Use of the Method of L-Moments of Parameter Estimation on Economic Data

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Conventional moments or cumulants are commonly used to describe sample statistical sets. When choosing an appropriate parametric distribution for a given data set the parameters of this parametric distribution are usually estimated using such methods of parametric estimation, such as method of moments, quantile method or method of maximum likelihood. However, the method of moments and quantile method of parameter estimation are not always satisfactory, especially in the case of small samples. Moment and quantile method are often less accurate than other methods of estimation parameters, such as maximum likelihood method. Use other characteristics, which we call L-moments, represents an alternative approach. L-moments are analogous to conventional moments, but they are based on linear combinations of order statistics, i.e. L-statistics. L-moments are more robust to the presence of outliers when estimating from the sample. L-moments are less prone to bias of estimation compared with conventional moments, and they are closer to asymptotical normal distribution in finite samples. Parameter estimates obtained using the L-moments are often more accurate than estimates of parameters taken by maximum likelihood method especially for small samples. L-moments characterize a wider range of distribution. Thus, using L-moments is advantageous over conventional moments. L-moments are often applied to the sample data sets in the field of hydrology and meteorology, for example, in connection with rainfall data. There are mostly very small data sets. This article deals with the application of the method of L-moments of parameter estimation on economic data, where there are larger sample data sets than which we meet in the field of hydrology and meteorology. In this presentation attention is paid to both application of the method of L-moments of parameter estimation directly on individual data and on data that are organized into a form of interval frequency distribution. The three-parametric lognormal distribution is the basic theoretical distribution. The results of both of these techniques are compared with an accuracy of other methods of parametric estimation on the economic data. Accuracy of the method of L-moments in its application to data from economic area is compared with the accuracy of such parametric estimation methods such as maximum likelihood method, method of moments, and quantile method. Sample data sets form the net annual household income in the Czech Republic per consumption unit in CZK (individual data) and gross monthly wage of employee in the Czech Republic in CZK (data in the form of interval frequency distribution).

Key Words: Lognormal distribution, maximum likelihood method, linear combinations of order statistics, conventional moments