FOURTH CUMULANT FOR MULTIVARIATE AGGREGATE CLAIM MODELS

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The fourth cumulant for the aggregated multivariate claims is considered in this article. We present a formula for the general case when the aggregating variable is independent of the multivariate claims. Two important special cases are also considered. In the first one, multivariate skewed normal claims are considered and aggregated by a Poisson variable. The second case is dealing with multivariate asymmetric generalized Laplace and aggregation is made by a negative binomial variable. Due to the invariance property, the latter case can be derived directly, leading to the identity involving the cumulant of the claims and the aggregated claims. There is a well established relation between asymmetric Laplace motion and negative binomial process that corresponds to the invariance principle of the aggregating claims for the generalized asymmetric Laplace distribution. We explore this relationship and provide multivariate continuous time version of the results. It is discussed how these results that deal only with dependence in the claim sizes can be used to obtain a formula for the fourth cumulant for more complex aggregate models of multivariate claims in which the dependence is also in the aggregating variables.