

Understanding the relationship between risk, reward and margin/equity ratio in managed futures, and the implications for assessing their attractiveness as an asset class

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Abstract

In order to benefit from managed futures as an asset class within a diversified portfolio, asset managers must be able to assess the quality of managers and make estimates of futures returns and risks. We have here highlighted the indissoluble relationship between return and risk in managed futures investments and have gone on to suggest how some insights from margined investment can be useful in thinking about risk in unleveraged portfolios

Recent studies have reinforced the case for including managed futures as a diversifying tool within a mixed portfolio (Schneeweis and Georgiev 2002; Schneeweis and Spurgin 1999). However, the nature of investment in futures, and in particular the concepts of margin and leverage, makes them a slippery asset class to conceptualise by traditional methods. The notion of risk, which is of obvious concern for potential investors, is tied inextricably to these two concepts. This relationship provides a useful starting point for discussing the structural differences between managed futures and margined investments in general, and traditional unleveraged investments. Furthermore, it will be argued that the reasons behind the perceived level "riskiness" of margined portfolios lie in the realm of business strategy rather than in any inherent property of a given investment strategy. This in turn will lead to a discussion of the versatile role of leverage in the construction of risk-optimised investment vehicles.

Managed futures investment portfolios differ from traditional investment portfolios (e.g. stock and bond mutual funds) in that they are not limited in any way by the twin constraints that all asset weights should be positive (all $X_i > 0$) and that, including cash as an asset, the sum of the asset weights should equal the value of the portfolio ($\sum X_i = 1$). These investment constraints are those that, in a traditional context, given a set of assets and a set of expected returns, risks and correlations, enable, via a procedure known as Markowitz mean-variance optimisation, the construction of an "optimal", "efficient" portfolio, that is portfolio which produces the most reward for a stipulated level of risk. The absence of these constraints transforms the way we must look at risk when assessing the attractiveness of an investment in managed futures.

The reason that the asset weights need not sum to the value of the portfolio is that it is possible to underwrite the price risk of a substantial value of underlying assets with the downpayment of only a small "margin"; perhaps as little as 1 or 2%. It is thus possible to take a lot of risk with a little money; however, it is unlikely that any sensible investment scheme is going to use all its assets as margin at any time. If for example it did use all the assets as margin for a single futures position in a contract with a margin requirement of 2% then a decline in the contracts value of only 2% would lead to a 100% loss in the value of the assets.

Almost all managed futures investments consist, like stock portfolios, of widely diversified baskets of underlying contracts. Since diversification is the best known effective risk/reward ratio enhancement strategy, diversified futures portfolios may employ a reasonably substantial proportion of their assets as margin - though nothing

like 100%. A range for typical managed futures investment would be more likely to be 5-30% (**Figure 1**). Since these numbers are much less than the (traditionally understood) "asset constraint" of 100%, it follows that futures fund managers could always employ more of their clients' money as trading margin and thus potentially produce higher returns. What prevents them from doing this? The answer is that they impose an arbitrary constraint on the level of margin to equity to limit the volatility of the investment returns to a level which they believe to be appropriate to their customers. For historical reasons which will be further discussed below, this level has traditionally been set fairly high in the managed futures industry, giving the impression, on the face of it, of a risky investment class. In reality, *the level of risk measurable from the track record of a futures fund manager tells us nothing about the inherent riskiness of the underlying strategy that he is pursuing and everything about the level of risk that, in running his business, he is choosing to offer the client.* This is important to note in that it is substantially different to other branches of the investment management business and thus a potent source of potential confusion when assessing risk for futures fund managers.

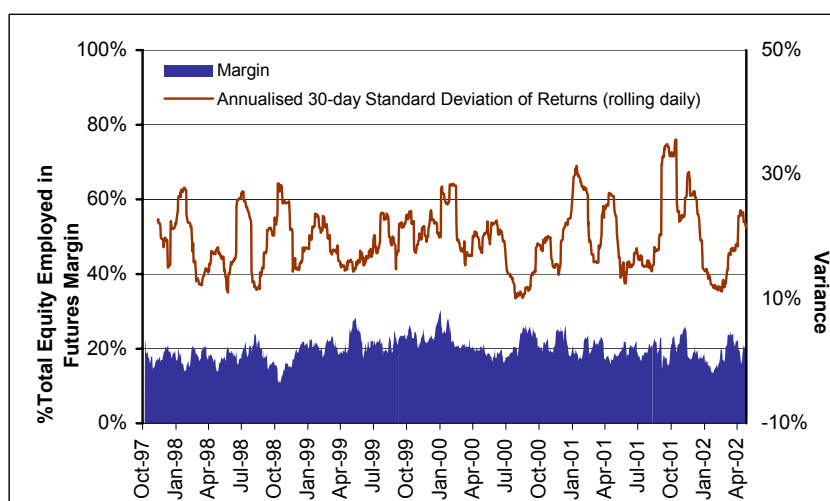


Figure 1. All the risk you want... at a fraction of the money. Historical margin/equity and volatility in the returns of a Winton futures fund.

