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Momentum strategies based on reward–risk stock selection criteria

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Abstract

In this paper, we analyze momentum strategies that are based on reward–risk stock selection criteria in contrast to ordinary momentum strategies based on a cumulative return criterion. Reward–risk stock selection criteria include the standard Sharpe ratio with variance as a risk measure, and alternative reward–risk ratios with the expected shortfall as a risk measure. We investigate momentum strategies using 517 stocks in the S&P 500 universe in the period 1996–2003. Although the cumulative return criterion provides the highest average monthly momentum profits of 1.3% compared to the monthly profit of 0.86% for the best alternative criterion, the alternative ratios provide better risk-adjusted returns measured on an independent risk-adjusted performance measure. We also provide evidence on unique distributional properties of extreme momentum portfolios analyzed within the framework of general non-normal stable Paretian distributions. Specifically, for every stock selection criterion, loser portfolios have the lowest tail index and tail index of winner portfolios is lower than that of middle deciles. The lower tail index is associated with a lower mean strategy.

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The lowest tail index is obtained for the cumulative return strategy. Given our data-set, these findings indicate that the cumulative return strategy obtains higher profits with the acceptance of higher tail risk, while strategies based on reward–risk criteria obtain better risk-adjusted performance with the acceptance of the lower tail risk.

JEL classification: G11; G14

Keywords: Momentum strategies; Reward–risk stock selection criteria; Expected tail loss; Stable Paretian distribution; Risk-adjusted performance

1. Introduction

A number of studies document the profitability of momentum strategies across different markets and time periods (Jegadeesh and Titman, 1993, 2001; Rouwenhorst, 1998; Griffin et al., 2003). The strategy of buying past winners and selling past losers over the time horizons between 6 and 12 months provides statistically significant and economically large payoffs with historically earned profits of about 1% per month. The empirical evidence on the momentum effect provides a serious challenge to asset pricing theory. There is so far no consistent risk-based explanation and, contrary to other financial market anomalies such as the size and value effect that gradually disappear after discovery, momentum effect persists.

Stock selection criteria play a key role in momentum portfolio construction. While other studies apply simple cumulative return or total return criterion using monthly data, we apply reward–risk portfolio selection criteria to individual securities using daily data. A usual choice of reward–risk criterion is the ordinary Sharpe ratio corresponding to the static mean–variance framework. The mean–variance model is valid for investors if (1) the returns of individual assets are normally distributed or (2) for a quadratic utility function, indicating that investors always prefer the portfolio with the minimum standard deviation for a given expected return. Either one of these assumptions are questionable. Regarding the first assumption, there is overwhelming empirical evidence that invalidates the assumption of normally distributed asset returns since stock returns exhibit asymmetries and heavy tails. In addition, further distributional properties such as kurtosis and skewness are lost in the one-period mean–variance approach.

Various measures of reward and risk can be used to compose alternative reward–risk ratios. We introduce alternative risk-adjusted criteria in the form of reward–risk ratios that use the expected shortfall as a measure of risk and expectation or expected shortfall as a measure of reward. The expected shortfall is an alternative to the value-at-risk (VaR) measure that overcomes the limitations of VaR with regards to the properties of coherent risk measures (Arztner et al., 1999). The motivation in using alternative risk-adjusted criteria is that they may provide strategies that obtain the same level of abnormal momentum returns but are less risky than those based on cumulative return criterion.

In previous and contemporary studies of momentum strategies, possible effects of non-normality of individual stock returns, their risk characteristics, and the distributional properties of obtained momentum datasets have not received much attention. Abundant empirical evidence shows that individual stock returns exhibit non-normality, leptokurtic, and heteroscedastic properties which implies that such effects are clearly important and