may exhibit relatively low standard deviations, but they also tend to provide skewness and kurtosis attributes that are exactly opposite to what investors desire. It is this whole package that constitutes hedge fund risk, not just the standard deviation.

SHARPE RATIOS AND ALPHAS OF HEDGE FUNDS CAN BE HIGHLY MISLEADING

To evaluate hedge fund performance many investors use the so-called Sharpe ratio, which is calculated as the ratio of the average excess return and the return standard deviation of the fund being evaluated. When applied to raw hedge fund return data, the relatively high means and low standard deviations offered by hedge funds lead to Sharpe ratios that are considerably higher than those of the relevant benchmark indices. While this type of analysis is widely used, it is again not without problems. First, survivorship bias and autocorrelation will cause investors to overestimate the mean and underestimate the standard deviation. Second, the Sharpe ratio does not take account of the negative skewness and excess kurtosis observed in hedge fund returns. This means that the Sharpe ratio will tend to systematically overstate true hedge fund performance. In this context it is important to note that there tends to be a clear relationship between a fund's Sharpe ratio and the skewness and kurtosis of that fund's return distribution. High Sharpe ratios tend to go together with negative skewness and high kurtosis. This means that the relatively high mean and low standard deviation offered by hedge funds is not a free lunch. Investors simply pay for a more attractive Sharpe ratio in the form of more negative skewness and higher kurtosis.

Another performance measure often used is "alpha." The idea behind alpha is to first construct a portfolio that replicates the sensitivities of a fund to the relevant return-generating factors and then compare the fund return with the return on that portfolio. If the fund produces a higher average return, this can be interpreted as superior performance since both share the same return-generating factors. The main problem with this approach lies in the choice of return-generating factors. As mentioned before, we have little idea what factors really generate hedge fund returns. As a result, investors that calculate hedge funds' alphas are likely to leave out one or more relevant risk factors. This will produce excess return where in reality there is none. Good examples of often forgotten but extremely important risks are credit and liquidity risk. So far, no study of hedge fund performance has explicitly figured in credit or liquidity risk as a source of return, despite the fact that some hedge funds virtually live off it.

Providing liquidity to a market can be expected to be compensated by a higher average return. However, when this is not taken into account, we will find alpha where there is in fact none. Exhibit 7 provides a simple example. For individual funds in the various strategy groups, Exhibit 7 shows 1) the average alpha assuming the stock and bond market are the only relevant risk fac-

EXHIBIT 6

Average Skewness and Kurtosis Individual Hedge Fund Returns 1994–2001

	Skewness	Kurtosis
Merger Arbitrage	-0.50	7.60
Distressed Securities	-0.77	8.92
Equity Mkt. Neutral	-0.40	5.58
Convertible Arbitrage	-1.12	8.51
Global Macro	1.04	10.12
Long/Short Equity	0.00	6.08
Emerging Markets	-0.36	7.83

EXHIBIT 7

Regression Individual Hedge Fund Alphas on Autocorrelation Coefficients 1994–2001

	Average Alpha	Average AC (1)	Regression Coefficient
Merger Arbitrage	1.20	0.13	1.1356
Distressed Securities	0.89	0.25	0.8720
Equity Mkt. Neutral	0.40	0.08	0.3112
Convertible Arbitrage	0.97	0.30	1.2975
Global Macro	0.26	0.03	0.2864
Long/Short Equity	0.94	0.09	0.8954
Emerging Markets	0.33	0.15	0.3680

tors, and 2) the average autocorrelation coefficient found in these funds monthly returns. Since the autocorrelation found in hedge fund returns is primarily the result of marking-to-market problems in illiquid markets, we can use the autocorrelation coefficient as a measure of the liquidity risk taken on by a fund. From the exhibit we see that there tends to be a positive relationship between alpha and autocorrelation. This is also confirmed by the last column of the exhibit, which shows the results of regressing the alphas of the funds in every strategy group on their respective autocorrelation coefficients. All regression coefficients are positive, meaning that in every category the funds that take more liquidity risk also tend to be the funds with the highest alphas.

The above makes it very clear that when it comes to hedge funds, traditional performance evaluation methods like the Sharpe ratio and alpha can be extremely misleading. A high Sharpe ratio or alpha should therefore not be interpreted as an indication of superior manager skill, but first and foremost as an indication that further research is required. One can only speak of superior performance if such research shows that the manager in question generates the observed excess return without taking any unusual and/or catastrophic risks. Unfortunately, simply studying a manager's past returns will not be enough. Apart from the fact that most hedge fund managers do not have much of a track record to study, extreme events only occur infrequently so that it is hard if not impossible to identify the presence of catastrophic risk from a relatively small sample of returns. Consider the following example. A substantial portion of the outstanding supply of catastrophe-linked bonds are held by hedge funds. These bonds pay an exceptionally high coupon in return for the bondholder putting (part of) his principal at risk. Since the world has not seen a major catastrophe for some time now, these bonds have performed very well and the available return series show little skewness. However, this does not give an accurate indication of the actual degree of skewness as when a catastrophe does eventually occur, these bonds will produce very large losses.

