

Asymptotic Properties of the Efficient Estimators for Cointegrating Regression Models with Serially Dependent Errors¹

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Abstract

In this paper, we analytically investigate three efficient estimators for cointegrating regression models: Phillips and Hansen's (1990) fully modified OLS estimator, Park's (1992) canonical cointegrating regression estimator, and Saikkonen's (1991) dynamic OLS estimator. First, by the Monte Carlo simulations, we demonstrate that these efficient methods do not work well when the regression errors are strongly serially correlated. In order to explain this result, we assume that the regression errors are generated from a nearly integrated autoregressive (AR) process with the AR coefficient approaching 1 at a rate of $1/T$, where T is the sample size. We derive the limiting distributions of the three efficient estimators as well as the OLS estimator and show that they have the same limiting distribution under this assumption. This implies that the three efficient methods no longer work well when the regression errors are strongly serially correlated. Further, we consider the case where the AR coefficient in the regression errors approaches 1 at a rate slower than $1/T$. In this case, the limiting distributions of the efficient estimators depend on the approaching rate. If the rate is slow enough, the efficiency is established for the three methods; however, if the approaching rate is relatively fast, they have the same limiting distribution as the OLS estimator. This result explains why the effect of the efficient methods diminishes as the serial correlation in the regression errors gets stronger.

JEL classification: C13; C22

Key Words: Cointegration; second-order bias; fully modified regressions; canonical cointegrating regressions; dynamic ordinary least squares regressions

¹This paper is downloadable from <http://hi-stat.ier.hit-u.ac.jp/research/discussion/2006/pdf/D06-197.pdf>