

Referee report on ‘A new family of distributions: Properties and applications’
REVSTAT-179-2020

This paper presents some results of estimation and proprieties of a new family of distributions by combining the Marshall-Olkin-G and Gamma-G classes. Authors have obtained maximum likelihood (ML) estimates for the model parameters, and presented a simulation study and applications to previously analyzed real data.

The results obtained for the proposed distribution seem to be interesting, but there are several issues that need to be clarified, corrected, and improved in the paper. For instance:

1. The article is written in an overly summarized form and is sometimes unattractive to the reader of any journal. That alone could lead to your rejection. In addition, I do suggest reviewing the use of English carefully, and considerable rewording and pruning to make the paper more concise and precise.
2. When I see a new paper about a new distribution, I wonder if it is due to any interesting properties or it arises naturally in some observable process like natural phenomena. I would like to see these arguments defended more clearly in the article by the authors. Could you do that?
3. The bibliography does not have many recent publications such as Martinez-Florez et al. (2020) and Magalhaes et al. (2020). I also suggest authors to create the state-of-art related to this topic in the first section that definitively needs to be improved.
4. I expect to see more detailed discussion in the simulation study and real data analysis. Could you revise these sections, including the conclusion section that is actually weak?
5. Suggestions: (i) Rewrite the paper title since the current one is nothing enlightening. How about naming the proposed distribution?. (ii) Place section 6 (properties) before section 4 (simulation). (iii) Reorganize the presentation of the tables. (iv) Put the simulation code in Supplementary material.

References:

Magalhaes TM, Gomez YM, Gallardo DI, Venegas O. (2020). Bias reduction for the Marshall-Olkin extended family of distributions with application to an airplane's air conditioning system and precipitation data. *Symmetry*, 12(5), 851.

Martinez-Florez G, Bolfarine H, Gomez YM, Gomez HW (2020). A unification of families of Birnbaum-Saunders distributions with applications. *REVSTAT – Statistical Journal*, 18(5), 637-660.