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From the Editor

Part II

This part contains a set of twelve articles written by thirty-four authors, indicating a dominant collaborative form of authorship (almost three authors per article on average) and showing a trend towards that observed in the natural and technical sciences. In this regard, another positive feature appears, that is the growing scope of internationalization of our journal. This is also important for the wide variety of its input and for the appropriate reach on the readership side, which we care so much about. In fact, the authors of the texts in this part come from thirteen countries: South Africa, Germany, USA, India, Morocco, France, Turkey, Poland, Nigeria, United Kingdom, Ukraine, Pakistan, and Sweden. Also, the spectrum of topics covered in these articles is suitably diverse, from theoretical interests to applications, but with concern shared about the usefulness of even abstract approaches to solving real-world problems in an innovative way.

Research articles

In the first paper, prepared by **Bonginkosi Duncan Ndlovu**, **Sileshi Fanta Melesse**, and **Temesgen Zewotir** titled ***A nonparametric analysis of discrete time competing risks data: a comparison of the cause-specific-hazards approach and the vertical approach*** the vertical model as a nonparametric model for analysis of discrete time competing risks data was presented. The secondary objective of this article is to compare the proposed model to this model. The authors pay particular attention to the estimates for the cause-specific-hazards and the cumulative incidence functions as well as their respective standard errors. It was shown that the standard errors for the estimates of these quantities were identical under both models. It is a roundabout way of estimating the cause-specific-hazards, however, there are cases in practice where these quantities cannot be estimated directly from the data such as when some of the subjects have failed with unknown failure causes. Furthermore, the cause-specific-hazards are not appropriate for application in the presence of a sizable proportion of cured subjects. The cause-specific-hazards model cannot handle these data complications. The proposed model, therefore, offers a possibility that the proposed model can also be upscaled to handle these challenges in discrete time.

Martin Vogt, **Partha Lahiri**, and **Ralf Münnich** in their article ***Spatial Prediction in Small Area Estimation*** have developed a hierarchical Bayes methodology for an extension of the well-celebrated Fay-Herriot model that incorporates spatial correlation using an intrinsic CAR model, and proved the propriety of the posterior distribution for our proposed model. The authors have tested the effect of covariates on the estimation results. An application to SAIPE data revealed that modeling spatial correlation can considerably improve on the associated hierarchical Bayes methodology if the area-specific auxiliary data are either weak. Small area estimation methods have become a widely used tool to provide accurate estimates for regional indicators such as poverty measures. Recent research has provided evidence that spatial modeling still can improve the precision of regional and local estimates.

In the next manuscript ***Efficient estimation of population mean in the presence of non-response and measurement error*** **Kuldeep Kumar Tiwari** and **Vishwantra Sharma** have considered ten estimators of population mean and studied them in the context of non-response and measurement error. In real-world surveys, non-response and measurement errors are common, therefore studying them together seems rational. Some population mean estimators are modified and studied in the presence of non-response and measurement errors. Bias and mean squared error expressions are derived under different cases. For all estimators, a theoretical comparison is made with the sample mean per unit estimator. The Monte-Carlo simulation is used to present a detailed picture of all estimators' performance. The expressions for bias and MSE for all the estimators in various cases were obtained.

Mounir Boumahdi's, **Idir Ouassou's**, and **Mustapha Rachdi's** *paper* ***Conditional density function for surrogate scalar response*** presents the estimator of the conditional density function of surrogated scalar response variable given a functional random one. A conditional density function by using the available (true) response data and the surrogate data was constructed, and some asymptotic properties of the constructed estimator in terms of the almost complete convergences were built. As a result, the authors have compared the estimator with the classical estimator through the Relative Mean Square Errors (RMSE). Finally, this analysis by displaying the superiority of the authors' estimator in terms of prediction when one is lacking complete data was completed. In this paper the almost complete convergence of conditional density function for surrogated scalar response variable given a functional random by using validation sample set was presented, and the performance of the estimator ˆ fxR (y) than ˆ f x V (y) to reduce RMSE by using the simulated data was shown.

