

## CONFIDENCE INTERVALS OF QUANTILES FOR THE GENERALIZED LOGISTIC DISTRIBUTION

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The standard error of estimate accounts for the error due to small samples, but not the error due to the choice of inappropriate distribution. The standard error of estimate depends in general on the methods of parameter estimation. Consequently, each method gives a different standard error of estimate and the most efficient method is that which gives the smallest standard error of estimate.

There have been several studies related to prediction accuracy. Some of the earlier work related to confidence intervals has been summarized in Yevjevich (1964). Bobee (1973) used the distribution to derive the confidence intervals associated with the measures of risk. Kite (1975) used data generation experiments to derive distributions of extreme events generated from probability distributions commonly used in hydrology. Hoshi (1981) had suggested an approximation technique to compute the derivative of a standard gamma quantile with respect to the shape parameter. This derivative was needed to estimate the sampling variance of a specified quantile. Heo et al. (2001) derived and compared confidence intervals on population quantiles for the Weibull model.

The generalized logistic distribution (GLO) was recommended for use with UK flood data (Institute of Hydrology, 1999). An appealing trait of the GLO distribution is that it is unbounded above unless the shape parameter is positive. Having an upper limit to a flood frequency distribution that is close to the maximum observed flow is often unrealistic except in special situations such as downstream of a large lake. Hence, it is expected the GLO distribution to be widely used for modeling extremes of natural phenomena and to play an important role in the frequency analysis.

Consequently, in this paper, we summarize the procedure to estimate the parameters based on the methods of moments, maximum likelihood, and probability weighted moments and derive the asymptotic variances of the MOM, ML, and PWM quantile estimators for the GLO distribution. The asymptotic variances of the MOM, ML, and PWM quantile estimators for the GLO distribution are derived as a function of the sample size, return period, and parameters, such variances can be used for estimating the confidence limits and confidence intervals of the population quantiles. The formulas obtained do not have simple forms but can be evaluated numerically.

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