PART

One

Performance

Chapter 1 demonstrates how adding managed futures to a portfolio of stocks and bonds can reduce that portfolio's standard deviation more and more quickly than hedge funds can, and without the undesirable consequences that often accompany hedge fund allocations. Portfolios consisting of both hedge funds and managed futures are shown to exhibit even more desirable diversification properties.

Chapter 2 presents an original methodology for constructing a representative and pure commodity trading advisor (CTA) index that addresses some of the crucial issues investors can face during the allocation process. Using this index as a reference, the chapter also analyzes CTAs' return characteristics and the extent to which investors would be better off integrating CTAs in their global allocation.

Chapter 3 examines the many benefits to investing in CTAs. Past studies have found little evidence of performance persistence in the returns to CTAs. But these studies have used small data sets and methods with low statistical power. Larger data sets and a variety of statistical methods are used here to investigate whether some advisors or funds consistently outperform others. The analysis uses data from public funds, private funds, and CTAs and applies four distinct methods to evaluate performance persistence.

A small amount of performance persistence was found. It was stronger when a return/risk measure was used as the measure of performance. The persistence found was small relative to the noise in the data, and, therefore, precise methods and long time series had to be used to properly select funds or CTAs. Results also indicated that CTAs using long- or medium-run systems had higher returns than CTAs using short-term trading systems and that CTAs with higher historical returns tend to charge higher fees. Returns were negatively correlated with the most recent past returns, but were positive in the long run. Yet, when deciding whether to invest or withdraw funds, investors put more weight on the most recent returns.

Chapter 4 examines CTA performance, which has been analyzed by many academic and practioners. However, few studies attempt to determine whether there are significant differences in their performance over time. The study presented in this chapter investigates CTA performance using one of the biggest databases ever employed in performance analysis studies to determine if some funds consistently and significantly over- or underperform. The chapter also analyzes the survivorship bias present in CTAs as well as the dissolution frequencies of these funds.

Chapter 5 applies data envelopment analysis (DEA) to a performance evaluation framework for CTAs. The DEA methodology allows the authors to integrate several performance measures into one efficiency score by establishing a multidimensional efficient frontier. Two dimensions of the frontier are consistent with the standard Markowitz mean-variance framework. Additional risk and return dimensions include skewness and kurtosis. The chapter also illustrates a method of analyzing determinants of efficiency scores. Tobit regressions of efficiency scores on equity betas, beta-squared, fund size, length of manager track record, investment style (market focus), and strategy (discretionary versus systematic) are performed for CTA returns over two time frames representing different market environments. The authors find the efficiency scores to be negatively related to beta-squared in both time periods. Results also indicate that emerging CTAs (those with shorter manager track records) tend to have better DEA efficiency scores. This relationship is strongest during the period from 1998 to 2000, but not statistically significant during the period from 2000 to 2002. For both time periods, fund size is not related to efficiency scores.

Chapter 6 examines the performance of six CTA indices from 1990 to 2003, during which time four distinct market trends are identified as well as three extreme events. The authors show that traditional multifactor as well as multimoment asset pricing models do not adequately describe CTA returns. However, with a proper choice of risk factors, a significant proportion of CTA returns can be explained and the abnormal performance of each strategy can be assessed properly.

Chapter 7 applies the basic, cross-evaluation, and superefficiency DEA models to evaluate the performance of CTA classifications. With the ever-increasing number of CTAs, there is an urgency to provide money managers, pension funds, and high-net-worth individuals with a trustworthy appraisal method for ranking CTA efficiency. Data envelopment analysis can achieve this, with the important benefit that benchmarks are not required, thereby alleviating the problem of using traditional benchmarks to examine nonnormal returns.

CHAPTER 1

Managed Futures and Hedge Funds: A Match Made in Heaven

Harry M. Kat

In this chapter we study the possible role of managed futures in portfolios of stocks, bonds, and hedge funds. We find that allocating to managed futures allows investors to achieve a very substantial degree of overall risk reduction at, in terms of expected return, relatively limited costs. Apart from their lower expected return, managed futures appear to be more effective diversifiers than hedge funds. Adding managed futures to a portfolio of stocks and bonds will reduce that portfolio's standard deviation more and more quickly than hedge funds will, and without the undesirable side effects on skewness and kurtosis. Overall portfolio standard deviation can be reduced further by combining both hedge funds and managed futures with stocks and bonds. As long as at least 45 to 50 percent of the alternatives allocation is to managed futures, this will have no negative side effects on skewness and kurtosis.

