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Synthetic Indexing

Futures Based Enhanced Indexing Using Portable Alpha Technique

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Enhanced indexing is a flexible quasi-passive investment strategy that effectively bridges the gap between active and passive investment management. The objective is to systematically beat the return of an index, such as the Dow Jones EURO STOXX 50 Index, typically through optimizing a combination of index linked derivatives and active strategies. Enhanced indexing has grown dramatically in popularity over recent years particularly among institutional investors who are looking for a consistent stream of small excess returns and low volatility. Generally, we can group enhanced indexing strategies into three, often overlapping, categories:

- Tilting
- Mathematical strategies
- Portable alpha

In the first strategy the fund manager starts with a core index fund and then implements directional tilts. The second strategy focuses on identifying complex price patterns and basing bets on mathematical properties. This article focuses on the third strategy.

We concentrate on a method that combines index futures with interest earning cash-equivalents and a long-short alpha generating strategy. Alpha is a coefficient measuring the risk-adjusted performance of a specific security. A large alpha indicates that the security has performed better than would be predicted considering the level of risk.

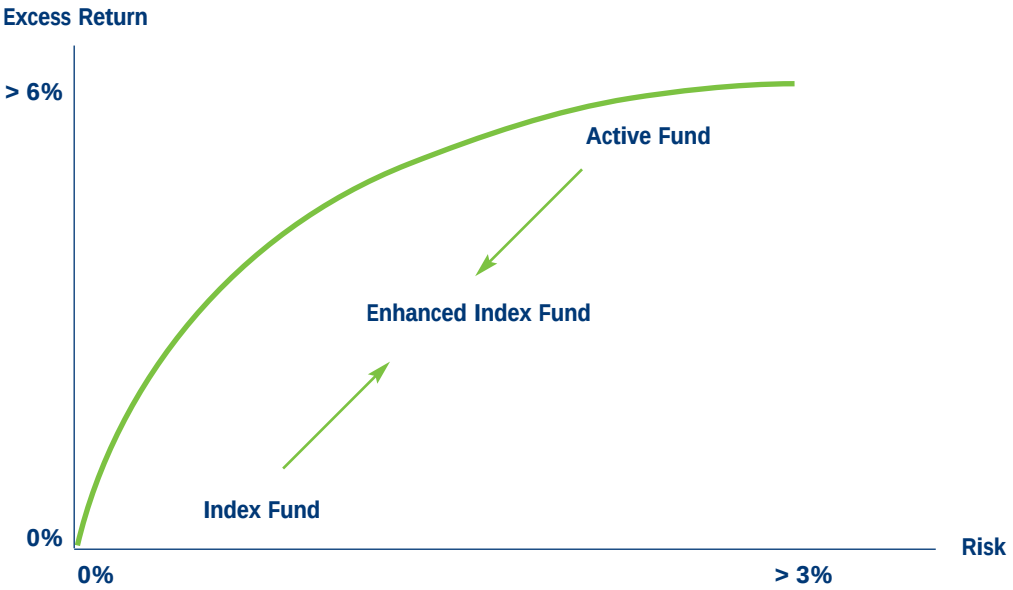
Portfolio Risk Profile

Over recent years a number of active institutional investors have become more risk averse amid relatively high market volatility and are frequently looking to shift into low tracking error strategies (shift down the risk curve). Simultaneously, some investors using passive strategies now demand more from their index fund manager in terms of low risk alpha generation (shift up the risk curve). As a result there is a demand for broadly diversified products that can deliver excess return over the benchmark in the region of 0.5 to 2.5 percent with low tracking error.

Furthermore, decision makers now also consider a full range of investment opportunities when making asset allocation decisions which, in turn, has shifted focus towards benchmark independent strategies such as alternative investments and absolute return strategies with little or no correlation to index returns. Essentially, they try to find asset classes with consistently low levels of correlation.

