EFFICIENT BENCHMARK HEDGING WITH FUNDCREATOR

This version: November 10, 2008.

Isambard Decision Making Systems Ltd.

Email Info@FundCreator.com

1. Introduction

Looking at how institutional investors spend their time, it appears that many have their priorities mixed up. Very substantial effort goes into chasing alpha and hunting for new undiscovered asset classes. The latter, however, should be no more than frivolities, which should only be pursued after the market risk (beta) profile of the overall investment portfolio has been properly optimised. Unfortunately, this is hardly ever the case, as the typical institutional investment portfolio tends to be seriously under-diversified in terms of the number of asset classes held, as well as the size of the allocations made. There are several possible explanations for this. One is regulation. In most jurisdictions, institutions are heavily regulated, which often comes at the cost of a highly inefficient portfolio. Another explanation is that that the diversification problem is simply too complicated for investors to solve in the time available. Instead, investors adopt simplifying heuristics, typically excluding alternatives that appear less attractive on a stand-alone basis while largely ignoring their possible diversification benefits.[1]

In this short paper we discuss how the under-diversification problem can be solved using a new risk management system, known as “FundCreator”. The sophisticated risk management technology of FundCreator allows us to create highly efficient market risk based diversifiers that are capable of greatly improving the risk-return profile of traditional investment portfolios. The result is a portfolio strategy, which efficiently exploits the risk premiums and risk profiles available in the global capital markets and which over time will almost surely outperform (in risk-return terms) any other market risk based investment strategy.

---

[1] This explanation goes back to Tversky (1972)’s Elimination By Aspects theory, which says that people tend to compare alternatives only on their most salient aspects and eliminate alternatives that fall short on these aspects.

2. FundCreator: An Example

FundCreator is a new and unique risk management system, based on principles first derived in Kat and Palaro (2005). The system allows its user to change the risk profile of any given investment portfolio. Take a portfolio, think of your ideal risk profile and use FundCreator to swap the portfolio's existing risk profile for the risk profile you want it to have. Let's look at a simple example. Suppose we were invested in a portfolio of 50% S&P 500 and 50% T-bonds and were looking for an efficient way to diversify. Now suppose we put together an equally weighted portfolio of 3M Libor, 10Y-Note, 30Y-Bond, S&P 500, S&P SmallCap 600 and GSCI futures.[2] By itself, this portfolio has quite a bit of negative skewness[3] and a correlation of 0.7 with our existing portfolio. It therefore does not exactly qualify as a good diversifier. But what if we could change this portfolio's risk profile in an efficient way? We could take away the negative skewness, take down the correlation with our existing portfolio, and, since thanks to the low correlation most of it will diversify away again, increase the volatility to capture more risk premium. With a risk profile like that, this initially unattractive portfolio could make an excellent diversifier.

	50/50	**Diversifier**
Mean	9.68%	9.82%
StDev	7.84%	11.93%
Skew	-0.16	0.13
Sharpe	0.72	0.49

Table 1: Summary statistics 50/50 portfolio and diversifier, Jan 1995 – Dec 2007.

We used the FundCreator system to design a risk management strategy aiming to give the above portfolio a volatility of 12%, zero skewness and zero correlation with

---

[2] We use futures for no other reason than that it is by far the easiest and cheapest way to pick up exposure to these indices.

[3] Roughly speaking, skewness measures whether positive and negative returns have equal probability of occurring or whether there is an increased probability of seeing a large positive ("positive skewness") or negative ("negative skewness") return every once in a while.

our existing portfolio. Next, we executed the resulting strategy over the period Jan 1995 – Dec 2007. Table 1 provides some summary results for the 50% S&P 500 and 50% T-Bond portfolio as well as the newly created diversifier. From the table we see that FundCreator has successfully taken the portfolio's volatility up to 11.93% and its skewness up to 0.13. However, the new diversifier's Sharpe ratio compares quite unfavorably with that of the 50/50 portfolio. Looking at the diversifier in isolation skips over the zero correlation though, which in a portfolio context is an extremely valuable feature. This becomes clear if we mix the new diversifier with the 50/50 portfolio. The results of doing so are shown in Table 2.

