

Adding hedge funds to traditional investments

By Jean-François Bacmann and Stefan Scholz, RMF, a core investment manager of Man Investments

The recent bear market has prompted a number of institutional investors to look for other sources of returns than equities. The absolute returns promised by hedge funds have proved to be particularly appealing in this environment. This is illustrated by the fact that, according to TASS, hedge funds have never seen bigger money inflows than during recent quarters. Still, many investors have concerns about hedge funds. These concerns include questions over transparency, liquidity, complexity, and the riskiness of hedge funds. While the first three issues can be addressed on a somewhat qualitative basis (see Moix and Scholz (2003a, 2003b) for an extensive discussion of these topics), the notion of risk also needs to be addressed from a quantitative point of view. In this paper, we show how to use the Omega function in order to evaluate the risk-return profile of portfolios consisting of hedge funds and traditional investments such as stocks and bonds.

Difference in risk profile

Adding hedge funds to traditional investments has strong implications for the risk-return profile of the resulting blended portfolio. In essence, the risks related to traditional investments and hedge funds are different. The risk drivers linked to traditional investment are linear in their performance impact and directly related to the underlying financial markets. In contrast, the risks associated with hedge funds are more complex, i.e. non-linear and usually not well understood. Thus far, two extreme schools of thought have dominated the perception of risk in hedge funds. Based on the low past volatility of most hedge fund styles, some people argue that hedge funds are not more risky than bonds and thus that they should replace them in the asset allocation. In contrast, the headline based school of thought looks at high profile blow-ups such as LTCM and concludes that hedge funds are extremely risky. As so often in life, the truth lies in between those two extremes. However, this implies that we need other measures than standard deviation and Sharpe ratio in order to appropriately quantify risk and performance.

Building portfolios of stocks, bonds and hedge funds

In this section, we empirically evaluate the impact of the addition of hedge funds to traditional investments. For that purpose, we design three different traditional portfolios, which reflect standard institutional behaviour: a bond dominated portfolio (80% bonds, 20% stocks), a stock dominated portfolio (80% stocks, 20% bonds), and a balanced portfolio (50% bonds, 50% stocks). The bond investment is proxied by the Citigroup Global Government Index and the stock investment by the MSCI World Total Return Index.

Hedge fund investments are represented by the respective style indices from HFR and Stark. In Table 1, we briefly explain the five hedge fund styles that we employ. For simplicity, the representative hedge fund portfolios are constructed by equally weighting the styles¹. As managed futures are sometimes considered not to be part of the hedge fund universe, we look at a portfolio with all five styles and a portfolio without managed futures.

In our modelling, hedge funds account for 20% of the total mixed portfolios. The statistics of the nine different portfolios are computed between January 1994 and February 2004 (see Table 2). The inclusion of hedge funds in the traditional portfolios has several consequences: returns are enhanced and the standard deviation is reduced. However, traditional investments and hedge funds do not combine well with respect to skewness. The addition of managed futures can partly compensate the skewness reduction but at the expense of a slight reduction of the mean return. Still, one question remains: are hedge funds reducing the risk of the overall portfolio?

Table 1: Style classification of hedge funds

¹We do not address the optimal allocation across hedge fund styles which is known to create additional value (see e.g. Bacmann and Pache (2004)).

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Style	Style description
Equity hedged (EH)	The strategies primarily involve investing in publicly traded instruments in developed and emerging countries. Equity hedged funds can be long and/or short.
Relative value (RV)	Relative value funds engage in arbitrage strategies in the global equity and bond markets, taking advantage of perceived mispricings between similar securities.
Event driven (ED)	Event driven funds engage in the purchase or sale of securities of companies undergoing substantial changes. Such changes can be the selling of assets/business lines, entry or exit of new markets, changes in the capital structure, acquisitions, mergers, tender offers or exchange offers.
Global macro (GM)	Global macro funds take opportunistic approaches designed to take advantage of shifts in macroeconomic trends. Decisions are based on expected rates of changes in variables such as interest rates, inflation, economic cycles, etc. These funds trade all markets, asset classes (e.g. stocks, bonds, currencies, commodities, etc.) and instruments (e.g. cash, futures, derivatives, etc.).
Managed futures (MF)	Managed futures strategies trade the worldwide futures markets ranging from global financial instruments, such as government bonds, stock indices and global currencies to tangible assets such as coffee, crude oil, gold, and other commodities.