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Enhanced Index Fund Risk Profile



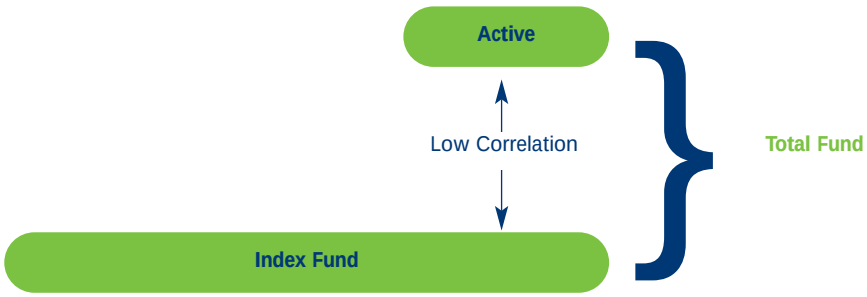
As a result fund providers are faced with a range of 'mixed signals' and must invent new flexible strategies and re-invent old products in order to accommodate investors. One way the portfolio manager can solve this conundrum is to consider a futures based index fund with one, or multiple, alpha generating overlays.

Portfolio Strategy

Fundamentally we divide the portfolio into two components: a diversifying element and an active element. The diversifying element, which is benchmark dependent, will ensure that we spread our risk across the market. The objective of the active element, which is benchmark independent, is to generate alpha. In order to achieve an optimal combination between the two elements the portfolio manager must, at the aggregate level, focus on optimizing three key components of enhanced indexing

- **Risk:** Defined as the tracking error between the fund and index. The objective is to control risk in part through methods related to indexing.
- **Excess Return:** The objective is to deliver consistent alpha (0.50 to 2.50 percent) with relatively low tracking error.
- **Cost:** When engineering the best possible enhanced index strategy the manager must take into account the cost of achieving it.

Traditional enhanced index engineering characteristically follows a two-stage strategy. Firstly, the manager constructs an index fund and secondly obtains modest overweights and underweights in a direction favored by the firm's analysts. A potential weakness here is that the fund manager using tilting techniques can only underweight a stock by a maximum of its weight in the index. For example, if a stock – identified as a strong sell – has an index weight of 0.10 percent, the biggest active underweight position a portfolio manager can take is therefore 0.10 percent. This reduces a manager's ability to add value in stocks that have been correctly identified as overvalued.



This problem could be avoided when using a portable alpha strategy. We adjust portfolio constraints by separating the active and passive investment process. The passive element would, for example, hold Dow Jones EURO STOXX 50 Index Futures as a permanent means of obtaining exposure to the European equity market and the cash reserves are invested in short-term, interest yielding cash equivalents. This synthetic index strategy would in most cases match the return of the index. However, since the price of the futures contract is determined by arbitrage a long term investor can expect to buy futures at fair value and invest his or her cash reserves at a higher rate of return which reflects a longer time horizon. Hence, a certain percentage of the cash reserves, subject to the overall risk profile of the total portfolio, could be placed in active fixed income funds in order to enhance the performance of the synthetic index strategy. Consequently the implied benchmark for the alpha overlay is the implied interest rate in the index futures contract. This can be illustrated by using the Dow Jones EURO STOXX 50 Index as the benchmark. We can then determine the enhanced index portfolio return using the standard futures fair value formula:

$$F = S + S \left[r - DP (1 + t) \right] n/360$$

where

F	=	Futures fair value
S	=	Dow Jones EURO STOXX 50 Index spot level
r	=	Annual financing rate
DP	=	Dividend yield
t	=	Dividend tax rate
n	=	Number of days until maturity

The above futures formula suggest that if we invest our cash at the implied interest rate inherent in the futures fair value formula then we would achieve the same rate of return on our enhanced index portfolio as the Dow Jones EURO STOXX 50 Index. Therefore, the goal in the enhanced index strategy is to achieve a rate of return on the reserve assets, which exceeds the implied financing rate in the Dow Jones EURO STOXX 50 Futures contract.