	50/50	**Diversifier**	**10% in Diversifier**	**20% in Diversifier**	**30% in Diversifier**
Mean	9.68%	9.82%	9.69%	9.70%	9.71%
StDev	7.84%	11.93%	7.13%	6.67%	6.49%
Skew	-0.16	0.13	-0.19	-0.18	-0.12
Sharpe	0.72	0.49	0.80	0.86	0.88

Table 2: Summary statistics mix of 50/50 portfolio and diversifier, Jan 1995 – Dec 2007.

From Table 2 we see that even a relatively small allocation to the newly created diversifier has a significant impact. With a 10% allocation, the volatility of the overall portfolio drops from 7.84% to 7.13%, while the Sharpe ratio goes up from 0.72 to 0.80. With a 20% allocation, the Sharpe ratio increases to 0.86. The above example clearly shows two things. First, it shows that FundCreator is capable of changing the risk profile of a portfolio with remarkable accuracy. The system works! Second, using FundCreator it is possible to create highly efficient diversifiers that greatly enhance the risk-return profile of a more traditional portfolio and which are purely driven by market risk and market risk premiums.

3. The Case of a Canadian Pension Fund

We recently did a study for a large, typical Canadian pension fund to determine to what extent a FundCreator-based diversifier would improve this pension fund's risk-return profile. The fund in question had the following benchmark allocation:

CAD/US equity – 30%
Foreign equity – 20%
CAD fixed income – 25%
Real return bonds – 10%
Real estate – 10%
Miscellaneous – 5%

To create our diversifier we first need to put together a well-diversified reserve asset. Of course, there is a whole range of alternatives to pick from, but to keep things simple (as well as to avoid any illusion of data mining) let's use the following futures contracts: 3M Libor, 5Y Note, 10Y Note, S&P 500, S&P SmallCap 600, and GSCI. This allows us to capture risk premiums in three main asset classes: the USD yield curve, large and small cap US stocks and energy commodities. The second step is to offer this portfolio to FundCreator, requesting a new risk profile worthy of a good diversifier: 8.5% volatility, zero skewness and zero correlation with the fund's benchmark portfolio.[4] Assuming we started our strategy in March 1995, Table 3 provides summary statistics for the results over the period Jan 1995 – Sep 2008.

	Existing Portfolio	Diversifier	10% in Diversifier	20% in Diversifier	30% in Diversifier
Mean	8.05%	8.31%	8.08%	8.10%	8.13%
StDev	8.36%	8.49%	7.59%	6.93%	6.43%
Skew	-0.80	-0.05	-0.77	-0.74	-0.71
Sharpe	0.53	0.55	0.58	0.64	0.70

Table 3: Sample statistics Canadian pension fund, Jan 1995 – Sep 2008.

[4] Since we are dealing with a Canadian pension fund, we use CAD as our home currency.

Table 3 shows a similar picture as we saw in section 2. The newly created diversifier itself may not be particularly attractive, but in combination with the fund's existing portfolio it adds a lot of value. A relatively small allocation of 20% increases the Sharpe ratio of the overall portfolio from 0.53 to 0.64.

Of course, we could leave it at this. After all, a 20% improvement in Sharpe ratio is not something to look down upon. However, the introduction of our diversifier has freed up a substantial risk budget. With a 20% allocation, the volatility of the fund portfolio comes down from 8.36% to 6.93%. If we can think of a smart way to spend this risk budget, we can further improve the fund's Sharpe ratio. One alternative is to leverage the overall portfolio. However, apart from the practical impossibility, that won't improve the Sharpe ratio. A much smarter move is to leverage the diversifier. By construction, the diversifier is a highly efficient vehicle. Leveraging it is therefore very likely to increase the fund's Sharpe ratio. Of course, although we speak of "leverage", we don't need to leverage the diversifier ourselves. FundCreator will do it for us if we ask for a higher volatility. Assuming we asked FundCreator for a diversifier volatility of 23% (which if we allocate 20% to the diversifier will theoretically make the overall portfolio volatility equal to 8.36% again), Figure 1 shows the evolution of $100 invested in the benchmark portfolio and an 80/20 mix of benchmark and diversifier over the period Jan 1995 – Sep 2008. Table 4 provides the usual summary statistics.

