APPLICATION OF ROTATIONAL RESIDUALS FOR NORMAL DIAGNOSTICS IN REGRESSION ANALYSIS : A SIMULATION STUDY

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To test the normality of observations it is a common practice to use graphical methods such as probability plots , and testing procedures such as Anderson – Darling , Shapiro-Wilk , Kolmogorov –Simirnov etc. All these methods are supported by independently and identically distributed observations.

To diagnose the normal errors in regression analysis, ordinary residuals are utilized. Tests designed for independently and identically distributed observations are valid asymptotically when using ordinary residuals under homoscedastic and uncorrelated disturbances. However these tests are applied, despite the failure of assumptions to validate their use . Jenson and Ramirez (1999) showed that such misuse may be critical, and considered linearly recovered errors (rotational residuals) as a remedial measure. Theil (1965) also introduced linear unbiased scaled disturbance estimators to correct for the hetroscedastic, correlated, and singular features of the residuals.

In this simulation study, a MINITAB- MACRO program was developed to find linearly recovered errors, having the requisite properties. A multiple regression model having multicollinearity among regressors was created to obtain correlated residuals. The normal probability plot was drawn, and Anderson – Darling, Shapiro-Wilk and Kolmogorov-Simirnov tests were applied for ordinary residuals. The tests confirmed the normality of the residuals, although the residuals are correlated. Therefore the applicability of the tests is questionable, and hence the recovered errors were simulated. The recovered errors were uncorrelated, and hence the diagnostics tests can be applied. This study reveals that the users of conventional diagnostics would be misdirected into reliance on normal theory if they use correlated ordinary residuals.