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Portfolio Constraints and the Fundamental Law of Active Management

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Abstract

Active portfolio management is typically conducted within constraints that do not allow managers to fully exploit their ability to forecast returns. Constraints on short positions and turnover, for example, are fairly common and materially restrictive. Other constraints, such as market-capitalization and value–growth neutrality with respect to the benchmark or economic-sector constraints, can further restrict an active portfolio's composition. We derive ex ante and ex post correlation relationships that facilitate the performance analysis of constrained portfolios. The ex ante relationship is a generalized version of a previously developed “fundamental law of active management” and provides an important strategic perspective on the potential for active management to add value. The ex post correlation relationship represents a practical decomposition of performance into the success of the return-prediction process and the “noise”

associated with portfolio constraints. We verify the accuracy of these relationships with a Monte Carlo simulation and illustrate their application with equity portfolio examples based on the S&P 500 Index as the benchmark.

The expected value added in an actively managed portfolio depends on both the manager's forecasting skill and the manager's freedom to take appropriate positions in securities that reflect those forecasts. The “fundamental law of active management” gives the maximum expected value added for an actively managed portfolio based on the forecasting ability of the manager and the breadth of application. The fundamental law does not, however, address the impact of portfolio constraints on potential value added. Constraints such as no short sales and limits on security concentration impede the transfer of information into optimal portfolio positions and decrease the expected value added.

We generalize the fundamental law of active management to include a transfer coefficient as well as an information coefficient. The information coefficient measures the strength of the return-forecasting process, or signal, and the transfer coefficient measures the degree to which the signal is transferred into active portfolio weights. The transfer coefficient turns out to be a simple scaling factor in the generalized fundamental law and is an intuitive way to measure the extent to which constraints reduce the expected value of forecasting ability. In an ideal world without any constraints, a well-constructed portfolio has a transfer coefficient of 1.0 and the original form of the fundamental law applies. In practice, managers often work under constraints that produce transfer coefficients ranging from 0.3 to 0.8. The transfer coefficient suggests why performance in practice is only a fraction (0.3 to 0.8) of what is predicted by the original form of the fundamental law.

Measuring the impact of portfolio constraints on active weights through use of the transfer coefficient allows an investment manager to assess strategic trade-offs in constructing portfolios. For example, we illustrate that increasing the tracking error in a long-only portfolio typically reduces the transfer coefficient because the long-only constraint becomes binding for more securities and thus impedes the transfer of information into desirable portfolio positions. Another strategic perspective is that the long-only constraint leads to an unintended small-cap bias in actively managed portfolios, which is then a motivation for market-cap-neutrality constraints. The combination of long-only and market-cap-neutrality constraints, however, leads to active management that is concentrated in the large-cap sector. We use the framework

of the generalized fundamental law and transfer coefficient to illustrate the impact on portfolios of not only the long-only constraint but also turnover constraints and multiple constraints.

In addition to the transfer coefficient's ex ante role, the transfer coefficient is also a critical parameter in reconciling realized performance with the realized success of return forecasting. We derive a decomposition of ex post active management performance based on the transfer coefficient and the realized information coefficient. The ex post performance decomposition indicates that only a fraction (the transfer coefficient squared) of the variation in realized performance, or tracking error, is attributable to variation in realized information coefficients. For example, if the portfolio has no constraints and the transfer coefficient is 1.0, variation in realized performance is wholly attributable to the success of the return-prediction process. If the transfer coefficient is 0.3, however, only 9 percent of performance variation is attributable to the success of the signal and the remaining 91 percent is attributable to constraint-induced “noise.” Managers with low transfer coefficients will experience frequent periods when the signal works but performance is poor and periods when performance is good even though the return-forecasting process failed.

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