	Existing Portfolio	**Diversifier**	**20% in Diversifier**
Mean	8.05%	16.11%	9.66%
StDev	8.36%	24.04%	8.28%
Skew	-0.80	0.39	-0.60
Sharpe	0.53	0.51	0.73

Table 4: Sample statistics Canadian pension fund with 20% allocation to high volatility diversifier, Jan 1995 – Sep 2008.

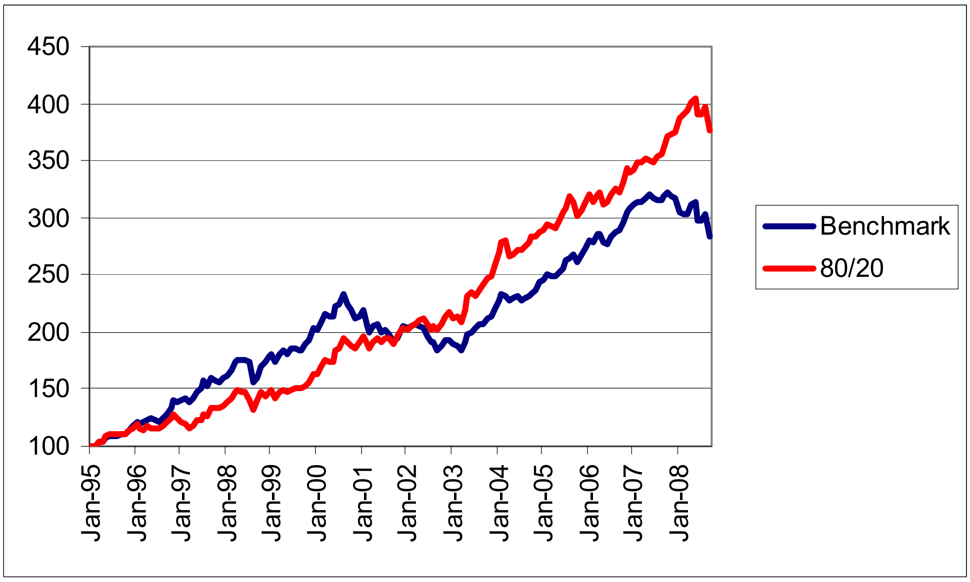

Figure 1: Performance benchmark and 80/20 mix of benchmark and diversifier, Jan 1995 – Sep 2008.

Figure 1 shows that the diversifier does an excellent job correcting the rather heavy over-allocation (in risk terms) to equity. The fund value almost completely misses out on the 2000-2002 equity bear market. Table 4 provides a now familiar picture. The new diversifier itself is not overly attractive. In combination with the benchmark portfolio, however, the zero correlation between diversifier and benchmark and the increased volatility of the diversifier pay off tremendous dividends, taking the fund's Sharpe ratio up from 0.53 to 0.73. In other words, our FundCreator-based diversifier allows for a 38% increase in Sharpe ratio without a significant change in the fund's volatility. The most remarkable thing about this steep efficiency gain is that it is purely the result of sophisticated management of traditional market risks. No alternative beta, no alpha, just good old-fashioned, cleverly managed equity, interest rate and commodity risk.

Conclusion

In this paper we have shown that with the use of the FundCreator risk management system the typical Canadian pension fund can achieve a very substantial improvement in the risk-return profile of its investment portfolio. This confirms that for most investors, sophisticated management of traditional market risks can add tremendous value, much more than alpha chasing and/or alternative investments ever can. Moreover, a FundCreator-based diversifier is not only very hard to beat, but it also avoids the many drawbacks that surround active management and alternative investments such as hedge funds. A FundCreator-based diversifier offers full transparency, no need for extensive due diligence, no lock-ups or notice periods, no capacity problems, no style drift and no excessive management fees. At a recent conference Martin Leibowitz said that: "any uncorrelated asset in a portfolio is gold". In this paper we have shown how to the point that remark really is.

References

Kat, H. and H. Palaro (2005), Who Needs Hedge Funds? A Copula-Based Approach to Hedge Fund Return Replication, Alternative Investment Research Centre Working Paper 27, Cass Business School, London.

Tversky, A. (1972), Elimination by Aspects: A Theory of Choice, *Psychological Review,* Vol. 79, pp. 281 – 299.