

1. Abstract

We recommend some methods of discrimination between statistical distributions used in hydro meteorological frequency modeling. The discriminations considered are between: Generalized Pareto (GP) and Kappa (KAP), Gumbel and some alternative frequency models, and model pairs belonging to the group {generalized extreme value (GEV), Pearson type 3 (P3), generalized logistic (GLO)}. Four discrimination methods are compared by Monte Carlo simulation in terms of their discrimination power and discrimination bias. These methods are: the ratio of maximized likelihood statistic (RML), the Anderson Darling statistic (AD) and the last two are based on a sample transformation to normality followed by the application of the Shapiro-Wilk statistic (TN.SW) and the Probability plot correlation coefficient statistic (TN.PPCC)

2. Introduction

The identification of a statistical distribution to model the frequency of occurrence of extreme hydro-meteorological events is important in hydrology. The objective of this study is to recommend some methods of discrimination between some statistical distributions used in hydro-meteorological frequency modeling. We will propose some discrimination procedures, justify their selection and then test and compare them.

3. Methods and Results

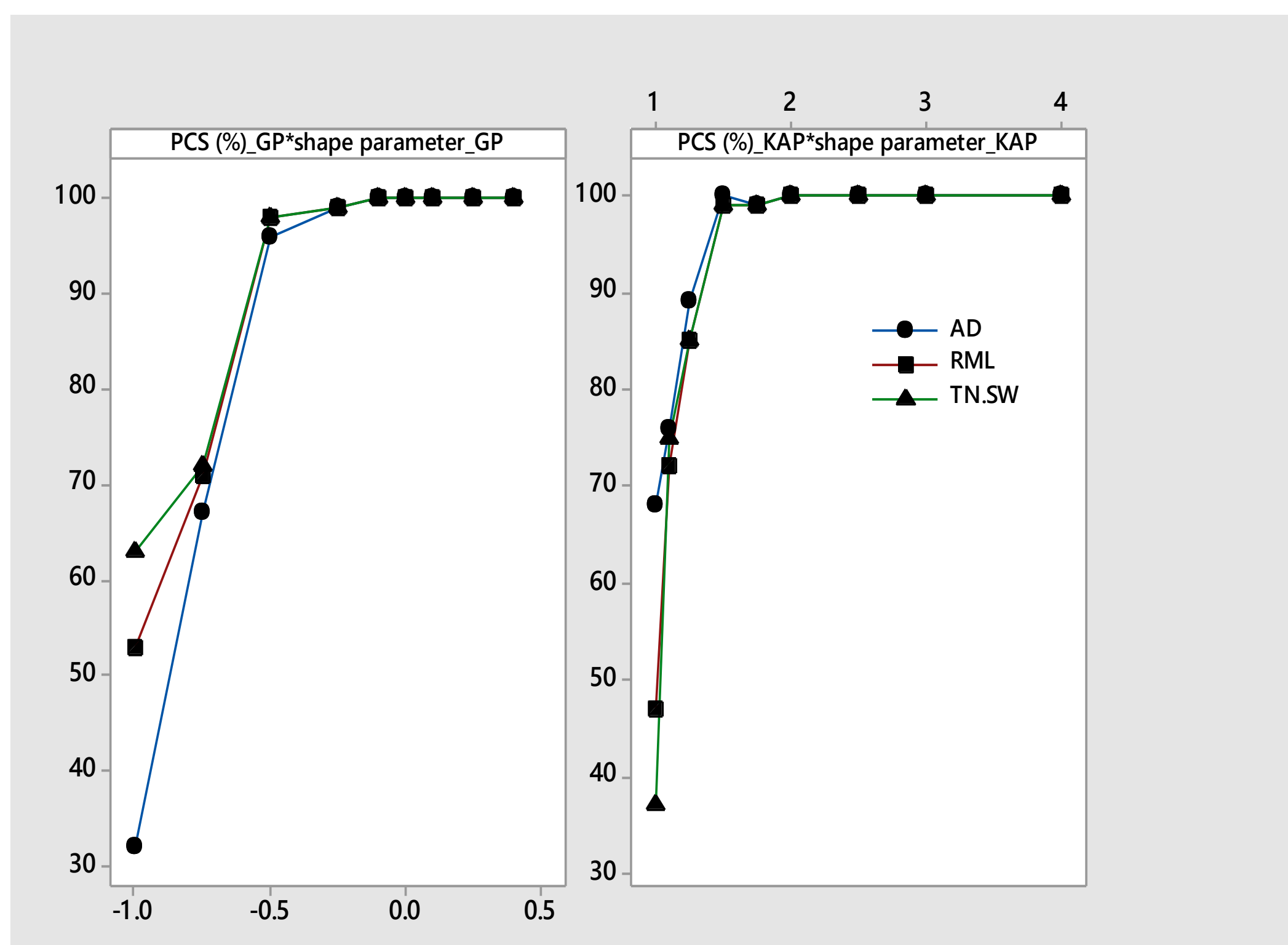


Fig. 1 Probability of correct selection (%) for sample sizes $n = 2000$ by the three test statistics when GP is the true sampled distribution (left) and when KAP is the true sampled distribution (right).

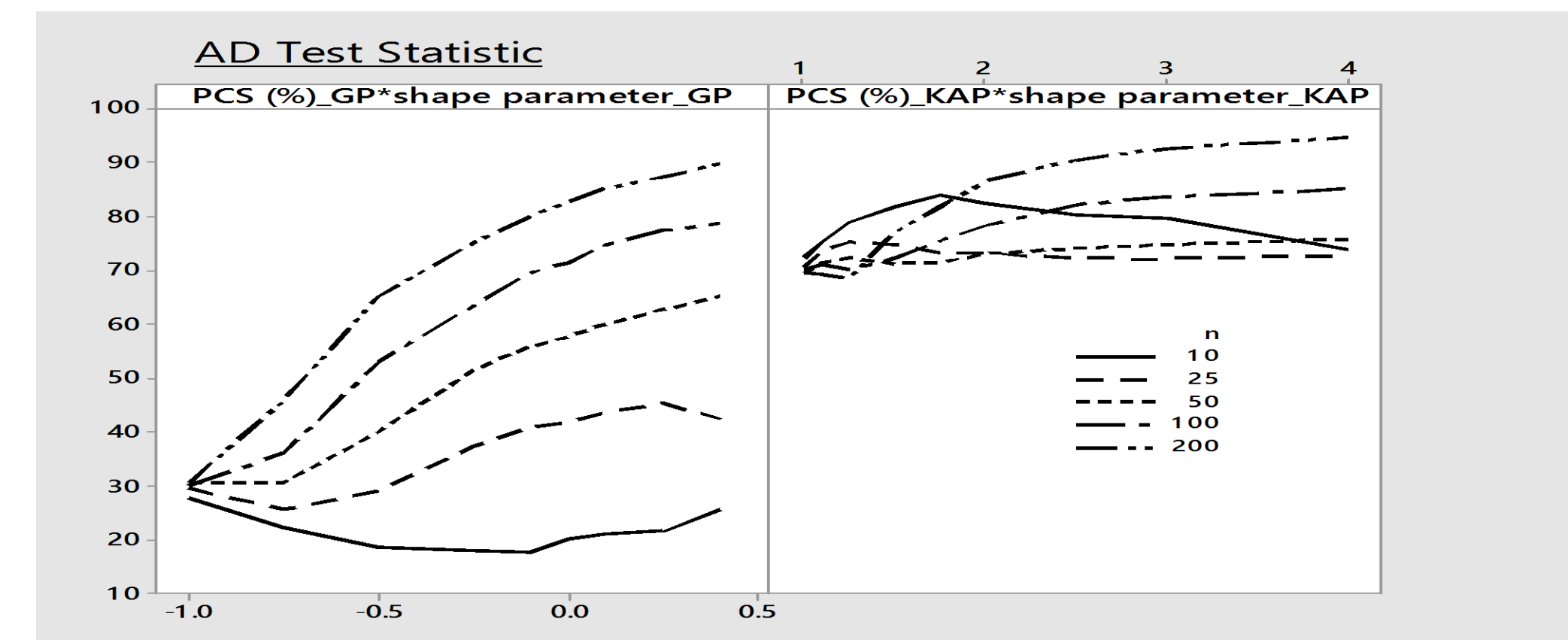


Fig. 2 Probability of correct selection (%) using the AD statistic when GP is the true sampled distribution (left) and when KAP is the true sampled distribution (right).