What considerations influence futures fund managers in deciding what level of risk to operate at? The considerations are numerous, and are related primarily to the packaging and marketing of investment products. Although no two managers will necessarily operate exactly alike, a number of distinct approaches can be discerned from a cursory survey of the industry. Several managers offer multiple different versions of more or less the same strategy differing only in the percentage of assets employed as margin. This could be seen as superfluous, given that a higher margin/equity ratio can easily be achieved by the client retaining part of the allocated funds under his own control in a reserve account. In other cases, managers will demonstrate different degrees of risk preference or aversion in the way they run their businesses or will orient them towards different investor groups and their level of risk preference (e.g. speculative private client or institutional investor). Also, since managers are usually remunerated through a mixture of management and performance fees there is a complicated relationship between the mix of these fees the client is likely to incur and the level of margin. A higher margin account will pay a proportionately greater percentage of its fees in terms of performance fees, a lower margin account, a greater proportion of management fees. A further factor affecting the level of margin employed by a manager may be his confidence level in the strategy he is employing. As stated before, the higher the margin the greater the level of returns that will be generated by a successful strategy; however if the manager's

objective is to maximise the compound growth rate of the assets under management over many years he cannot afford to lose 100% (or even 70, 80, 90%) at any time. There is thus a risk constraint introduced which will limit the level of margin he will be willing to routinely employ.

Indeed, if the manager and his investors have unbiased utility preference functions (i.e. the attraction of a 1% wealth gain exactly equals in magnitude the aversion shown to a 1% wealth loss), and their objective is to maximise the compound rate of growth of his assets over the long term, then there is an optimal level of leverage calculated according to what is known as the "Kelly Criterion". This establishes the optimal percentage of one's investment to commit (or borrow to over-commit in the form of leverage) as a function of the forecast return distribution (assuming normal return forecast) of the investment.

From the investors point of view, therefore, it is especially important in assessing futures fund managers to look at the reward to risk ratio (Sharpe, Sortino or similar) in order to assess the quality of the strategy rather than estimating risk with simple dispersion measures. These ratios remain substantially unchanged even by large changes in leverage, and therefore provide an independent measure of the effectiveness of the underlying investment strategy. Having evaluated the most desirable reward to risk ratio investment, the risk can be tailored by the investor to any level desired by agreement with the manager. Most managers if asked will be very happy to operate accounts for major investors on any level of margin stipulated. A secondary issue to take account of is the level of fees, particularly management fees, which are usually calculated with reference to an account size (which may well be nominal), which is related to some standardised level of margin. Ideally, a half leveraged account would be levied half the management fee and vice versa. Performance fees, on the other hand should tend to be lower on a higher leveraged account as the value of the optionality contained within them from the point of view of the manager is higher.

This sort of analysis also suggests a fairer method of comparing managed futures funds with other risky investments. Portfolios of stocks for example over the long run have quite high risks both measured by monthly variance or by peak to trough drawdown. Major stock indices can be expected from time to time to decline 50-75% in value and yet to produce a long-term return of only 3-7% in excess of the risk free rate. Individual stocks have a lower return to risk expectation than this. By these standards the return to risk ratio of the better-managed futures managers is attractive and can be seen to represent a desirable diversification to long-term investment portfolios (**Table 1**). Furthermore, although there is only really a documented history of managed futures investment over the last 30 years there are good logical reasons why the inclusion of managed futures would help institutional managers to reduce the risk of long term asset liability mismatch, given that managed futures investments can prosper during periods of sustained risks in interest rates or commodity prices, or currency instability.

<Insert **Table 1**>

Table 1*. Comparative return/risk statistics for two sets of simulated returns generated by the Winton Capital Management trading system at different levels of

* In compliance with AIMA editorial policy, we present here simulated rather than actual returns. WCM Simulated Returns represent purely hypothetical performance figures, generated by applying the Winton trading system to market prices from the last 20 years. The following assumptions were also made:

- Account size: \$50 million;
- Risk-free rate of return: 3-month T-Bill rate;

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leverage, managed futures and hedge fund indices, major stock indices and individual stocks over the past 20 years.

