

ON THE USE OF QUANTILE REGRESSION FOR FINANCIAL PORTFOLIOS' STYLE ANALYSIS*

Domenico Vistocco¹

¹ Dipartimento di Scienze Economiche, Università di Cassino

Via S. Angelo – Loc. Folcara, I-03043, Cassino(FR), Italy, vistocco@unicas.it

Abstract: Style analysis models aim at assessing and comparing the performance of different financial products using past returns. In the framework of ordinary least squares, the estimated composition of the classical model is interpretable in terms of sensitivity of portfolio expected returns to constituents returns: the style of the products is determined by the way constituents exposure influences expected returns. Quantile regression may be viewed as an extension of classical least squares estimation of conditional mean models for conditional quantile functions. It then offers an useful look at the style analysis problem from a different point of view, allowing to obtain information on the entire return distributions of analyzed products.

KEYWORDS: Benchmarking, Portfolio Management, Performance Attribution, Constrained Linear Regression, Constrained Quantile Regression..

A variety of techniques has been devised in order to assess accurately the skill of portfolio manager. It is straightforward to say that the task has great practical importance: small savers as well as investment consultants and funds of funds managers all have the need to decide whether or not funds are exhibiting skill.

Three major approaches are available for portfolio performance measurement:

- The use of a benchmark, a portfolio is judged against a market index (benchmark) by comparing a series of returns from the portfolio with the same series of returns for the benchmark (Siegel, 2003),
- The use of a peer group, a number of portfolios that are similar to the portfolio in question are founded in order to examine its performance relative to the peer portfolios,
- The use of random portfolios, a number of random portfolios are generated satisfying the same constraints placed on the portfolio. The performance of the portfolio is then compared to the performance of the random portfolios (Burns, 2004).

Style analysis models (Sharpe, 1993) belong to first group, as the market index (the so-called benchmark) plays a central role in such an analysis (Tierney and Winston, 1991). The broad objective of style analysis is to assess and compare the performance of different financial products using past returns. Portfolio managers can use different investment strategies when assembling a portfolio of risky assets. The use of a passive investment strategy lead the manager to replicate a reference

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market index (by component shares and weights) in composing its portfolio. On the opposite side, a portfolio that differs from the market index by having different weights in some or all the shares is the result of an active investment strategy. The passive investor does not rely on superior information and his trading operations are limited to rebalancing when the constituents of the index change. The return of a passive manager is therefore the market return less the unavoidable trading costs. The active manager, on the other side, relies on having superior information and is prepared to incur in much greater trading costs. Due to these costs, only a few active investors outperform the returns from passive investment in the long run (Waring and Siegel, 2003).

Style analysis models aim at estimate the internal composition of a portfolio. Typically, indeed, there is no information available to external subjects about the detailed choice of assets a particular portfolio holds. These models allow to use a multi-index benchmark in the measurement of active investment strategies. Style analysis models construct a benchmark portfolio from a set of known indices against which to compare the performance of analyzed portfolios. The only restriction is the availability of returns for such indexes, that should reflect activity in different asset classes. The model estimates the quotas of such indexes both in the reference portfolio and in the financial products, with the aim to separate out the attribution to return (Conversano and Vistocco, 2004).

The classical model for style analysis is based on a least-squares constrained regression model. Model constraints allow the coefficients to be exhaustive and non negative. The estimated compositions are interpretable in the framework of classical regression, that is in terms of sensitivity of portfolio expected returns to constituents returns: the style of the products is determined by the way constituents exposure influences expected returns.

Quantile regression, as introduced by Koenker and Basset (1978) may be viewed as an extension of classical least squares estimation of conditional mean models for conditional quantile functions. It then offers an useful look at the style analysis problem from a different point of view, allowing to obtain information on the entire return distributions of analyzed products. Through these additional features a more detailed comparison of the financial products is then obtainable, by combining classical model results and quantile regression results. The use of both the models allows to reveal the different impact of asset allocation choices at different parts of the portfolio returns distribution.

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