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Backward/forward optimal combination of performance measures for equity screening☆

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A B S T R A C T

We introduce a novel criterion for performance measure combination designed to be used as an equity screening algorithm. The proposed approach follows the general idea of linearly combining selected performance measures with positive weights and combination weights are determined by means of an optimisation step. The underlying criterion function takes into account the risk-return trade-off potentially associated with the equity screens, evaluated on a historical and rolling basis. By construction, performance combination weights can vary over time, allowing for changes in preferences across performance measures. An empirical example shows the benefits of our approach compared to naive screening rules based on the Sharpe ratio.

1. Introduction

The investment process is described by the complete set of actions taken by a portfolio manager, including the definition of the investment objectives and the associated strategic allocation, the construction of tactical asset allocation and stock selection, and general rules for portfolio monitoring

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(see for example Grinold & Kahn, 1999). The security selection step focuses on identifying the most promising investment opportunities, represented by specific assets. Different approaches might be employed at this stage, inspired by technical analysis or based on a more fundamental analysis. In general, security selection methodologies can be classified as qualitative or quantitative. The latter presumes the existence and the use of some quantitative tools.

The broad class of quantitative security selection instruments includes the so-called equity screening rules, methodologies whose purpose is to rank a large set of assets in order to focus attention on the best ones or to exclude the worst ones. Screening rules can be used directly as security selection tools or might simply represent a first step in a security selection procedure; in fact, they permit to restrict the investment universe to a reasonably limited set of assets, to be analysed in greater detail by analysts. We stress that screening rules should, when used as asset allocation tools (for instance by directly investing in the best assets) might turn out to be suboptimal, since they do not control for the correlation across assets.

Relevant and relatively simple examples of screening rules are given by performance measures; these are quantities that, in most cases, represent a remuneration per unit of risk, or risk adjusted returns. In the last decade, the financial economics literature has discussed a large number of alternative performance measures; see the surveys by Aftalion and Poncet (2003), Bacon (2008), Cogneau and Hübner (2009a, 2009b), Le Sourd (2007) and Caporin, Jannin, Lisi, and Maillet (2014). The available performance measures can be classified into four large families, as suggested by Caporin et al. (2014), to highlight and understand their differences: relative performance measures (rewards per unit of risk), absolute performance measures (risk-adjusted measures referred to a benchmark or to a set of risk factors), measures derived from utility functions and measures expressed as functions of return distribution features. It is also important to note that performance measures belonging to the same class are heterogeneous since they can be based on different quantities (such as utility functions, moments, partial moments or quantiles) or different information sets (different selections of risk factors). Furthermore, if performance measures are used to order assets (as equity screening rules), the ranks they produce for a common set of assets might be sensibly different; see Caporin and Lisi (2011). The last finding confirms that alternative measures have different views over assets, and the construction of an 'optimal' equity screening tool should take those different viewpoints into account.[1]

Differently, within a performance evaluation framework, several authors have considered the problem of determining the optimal portfolio weights by maximizing different performance measures. They aim at finding the 'best' performance measure; see for example Farinelli, Ferreira, Rossello, Thoeny, and Tibiletti (2008, 2009), among others. The outcomes of these studies are not completely conclusive, since different performance measures provide superior results over different samples and different assets.

A possible solution to the above-mentioned limitations is the construction of a composite performance index to be used within an equity screening programme, or to guide the allocation of a portfolios without taking into account a single performance measure. To our best knowledge, Hwang and Salmon (2003) is the first and unique paper proposing a combination of performance measures. The authors propose the construction of a combined index by resorting to a copula function. However, given a number of issues, including the need of recovering by simulation the performance measure densities, they do not provide an empirical analysis supporting their proposal. We follow the spirit of Hwang and Salmon (2003), and contribute to this strand of the quantitative finance literature by introducing a new approach for the construction of a composite performance index. Differently from the cited paper, our approach is computationally feasible, thanks to the adoption of a linear combination criterion. Moreover, we highlight a number of computational and implementation issues, suggesting methods that allow overcoming most of them. Finally, we provide an extensive empirical example.

The combination criterion we propose, called Backward/Forward, follows the general idea of linearly combining existing performance measures with positive weights. These weights are determined

[1] We do not consider performance measures based on portfolio holdings as their computation requires access to detailed portfolio composition over time; see Wermers (2006).