INTRODUCTION

Hedge funds are often said to provide investors with the best of both worlds: an expected return similar to equity combined with a risk similar to bonds. When past returns are simply extrapolated and risk is defined as the standard deviation of the fund return, this is indeed true. Recent research, however, has shown that the risk and dependence characteristics of hedge funds are substantially more complex than those of stocks and bonds. Amin and Kat (2003), for example, show that although including hedge funds in a traditional investment portfolio may significantly improve that portfolio's mean-variance characteristics, it can also be expected to lead to significantly

lower skewness. The additional negative skewness that arises when hedge funds are introduced in a portfolio of stocks and bonds forms a major risk, as one large negative return can destroy years of careful compounding. To hedge this risk, investors need to expand their horizon beyond stocks and bonds. Kat (2003) showed how stock index put options may be used to hedge against the unwanted skewness effect of hedge funds. Kat (2004) showed that put options on (baskets of) hedge funds may perform a similar task.

Of course, the list of possible remedies does not end here. Any asset or asset class that has suitable (co-)skewness characteristics can be used. One obvious candidate is managed futures. Managed futures programs are often trend-following in nature. In essence, what these programs do is somewhat similar to how option traders hedge a short call position. When the market moves up, they increase exposure, and vice versa. By moving out of the market when it comes down, managed futures programs avoid being pulled in. As a result, the (co-)skewness characteristics of managed futures programs can be expected to be more or less opposite to those of many hedge funds.

In this chapter we investigate how managed futures mix with stocks, bonds, and hedge funds and how they can be used to control the undesirable skewness effects that arise when hedge funds are added to portfolios of stocks and bonds. We find that managed futures combine extremely well with stocks, bonds, and hedge funds and that the combination allows investors to significantly improve the overall risk characteristics of their portfolio without, under the assumptions made, giving up much in terms of expected return.

MANAGED FUTURES

The asset class "managed futures" refers to professional money managers known as commodity trading advisors (CTAs) who manage assets using the global futures and options markets as their investment universe. Managed futures have been available for investment since 1948, when the first public futures fund started trading. The industry did not take off until the late 1970s. Since then the sector has seen a fair amount of growth with currently an estimated $40 to $45 billion under management.

There are three ways in which investors can get into managed futures.

1. Investors can buy shares in a public commodity (or futures) fund, in much the same way as they would invest in stock or bond mutual funds.
2. They can place funds privately with a commodity pool operator (CPO) who pools investors' money and employs one or more CTAs to manage the pooled funds.

3. Investors can retain one or more CTAs directly to manage their money on an individual basis or hire a manager of managers (MOM) to select CTAs for them.

The minimum investment required by funds, pools, and CTAs varies considerably, with the direct CTA route open only to investors who want to make a substantial investment. CTAs charge management and incentive fees comparable to those charged by hedge funds (i.e., 2 percent management fee plus 20 percent incentive fee). Like funds of hedge funds, funds and pools charge an additional fee on top of that.

Initially, CTAs were limited to trading commodity futures (which explains terms such as "public commodity fund," "CTA," and "CPO"). With the introduction of futures on currencies, interest rates, bonds, and stock indices in the 1980s, however, the trading spectrum widened substantially. Nowadays CTAs trade both commodity and financial futures. Many take a very technical, systematic approach to trading, but others opt for a more fundamental, discretionary approach. Some concentrate on particular futures markets, such as agricultural, currencies, or metals, but most diversify over different types of markets.

For our purposes, one of the most important features of managed futures is their trend-following nature. That CTA returns have a strong trend-following component can be shown by calculating the correlation between managed futures returns and the returns on a purely mechanical trend-following strategy. One such strategy underlies the Mount Lucas Management (MLM) index, which reflects the results of a purely mechanical, moving-average-based, trading strategy in 25 different commodity and financial futures markets. Estimates of the correlation between the MLM index and CTA returns are typically positive and highly significant.

