

# SYNTHETIC FUNDS AND THE MONGOLIAN BARBEQUE

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## **The Mongolian Barbeque**

Some time ago, a new restaurant opened its doors in our village. Of course, restaurants come and go. However, there was something intriguing about this one, called “The Mongolian Barbeque”. The concept behind The Mongolian Barbeque was simple, but different. Guests are offered a selection of uncooked meats, vegetables, and spices from which they have to create their own dish. After gathering the ingredients, the latter are cooked for them on a large Mongolian hot plate, hence the name “The Mongolian Barbeque”. Of course, always eager to try something new, we went there. We mixed and matched different meats, vegetables and spices up to the point where we probably had a little bit of everything on our plates. Then we took it to the Mongolian hot plate and five minutes later our meals were ready. Since we carefully picked all ingredients ourselves, we expected to get the best meal we had in a long time. Unfortunately, reality was far from that. Despite the high quality of the ingredients and the care taken selecting them, what came off the hot plate wasn’t very good at all. Not easily beaten, and because it was all-you-can-eat, we did it again, with the same result: perfectly good ingredients transformed into something you would be ashamed to feed your worst enemy.

Talking to a neighbour one night, we told him about our experience at The Mongolian Barbeque. It turned out he and his family had been there as well, sharing our rather disappointing experience. Intrigued, I decided to visit our village barber, who knows more about what goes on in the village than anybody else. What he told me confirmed my suspicions: quite a number of people that visited The Mongolian Barbeque had left the establishment rather disappointed. Not because there was something wrong with the ingredients per se, but because they were unable to turn those ingredients into the delightful meal they were hoping for. Six months later The Mongolian Barbeque closed its doors. There are currently plans to turn it into a Burger King outlet.

Where did The Mongolian Barbeque go wrong? Operational errors aside, I think they made two mistakes. First, not many people know enough about food preparation to be able to make the right selection of ingredients. In fact, that is exactly why we go to a restaurant: to enjoy the kind of food we could never prepare ourselves at home. Second, although of good quality, the ingredients on offer were rather limited and

one-sided. Obviously, this makes it difficult to prepare a proper dish, even if you do know what you're doing.

## **Investment as a Mongolian Barbeque**

Thinking a bit more about the rise and fall of The Mongolian Barbeque, I suddenly realized that the way in which many investment portfolios are managed is very similar to a visit to The Mongolian Barbeque. As in The Mongolian Barbeque, investors tend to be quite limited in their choice of ingredients, i.e. funds to invest in. Theoretically, investors' opportunity set spans all funds in existence. In reality, however, investors' opportunity set is limited to whatever happens to come on their way: funds they read about in magazines or hear about at conferences, funds offered to them by their bank, etc. In other words, whether a fund is part of an investor's opportunity set is very much a matter of coincidence. If you have heard about it, it is. If you haven't, it is not. The result is obvious: *most investors select their portfolio from a heavily restricted and biased set of alternatives.*

The similarity between investment and The Mongolian Barbeque doesn't end here. Just as many visitors of The Mongolian Barbeque didn't know how to pick and mix ingredients, from the composition of investors' portfolios it is obvious that *many investors have a serious problem picking and mixing funds to build themselves a portfolio that fits their goals.* For many investors fund evaluation and selection is still very much a stand-alone activity with little or no attention being given to the impact a fund will have on the overall portfolio, including liabilities.

## **Synthetic Funds**

The Mongolian approach to investment is likely to result in sub-optimal portfolios. The solution to this problem is evident, however. Investors need better ingredients and a better understanding of what it is they really need and how to obtain it. Starting with the latter, to make correct investment decisions investors need a proper framework; flexible enough to realistically capture the complexity of their situation. Risk and return are crucial, that much is obvious, but how do we measure risk? Many fall back on the standard Markowitz model, defining risk as the standard deviation of future asset returns. There are two major problems with this though. First, asset returns are

not always the correct variable to concentrate on. Pension funds, for example, should be more concerned about their funding ratio than the return on their assets. For pension funds therefore, the standard deviation of their return on equity makes a much more sensible risk measure than the standard deviation of their asset return. Second, standard deviation only measures one particular element of risk: the overall dispersion of possible outcomes. A proper definition of risk, however, should also capture other elements such as the symmetry of the return distribution (skewness), and the probability of an extreme outcome (kurtosis). Risk may be one word, but it is certainly not one number!