The concepts of margin and leverage provide us with a useful handle for grasping the essential differences between managed futures (and other types of margined investment) and traditional non-margined assets. At the same time, they suggest an avenue for assessing these different types of assets classes side by side on a return/risk basis. Most importantly, they provide a method for tailoring leveraged investments to individual investors' risk tolerance. It is suggested here that measures of return/risk should comprise the initial step in assessing the suitability of an underlying managed futures strategy; thereafter, the investor should be free to adjust the leverage to suit their risk requirements.

References

Lintner, J. (1983). The Potential Role of Managed Commodity-Financial Futures Accounts in Portfolios of Stocks and Bonds. Annual Conference of the Financial Analysts Federation, Toronto, Canada, 1983.

Schneeweis, T. and G. Georgiev (2002). The Benefits of Managed Futures. CISDM/ISOM Working Paper.

Schneeweis, T. and R. Spurgin (1999). Quantitative Analysis of Hedge Fund and Managed Futures Return and Risk Characteristics. In: R. Lake (ed.), Evaluating and Implementing Hedge Fund Strategies.

Further analysis of the effects of variable leverage can be found at www.wintoncapital.com/leverage.htm

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- Commission on trades: \$10 per round turn.

WCM Simulation 1 also used the following specifications:

- Average margin/equity: 20%;
- Fees: Management 1% (monthly); Performance 20% (quarterly).

WCM Simulation 2 also used the following specifications:

- Average margin/equity: 5%;
- Fees: Management 0.25% (monthly); Performance 20% (quarterly).

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	Average Annual Returns			Annualised Standard Deviation			Sharpe Ratio			Maximum Monthly Drawdown		
	3 years	10 Years	20 Years	3 years	10 Years	20 Years	3 years	10 Years	20 Years	3 years	10 Years	20 Years
WCM Simulated Returns*												
WCM Simulation 1 - 20% I/M/E	20.00%	45.59%	54.75%	26.99	26.49	25.76	0.7	1.4	1.7	26.76%	26.76%	26.76%
WCM Simulation 2 - 5% I/M/E	7.95%	13.30%	16.06%	6.84	6.7	6.58	0.7	1.4	1.6	6.95%	6.95%	6.95%
Fund Indices												
Zurich CTA Index	3.95%	9.84%	11.82%	7.80	8.97	15.19	-0.1	0.8	0.7	5.82%	10.69%	20.39%
CSFB/Tremont Managed Futures	0.48%			11.05			-0.4			14.23%		
CSFB/Tremont Hedge Fund	10.58%			8.31			0.8			9.36%		
Equity Indices												
S&P 500	-2.53%	13.26%	15.70%	16.64	14.01	15.28	-0.5	0.8	1.0	30.49%	30.49%	30.49%
FTSE 100	-5.74%	8.01%		13.76	13.86		-0.8	0.4		29.25%	29.25%	
NASDAQ Composite	-9.16%	11.82%		40.48	27.26		-0.4	0.4		68.09%	68.09%	
MSCI World Equity	-5.46%			15.59			-0.7			35.39%		
Stocks												
Citigroup Inc	17.09%	31.39%	32.27%	31.24	31.88	32.27	0.4	1.0	0.6	-29.87%	-44.26%	-64.89%
General Electric Co.	1.35%	19.78%	18.34%	28.39	21.90	22.45	-0.1	0.9	0.8	-36.83%	-36.83%	-36.83%
AOL Time Warner Inc	-31.48%	69.62%		64.69	64.49		-0.7	1.1		-68.83%	-68.83%	
Berkshire Hathaway Inc	-0.14%	23.03%		28.14	25.10		-0.2	0.9		-43.81%	-43.81%	
BP Plc	5.48%	17.23%		25.89	23.20		0.0	0.7		-22.64%	-49.87%	
Microsoft Corp.	-12.37%	28.43%		54.10	40.27		-0.4	0.7		-62.84%	-62.84%	
Vodafone Group Plc	-17.54%	19.71%		33.76	31.70		-0.7	0.6		-63.35%	-63.35%	
Risk-free Investment												
T-Bill (3 months)	4.48%	4.52%	6.04%	0.41	0.32	0.60	n/a	n/a	n/a	n/a	n/a	n/a
\$ LIBOR (3 months)	5.07%	5.11%	6.93%	0.49	0.36	0.72	n/a	n/a	n/a	n/a	n/a	n/a
Gold	-1.65%	-4.49%	-4.43%	13.01	10.11	9.93	-0.5	-2.3	n/a	-70.42%	-70.42%	-70.42%