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Degui Li, Runze Li

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Local Composite Quantile Regression Smoothing for Harris Recurrent Markov Processes

Degui Li* and Runze Li†

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Abstract

In this paper, we study the local polynomial composite quantile regression (CQR) smoothing method for the nonlinear and nonparametric models under the Harris recurrent Markov chain framework. The local polynomial CQR regression method is a robust alternative to the widely-used local polynomial method, and has been well studied in stationary time series. In this paper, we relax the stationarity restriction on the model, and allow that the regressors are generated by a general Harris recurrent Markov process which includes both the stationary (positive recurrent) and nonstationary (null recurrent) cases. Under some mild conditions, we establish the asymptotic theory for the proposed local polynomial CQR estimator of the mean regression function, and show that the convergence rate for the estimator in nonstationary case is slower than that in stationary case. Furthermore, a weighted type local polynomial CQR estimator is provided to improve the estimation efficiency, and a data-driven bandwidth selection is introduced to choose the optimal bandwidth involved in the nonparametric estimators. Finally, we give some numerical studies to examine the finite sample performance of the developed methodology and theory.

Keywords: Asymptotic theory, bandwidth selection, β-null recurrence, composite quantile regression, Harris recurrent Markov process, local polynomial smoothing.

JEL subject classifications: C22, C14.

*Department of Mathematics, University of York, York, YO10 5DD, UK. Email: degui.li@york.ac.uk.

†Department of Statistics and the Methodology Center, Pennsylvania State University, University Park, PA 16802-2111, USA. Email: rzli@psu.edu.