Notice for the PhD Viva Voce Examination

Ms Anna Thomas, Registration Number: 2270161, PhD Scholar at the Department of Statistics and Data Science, School of Sciences, CHRIST (Deemed to be University) will defend her PhD thesis at the public viva-voce examination on Tuesday, 07 April 2026 at 2.00 pm in Room No. 736, 7th Floor, R&D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis	:	**Regression and Time Series Modelling in the Presence of Measurement Error**
Discipline	:	**Statistics**
External Examiner - I	:	**Dr Parameshwar V Pandit** Senior Professor Department of Statistics Bangalore University Bangalore - 560056 Karnataka
External Examiner - II	:	**Dr Debasis Kundu** Professor Department of Mathematics and Statistics Indian Institute of Technology Kanpur Kalyanpur, Kanpur - 208016 Uttar Pradesh
Supervisor	:	**Dr Nimitha John** Assistant Professor Department of Statistics and Data Science School of Sciences CHRIST (Deemed to be University) Bengaluru - 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva–voce examination.

Registrar (Academics)

Place: Bengaluru
Date: 27 March 2026

ABSTRACT

Accurate measurement of variables is essential for reliable statistical analysis, as model validity depends on data quality. In practice, observed values often deviate from their true values due to instrumental inaccuracies, human error, or environmental factors. This discrepancy, known as measurement error, can bias parameter estimates, distort inferences, and reduce the predictive accuracy of statistical models. This research examines the impact of measurement error in both regression and time series frameworks, particularly under conditions where standard model assumptions are violated. It also focuses on testing the presence of measurement error in real-world data. A methodology based on a corrected score estimation approach is proposed for parameter estimation in regression models with autocorrelated errors in the presence of measurement error. A comparative analysis reveals that when measurement error is present, the corrected score estimator consistently outperforms the conventional Ordinary Least Squares (OLS) method in terms of efficiency and accuracy. Furthermore, a Lagrange Multiplier (LM) test procedure is developed to detect the presence of measurement error in such models, where the parameters are estimated using the corrected score estimation technique. The study also investigates parameter estimation and hypothesis testing in regression models with heteroscedasticity under measurement error. In this framework, parameters are estimated using a two-step procedure that integrates the corrected score estimation with weighted linear regression, while the Likelihood Ratio (LR) test is employed to assess the existence of measurement error in the model. The next important violation of the regression model assumptions pertains to the normality of the error terms. Before addressing this violation, as it is essential to discuss the estimation of parameters in autoregressive models with non-normal errors. This research develops an efficient estimation framework for autoregressive models with non-Gaussian error distributions. The Godambe Optimal Estimating Function method is proposed to estimate the parameters of an AR(1) model with non-normal errors. Traditional methods such as Maximum Likelihood Estimation (MLE) often become computationally challenging in such contexts due to the absence of closed-form expressions. The estimating function approach effectively overcomes this limitation by utilizing the underlying structure of the error distribution to derive efficient parameter estimates without relying on the full likelihood specification. Furthermore, the proposed methodology is extended to AR(1) models with non-Gaussian errors in the presence of measurement error. Finally, a two-step estimation procedure integrating the estimating function method with the Cochran–Orcutt technique is proposed for regression models with non-normal errors. The proposed methodology is further extended to regression models with non-normal errors in the presence of measurement error. All proposed methodologies are validated through extensive Monte Carlo simulations and supported by analyses of various real-world datasets, demonstrating their robustness, efficiency, and practical applicability.

Keywords: *Measurement Error, Regression, Time Series, Autocorrelation, Corrected Score, Godambe Estimating Function, Cochran- Orchutt, Heteroscedastic Errors, Lagrange Multiplier Test, Likelihood Ratio Test, Non Normal Error*

Publications:

1. **Thomas, A.**, & John, N. (2025). Regression with Volatile Errors in the Presence of Measurement Errors. Reliability: Theory & Applications, 20(3 (86)), 310-321.

2. **Thomas, A.**, & John, N. (2024, November). Estimating Function Approach for Modelling Non- Gaussian Time Series. In International Conference on Data Science, Computation and Security (pp. 257-271). Singapore: Springer Nature Singapore.

3. **Thomas, A.**, John, N., Pereira, L. M., & Pokhriyal, H. (2024, January). Corrected Score Estimation of Regression with Autocorrelation Under Measurement Errors. In International Conference on Communication and Computational Technologies (pp. 179-189). Singapore: Springer Nature Singapore.