DATA

We distinguish between four different asset classes: stocks, bonds, hedge funds, and managed futures. Stocks are represented by the Standard & Poor's (S&P) 500 index and bonds by the 10-year Salomon Brothers Government Bond index. Hedge fund return data were obtained from Tremont TASS, one of the largest hedge fund databases currently available. After eliminating funds with incomplete and ambiguous data as well as funds of funds, the database at our disposal as of May 2001 contained monthly net-of-fee returns on 1,195 live and 526 dead funds. To avoid survivorship bias, we created 455 seven-year monthly return series by, beginning with the 455

funds that were alive in June 1994, replacing every fund that closed down during the sample period by a fund randomly selected from the set of funds alive at the time of closure, following the same type of strategy and of similar age and size. Next we used random sampling to create 500 different equally weighted portfolios containing 20 hedge funds each. From the monthly returns on these portfolios we calculated the mean, standard deviation, skewness, and kurtosis and determined the median value of each of these statistics. Subsequently we selected the portfolio whose sample statistics came closest to the latter median values. We use this "median portfolio" to represent hedge funds.

Managed futures are represented by the Stark 300 index. This asset-weighted index is compiled using the top 300 trading programs from the Daniel B. Stark & Co. database.[1] The top 300 trading programs are deter` gram closes down, the index does not get adjusted backward, which takes care of survivorship bias issues. All 300 of the CTAs in the index are classified by their trading approach and market category. Currently the index contains 248 systematic and 52 discretionary traders, which split up in 169 diversified, 111 financial only, 9 financial and metals, and 11 nonfinancial trading programs.

Throughout we use monthly return data over the period June 1994 to May 2001. For bonds, hedge funds, and managed futures we use the sample mean as our estimate of the expected future return. For stocks, however, we assume an expected return of 1 percent per month, as it would be unrealistic to assume an immediate repeat of the 1990s bull market. Under these assumptions, the basic return statistics for our four asset classes are shown in Table 1.1 The table shows that managed futures returns have a lower mean and a higher standard deviation than hedge fund returns. However, managed futures also exhibit positive instead of negative skewness and much lower kurtosis.[2] From the correlation matrix we see that the correlation of managed futures with stocks and hedge funds is very low. This means that, as long as there are no negative side effects, such as lower skewness or higher kurtosis, managed futures will make very good diversifiers. This is what we investigate in more detail next.

[1]Note that contrary to the Mount Lucas Management index, the Stark 300 is a true CTA index.

[2]Over the sample period the MLM index has a mean of 0.89 percent, a standard deviation of 1.63 percent, a skewness of –0.81 and a kurtosis of 3.42. The Stark 300 index has fundamentally different skewness and kurtosis properties than the MLM index.

TABLE 1.1 Basic Monthly Statistics S&P 500, Bonds, Hedge Funds, and Managed Futures

	S&P 500	Bonds	Hedge Funds	Managed Fut.
Mean	1.00	0.45	0.99	0.70
Standard deviation	4.39	1.77	2.44	2.89
Skewness	–0.82	0.58	–0.47	0.45
Excess kurtosis	1.05	1.45	2.67	0.21
	Correlations			
	S&P 500	**Bonds**	**Hedge Fund**	**Managed Fut.**
S&P 500	1			
Bonds	0.15	1		
HF	0.63	–0.05	1	
MF	–0.07	0.20	–0.14	1

STOCKS, BONDS, PLUS HEDGE FUNDS OR MANAGED FUTURES

Given the complexity of the relationship between hedge fund and equity returns, we study the impact of hedge funds and managed futures for two different types of investors. The first are what we refer to as 50/50 investors—investors who always invest an equal amount in stocks and bonds. When adding hedge funds and/or managed futures to their portfolio, 50/50 investors will reduce their stock and bond holdings by the same amount. This gives rise to portfolios consisting of 45 percent stocks, 45 percent bonds, and 10 percent hedge funds or 40 percent stocks, 40 percent bonds, and 20 percent managed futures. The second type of investors, what we call 33/66 investors, always divide the money invested in stocks and bonds in such a way that one-third is invested in stocks and two-thirds is invested in bonds.