The article by **H. Öztaş Ayhan** entitled ***Models for survey nonresponse and bias adjustment techniques*** discusses the aspects and the complex nature of the

nonresponse in sample surveys. An overview of the components of the bias due to nonresponse was performed. The survey unit nonresponse bias has been examined alternatively by taking response amounts which are fixed initially and also by taking the response amounts as random variables. Nonresponse bias components were illustrated for each alternative approach and the amount of bias was computed for each case. The evaluation of the nonresponse bias as nonresponse error or nonresponse rate was misleading. The nonresponse bias may seem to be related to the response rates for a given study. Increasing response rate may not always correspond to decreasing nonresponse bias for a given study. This paper has shown alternative approaches to nonresponse bias. In addition to this, the causes of the nonresponse bias can also be obtained from empirical studies of components and models relating to the covariates of survey participation and non-participation. The current research examined the response amounts as fixed initially. The proposed methodology has shown the effect of bias of nonresponse, which is based as the product of "amount of nonresponse rate" and the "difference between the response and nonresponse strata means".

Jacek Białek's paper ***Quality adjusted GEKS-type indices for price comparisons scanner data*** deals with the two new multilateral indices, the idea of which resembles the GEKS method, but which perform additional quality adjustment and deviate from the classical approach in which the base formula of the GEKS index is a superlative index. The empirical analysis has confirmed that the two proposed indices (GEKS-AQU and GEKS-AQI) satisfy most of commonly accepted tests for multilateral indices including the identity test. The study has shown that differences between the proposed indices and other considered multilateral indices appear only with large variability of quantity in homogeneous groups of products. It should be noted that quite surprisingly, the price volatility did not play a significant role in the empirical study as determinants of differences between multilateral indices. The same study has also shown that the computation time needed in the case of the GEKS-AQU and GEKS-AQI indices is average compared to most other multilateral indices. The previously known multilateral indices (Geary-Khamis, GEKS, TPD, CCDI, and SPQ) as well as the new indices proposed and discussed in the paper (GEK-AQU, GEKS-AQI, and their weighted versions: WGEKS-AQU and WGEKS-AQI) are implemented in the PriceIndices R package, and thus the reader can verify their usefulness on their own data sets.

Gbenga A. Olalude, **OlaOluwa S. Yaya**, **Hammed A. Olayinka**, **Toheeb A. Jimoh**, **Aliu A. Adebiyi**, and **Oluwaseun A. Adesina** in their paper ***Household expenditure in Africa: evidence of mean reversion*** investigate the mean reversion in household consumption expenditure in 38 African countries. The expenditure series used were

the percentage of nominal Gross Domestic Product (GDP), each spanning 1990 to 2018. Due to a small sample size of time series of household expenditure, with possible structural breaks, the authors used the Fourier unit root test approach, which enabled modeling both smooth and instantaneous breaks in the expenditure series. The results showed non-mean reversion in the consumption expenditure pattern of Egypt, Madagascar and Tunisia, while mean reversion was detected in the remaining 35 countries. Thus, the majority of African countries are on the verge of recession once shocks that affect the growth of GDP are triggered. Findings in this paper are of relevance to policymakers on poverty alleviation programmes in those selected countries.

In the paper ***Does economic freedom promote financial development? Evidence from EU countries*** **Anand Sharma**, **Vipin Sharma,** and **Shekhar Tokas** empirically explore the relationship between economic freedom and financial development in EU countries. Using panel data covering the years 2000–2017 and employing fixed effects, random effects, and the generalised method of moments (GMM), the paper examines the effect of economic freedom on financial development. The research results demonstrate that greater economic freedom is conducive to financial development in the EU. These findings remain robust to the use of an alternative index of economic freedom. The results imply that policies which promote economic freedom are likely to raise the level of a country's financial development. The article uses an index of overall financial development as a dependent variable and does not focus on the financial markets and financial institutions sub-indices. Future research may attempt to consider the effect of economic freedom on the development of financial markets and financial institutions.