THERE ARE NO SHORTCUTS IN HEDGE FUND SELECTION

When it comes to fund selection, the first thing that investors should (but hardly ever) do is to investigate how good one has to be in predicting future winners and losers to actually make a difference, i.e., to do significantly better than the index or a randomly selected portfolio of funds. Subsequently, investors should ask themselves how likely it is that they indeed possess the required degree of fund-picking skills. Recent research by Martin [2001] has shown that the level of accuracy required to be a successful hedge fund picker is very high. Only investors that have an almost supernatural talent for distinguishing future winners and losers can expect to significantly outperform the average. This leaves us with the question of how likely it is that an investor (and that includes fund of funds managers) indeed possesses such an extremely high level of skill.

Many investors allocate to different managers based on these managers' historical track record. Relatively good performance is rewarded with a high allocation, while badly performing managers are replaced. The weight given to a track record by investors implies that many believe that good and bad performance persists, i.e., that winners will continue to win and losers will continue to lose. Unfortunately, this is not the case. Exhibit 8 shows the results of a regression of average individual hedge fund returns over the period June 1994–November 1997 on average individual hedge fund returns over the period December 1997–May 2001. The regression coefficients are all insignificant, pointing to a complete lack of persistence in these hedge funds' returns.

A strategy of allocating only to top performers cannot be expected to yield a significantly higher return, but what

EXHIBIT 8

Regression Mean 1994-1997 on Mean 1997–2001

	Coefficient	t-statistic	R-squared
Long/Short Equity	0.1815	1.5698	0.0217
Merger Arbitrage	0.2584	1.6175	0.0439
Global Macro	-0.7999	-1.9220	0.1976
Emerging Markets	0.3031	2.1496	0.1614
Equity Market Neutral	0.0898	0.4960	0.0084

EXHIBIT 9

Individual Hedge Fund and Hedge Fund Portfolio Risks

	Individual Hedge Funds			Portfolio of Hedge Funds		
	Standard Deviation	Skewness	Corr S&P 500	Standard Deviation	Skewness	Corr S&P 500
Merger Arbitrage	1.75	-0.50	0.47	1.04	-2.19	0.56
Distressed Securities	2.37	-0.77	0.37	1.54	-2.60	0.47
Equity Mkt. Neutral	2.70	-0.40	0.07	1.14	-0.41	0.19
Convertible Arbitrage	3.01	-1.12	0.19	1.64	-1.35	0.38
Global Macro	5.23	1.04	0.14	2.43	0.87	0.37
Long/Short Equity	5.83	0.00	0.35	2.95	-0.29	0.63
Emerging Markets	8.33	-0.36	0.44	6.15	**-0.65**	0.67

about other strategies like investing only in young funds, large funds, funds where the manager has a Ph.D., funds that charge extremely high fees, etc.? So far, after properly controlling for all the risks involved, none of these strategies has turned out to produce superior results. At first sight it often appears that on average small, young funds produce higher returns than larger, older funds. There are several good reasons for this, however. First, most funds do not start contributing to a database until some time after their actual start-up date. This means that we have no information available about funds that close down before entering a database, which will lead us to overestimate the average return on young funds. Second, young funds are more risky. They are more likely to close down due to lack of assets under management or disappointing performance. In addition, successful young funds will have to undergo significant organizational changes to deal with the increase of assets under management and the greater variety in investment strategies followed. This makes them more risky in operational terms as well.

Another indication of the difficulty of selecting future winners and losers can be found in the performance of funds of hedge funds. Over the period 1994–2001, an equally-weighted portfolio of randomly selected hedge funds would have offered an almost 3% higher mean return than the average fund of funds. Since this is more or less equal to the annual management and incentive fee charged by funds of funds, this strongly suggests that the timing and fund-picking activities of the average fund of funds manager are not rewarded by a higher return.

The above strongly suggests that, at least for the majority of investors, successful fund picking is an illusion. Frantically chasing winners, as so many investors and funds of funds seem to do nowadays, can only be expected to lead to higher costs and therefore lower bottom-line returns. A much more rational strategy is to develop proper due diligence and monitoring procedures, use these to identify professional, trustworthy managers (that charge reasonable fees), and simply stick with them.

HEDGE FUND DIVERSIFICATION IS NOT A FREE LUNCH

The only time when investors should not diversify is when they have substantial fund-picking skills. Since this is quite unlikely when it comes to hedge funds, hedge fund investors should always invest in a diversified basket of funds and not in just one or two individual funds. For risk-averse investors, diversification is often said to be the only true free lunch in finance. Unfortunately, this does not include hedge funds. Although combining hedge funds into a basket will substantially reduce the standard deviation of the return on that portfolio, it can also be expected to lower the skewness and raise the correlation with the stock market.

