Tail risk measures for Generalized Skew - Elliptical distributions

Zinoviy Landsman Udi Makov
Tomer Shushi
Department of Statistics, University of Haifa,
Mount Carmel, 31905, Haifa, Israel
e-mail: tomershushi@gmail.com

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Abstract

One of the basic concepts in financial investments is that any investment is subjected to risk that could result in a financial loss. Consequently, investment firms, insurance companies and banks have incessant risks for loss. Therefore, financial regulators, such as the Basel Committee of Banking Supervision (BCBS) which introduced the Basel accords, encourage investment firms, insurance companies and banks to measure their risks and quantify the potential loss and act accordingly (see Landsman and Makov (2011)). The risk measure tail conditional expectation (TCE) has properties which are considered desirable and applicable in a variety of situations (In particular, it satisfies requirements of a "coherent" risk measure in the spirit developed by Artzner et al. (1999)). Consequently, there has been growing interest among risk measures, actuaries, and investment experts in this risk measure. Unlike the TCE, tail variance (TV) provides information of the deviation of the risk from its expectation in the upper tail, and hence, TV is important for understanding the dispersion in the tail of the distribution. Further, it is well known that since insurance claims and returns have a non-symmetric distributions, therefore, skewed distributions are needed for more accurate analysis of the data. In this spirit, this paper derives formulae for computing the TCE and

the TV for a family of non-symmetric distributions, the generalized skew elliptical (GSE) distributions. We also define a new risk measure, the tail variance-to-mean ratio, a normalized measure of tail dispersion with respect to a given loss distribution. This measure attempts to examine the tail dispersion for extreme values of loss.

Keywords: Tail conditional expectation; Tail value at risk; Tail variance; Multivariate generalized skew elliptical distributions

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