# ON THE MULTIVARIATE SARMANOV DISTRIBUTION AND ITS ACTUARIAL APPLICATIONS

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***ABSTRACT:*** *Sarmanov's family of multivariate distributions recently gained the interest of researchers in various domains due to its flexible structure that can model a large range of dependencies starting from given marginals. In particular, this property motivates the consideration of Sarmanov's distribution in the fields of insurance and finance, from which we will present several applications. Therefore, we start by presenting the distribution's main characteristics and then we discuss its fitting to some real insurance data. More precisely, as a first example, we shall see how the bivariate Sarmanov distribution with different types of truncated marginal distributions could serve as a good model for bivariate losses (i.e., we fitted it to a random data sample of motor insurance claims consisting of the costs of property damage and medical expenses). As a second example, we introduce some trivariate Sarmanov distributions with Generalized Linear Models for marginals with the aim to incorporate some individual characteristics of the policyholders when modeling a real trivariate data set of claims frequencies (i.e., we modeled a count data set corresponding to three types of accident risks, two for motor insurance and one for home insurance). Finally, we consider the capital allocation problem, which consists in fairly allocating the capital needed to cover the aggregate loss of a company (e.g., insurance company) among its various lines of business. Risk measures are well-known tools used for this purpose, and one of the most popular such risk measure is the Tail-Value-at-Risk (TVaR). Based on this risk measure, we present some closed-type allocation formulas for risks modeled by Sarmanov's distribution.*

***KEYWORDS:*** *Sarmanov multivariate distribution, Insurance applications, Finance applications, Risk measures, Capital allocation problem.*

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