
Toward More Information-Efficient Portfolios

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When certain constraints are imposed on portfolio managers, their ability to efficiently capture alpha is diminished. Managers may dramatically improve expected risk-adjusted performance by relaxing the short-sale constraint on long-only portfolios. Although a portfolio's target tracking error may dictate different levels of short-selling activity, even a modest introduction of short selling can result in dramatic improvement.

Given the modest returns expected from the equity markets in the foreseeable future, investors are striving harder than ever to eke out as much alpha as possible. One of the natural possibilities to explore is the degree to which policy-imposed constraints diminish managers' ability to efficiently capture alpha.

The authors build on previous research by applying empirical analysis to quantify the impact of the long-only constraint and several other common portfolio constraints, including market-capitalization neutrality, industry neutrality, sector neutrality, and position limits relative to index weights.

To conduct their analysis, the authors examine a series of portfolios with *ex ante* annualized tracking error of 4 percent. The portfolios consist of S&P 500 Index stocks and are optimized to maximize a value-based expected return signal, subject to beta neutrality versus the S&P 500 and subject to each of the constraints being analyzed. They then remove the constraints one by one and re-optimize the portfolio to determine the impact of each constraint.

The authors measure the impact by using the portfolio transfer coefficient (TC), which was developed by Clarke, de Silva, and Thorley (*Financial Analysts Journal*, 2000) as an extension of the fundamental law of active management (Grinold, *Journal of Portfolio*

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Management, 1989), which states that the expected information ratio for a portfolio is a product of skill (quality of the information), breadth (how widely the information is applied), and efficiency (how effectively information and skill are transferred into holdings). The TC is determined by analyzing the correlation between the risk-adjusted expected returns and the risk-weighted active exposures of securities in the portfolio. A portfolio's expected information ratio can be expressed as the product of the TC, the portfolio's information content (IC), which is the expected correlation between predicted and actual returns, and the square root of the number of independent securities from which to choose for the portfolio. Thus, the TC has a direct impact on a portfolio's expected information ratio, with a higher TC implying a more efficiently constructed portfolio, all else being equal.

In conducting their analysis, the authors report a TC of 0.332 with all constraints imposed, which implies that about only 33 percent of the information in security rankings is successfully carried through into active positions within the portfolio. In relaxing the industry and sector constraints, they find that the TC improved modestly to 0.347 and 0.34, respectively, and to 0.422 with both constraints removed simultaneously. The authors discover that relaxing the constraint on position limits resulted in a modest decline in the TC to 0.298. In contrast, relaxing the market-cap and long-only constraints resulted in marked improvement of the TC to 0.471 for the market-cap constraint and 0.678 for the long-only constraint.

Improvement of the TC with removal of the market-cap constraint is explainable by virtue of the market capitalization of the S&P 500 being focused heavily on the top stocks. For example, the top 20 stocks in the S&P 500 have an average weight of 1.7 percent in the index, whereas the bottom 404 stocks in the index have a mere 0.1 percent average weight. Without a market-cap constraint, managers have much more leeway in their ability to underweight the largest stocks and overweight the vast number of smaller-cap stocks in the index. This ability allows managers to put information about these stocks to greater use in the portfolio, which leads to a higher portfolio TC.

The authors find the largest increase in TC by relaxing the long-only constraint, again because of managers' ability to more fully exploit information about the stocks. Interestingly, they find that a full-blown long-short strategy was not necessary to reap these gains. Rather, even a modest relaxation of the long-only constraint resulted in significant information-efficiency improvement.

While exploring the long-only constraint issue more fully, the authors find that for any given level of *ex ante* tracking error, increasing the level of short sales boosts portfolio activity and distributes weights across more securities in the benchmark. Additionally, they find that as a function of tracking error, TC initially increases to an optimum and then begins to decline at higher levels of tracking error. Despite this decline at higher tracking errors, the TC for portfolios with shorting activity remained consistently above the TC for long-only portfolios. Generally, high-tracking-error portfolios (above 3 percent) justified a greater degree of short selling (150 percent long/50 percent short). Low-tracking-error portfolios, however, justified the use of less short-selling activity to maximize the TC (110 percent long/10 percent short). Thus, managers with lower tracking errors, such as enhanced-index managers, may improve risk-adjusted performance with just modest use of short selling.

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