The first step in our analysis is to see whether there are any significant differences in the way in which hedge funds and managed futures combine with stocks and bonds. We therefore form portfolios of stocks, bonds, and hedge funds, as well as portfolios of stocks, bonds, and managed futures. Table 1.2 shows the basic return statistics for 50/50 investors. Table 1.3 shows the same for 33/66 investors. From Table 1.2 we see that if the hedge fund allocation increases, both the standard deviation and the skewness of the portfolio return distribution drop substantially, while at the same time the return distribution's kurtosis increases. A similar picture emerges from

TABLE 1.2 Return Statistics 50/50 Portfolios of Stocks, Bonds, and Hedge Funds or Managed Futures

Hedge Funds					Managed Futures				
% HF	Mean	SD	Skewness	Kurtosis	% MF	Mean	SD	Skewness	Kurtosis
0	0.72	2.49	–0.33	–0.03	0	0.72	2.49	–0.33	–0.03
5	0.73	2.43	–0.40	0.02	5	0.71	2.37	–0.28	–0.18
10	0.74	2.38	–0.46	0.08	10	0.71	2.26	–0.21	–0.30
15	0.76	2.33	–0.53	0.17	15	0.71	2.16	–0.14	–0.39
20	0.77	2.29	–0.60	0.28	20	0.71	2.08	–0.06	–0.42
25	0.78	2.25	–0.66	0.42	25	0.71	2.00	0.02	–0.40
30	0.80	2.22	–0.72	0.58	30	0.71	1.95	0.10	–0.32
35	0.81	2.20	–0.78	0.77	35	0.71	1.91	0.18	–0.20
40	0.82	2.18	–0.82	0.97	40	0.71	1.89	0.24	–0.06
45	0.84	2.17	–0.85	1.19	45	0.71	1.89	0.30	0.08
50	0.85	2.16	–0.87	1.41	50	0.71	1.91	0.34	0.19

Table 1.3 for 33/66 investors, except that the drop in skewness is much more pronounced. With managed futures the picture is different. If the managed futures allocation increases, the standard deviation drops faster than with hedge funds. More remarkably, skewness rises instead of drops while kurtosis drops instead of rises. Although (under the assumptions made) hedge funds offer a somewhat higher expected return, from an overall risk perspective managed futures appear to be better diversifiers than hedge funds.

TABLE 1.3 Return Statistics 33/66 Portfolios of Stocks, Bonds, and Hedge Funds or Managed Futures

Hedge Funds					Managed Futures				
% HF	Mean	SD	Skewness	Kurtosis	% MF	Mean	SD	Skewness	Kurtosis
0	0.62	2.01	0.03	0.21	0	0.62	2.01	0.03	0.21
5	0.64	1.97	–0.05	0.13	5	0.62	1.93	0.09	0.17
10	0.66	1.93	–0.14	0.08	10	0.63	1.85	0.15	0.14
15	0.68	1.90	–0.24	0.04	15	0.63	1.79	0.22	0.15
20	0.69	1.87	–0.34	0.04	20	0.64	1.75	0.28	0.18
25	0.71	1.86	–0.43	0.09	25	0.64	1.71	0.34	0.24
30	0.73	1.85	–0.52	0.17	30	0.65	1.70	0.39	0.30
35	0.75	1.84	–0.60	0.31	35	0.65	1.70	0.42	0.36
40	0.77	1.85	–0.66	0.49	40	0.65	1.72	0.45	0.41
45	0.79	1.86	–0.71	0.70	45	0.66	1.76	0.47	0.43
50	0.80	1.89	–0.75	0.94	50	0.66	1.81	0.48	0.42

HEDGE FUNDS PLUS MANAGED FUTURES

The next step is to study how hedge funds and managed futures combine with each other. This is shown in Table 1.4. Adding managed futures to a hedge fund portfolio will put downward pressure on the portfolio's expected return as the expected return on managed futures is lower than that of hedge funds. From a risk perspective, however, the benefits of managed futures are again very substantial. From the table we see that adding managed futures to a portfolio of hedge funds will lead to a very significant drop in the portfolio return's standard deviation. With 40 percent invested in managed futures, the standard deviation falls from 2.44 percent to 1.74 percent. When 45 percent is invested in managed futures, skewness rises quickly—from –0.47 to 0.39, and kurtosis exhibits a strong drop—from 2.67 to –0.17. Giving up 10 to 15 basis points per month in expected return does not seem an unrealistic price to pay for such a substantial improvement in overall risk profile.

