

Feng Li, Ph.D.  
School of Statistics and Mathematics  
Central University of Finance and Economics  
102206 Beijing, China  
✉ [feng.li@cufe.edu.cn](mailto:feng.li@cufe.edu.cn)  
🌐 <https://feng.li/>

May 29, 2023

Dear Editor,

Please find the attached manuscript entitled “Discrete Forecast Reconciliation” by Bohan Zhang, Anastasios Panagiotelis, Yanfei Kang and Feng Li, which we wish to submit for publication as a regular article in *European Journal of Operational Research*. No conflict of interest exists in the submission of this manuscript, and the manuscript is approved by all authors for publication. We confirm that the work is original research that has not been published previously, and not under consideration for publication elsewhere.

In this paper, we develop a formal discrete forecast reconciliation framework based on optimising scoring rules using quadratic programming. The proposed framework produces coherent joint probabilistic forecasts for count hierarchical time series. Two discrete reconciliation algorithms are proposed and compared to generalisations of the top-down and bottom-up approaches to count data. Two simulation experiments and two empirical examples are conducted to validate that the proposed reconciliation algorithms improve forecast accuracy. The empirical applications are to forecast criminal offences in Washington D.C. and the exceedance of thresholds in age-specific mortality rates in Australia. Compared to the top-down and bottom-up approaches, the proposed framework shows superior performance in both simulations and empirical studies.

We hope that the manuscript meets the standards of your journal. Thank you for your consideration.

Sincerely,

Feng Li