Returns-Based Style Analysis (RBSA)

The RBSA technique (Sharpe 1988, 1992)[1] focuses on revealing the characteristics of a portfolio by looking at its realized returns. It involves calculating constrained regression coefficients of the portfolio returns on the return series of a set of indices, either at some point in time or on a time-rolling basis. Rolling serves to spot potential style drifts over time.

In order to enable the analysis, the indices need to be:

- mutually exclusive (For eg.: large cap/small cap, value/growth.)
- exhaustive with respect to managers' universe;
- ideally uncorrelated sources of risk.

The original RBSA involves the constraints that the coefficients on indices are nonnegative and sum to 1. This allows interpreting a beta as a proportional exposure to the particular style represented by the index. In applying the analysis, I relaxed the constraint of non-negativity and kept only the constraint that coefficients sum up to one, for two reasons:

- This analysis is much simpler to produce in Excel
- It is consistent with long/short strategies or with "reverse exposure" (like reverse carry in currency management for example).

The proportional exposure interpretation of indices is still valid.

In my opinion, this analysis does not bring value on its own, but it may be useful in counterchecking the portfolio managers' affirmation regarding investment style and changes in strategies.

How the excel file works:

The series for portfolio and indices are exported from PH. Rolling Optimal Least Squares regression coefficients are calculated by using matrix calculations on modified series, such that
(Assume there are 4 orthogonal indices $X_1, \ldots X_4$, and Y_t represents portfolio returns):

$Y_t = \alpha_t + \beta_{1,t} X_{1,t} + \beta_{2,t} X_{2,t} + \beta_{3,t} X_{3,t} + \beta_{4,t} X_{4,t} + \varepsilon_t$, subject to $\beta_{1,t} + \beta_{2,t} + \beta_{3,t} + \beta_{4,t} = 1$.

This is easily done by running an auxiliary regression:

$(Y_t - X_{1,t}) = \alpha_t + \beta_{2,t} (X_{2,t} - X_{1,t}) + \beta_{3,t} (X_{3,t} - X_{1,t}) + \beta_{4,t} (X_{4,t} - X_{1,t}) + \varepsilon_t$

And then obtaining $\beta_{1,t} = 1 - \beta_{2,t} - \beta_{3,t} - \beta_{4,t}$.

The α_t coefficient represents the part of managers' return that is independent of the exposures to indices. Unless the manager is actively managing strategy exposure, this can be interpreted as traditional "alpha".

Note: Until this report can be run directly in PH (if it can be run...), it can be used in Excel.
This file is designed for 4 mutually exclusive and exhaustive indices. The formulas need to be modified in order to use a larger or a smaller number of indices - this can be done quite easily.
They can also be modified for different rolling window durations.

Steps:
- Export from PH the portfolio series of "NAV Price" and the Index series "Index Total Value".
- In "1y Regressions", "2y Regressions", etc, copy and paste below the rows to fill the whole time series. Change also the time scale in the charts.
- Interpret.

[1] Source: CFA® Program Curriculum