STOCKS, BONDS, HEDGE FUNDS, AND MANAGED FUTURES

The final step in our analysis is to bring all four asset classes together in one portfolio. We do so in two steps. First, we combine hedge funds and managed futures into what we will call the alternatives portfolio. Then we combine the alternatives portfolio with stocks and bonds. We vary the managed futures allocation in the alternatives portfolio as well as the alternatives allocation in the overall portfolio from 0 percent to 100 percent in 5 percent steps.

Without managed futures, increasing the alternatives allocation will significantly raise the expected return. When the managed futures alloca-

TABLE 1.4 Return Statistics Portfolios of Hedge Funds and Managed Futures

% MF	Mean	SD	Skewness	Kurtosis
0	0.99	2.44	–0.47	2.67
5	0.97	2.31	–0.37	2.31
10	0.96	2.18	–0.27	1.91
15	0.94	2.06	–0.15	1.46
20	0.93	1.96	–0.03	1.01
25	0.92	1.88	0.09	0.59
30	0.90	1.81	0.20	0.23
35	0.89	1.76	0.29	–0.01
40	0.87	1.74	0.36	–0.14
45	0.86	1.74	0.39	–0.17
50	0.85	1.76	0.39	–0.15

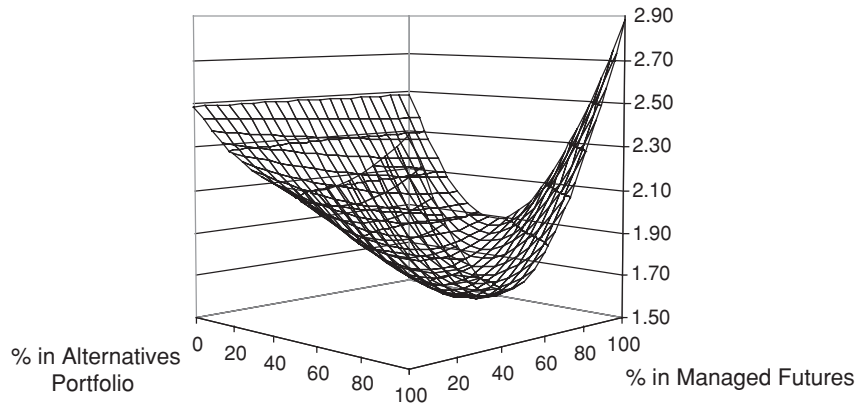

FIGURE 1.1 Standard Deviation 50/50 Portfolios of Stocks, Bonds, Hedge Funds, and Managed Futures

tion increases, however, the expected return will drop. This follows directly from the result that the expected return on hedge funds is 0.99 percent, but it is only 0.70 percent on managed futures (Table 1.1). On the risk front the picture is much more interesting. Figures 1.1 and 1.2 show that investing in alternatives can substantially reduce the overall portfolio return's standard deviation, for 50/50 as well as 33/66 investors. The drop, however, is heavily dependent on the percentage of managed futures in the alternatives portfolio. Surprisingly, for allocations to alternatives between 0 percent and 20 percent, the lowest standard deviations are obtained without hedge funds,

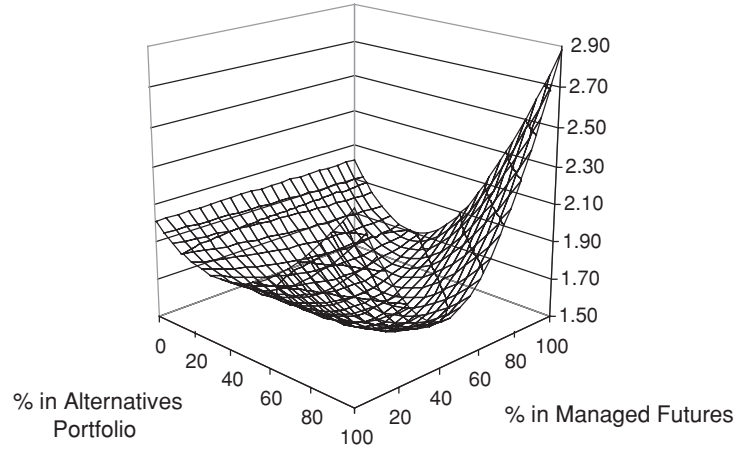

FIGURE 1.2 Standard Deviation 33/66 Portfolios of Stocks, Bonds, Hedge Funds, and Managed Futures

