



## **Inference for the bivariate Birnbaum-Saunders distribution**

Luis Benites\*

Universidade de São Paulo, São Paulo, Brazil - lsanchez@ime.usp.br

Víctor Leiva

Universidad de Valparaíso, Valparaíso, Chile - victor.leiva@uv.cl

Filidor Vilca

Universidade Estadual de Campinas, Campinas, Brazil - fily@ime.unicamp.br

Multivariate distributions are a topic largely studied and, particularly, because of its applicability, the bivariate case is often taken into account. Birnbaum-Saunders distributions have been widely considered due to their good properties and useful for modeling different types of phenomena. We investigate estimation and hypothesis testing in the bivariate Birnbaum-Saunders distribution. About estimation, modified moment and maximum likelihood methods are employed. We prove that the modified moment estimators are consistent and asymptotically normal distributed. Regarding hypothesis testing, likelihood ratio, score and Wald statistics are analyzed. We obtain the Fisher information in a matrix form, which facilitates the implementation of the score and Wald statistics. We validate our approach with simulated and real-world data. Our study provides new findings and improves the results proposed until now on this topic.

**Keywords:** asymptotic tests; data analysis; moment and maximum likelihood estimators.