AlternativeSoft
Analytical Investment Solutions

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Alpha Decomposition Technique in AlternativeSoft

This document explains the methodology behind the Style Analysis technique used in AlternativeSoft. The idea behind Style Analysis is to:

I. Calculate a fund alpha versus a reasonable benchmark.
II. Decompose the fund alpha into two components:
   a) Style timing alpha
   b) Asset selection alpha.

The Style Analysis procedure in AlternativeSoft can be applied to hedge funds, fund of hedge funds and mutual funds.

In the first section, we explain how AlternativeSoft statistically constructs a benchmark for the fund. Most hedge funds claim that they belong to a certain strategy. However, we want to assess them against a benchmark that reflects their real exposure to that particular strategy. The alpha for the hedge fund is then calculated versus their real strategy exposures.

In the second section, we explain how to split the fund's alpha into two parts. One part accounts for the ability to invest in the right strategies at the correct time (i.e. strategy timing). The other part measures the ability to pick the best assets at the correct time (i.e. asset selection).

Section 1 Calculate a fund's alpha versus a synthetic benchmark

Let's assume we have a hedge fund time series with returns r_t where $1 \le t \le T$ and for the same time period t another time series $f_{i,t}$ for regression factors, where $1 \le i \le N$. Example regression factors $f_{i,t}$ could be the HFR or EDHEC style indices.

Step 1: At each time point t, $\tau \le t \le T$, we take the last τ data points of the hedge fund time series, indicated by $r_{[t-\tau+1,t]}$, and the corresponding factor returns, indicated by $f_{i,[t-\tau+1,t]}, \forall i$. We then perform a regression between the factor returns and the respective hedge fund returns. This gives us the factor sensitivities β for this regression d as shown below.

$$r_{[t-\tau+1,t]} = \sum_{i=1}^{N} \beta_{i,d} f_{i,[t-\tau+1,t]} + e_{d,[t-\tau+1,t]}$$

Where the regression variable d, $\tau \le d \le T$, indicates the regression with the data of the time period $[d-\tau+1, d]$. At time $t+1$, the regression $d+1$ will be performed with the hedge fund returns and the

factor returns of the time period $[d-\tau+2, d+1]$. There is no $d<\tau$ because there would be not enough data, i.e. τ data points, for the style analysis.

Since we do a constraint regression, it holds that $0 \le \beta_{i,d} \le 1, \ \forall i,d$ and $\sum_{i=1}^{N} \beta_{i,d} = 1, \ \forall d$.

Step 2: We construct a time series R_t^{SB} for the strategic benchmark of the hedge fund. This strategic benchmark will be a weighted average of the strategies that the hedge fund is exposed to. We do this by calculating the average exposure $\overline{\beta}$ of the hedge fund to each factor and multiply it with the factor returns at each time t:

$$R_t^{SB} = \sum_{i=1}^{N} \overline{\beta}_i f_{i,t} \quad \text{for } 1 \le t \le T \qquad \text{with } \overline{\beta}_i = \frac{1}{T-\tau+1} \sum_{d=\tau}^{T} \beta_{i,d}$$

where R_t^{SB} is the return of the strategic benchmark at time t.

Step 3: We calculate the total alpha of the fund versus its strategic benchmark:

$$\alpha_{total} = \overline{r_{[1,T]}} - \overline{R_{[1,T]}^{SB}}$$

where $\overline{r_{[1,T]}}$ indicates the annualized geometric return of the hedge fund and $\overline{R_{[1,T]}^{SB}}$ indicates the annualized geometric return of the strategic benchmark.

Section 2 Fund's Style Timing Alpha and its Asset Selection Alpha

Step 4: In Step 2, we used the average beta to construct the strategic benchmark R_t^{SB}. In order to decide whether the hedge fund manager delivers style timing capabilities, we construct a style timing benchmark R_t^{ST} composed of the style exposure at a given point in time:

$$R_t^{ST} = \begin{cases} \sum_{i=1}^{N} \beta_{i,\tau} f_{i,t} & for \quad t \le \tau \\ \sum_{i=1}^{N} \beta_{i,t} f_{i,t} & for \quad t > \tau \end{cases}$$

For the returns $R_{[1,\tau]}^{ST}$, we use the sensitivities β from the first stepwise regression ($d=\tau$). For the later returns $R_{[\tau+1,T]}^{ST}$, we use the sensitivities β from the corresponding regression ($d=[\tau+1,T]$).