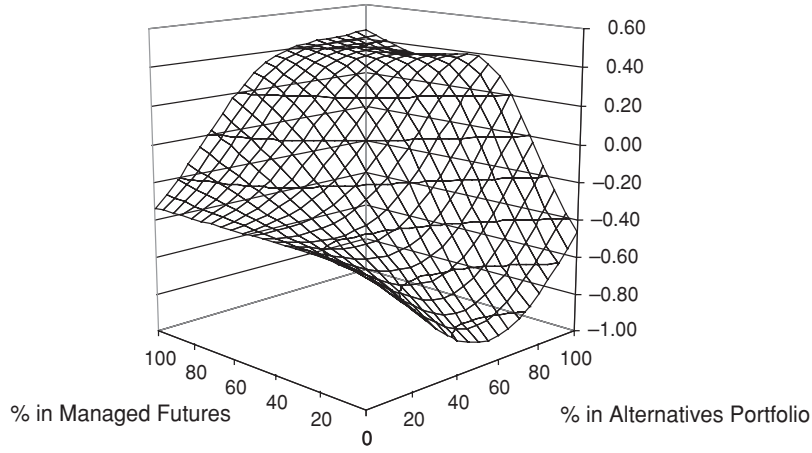

FIGURE 1.3 Skewness 50/50 Portfolios of Stocks, Bonds, Hedge Funds, and Managed Futures

that is, when 100 percent is invested in managed futures. For higher alternatives allocations, however, it pays also to include some hedge funds in the alternatives portfolio. This makes sense, because for the alternatives portfolio, the lowest standard deviation is found when 40 to 45 percent is invested in managed futures. We saw that before in Table 1.4.

Figures 1.3 and 1.4 show the impact of allocation on skewness, for 50/50 and 33/66 investors respectively. From these graphs we see once more

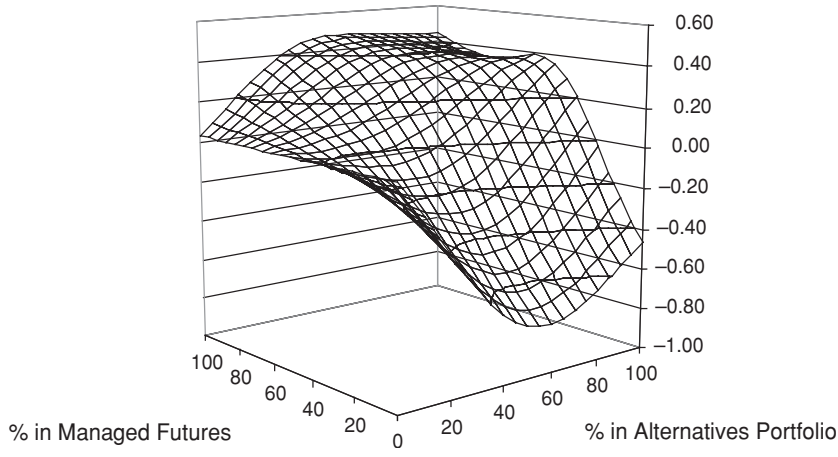

FIGURE 1.4 Skewness 33/66 Portfolios of Stocks, Bonds, Hedge Funds, and Managed Futures

that without managed futures, increasing the alternatives allocation will lead to a substantial reduction in skewness. The higher the managed futures allocation, however, the more this effect is neutralized. When more than 50 percent is invested in managed futures, the skewness effect of hedge funds is (more than) fully eliminated and the skewness of the overall portfolio return actually rises when alternatives are introduced. Finally, Figures 1.5 and 1.6 show the impact on kurtosis. With 0 percent allocated to managed futures, kurtosis rises substantially when the alternatives allocation is increased. With a sizable managed futures allocation, however, this is no longer the case, and kurtosis actually drops when more weight is given to alternatives.

To summarize, Figures 1.1 to 1.6 show that *investing in managed futures can improve the overall risk profile of a portfolio far beyond what can be achieved with hedge funds alone*. Making an allocation to managed futures not only neutralizes the unwanted side effects of hedge funds but also leads to further risk reduction. Assuming managed futures offer an acceptable expected return, all of this comes at quite a low price in terms of expected return forgone.