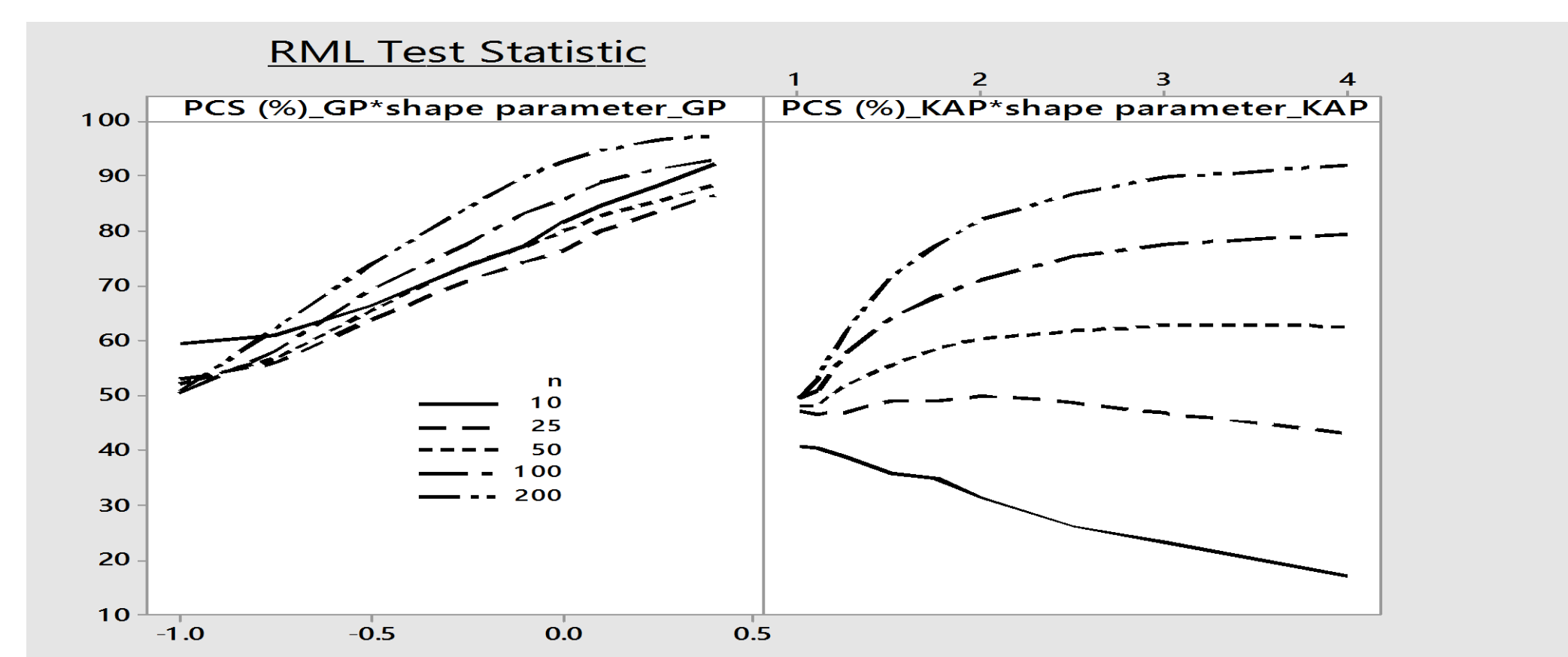


Fig. 3 Probability of correct selection (%) using the RML statistic when GP is the true sampled distribution (left) and when KAP is the true sampled distribution (right).