Table 2: Summary statistics of the different portfolios

	Traditional investments only	Traditional investments plus EH, RV, ED, GM	Traditional investments plus EH, RV, ED, GM, MF
Bond dominated portfolio			
Ann. mean	7.06%	8.12%	7.98%
Ann. std	6.09%	5.31%	5.28%
Skewness	0.09	-0.05	0.07
Kurtosis	3.48	3.12	3.23
Mixed portfolio			
Ann. mean	7.64%	8.59%	8.44%
Ann. std	8.15%	7.25%	7.09%
Skewness	-0.27	-0.40	-0.33
Kurtosis	2.94	3.01	2.85
Stock dominated portfolio			
Ann. mean	8.22%	9.05%	8.91%
Ann. std	11.84%	10.27%	10.05%
Skewness	-0.48	-0.57	-0.53
Kurtosis	3.27	3.50	3.29

Evaluating the risk of the portfolios

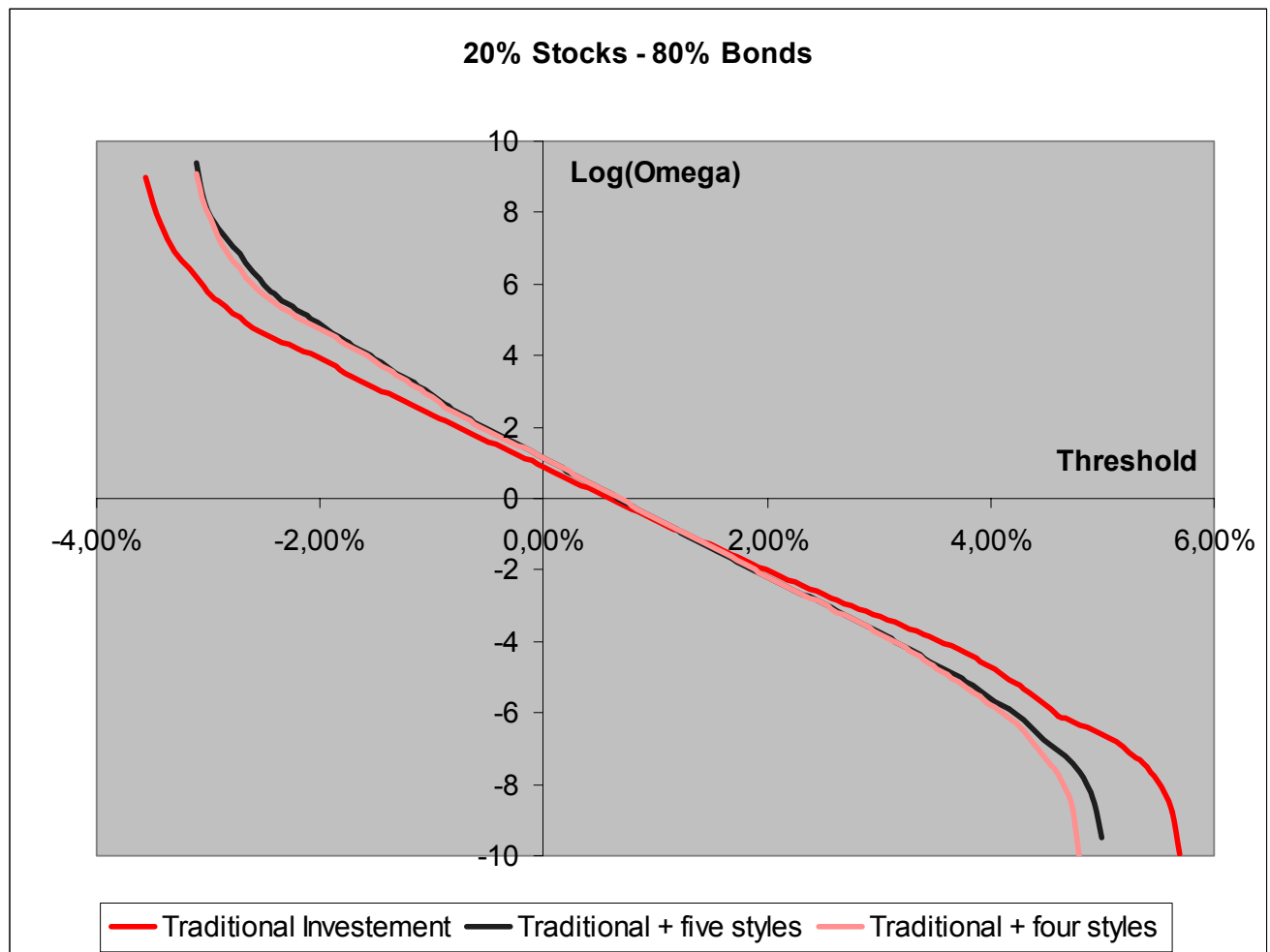
In a recent paper, Bacmann and Gawron (2004) advocate the use of VaR and Expected Shortfall derived from extreme value theory to measure the extreme risk of portfolios incorporating hedge funds. Here, we present advantages of the Omega function in evaluating the overall risk of an investment. The Omega function, originally introduced by Keating and Shadwick (2002), is designed as a performance measure. It splits the return space into two sub-parts according to a threshold. The returns below this threshold are considered as losses while the returns above the threshold are labeled as gains. More specifically, Omega provides a risk-reward measure for which returns are weighted by their probability of occurrence. In practice, the Omega function at a given threshold can be estimated as