To make sure that these findings have general validity—that they are not simply due to the particular choice of index—we repeated the procedure with a number of other CTA indices, including various indices calculated by the Barclay Group. In all cases the results were very similar, which

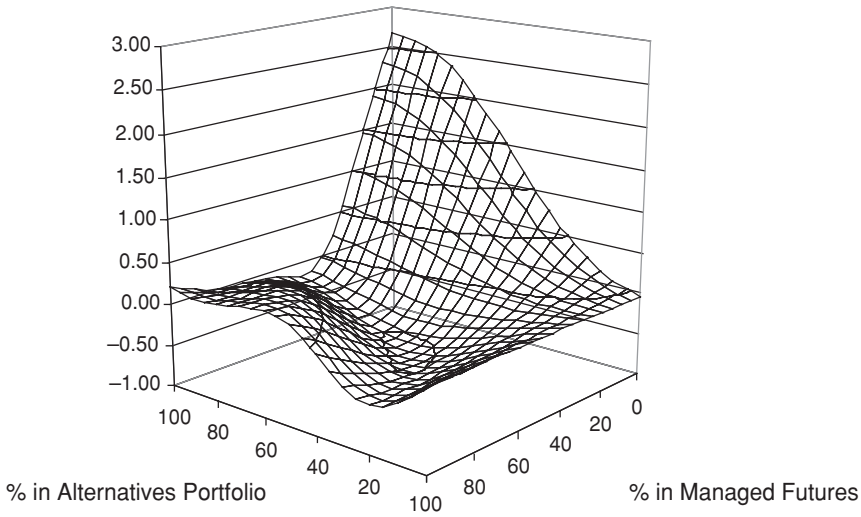

FIGURE 1.5 Kurtosis 50/50 Portfolios of Stocks, Bonds, Hedge Funds, and Managed Futures

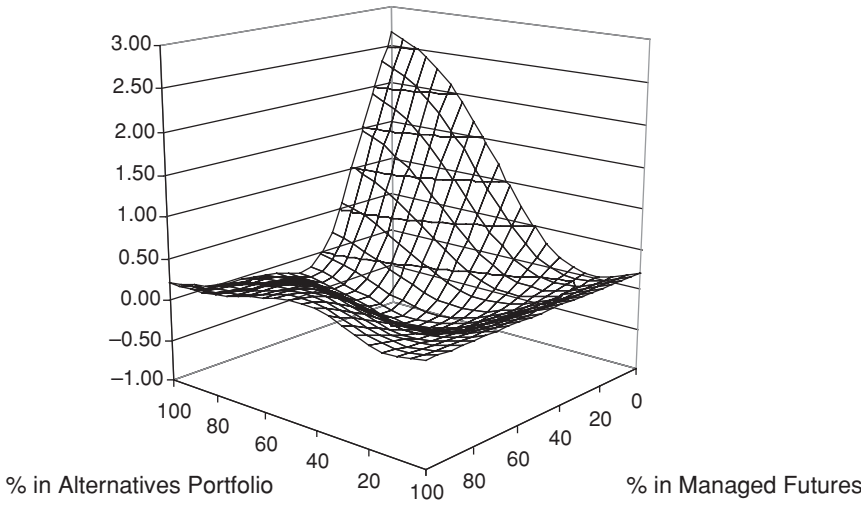

FIGURE 1.6 Kurtosis 33/66 Portfolios of Stocks, Bonds, Hedge Funds, and Managed Futures

suggests that our results are robust with respect to the choice of managed futures index.

SKEWNESS REDUCTION WITH MANAGED FUTURES

Our findings lead us to question what the exact costs are of using managed futures to eliminate the negative skewness that arises when hedge funds are introduced in a traditional portfolio of stocks and bonds. To answer this question we follow the same procedure as in Kat (2003). First, we determine the managed futures allocation required to bring the overall portfolio skewness back to its level before the addition of hedge funds, which is –0.33 for 50/50 investors and 0.03 for 33/66 investors. Next, we leverage (assuming 4 percent interest) the resulting portfolio to restore the standard deviation. Tables 1.5 and 1.6 show the resulting overall portfolio allocations and the accompanying changes in expected return (on a per annum basis) and kurtosis. From Table 1.6 we see that the optimal portfolios are quite straightforward. In essence, the bulk of the managed futures holdings is financed by borrowing, without changing much about the stock, bond, and hedge fund allocations. It is interesting to see that for smaller initial hedge fund allocations, the optimal hedge fund and managed futures allocation are more or less equal. This is true for 50/50 as well as 33/66 investors.

