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MANAGED FUTURES AND HEDGE FUNDS: A MATCH MADE IN HEAVEN

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In this paper 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 quicker than hedge funds will, and without the undesirable side effects on skewness and kurtosis. The 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 45–50% of the alternatives allocation is allocated to managed futures, this will have no negative side effects on skewness and kurtosis.

1 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 that of 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 will have to expand their horizon beyond stocks and bonds. In Kat (2003) it was shown how stock index put options may be used to hedge against the unwanted skewness effect of hedge funds. In Kat (2002) it was shown that put options on (baskets of) hedge funds may perform a similar task.

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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 what option traders will do to 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 paper, 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 adding hedge funds to portfolios of stocks and bonds. We find that managed futures combine extremely well with stocks and bonds as well as 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.

2   Managed futures

The asset class "managed futures" refers to professional money managers known as commodity trading advisors or 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 though. Since then the sector has seen a fair amount of growth with, currently, an estimated $40–45 billion under management.

There are three ways in which investors can get into managed futures. First, investors can buy shares in a public commodity (or futures) fund, in much the same way as they would invest in a stock or bond mutual funds. Second, investors 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. Third, 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 that want to make a substantial investment. CTAs charge management and incentive fees comparable to those charged by hedge funds, i.e. 2% management fee plus 20% incentive fee. Similar to 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 is the one underlying the Mount Lucas Management (MLM) index. The latter 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.

3   Data

We distinguish between four different asset classes: stocks, bonds, hedge funds, and managed futures. Stocks are represented by the S&P 500 index and bonds by the 10-year Salomon Brothers Government Bond index. Hedge fund return data were obtained from Tremont TASS, which is one of the largest hedge fund databases currently available. After eliminating funds with incomplete and ambiguous data as well as funds of funds, per May 2001 the database at our disposal contained monthly net of fee returns on 1195 live and 526 dead funds. To avoid survivorship bias, we created 455 7-year monthly return series by, starting off 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 determined quarterly, based on assets under management. When a trading program closes down, the index does not get adjusted backwards, 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 into 169 diversified, 111 financial only, 9 financial and metals, and 11 non-financial 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% 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. 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, especially, is extremely low. This means that, as long as there are no negative side effects such as lower skewness or higher kurtosis, for example, managed futures will make very good diversifiers. This is what we investigate in more detail next.

4   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 will refer to as '50/50 investors'. These are investors that always invest an equal amount in stocks and bonds. When adding hedge funds and/or managed futures

Table 1 Basic statistics S&P 500, bonds, hedge funds, and managed futures.

	S&P 500	Bonds	Hedge funds	Managed futures
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	1			
Bonds	0.15	1		
HF	0.63	−0.05	1	
MF	−0.07	0.20	−0.14	1

Table 2 Return statistics 50/50 portfolios of stocks, bonds, and hedge funds or managed futures

	Hedge funds					Managed futures			
% HF	Mean	SD	Skew	Kurt	% MF	Mean	SD	Skew	Kurt
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

to their portfolio, 50/50 investors will reduce their stock and bond holdings by the same amount. This gives rise to portfolios like 45% stocks, 45% bonds, and 10% hedge funds, or 40% stocks, 40% bonds, and 20% managed futures. The second type of investors are what we will call "33/66 investors". These investors always divide the money invested in stocks and bonds in such a way that $\frac{1}{3}$ is invested in stocks and $\frac{2}{3}$ 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 stocks, bonds, and managed futures. Table 2 shows the basic return statistics for 50/50 investors. Table 3 shows the same for 33/66 investors. From Table 2 we see that if the hedge fund allocation increases, both the standard deviation and the skewness of the port-folio return distribution drop substantially, while at the same time the return distribution's kurtosis increases. A similar picture emerges from Table 3 for 33/66 investors, except that the drop in skewness

Table 3 Return statistics 33/66 portfolios of stocks, bonds, and hedge funds or managed futures.

	Hedge funds					Managed futures			
% HF	Mean	SD	Skew	Kurt	% MF	Mean	SD	Skew	Kurt
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

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 dropping, while the reverse is true for kurtosis. 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.

5   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 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% invested in managed

Table 4 Return statistics portfolios of hedge funds and managed futures.

| % MF	Mean	SD	Skew	Kurt
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

futures the standard deviation comes down from 2.44% to 1.74%. Skewness rises quickly as well; from −0.47 without to 0.39 when 45% is invested in managed futures. In addition, kurtosis exhibits a strong drop; from 2.67 without to −0.17 when 45% is invested in managed futures. Giving up 10–15 basis points per month in expected return does not seem an unrealistic price to pay for such a substantial improvement in overall risk profile.