What about the portfolio building blocks? Finding and selecting new diversifiers the old-fashioned way is a very laborious, costly and inadequate process. A new fund's risk-return profile is typically not immediately obvious and investors may have to dig long and hard to gather sufficient information. Fortunately, there is light at the end of the tunnel. In Kat and Palaro (2006a) it is shown how investors can design futures trading strategies that generate returns with predefined statistical properties. With this technique, investors can design trading strategies, which generate returns with exactly the characteristics they are longing for. This means that investors no longer have to work with what happens be available and guess what a fund's true risk-return profile is. Given an investor's existing portfolio, we can structure a futures trading strategy (or *synthetic fund* as we like to call these strategies) that produces returns with properties that fit in optimally with what is already there.

With synthetic funds investors create directly whatever it is they need. This contrasts sharply with the beauty parades typically held by investors, which are often no more than awkward attempts to sort out what realistically can't be sorted out. Synthetic funds also eliminate the need for investors to venture into the great unknown of alternative investments; no more need for years of study and that nagging feeling that you still don't understand where those returns really come from. In addition, since all trading is done mechanically and in highly liquid markets, synthetic funds avoid the many drawbacks that typically surround alternative investments, including the need for extensive due diligence, liquidity, capacity, transparency and style drift problems, as well as, very importantly, excessive management and incentive fees.

## An Example of a Synthetic Fund<sup>1</sup>

Let's look at a simple example. Suppose an investor made his investment decisions in a mean-standard deviation-skewness framework, i.e. a Markowitz model extended with skewness. Since his existing portfolio exhibits little skewness and he knows that assets with a very low standard deviation and correlation with other assets are likely to have a low expected return as well, he decides that the ideal diversifier to add to his existing portfolio, consisting of US stocks and bonds, has the following risk characteristics:

Standard deviation = 12% (annual)

Skewness = 0

Correlation with existing portfolio = 0

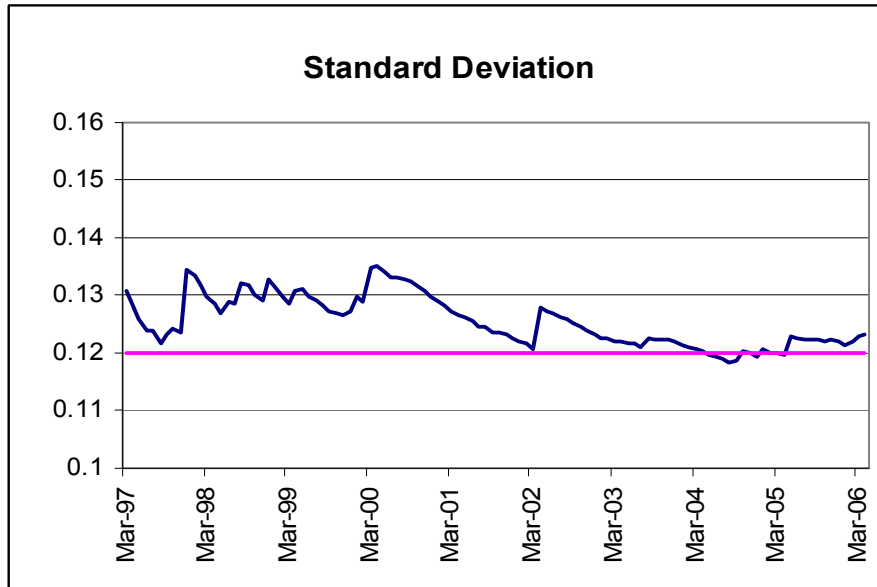
Having decided on the characteristics of the (for him) optimal diversifier, our investor uses the results in Kat and Palaro (2006a) to design himself a synthetic fund with exactly those properties, trading S&P 500, Russell 2000, eurodollar, 2-year and 10-year note, T-bond and GSCI futures. As this is just an example, the selection of futures contracts to trade is quite arbitrary. In practice, it will be guided by the composition of the investor's existing portfolio and possibly the investor's view on the various asset classes as well.

