

Improving Value-at-Risk Estimates by Combining Kernel Estimation with Historical Simulation

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Abstract

In this paper we develop an improvement on one of the more popular methods for Value-at-Risk measurement, the historical simulation approach. The procedure we employ is the following: First, the density of the return on a portfolio is estimated using a nonparametric method, called a Gaussian kernel. Second, we derive an expression for the density of any order statistic of the return distribution. Finally, because the density is not analytic, we employ Gauss-Legendre integration to obtain the moments of the density of the order statistic, the mean being our Value-at-Risk estimate, and the standard deviation providing us with the ability to construct a confidence interval around the estimate. We apply this method to trading portfolios provided by a financial institution.

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