Bayesian modelling for semi-competing risks data in the presence of censoring prepared by **Atanu Bhattacharjee** and **Rajashree Dey** presents the semi-competing risks framework as a way of investigating variation in risk for a non-terminal event where the occurrence of the event is subject to a terminal event. In this context, the authors have analyzed the semi-competing risk data using the proposed AFT illness death model, which serves as a helpful complement of the traditional hazard-based model of say. The work is dedicated to overcoming the existing challenges by the applications of R programming and data illustration. The authors arrived at a conclusion that the developed methods are suitable to run and easy to implement in R software. The selection of covariates in the AFT model can be evaluated using model selection criteria such as the Deviance Information Criteria (DIC) and Log-pseudo marginal likelihood (LPML). Various extensions of the AFT model, such as AFT-DPM and AFT-LN, have been demonstrated. The final model was selected based on minimum DIC values and larger LPML values.

Other articles

Svitlana Chugaievska's, Grażyna Dehnel's, and **Andrey Targonskii's** paper ***Census administration in Ukraine: insight into the Polish experience in the context of international indicators analysis*** deals with the analysis of a number of international indices that are relevant for respondent participation in statistical surveys, and particularly in the context of the next population census. Three groups of indices were identified: indicators of electronic document circulation, indicators of sustainable economic development, and social indicators. Considering each of these indices, the situation of Poland is significantly better compared to that of Ukraine, where the last national census was conducted only once in 2001. A comparative analysis of census questionnaires used in Poland in 2021 and in Ukraine in 2019 revealed that the Polish census form was not only longer (73 vs. 50 questions), but also included some aspects that were absent from the Ukrainian questionnaire, e.g. a section about family ties in the household. As regards respondent participation, a very low percentage of young respondents self-enumerated online, probably because of insufficient information about how to use the web application.

The article by **Wioletta Grzenda** entitled ***Estimating the probability of leaving unemployment for older people in Poland using survival models with censored data*** assesses the probability of leaving unemployment for people aged 50–71 based on their characteristics and the length of the unemployment period. The data from the Labour Force Survey for 2019–2020 were used. The key factors determining employment status are identified using the proportional hazard model. The author takes these factors into account and uses the direct adjusted survival curve to show how the probability of returning to work in Poland changes as people age. Due to the fact that not many people take up employment around their retirement age, an in-depth evaluation of the accuracy of predictions obtained via the models is crucial to assess the results. Hence, in this paper, a time-dependent ROC curve is used. The results indicate that the key factor that influences the return to work after an unemployment period in the case of older people in Poland is whether they reached the age of 60. Other factors that proved important in this context are the sex and the education level of older people.

Research Communicates and Letters

The *research communicates and letters* includes the paper by **Nadeem Akhtar, Sajjad Ahamad Khan, Muhammad Amin, Akbar Ali Khan, Amjad Ali,** and **Sadaf Manzoor,** entitled ***Bayesian estimation of a geometric distribution using informative priors based on a Type-I censoring scheme.*** The authors discuss the geometric distribution parameter that is estimated under a type-I censoring scheme by means of

the Bayesian estimation approach. The Beta and Kumaraswamy informative priors, as well as five loss functions are used for this purpose. Expressions of Bayes estimators and Bayes risks are derived under the Squared Error Loss Function (SELF), the Quadratic Loss Function (QLF), the Precautionary Loss Function (PLF), the Simple Asymmetric Precautionary Loss Function (SAPLF), and the DeGroot Loss Function (DLF) using the two aforementioned priors. The prior densities are obtained through prior predictive distributions. Simulation studies are carried out to make comparisons using Bayes risks. Finally, a real-life data example is used to verify the model's efficiency. An extensive simulation study and a real-life data analysis is employed to validate the importance of the proposed strategy. The numerical results reveal that Beta is an appropriate prior and SELF is a better loss function while analysing discrete geometric life testing model under type-I censoring scheme. The real-life data analysis cements these findings.

Włodzimierz Okrasa
Editor