$$\Omega(r) = \frac{\frac{1}{n} \sum_i \max(0, R_i - r)}{\frac{1}{n} \sum_i \max(0, r - R_i)}, \text{ where } r \text{ is the return level regarded as the loss threshold.}$$

As noted by Keating and Shadwick (2002), the Omega function is equivalent to the return distribution. Thus, all higher moments are encoded in Omega. In practice, the logarithm of the Omega function is extremely well suited to analyse and visualise the behaviour of the return distribution. It is a smooth monotone decreasing function from $[a, b]$ to $]-\infty, +\infty[$. When the mean of the distribution is chosen as the threshold, the logarithm of Omega is equal to zero, whatever the distribution is. Moreover, at any given threshold, the best investment should have the best Omega function (see e.g. Bacmann and Scholz (2003)). As a consequence, at low negative thresholds, the higher the logarithm of Omega, the less risky the investment is in the extreme.

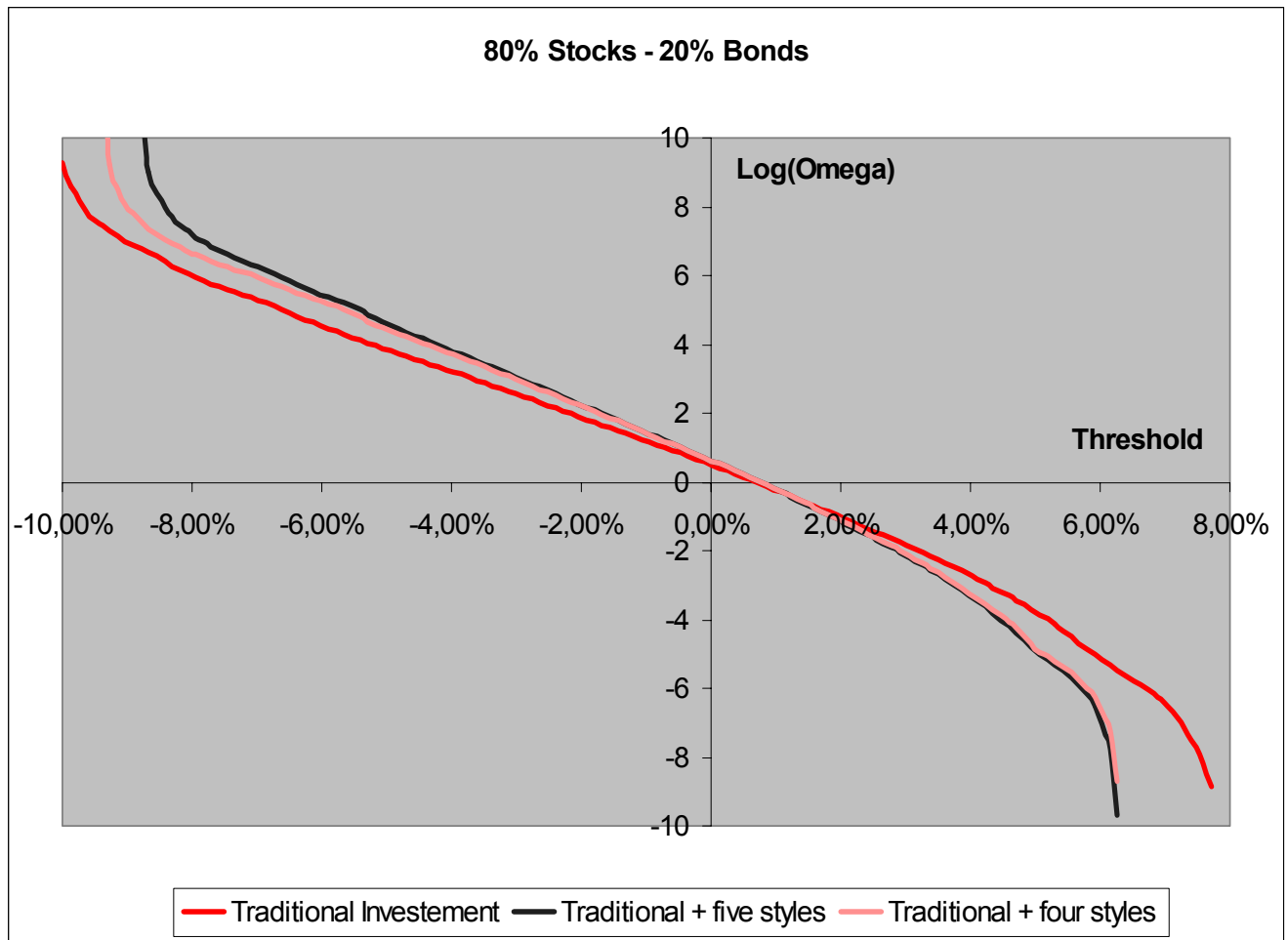
Figures 1 and 2 display the Omega function of the different portfolios. Adding hedge funds to a traditional portfolio clearly improves the return distribution on the downside. Even though hedge funds and traditional investments do not combine well regarding skewness, the variance reduction achieved by adding hedge funds prevails. In other words, the blended portfolios are less risky than the traditional ones. On the upside, the blended portfolios are dominated by the traditional ones. This is a consequence of the diversification effect obtained through hedge funds. The impact of the addition of managed futures depends strongly on the initial portfolio. The negative tail can be reduced by the inclusion of managed futures when the traditional portfolio contains a significant portion of stocks.

Figure 1: Risk-return profile of a hedge fund and a bond dominated portfolio



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Figure 2: Risk-return profile of a hedge fund and a stock dominated portfolio



Conclusion

The risk of portfolios containing hedge funds cannot be assessed by looking at volatility only or at higher moments individually. The Omega function is a means to show that the inclusion of hedge funds in a traditional portfolio helps to reduce the risk of the portfolio. Moreover, the expected return of such a blended portfolio is higher than for a traditional portfolio. However, the overall change in the risk-return profile as depicted by the Omega function depends strongly on the composition of the traditional portfolio and on the magnitude of the investment in hedge funds. In this context, the definition of an optimal hedge fund style allocation should further improve the risk-return profile of the blended portfolio. Yet, recent research has only started to address this issue.

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