

ADOPTION OF RIDGE ESTIMATOR IN POISSON-MODIFICATION OF QUASI LINDLEY REGRESSION MODEL TO OVERCOME MULTICOLLINEARITY

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The generalised linear model approach of a mixed Poisson regression (MPR) model is a remedial measure to solve the over-dispersion problem in the Poisson regression model. The Poisson-Modification of the Quasi Lindley (PMQL) regression model is one of the MPR models. The maximum likelihood estimator (MLE) is used to estimate its regression coefficients by applying the iterative weighted least square (IWLS) algorithm. However, the variance of the MLE is inflated when multicollinearity exists. In this study, we adopt the ridge regression method in the PMQL regression model to combat multicollinearity. The performance of the MLE and PMQL ridge regression estimator (RE_{PMQL}) are compared in terms of scalar mean square (SMSE) criterion by using an extensive Monte Carlo simulation study. To estimate the ridge parameter in RE_{PMQL} we adhere to eight notable classical and modified ridge parameter estimators proposed for the ordinary linear regression model. High correlation coefficients (0.90, 0.95, 0.99) were considered to generate the covariates with several degrees of multicollinearity in the simulation study. The results of the simulation study show that the RE_{PMQL} performs better than the MLE to estimate the regression coefficients of the PMQL regression model in the presence of multicollinearity. The performance of the different estimators reviewed in this study is affected by the factors of degrees of correlation among the covariates (ρ), the sample size (n), the value of the intercept (β_0), the number of covariates (p), and the values of the over-dispersion parameters of the PMQL regression model (α, δ).

Keywords: Multicollinearity, Over-dispersion, PMQL regression, Poisson regression, Ridge estimator