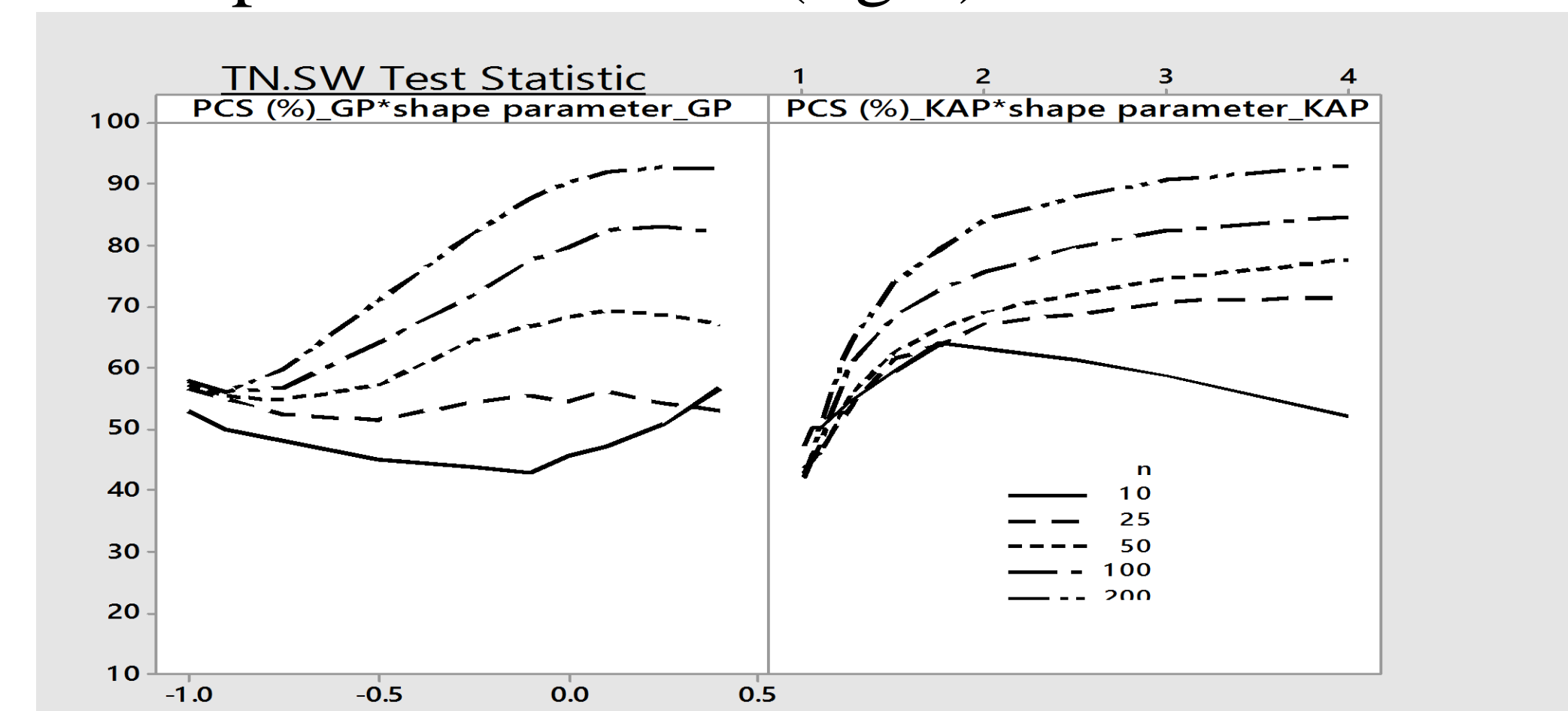


Fig. 4 Probability of correct selection (%) using the TN.SW statistic when GP is the true sampled distribution (left) and when KAP is the true sampled distribution (right).