The following table depicts the results of a basic simulation. Suppose the index will return five percent over the three-month period. To keep things simple we assume a dividend yield of three percent, a 30 percent tax rate and an interest rate of 2.75 percent. If our alpha strategy outperforms the futures implied interest rate by 0.5 percent over the same period then this strategy could potentially outperform the benchmark index by 0.43 percent.

Simulated Results Assuming an Index Return of 5 Percent over the Investment Period

Alpha strategy return equal to implied futures interest rate

	Spot Index	Futures Fair Value	Futures Fair Value in points
January 9, 2003	2,430.1	2,441.3	11.2
March 21, 2003	2.551.6	2,567.4	15.8
Return	5.00%	5.17%	

Alpha strategy return 0.5 percent above implied futures interest rate

	Spot Index	Futures Fair Value	Futures Fair Value in points
January 9, 2003	2,430.1	2,441.3	11.2
March 21, 2003	2,551.6	2,573.8	22.2
Return	5.00%	5.43%	

Alpha strategy return 1 percent below implied futures interest rate

	Spot Index	Futures Fair Value	Futures Fair Value in points
January 9, 2003	2.430.1	2.441.3	11.2
March 21, 2003	2.551.6	2.561.0	9.4
Return	5.00%	4,90%	

The alpha generating strategies involved in achieving excess cash returns are numerous and are not limited to equity linked strategies. In fact, this strategy offers the opportunity to "transfer" alpha from a range of strategies examined by the fund manager. As long as the risk exposure to the alpha strategy and the risk embedded in the alpha strategy are appropriately constrained, the potential alpha generated can be obtained with relatively low volatility at the aggregate level. In other words, we manage and control the beta tilt of the portfolio through an optimal exposure to an active strategy. This can be illustrated by adding an alpha strategy to the above futures position. Suppose we have EUR 50 million to invest and the aim is to outperform the Dow Jones EURO STOXX 50 Index with a one percent tracking error and an out performance target of two percent which implies an information ratio of two. The information ratio reflects the annualized relative returns between the fund and the benchmark (tracking error) adjusted to the risk measured by the annualized standard deviation of the relative return.

Firstly, we combine Dow Jones EURO STOXX 50 Futures and interest earning cash-equivalents in order to replicate the Dow Jones EURO STOXX 50 Index. This position is rolled over the course of the year. Traditionally, the fund manager has the risk that, should the contract not be trading at fair value,

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the futures contract may be bought expensively or sold cheaply relative to its fair value. This tracking error is commonly referred to as basis risk and in this simulation we assume basis risk is zero. Inexorably, there may potentially be a return differential in individual months due to calendar spread mispricing or month end mark mispricing of the index futures contract. Over the entire investment period, however, a synthetic indexing strategy based on buying index futures tends to deliver returns within 0.05 percent (annualized) of those of the relevant stock market indexes if the index futures contracts are rolled at fair value.

Enhanced Indexing Strategy

Alpha Overlay in percent	Tracking Error in percent	Relative Return in percent	Annualized relative Return in percent	Information Ratio
5	0.62	1.60	1.36	2.20
6	0.74	1.93	1.63	2.20
7	0.87	2.26	1.91	2.20
8	0.99	2.58	2.18	2.21
9	1.11	2.91	2.46	2.21
10	1.24	3.24	2.74	2.25
20	2.48	6.61	5.56	2.25
30	3.71	10.12	8.47	2.28

Source: HSBC Asset Management (Europe) Ltd.