Not for Distribution

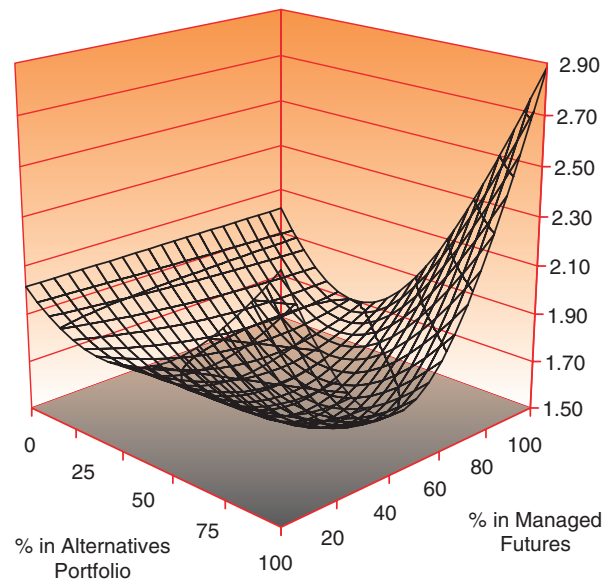## 6 Stocks, bonds, hedge funds, and managed futures

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." Secondly, 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% to 100% in 5% steps.

Without managed futures, increasing the alternatives allocation will significantly raise the expected return. When the managed futures allocation increases, however, the expected return will drop. This follows directly from the assumption that the expected return on hedge funds is 0.99%, but only 0.7% on managed futures. On the risk front, the picture is a lot more interesting. Figures 1 and 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% and 20% the lowest standard deviations are obtained without hedge funds, i.e. when 100% is invested in managed futures. For higher alternatives allocations, however, it pays to also include some hedge funds in the alternatives portfolio. This makes sense, as for the alternatives portfolio itself the lowest standard deviation is found when 40–45% is invested in managed futures. We saw that before in Table 4.

Figures 3 and 4 show the skewness results for 50/50 and 33/66 investors, respectively. From these graphs we see once more 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
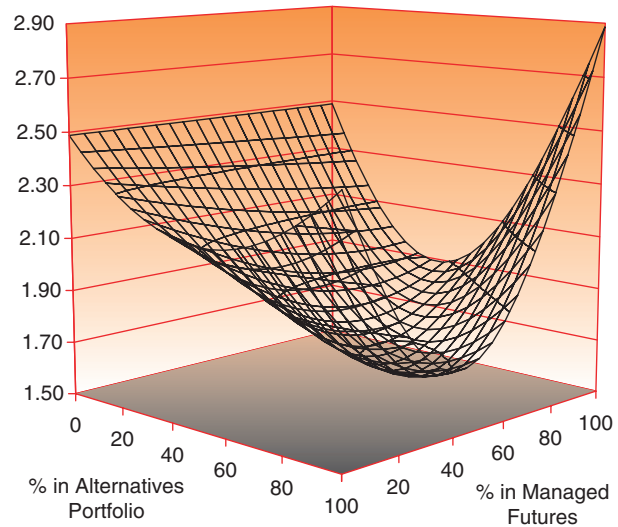

**Figure 1** Standard deviation 50/50 portfolios of stocks, bonds, HF, and MF.

Figure 2 Standard deviation 33/66 portfolios of stocks, bonds, HF, and MF.

