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Abstract

We propose generalized and pseudo generalized trimmed means for the linear regression with AR(1) errors model. These will play the role of robust type generalized and pseudo generalized estimators for this regression model. Their asymptotic distributions are developed.

KEYWORDS: Generalized trimmed mean; regression quantile; trimmed mean

Introduction

For some regression models such as linear regression with AR(1) errors or the seemingly unrelated regression model, the generalized least squares estimator (GLSE) and the pseudo generalized least squares estimator (PGLSE) have the advantage that their variances (or asymptotic variances) are smaller than that of the least squares estimator (LSE).

However, the GLSE and the PGLSE are sensitive to departures from normality and to the presence of outliers. Hence, extending these concepts to robust estimation is an interesting topic in regression analysis. The concept of developing robust type generalized estimators in regression analysis is not new. Koenker and Portnoy (1990) introduced this interesting idea and developed the generalized M-estimators for the estimation of regression parameters of the multivariate regression model.

Although considering only generalized estimation, their approach initiated interest in robust type generalized and pseudo generalized estimators for estimation of regression parameters. Rather than multivariate regression, we consider the linear regression with AR(1) errors modelFrom the regression theory on the estimation of beta, it is known that, when rho is known, the GLSE and, when rho is unknown, the PGLSE have (or asymptotically have) the same covariance matrix, which is smaller than that of the LSE. To see the sensitivity of the GLSE and the PGLSE, the GLSE and the PGLSE both have a (asymptotic) covariance matrix of the form sigma Q.

The sensitivity is clear from the fact that sigma could be arbitrary large when error variable has a heavy tailed distribution. The fact that sigma is sensitive to the error distribution motivates us to consider robust estimators that have a (asymptotic) covariance matrix of the form gamma Q where robustness means that gamma is insensitive to heavy tailed distributions.Based on the regression quantiles of Koenker and Bassett (1978), we will introduce the generalized trimmed mean (GTM) and the pseudo generalized trimmed mean (PGTM) to play the role of robust type generalized and pseudo generalized estimators for the linear regression with AR(1) errors model.

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