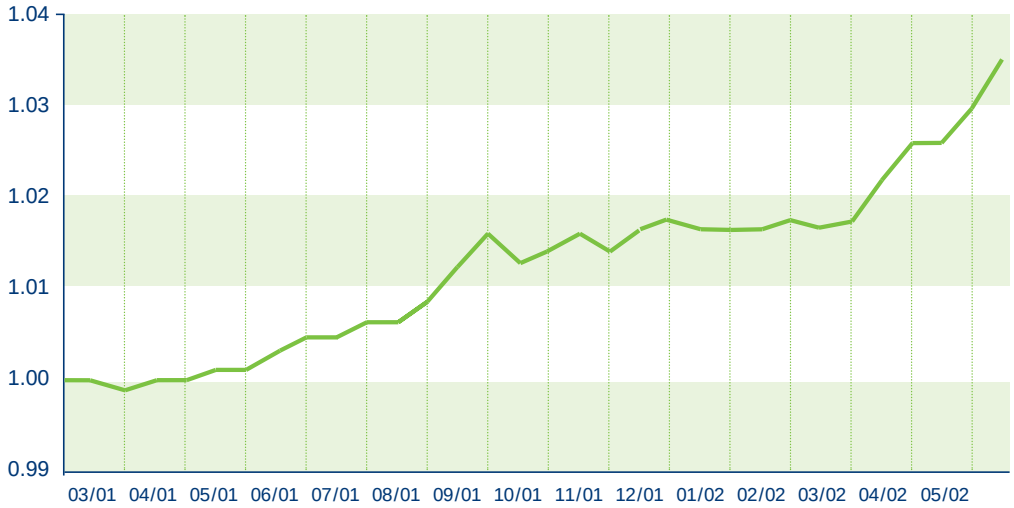
Secondly, we transfer a daily euro P/L from a long-short European equity portfolio, which is our alpha element. The size of this P/L will be directly related to performance of the long portfolio, the short portfolio and the exposure at the aggregate level to this alpha element. That is, suppose we want to achieve a ten percent exposure to the alpha element then we would purchase a EUR 5 million long position while we would simultaneously enter into a EUR 5 million short position and receive that amount in sale proceeds. At the end of day one the manager would have EUR 5 million of long assets, EUR 5 million of short liabilities and EUR 5 million of cash which is already sitting in cash-equivalents. The results are shown in the table above. Our target was an information ratio of two. The table shows that a futures based index strategy with an eight percent alpha overlay generated an annualized out performance of approximately two percent with an annualized tracking error of one percent which equates to an information ratio of around 2.2.

Re-engineering and Tilting the Alpha Overlay Using Options

The fund manager could beta tilt the portfolio further by introducing an extra level of performance enhancement using single stock options. This can be achieved by selling upside calls on shares in the short portfolio in our alpha element with high implied volatility and selling puts on shares in the long portfolio in our alpha element with high implied volatility. The combination of high implied volatility put-selling and call-overwriting will generate a relatively high level premium income and thus enhance performance further.

The clear advantage of such a strategy is avoiding style dependency. A single model may not work equally well in all market scenarios and time periods and if the alpha generating process is too systematic, the manager will be too slow to adapt to changing conditions. A successful new investment enhancement strategy may not remain profitable forever and old strategies may suddenly work well. In sum, flexibility within the alpha generating component is key to success. Crucially, the manager must ensure strategy diversification, integrate a selection of risk models and different types of alphas.

Compound Relative Performance 8 Percent Alpha Exposure



Conclusion

Futures based enhanced indexing using portable alpha techniques offers an investor the opportunity to systematically beat the return of an index by effectively "transferring" alpha from a range of strategies examined by the fund manager. The futures element embedded in the portfolio enhancement strategy provides the investor with broad diversification and is a flexible vehicle for active overlays. There is evidence, provided that the exposure to the alpha strategy and the risk embedded in the alpha strategy are appropriately constrained, that the potential excess return generated can be obtained with relatively low tracking error at the aggregate level.

This case study is part of a new brochure jointly developed by Eurex, Xetra® and Clearstream International. In addition to ten case studies contributed by leading investment firms which illustrate the applications of Deutsche Börse Group's products and services, this brochure provides an overview of Deutsche Börse Group as a one-stop access transaction service provider for institutional investors.

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