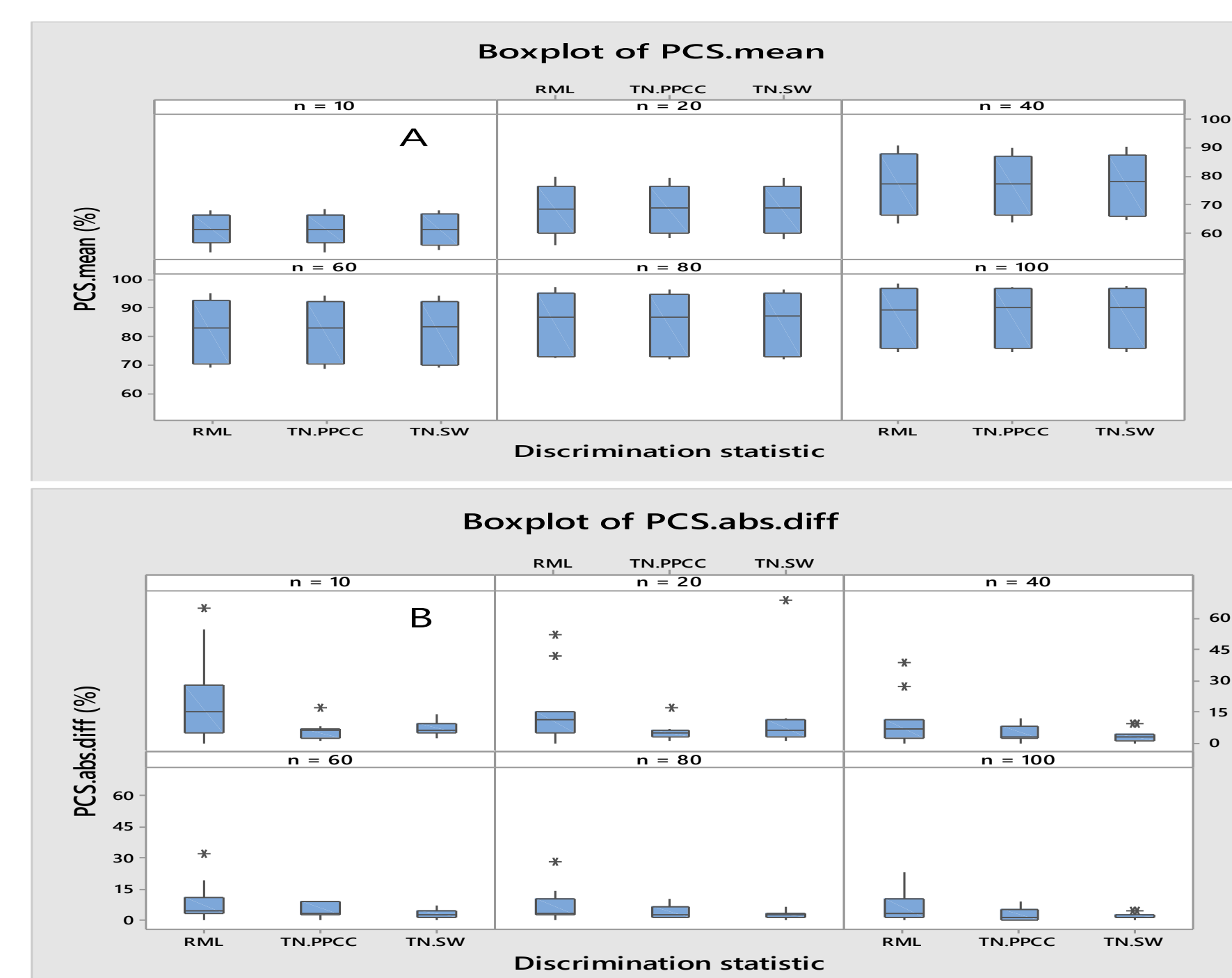


Fig. 5 Boxplot of PCS.mean and PCS.abs.diff. The discrimination is between Gumbel and some alternative frequency models

