Accepted Manuscript

Nonparametric conditional quantile estimation: A locally weighted quantile Kernel approach

Jeffrey S. Racine, Kevin Li

PII: S0304-4076(17)30118-5
DOI: http://dx.doi.org/10.1016/j.jeconom.2017.06.020
Reference: ECONOM 4400

To appear in: *Journal of Econometrics*

Received date : 23 April 2015
Revised date : 27 June 2016
Accepted date : 30 June 2017

Please cite this article as: Racine, J.S., Li, K., Nonparametric conditional quantile estimation: A locally weighted quantile Kernel approach. *Journal of Econometrics* (2017), http://dx.doi.org/10.1016/j.jeconom.2017.06.020

NONPARAMETRIC CONDITIONAL QUANTILE ESTIMATION: A LOCALLY WEIGHTED QUANTILE KERNEL APPROACH

JEFFREY S. RACINE

KEVIN LI

Jeffrey S. Racine (corresponding author), Department of Economics and Graduate Program in Statistics, McMaster University, racinej@mcmaster.ca; Department of Economics and Finance, La Trobe University; Info-Metrics Institute, American University; Rimini Center for Economic Analysis

Kevin Li, Department of Mathematics, Massachusetts Institute of Technology, 77 Massachusetts Avenue Cambridge, MA USA 02139-4307. Email: kevinli@mit.edu

Abstract. Nonparametric conditional cumulative distribution function (CDF) estimation has emerged as a powerful tool having widespread potential application, which has led to a literature on estimators of conditional quantile functions that are obtained via inversion of the nonparametrically estimated conditional CDF. Other nonparametric estimators of conditional quantiles that are based on an alternative characterisation of the quantile (i.e., as the function that minimises the expectation of the check-function) have also appeared in the literature. In this paper, we propose a novel nonparametric approach. Relative to its inverse-CDF-based and the check-function-based peers, our proposed estimator has a simple expression. We also show that under certain conditions, our estimator is more efficient in tail regions when the data has unbounded support (our theoretical results underscore this property). Theoretical underpinnings are developed, a method for data-driven smoothing parameter selection is provided, and Monte Carlo simulations and empirical examples are considered. Two empirical examples illustrate how the proposed approach can deliver more reasonable quantile and quantile derivative estimates than its inverse-CDF-based and the check-function-based counterparts, particularly in tail regions.

Date: June 27, 2017.
JEL Classification. C14 Semiparametric and Nonparametric Methods.
Key words and phrases. Kernel Smoothing, Quantile Kernel Function.
We are indebted to an Associate Editor and two anonymous referees whose insightful comments and feedback led to great improvements in this paper. We would also like to thank but not implicate Peter Hall and John Kealey for their helpful feedback, and we dedicate this paper in memory of Peter Hall who recently passed away and will be sorely missed. Racine would like to gratefully acknowledge support from the Natural Sciences and Engineering Research Council of Canada (NSERC:www.nserc.ca), the Social Sciences and Humanities Research Council of Canada (SSHRC:www.sshrc.ca), and the Shared Hierarchical Academic Research Computing Network (SHARCNET:www.sharcnet.ca).