Step 5: We calculate the style timing alpha of the hedge fund versus its style timing benchmark R^{ST}:

$$\alpha_{style\_timing} = \overline{r_{[1,T]}} - \overline{R_{[1,T]}^{ST}}$$

Step 6: The asset selection alpha is the difference between the hedge fund total alpha and the style timing alpha:

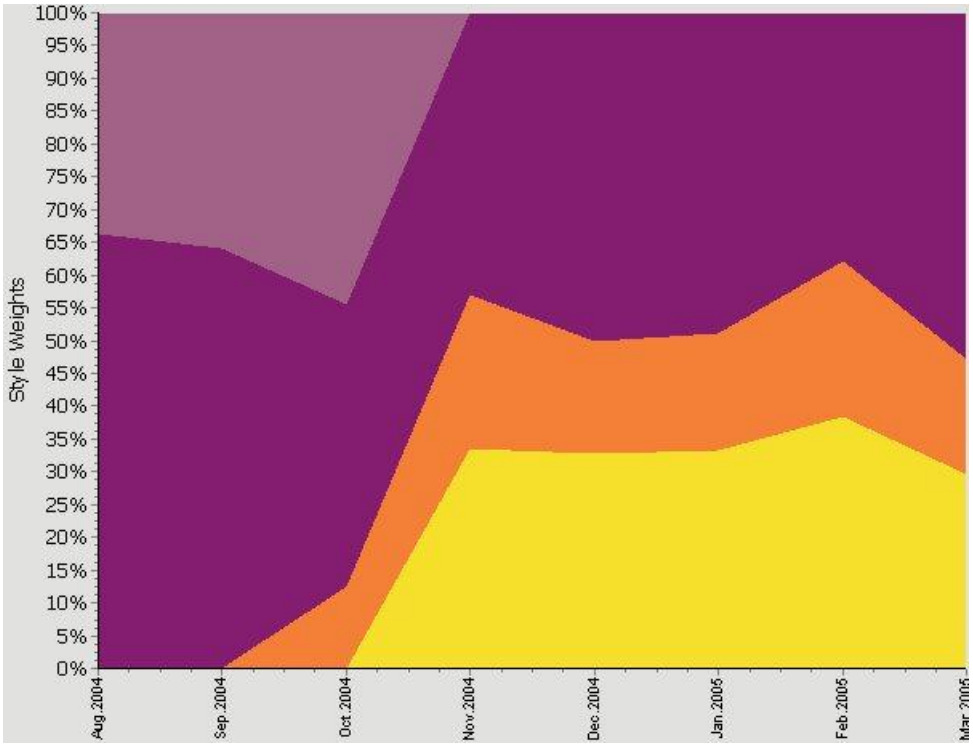
$$\alpha_{asset\_selection} = \alpha_{total} - \alpha_{style\_timing}$$

Step 7: The interpretation of the results is straightforward. A fund can have any combination of positive / negative style timing alpha and positive / negative asset selection alpha to explain its total positive / negative alpha.

Below we have some examples of hedge fund alpha decomposition.