Exhibit 9 shows the standard deviation, skewness, and correlation with the S&P 500 of the average individual hedge fund in the various strategy groups as well as an equally-weighted portfolio of all funds in each group. From the exhibit we see that forming portfolios leads to a very substantial reduction in standard deviation. With the exception of emerging market funds, the portfolio standard deviations are approximately half the standard deviations of the average individual fund. This again signals that the degree of correlation between funds in the same strategy group must be quite low. Contrary to standard deviation, skewness is not diversified away and actually drops further as portfolios are formed. With the exception of equity market neutral funds, the portfolio skewness figures are lower than for the average individual fund, with especially merger

arbitrage and distressed securities funds standing out. Despite the lack of overall correlation, it appears that when things are bad for one fund, they tend to be bad for other funds in the same sector as well. Finally, comparing the correlation on individual funds and portfolios we see clearly that the returns on portfolios of hedge funds tend to be much more correlated with the stock market than the returns on individual funds. Although individual hedge funds may be more or less market neutral, the portfolios that most investors invest in are not.

HEDGE FUNDS DO NOT COMBINE VERY WELL WITH EQUITY

It is often argued that given their relatively weak correlation with other asset classes, hedge funds can play an important role in risk reduction and yield enhancement strategies. This diversification service does not come for free, however. Although the inclusion of hedge funds in a portfolio may significantly improve that portfolio's mean-variance characteristics, it can also be expected to lead to significantly lower skewness as well as higher kurtosis. Exhibit 10 shows what happens to the standard deviation, skewness, and kurtosis of the portfolio return distribution if, starting with 50% stocks and 50% bonds, we introduce hedge funds into a traditional stock-bond portfolio. As expected, when hedge funds are introduced the standard deviation drops significantly. This represents the relatively low correlation of hedge funds with stocks and bonds. This is the good news. The bad news, however, is that a similar drop is observed in the skewness of the portfolio return. In addition, we also observe a rise in kurtosis.

Especially the skewness effect goes far beyond what one might expect given the hedge fund skewness results in Exhibit 6. When things go wrong in the stock market, they also tend to go wrong for hedge funds—not necessarily because of what happens to stock prices (after all, many hedge funds do not invest in equity), but because a significant drop in stock prices will often be accompanied by a widening of credit spreads, a significant drop in market liquidity, higher volatility, etc. Since hedge funds are highly sensitive to such factors, when the stock market drops, hedge funds can be expected to show relatively bad performance as well. Recent experience provides a good example. Over the year 2002, the S&P 500 dropped by more than 20% with relatively high volatility and substantially widening credit spreads. Distressed debt funds, at the start of 2002 seen by many investors as one of the most promising sectors, suffered substantially from the widening of credit spreads. Credit spreads also had a negative impact on convertible arbitrage funds. Stock market volatility worked in their favor, however. Managers focusing on volatility trading generally fared best, while managers actively taking credit exposure did worst. Equity market neutral funds suffered greatly from a lack of liquidity, while long/short equity funds with low net exposure outperformed managers that remained net long throughout the year. As a result, overall hedge fund performance in 2002 as measured by the main hedge fund indices was more or less flat.

EXHIBIT 10

Effects of Combining Hedge Funds with Stocks and Bonds

% HF	SD	Skewness	Kurtosis
0	2.49	-0.33	2.97
5	2.43	-0.40	3.02
10	2.38	-0.46	3.08
15	2.33	-0.53	3.17
20	2.29	-0.60	3.28
25	2.25	-0.66	3.42
30	2.22	-0.72	3.58
35	2.20	-0.78	3.77
40	2.18	-0.82	3.97
45	2.17	-0.85	4.19
50	2.16	-0.87	4.41

MODERN PORTFOLIO THEORY IS TOO SIMPLISTIC TO DEAL WITH HEDGE FUNDS

Implicitly or explicitly, many investors evaluate and select investment portfolios in the mean-variance framework of Markowitz [1959], which formalizes the idea that out of all possible portfolios a risk-averse investor will only be interested in those portfolios that offer the highest expected return for a given level of standard deviation. When studied in the mean-variance framework, the inclusion of hedge funds in a portfolio appears to pay off impressive dividends. However, since mean-variance analysis only looks at the mean and standard deviation, it skips over the fact that with hedge funds more attractive mean-variance attributes tend to go hand in hand with less attractive skewness and kurtosis properties.

We performed two standard mean-variance optimizations; one with only stocks and bonds and one with stocks, bonds, and hedge funds as the available asset classes.