TABLE 1.5 Allocations and Change in Mean and Kurtosis 50/50 Portfolios of Stocks, Bonds, Hedge Funds, Managed Futures, and Cash with –0.33 Skewness and Standard Deviations as in Third Column of Table 1.2

Initial % HF	% Stocks	% Bonds	% HF	% MF	% Cash	Gain Mean per annum	Change Kurtosis
0	50.00	50.00	0.00	0.00	0.00	0.00	0.00
5	47.42	47.42	4.99	5.48	–5.30	0.66	–0.18
10	44.71	44.71	9.94	9.95	–9.30	1.15	–0.34
15	41.99	41.99	14.82	13.60	–12.40	1.53	–0.50
20	39.34	39.34	19.67	16.55	–14.90	1.83	–0.66
25	36.67	36.67	24.45	18.91	–16.70	2.05	–0.82
30	34.09	34.09	29.22	20.80	–18.20	2.23	–0.98
35	31.55	31.55	33.98	22.33	–19.40	2.37	–1.15
40	29.06	29.06	38.75	23.32	–20.20	2.46	–1.31
45	26.61	26.61	43.54	24.04	–20.80	2.53	–1.46
50	24.25	24.25	48.50	24.40	–21.40	2.60	–1.59

Looking at the change in expected return, we see that as a result of the addition of managed futures and the subsequent leverage, the expected return actually increases instead of drops. From the last column we also see that this rise in expected return is accompanied by a significant drop in kurtosis. This compares very favorably with the results in Kat (2003, 2004), where it is shown that the costs of skewness reduction through stock index or hedge fund puts can be quite significant.

TABLE 1.6 Allocations and Change in Mean and Kurtosis 33/66 Portfolios of Stocks, Bonds, Hedge Funds, Managed Futures, and Cash with 0.03 Skewness and Standard Deviations as in Third Column of Table 1.3

Initial % HF	% Stocks	% Bonds	% HF	% MF	% Cash	Gain Mean per annum	Change Kurtosis
0	33.33	66.67	0.00	0.00	0.00	0.00	0.00
5	32.08	64.16	5.07	6.70	–8.00	0.98	–0.07
10	30.54	61.07	10.18	12.71	–14.50	1.79	–0.15
15	28.83	57.66	15.26	17.96	–19.70	2.44	–0.22
20	26.99	53.99	20.25	22.37	–23.60	2.93	–0.31
25	25.11	50.22	25.11	26.06	–26.50	3.29	–0.42
30	23.21	46.41	29.84	29.04	–28.50	3.53	–0.56
35	21.32	42.63	34.44	31.41	–29.80	3.69	–0.73
40	19.47	38.94	38.94	33.15	–30.50	3.76	–0.93
45	17.65	35.29	43.31	34.35	–30.60	3.76	–1.15
50	15.85	31.71	47.56	35.18	–30.30	3.70	–1.38

Conclusion

In this chapter we have studied the possible role of managed futures in portfolios of stocks, bonds, and hedge funds. We have found that allocating to managed futures allows investors to achieve a very substantial degree of overall risk reduction at limited costs. Despite their lower expected return, managed futures appear to be more effective diversifiers than hedge funds. Adding managed futures to a portfolio of stocks and bonds will reduce that portfolio's standard deviation more effectively than hedge funds alone, and without the undesirable impact on skewness and kurtosis. This does not mean that hedge funds are superfluous. Overall portfolio standard deviation can be reduced further by combining both hedge funds and managed futures with stocks and bonds. As long as at least 45 to 50 percent of the alternatives allocation is allocated to managed futures, there will be no negative side effects on portfolio skewness and kurtosis. Assuming that hedge funds will continue to provide higher returns than managed futures, the inclusion of hedge funds also will boost the portfolio's expected return somewhat.