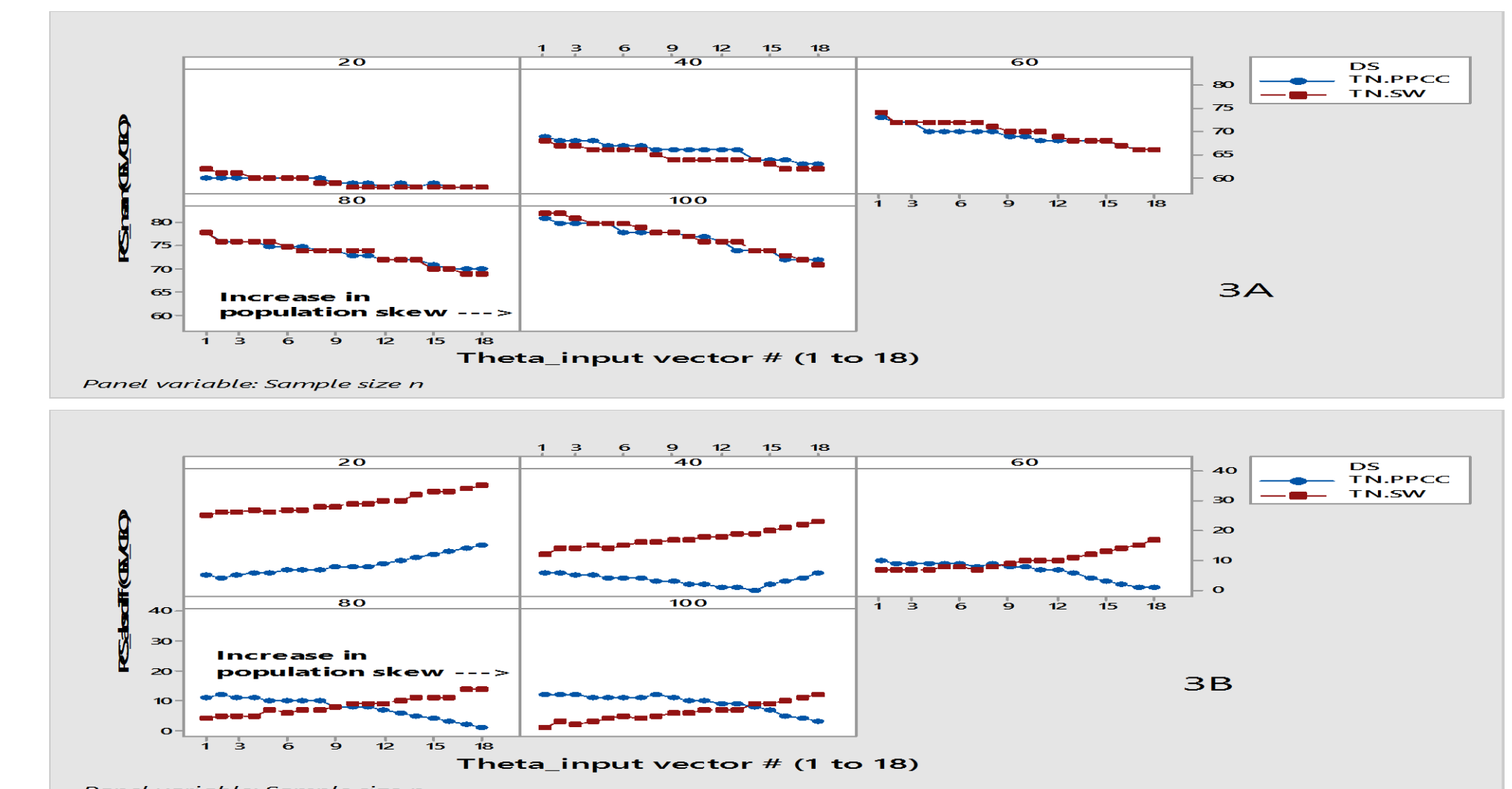


Fig. 6 PCS means (3A) and absolute differences (3B), for comparing TN.PPCC and TN.SW. The discrimination is between GEV and GLO