Now let's assume our investor lived in March 1995 and started the above synthetic fund. What kind of returns would he have generated over time and how much trading would have been required to do so? Before we look into this, it is important to realize that there can be temporary discrepancies between the target parameters chosen and the sample parameters generated. For example, we may be after a standard deviation of 12%, but when calculating the standard deviation from the returns actually generated we may find 11% or 13% instead. This is nothing unusual. When tossing a coin the chances of heads and tails are 50/50. This does not mean that when tossing a coin a number of times one will always find an equal number of heads and tails. In a

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<sup>1</sup> Further details and 3 more examples of synthetic funds can be found on [www.FundCreator.com](http://www.FundCreator.com), a website entirely dedicated to synthetic fund design.

small sample, heads may dominate tails or vice versa. When the number of observations increases, however, this is likely to be corrected as the sample becomes more representative for the distribution it is taken from.



**Figure 1: Standard deviation synthetic fund return, March 1997 – April 2006.**

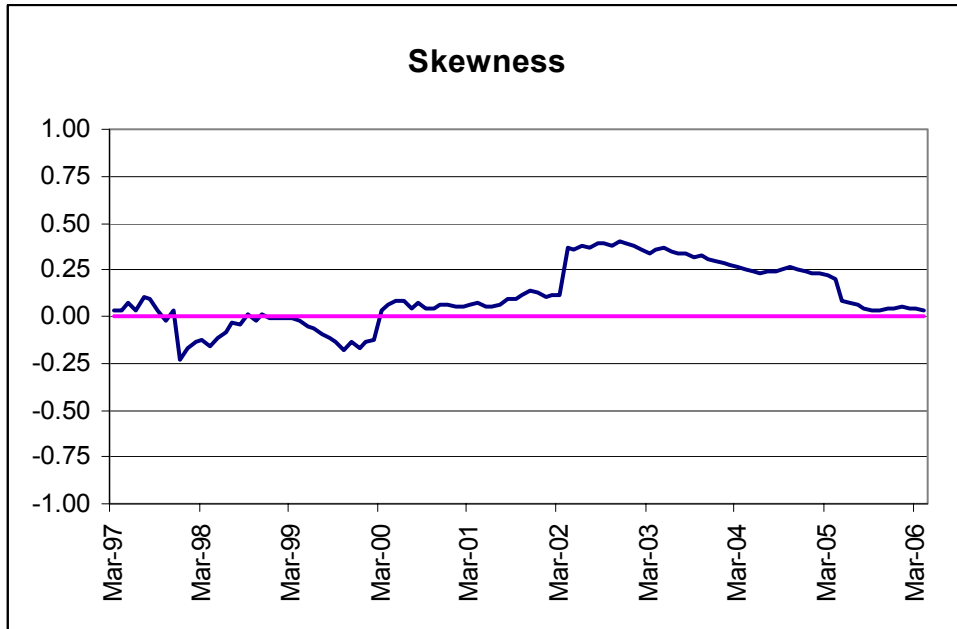
Figure 1 shows the evolution of the standard deviation of the synthetic fund return over the period March 1997 – April 2006<sup>2</sup>, with the straight line representing the target value of 12%. The graph clearly shows that over the entire 9-year period the standard deviation of the synthetic fund return stayed quite close to the target value. There are a couple of small jumps, for example corresponding with the bursting of the technology bubble in March 2000, but these are quickly corrected over time.

Figure 2 shows the evolution of the skewness of the synthetic fund return over the same period, while figure 3 shows the evolution of the correlation between the synthetic fund and the investor's existing portfolio. From these graphs it is clear that, as with the standard deviation, over the entire period studied the skewness and correlation of the synthetic fund return never deviated far from their target values.

