Value at Risk and Expected Shortfall based on Gram-Charlier-like expansions.

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Value at Risk and Expected Shortfall based on Gram-Charlier-like expansions.

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Abstract

This paper offers a new approach to modeling the distribution of a portfolio composed of either asset returns or insurance losses. To capture the leptokurtosis, which is inherent in most financial series, data are modeled by using Gram–Charlier (GC) expansions. Since we are interested in operating with several series simultaneously, the distribution of the sum of GC random variables is derived. This latter turns out to be a tail-sensitive density, suitable for modeling the distribution of a portfolio return-losses and, accordingly, can be conveniently adopted for computing risk measures such as the value at risk and the expected shortfall as well as some performance measures based on its partial moments. The closed form expressions of these risk measures are derived for cases when the density of a portfolio is the sum of GC expansions, either with the same or different kurtosis. An empirical application of this approach to a portfolio of financial asset indexes provides evidence of the comparative effectiveness of this technique in computing risk measures, both in and out of the sample period.

JEL code: C1; G1

Keywords:

Gram-Charlier expansions; Value at Risk; Expected Shortfall; Heavy tailed distributions

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