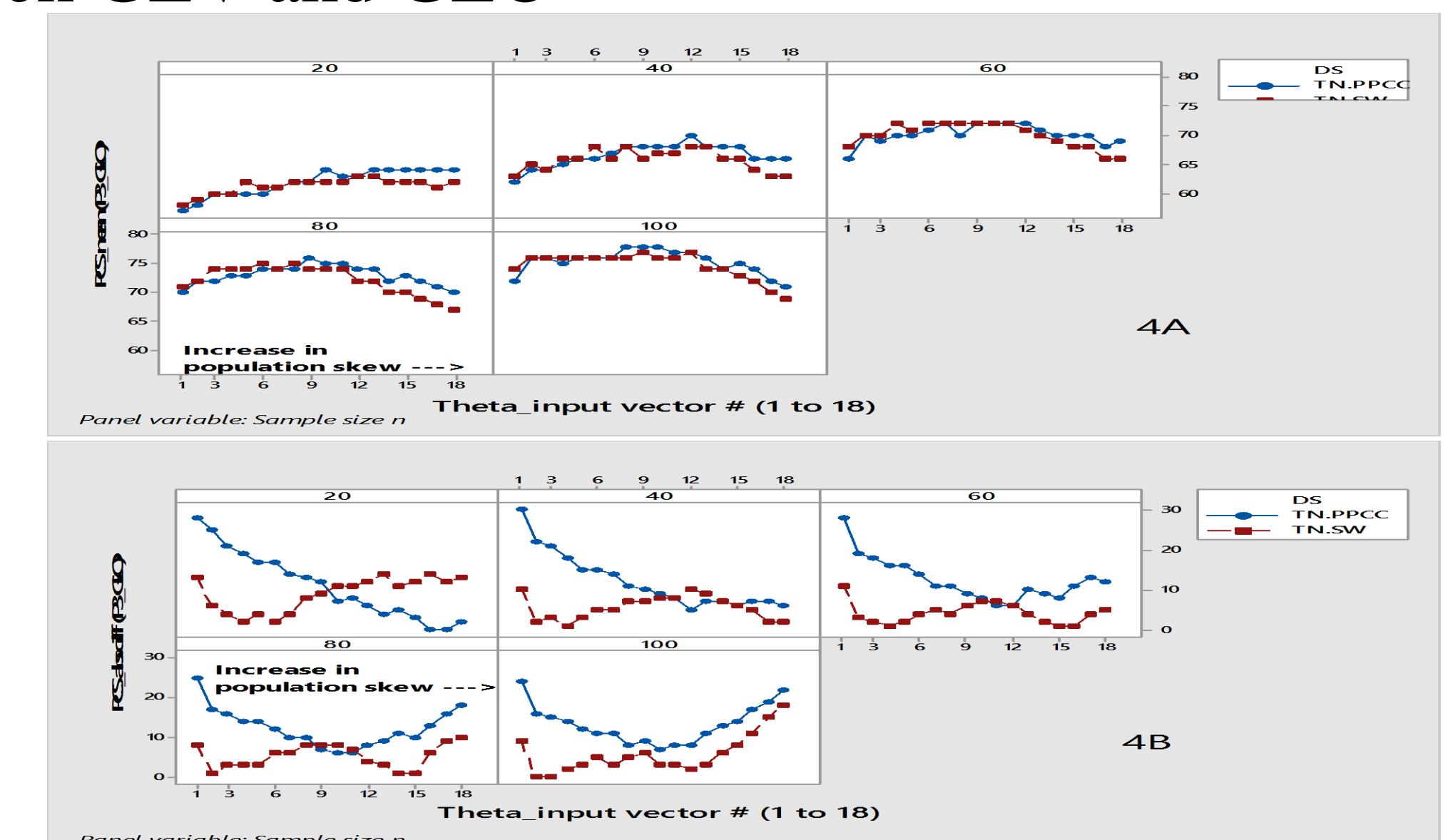


Fig. 7 PCS means (4A) and absolute differences (4B), for comparing TN.PPCC and TN.SW. The discrimination is between P3 and GLO