EXHIBIT 11
Mean-Variance Optimal Portfolios

	Stocks and Bonds Only					
Std.Dev.	**Mean**	**% Stocks**	**% Bonds**	**% HFund**	**Skew**	**Kurtosis**
2	0.77	32.79	67.21		0.04	3.23
2.5	0.95	50.31	49.69		-0.34	2.97
3	1.10	64.68	35.32		-0.55	3.24
3.5	1.23	77.86	22.14		-0.68	3.57
4	1.36	90.44	9.56		-0.77	3.86
	Stocks, Bonds, and Hedge Funds					
2	0.92	18.07	26.81	55.12	-0.82	4.39
2.5	1.06	29.95	10.75	59.30	-0.99	5.26
3	1.20	45.07	0	54.93	-1.07	5.47
3.5	1.30	67.08	0	32.92	-1.00	4.81
4	1.39	86.14	0	13.86	-0.89	4.32

The results of both optimizations can be found in Exhibit 11. Starting with the case without hedge funds (top panel), we see that moving upwards over the efficient frontier results in a straightforward exchange of bonds for stocks. Since stocks have a higher mean than bonds, the mean goes up. While this happens, the skewness of the return distribution drops in a more or less linear fashion as stock returns are more negatively skewed than bond returns. The kurtosis of the return distribution remains more or less unchanged. Next, we added hedge funds and recalculated the efficient frontier (bottom panel). Moving over the efficient frontier, we see that at first bonds are exchanged for stocks while the hedge fund allocation remains more or less constant. When the bond allocation is depleted, the equity allocation continues to grow but now at the expense of the hedge fund allocation. Similar to the case without hedge funds, if we increase the standard deviation, the mean goes up, while the skewness of the return distribution goes down. Unlike what we saw before, however, skewness drops as long as bonds are being replaced by equity but rises again as hedge funds start to be replaced by equity. The lowest level of skewness is reached when the bond allocation reaches 0%, which is fully in line with our earlier observation that in terms of skewness hedge funds and equity are not a good mix.

Comparing the case with and without hedge funds, we see a significant improvement in the mean, especially for lower standard deviations. However, we also see a major deterioration in skewness and kurtosis, with the largest change taking pace exactly there where the mean improves most. From this it is painfully clear that standard mean-variance portfolio decision-making is no longer appropriate when hedge funds are involved as it completely ignores these effects. When hedge funds are involved, investors need a decision-making framework that also incorporates the skewness and kurtosis of the portfolio return distribution. Academic researchers have briefly worked on this kind of models in the early 1970s but, due to their higher level of complexity and because the returns on portfolios of stocks and bonds tend to be more or less normally distributed, none of them has attracted the kind of following that mean-variance models have.

ONE HAS TO INVEST AT LEAST 20% IN HEDGE FUNDS FOR IT TO MAKE A DIFFERENCE

Diversification is about not putting all of one's eggs in one basket. The idea, however, is not to put one egg in one basket and the other 99 in another. To fully realize the potential of diversification, investors have to spread their portfolio over the various asset classes in a more or less equal fashion. This is also the picture that emerges from Exhibit 10. Allocating 5% or 10% to hedge funds changes very little. Only if we invest 20% or more in hedge funds do we see significant changes in the standard deviation, skewness, and kurtosis. The above observation may seem very obvious, but it appears to be largely forgotten by (potential) hedge fund investors, many of whom (are contemplating to) invest only between 1%–5% in this asset class.

CONCLUSION

Proper hedge fund investing requires a much more elaborate approach to investment decision-making than is

currently in use by most investors. The available data on hedge funds should not be taken at face value, but should first be corrected for various types of errors, survivorship bias, and autocorrelation. Tools like mean-variance analysis and the Sharpe ratio that many investors have become accustomed to over the years are no longer appropriate when hedge funds are involved as they concentrate on the good part while completely skipping over the bad part of the hedge fund story. Investors also have to find a way to figure in the long lock-up and advance notice periods, which make hedge fund investments highly illiquid. In addition, investors will have to give weight to the fact that without more insight in the way in which hedge funds generate their returns, it is very hard to say something sensible about hedge funds' future longer-run performance. The academic tools to accomplish this formally are not there (yet), meaning that more than ever investors will have to rely on good old-fashioned common sense.

It has also become clear that hedge funds are not the miracle cure that many investors think or have been told they are. Hedge funds offer investors a way to obtain a lower standard deviation and/or higher expected return but at the cost of a higher probability of a large loss, i.e., lower skewness and higher kurtosis. Whether the resulting portfolio makes for a more attractive investment than the original is purely a matter of taste, not a general rule. Finally, all those investors that (plan to) invest only 1%–5% in hedge funds should seriously consider whether this is really worth the effort as such a small allocation will have very little effect on the performance of the overall portfolio. To make a real difference one has to allocate at least 20% to hedge funds.

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