this effect is neutralized. When more than 50% 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 5 and 6 show the results on kurtosis. With 0% allocated to managed futures, kurtosis rises substantially when the alternatives allocation is increased.
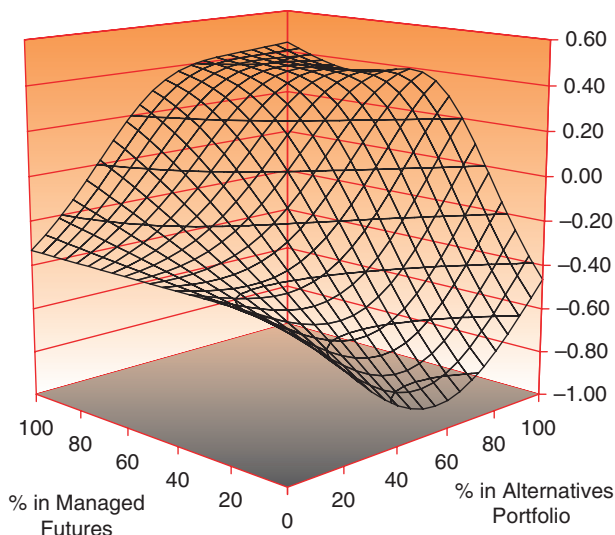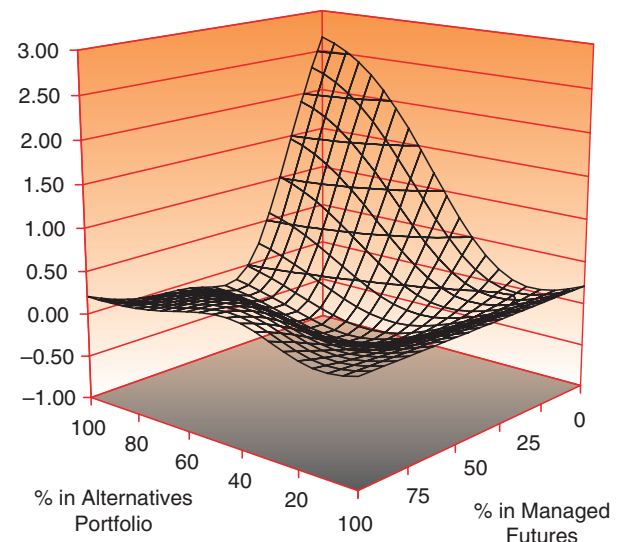
Figure 3 Skewness 50/50 portfolios of stocks, bonds, HF, and MF.
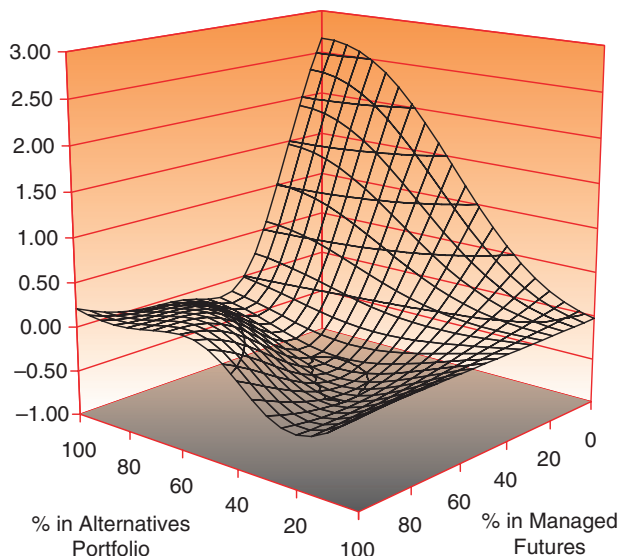
Figure 5 Kurtosis 50/50 portfolios of stocks, bonds, HF, and MF.
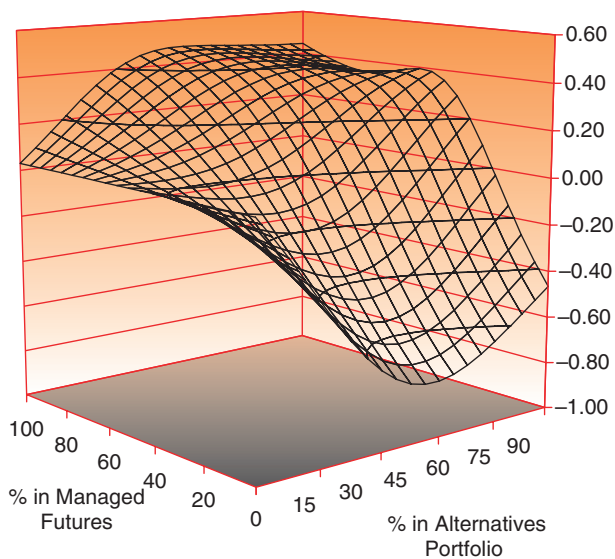
Figure 4 Skewness 33/66 portfolios of stocks, bonds, HF, and MF.

Figure 6 Kurtosis 33/66 portfolios of stocks, bonds, HF, and MF.

With a sizable managed futures allocation, however, this is no longer the case and kurtosis actually drops when more weight is given to alternatives.

In sum, Figures 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 foregone.

To make sure that the above findings have general validity, i.e. are not simply due to the particular

Table 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 in Table 2.

Initial % HF	% Stocks	% Bonds	% HF	% MF	% Cash	Gain mean pa	Change kurt
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

choice of index, we repeated the above procedure with a number of other CTA indexes, including various indexes calculated by The Barclay Group. In all cases the results were very similar to what we found above, meaning that our results are robust with respect to the choice of the managed futures index.

7   Skewness reduction with managed futures

The above leads us to the question as to what the exact costs are of using managed futures to eliminate the negative skewness effects of introducing hedge funds 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. Subsequently, we leverage (assuming 4% interest) the resulting portfolio to restore the standard deviation. The resulting overall portfolio allocations and the accompanying changes in expected return (on a per annum basis) and kurtosis are shown in Tables 5 and 6. From the latter 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.

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 (2002, 2003) where it is shown that the costs of skewness reduction through stock index or hedge fund puts can be quite significant.

8   Conclusion

In this paper we have studied the possible role of managed futures in portfolios of stocks, bonds, and hedge funds. We found that allocating to managed futures allows investors to achieve a very substantial degree of overall risk reduction at limited costs.

Table 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 in Table 3.

Initial % HF	% Stocks	% Bonds	% HF	% MF	% Cash	Gain mean pa	Change kurt
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

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 quicker than hedge funds will, and without the undesirable side effects on skewness and kurtosis. This does not mean that hedge funds are superfluous though. 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 45–50% of the alternatives allocation is allocated to managed futures, this again will not have any negative side effects on skewness and kurtosis. Assuming that, on average, hedge funds will continue to provide higher returns than managed futures, the inclusion of hedge funds will also boost the portfolio's expected return somewhat.

Notes

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

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

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