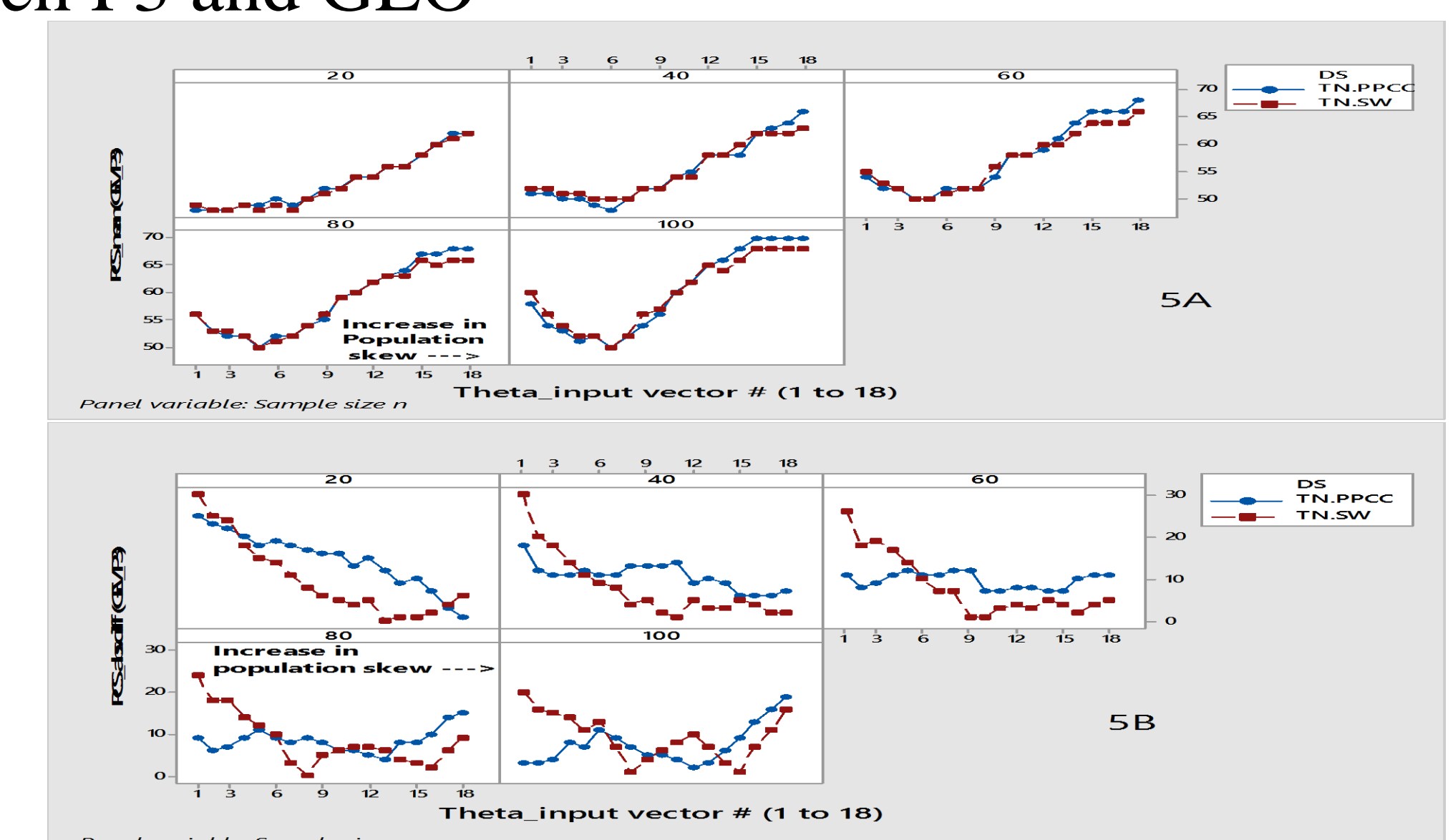


Fig. 8 PCS means (5A) and absolute differences (5B), for comparing TN.PPCC and TN.SW. The discrimination is between P3 and GEV

4. Conclusions

- To discriminate between the KAP and GP models, use of the AD statistic leads to bias for one model over the other.
- The TN.SW and TN.PPCC statistic proved to be the most advantageous, they would be recommendable in practice for this reason.
- We found a difficulty in discriminating between P3 and GEV models.