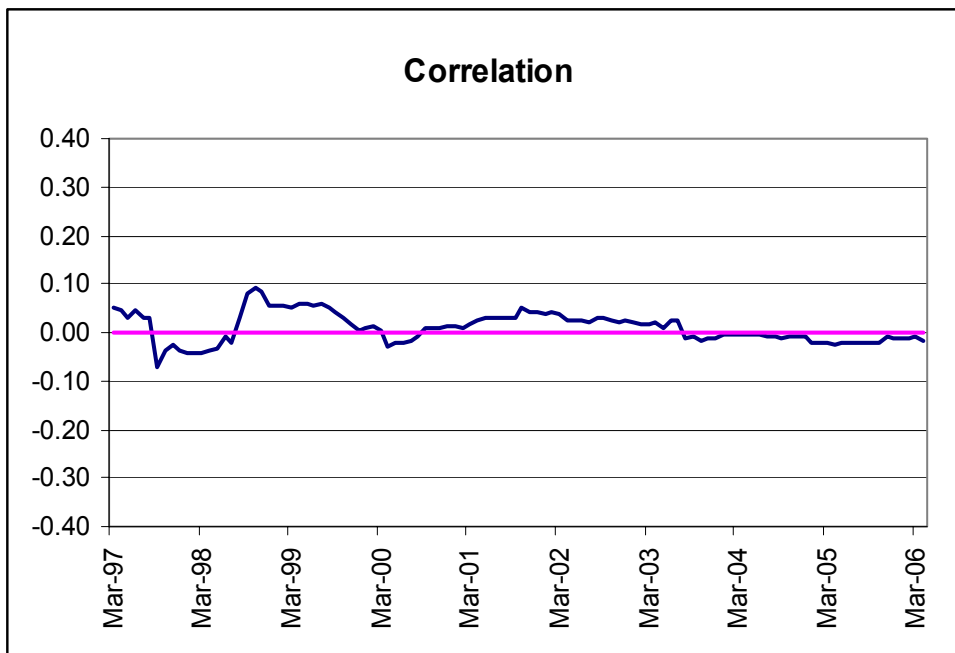
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<sup>2</sup> Although the fund starts trading in March 1995, the graph in figure 1 (as well as in figure 2-4) starts in March 1997 because to meaningfully calculate the standard deviation we need at least 24 observations.

Given the at times tempestuous and erratic behaviour of markets, this is quite a remarkable achievement.

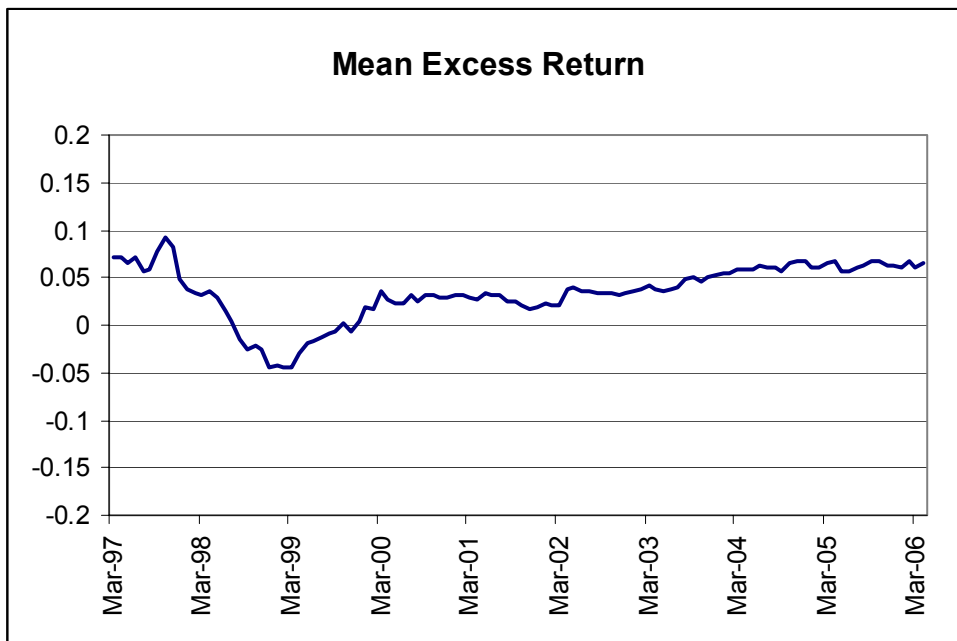


**Figure 2: Skewness synthetic fund return, March 1997 – April 2006.**



**Figure 3: Correlation synthetic fund return, March 1997 – April 2006.**

So far, we have not said anything about the synthetic fund's expected return. On one hand, given the relatively low correlation with the investor's existing portfolio, one would expect the fund to have a relatively low expected return. After all, putting money in the bank also has a correlation of zero with the investor's portfolio and that only provides a return equal to the interest rate. On the other hand, our synthetic fund returns are quite volatile, for which we should receive a risk premium. Figure 4 shows the evolution of the mean excess (over 1-month USD Libor) return on the synthetic fund over the period March 1997 – April 2006. It shows that over the 9-year period studied the fund's mean excess return converged to around 6%. With an average interest rate of little over 4%, this implies a total return of about 10%. For a diversifier with zero correlation with the investor's existing stock-bond portfolio, this is a very good result by any standard.