Example 1 Style Analysis within the AlternativeSoft Platform

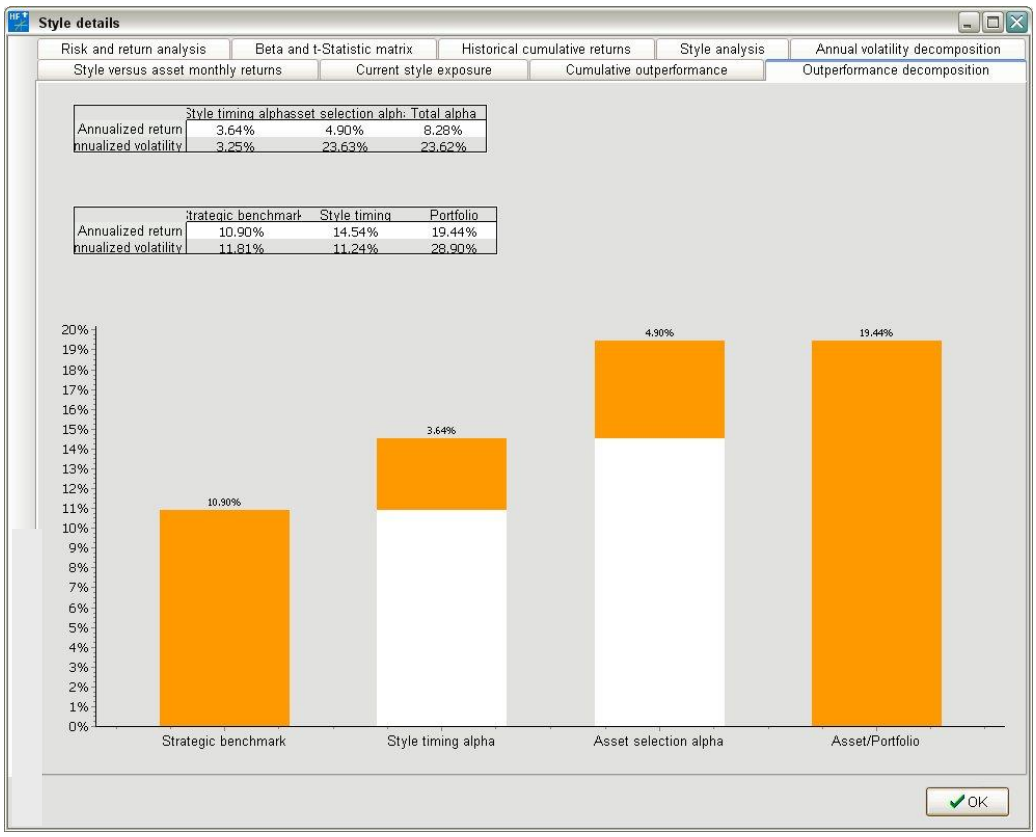
The following graph displays the results of a style analysis. The first style analysis (rolling window $\tau = 24$ months) has been performed on August 2004 using the data from September 2002 to August 2004. The analysis of the 2 years of data tells us how the returns during particular months are best explained. For example in August 2004 the returns are best explained by 34% exposure in Relative Value Style (light purple) and 66% exposure in Merger Arbitrage Style (dark purple).
This procedure has been applied to each month. For example in December 2004, an analysis using data from January 2003 to December 2004, exhibits 32% Convertible Arbitrage exposure (yellow), 18% Market Timing exposure (orange) and 50% Merger Arbitrage exposure (dark purple).



	HFR Relative Value
	HFR Merger Arbitrage
	HFR Market Timing
	HFR Convertible Arbitrage

Example 2 Alpha Decomposition within the AlternativeSoft Platform.

The following picture shows a fund with a total alpha of 8.28% versus the strategic benchmark. This alpha is explained with 3.64% style timing alpha and 4.90% asset selection alpha. This fund has generated 3.64% per annum above a strategic benchmark, by changing its exposure to the different fund strategies. Moreover, this fund has generated 4.90% per annum by selecting better assets than the average funds within each strategy. This translates into the following computation:
Strategic benchmark (10.90%) + Style timing alpha (3.64%) + Asset selection alpha (4.90%) = Fund annualized return (19.44%).



The picture below shows a fund with a positive style timing alpha of 1.06% and a negative asset selection alpha of -6.46%, resulting in a total alpha of -5.02%. This fund has not been able to outperform the fund strategies it was following. It has selected the wrong assets within its selected fund strategies leading to this -6.46% annual asset selection alpha.