**Figure 4: Mean excess return synthetic fund, March 1997 – April 2006.**

What about alpha? Unless at the beginning of every month the investor is able to pick those futures contracts that will perform best, synthetic funds do not generate alpha in the traditional sense, as the underlying trading strategy is purely mechanical and does not incorporate any 'trading secrets'. Because of synthetic funds' mechanical nature, however, investors can do without expensive managers. Given the level of fees in alternative investments, this means that although pre-fee returns may not be superior,

after-fee returns might very well be<sup>3</sup>. Synthetic funds generate alpha by efficient risk management and cost control, while real fund managers do so by trying to beat the market. Cost reduction is a sure thing, beating the market, however, is not. This begs the following question: do you really prefer the hope for alpha from a manager that claims to have enough skill to make up for his 2 plus 20 fee over the certainty of alpha obtained by eliminating that fee?

The statistical properties of the synthetic fund returns over the period March 1997 – April 2006 have been very much in line with the target values set out at the start, but how much trading was required to accomplish this? Since futures have relatively short maturities and we are looking at monthly returns, there are three reasons for trading in our synthetic fund: (1) normal day-to-day exposure adjustment during the month, (2) resetting of all positions at the start of every new month, and (3) periodic rolling over of existing futures positions. Taking all three together, table 1 shows the average daily trade size for the above synthetic fund over the period March 1995 – April 2006, assuming an initial fund value of \$100 million.

<b>Futures Contract</b>	<b>Average Daily Trade Size (Number of Contracts)</b>
<b>S&amp;P 500</b>	<b>11</b>
<b>Russell 2000</b>	<b>15</b>
<b>Eurodollar</b>	<b>13</b>
<b>2-year Note</b>	<b>15</b>
<b>10-year Note</b>	<b>31</b>
<b>T-Bond</b>	<b>53</b>
<b>GSCI</b>	<b>63</b>

**Table 1: Average daily trade size synthetic fund, March 1995 – April 2006.**

From table 1, we see that on average managing a \$100m synthetic fund does not require very much trading at all. As the numbers of contracts in table 1 are only a (very) small fraction of the typical daily market volume, table 1 also confirms that

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<sup>3</sup> This is confirmed by research reported in Kat and Palaro (2006b, 2006c).

liquidity problems are highly unlikely, even when the fund size was a lot larger than \$100m.

So far we have assumed that our investor wants to leave his existing portfolio more or less intact. It could be, for example, that he had a number of strategic real estate and (private) equity holdings in his portfolio. If not, our investor might consider allocating all of his wealth to a synthetic fund. After all, why painfully piece together a sub-optimal portfolio if the optimal portfolio can be obtained in one easy scoop in the form of a synthetic fund?! The mechanics of doing so would be exactly the same as before. The investor would decide on the desired overall portfolio characteristics, design the appropriate trading strategy, and subsequently execute that strategy in the futures markets, just as we did before.

## **Conclusion**

With the arrival of synthetic funds, investment management no longer has to resemble a visit to The Mongolian Barbeque. Investors no longer have to go through the usual process of finding and combining individual assets and funds into portfolios in an, often only partially successful, attempt to construct an overall portfolio with the characteristics they require. They can now design and create their ideal diversifier or overall portfolio by themselves and avoid the many pitfalls and excessive fees that surround popular new asset classes, such as hedge funds, private equity, etc. Undoubtedly, investors will need time to come to grips with the concept, but given these benefits, there is no doubt synthetic funds have a bright future ahead of them.

## References

**Kat, H and H. Palaro**, *Who Needs Hedge Funds? A Copula-Based Approach to Hedge Fund Return Replication*, Working Paper 27, Alternative Investment Research Centre, Cass Business School, London, 2006a.

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