Unifying estimation of varying-coefficient models

Weitong Yin

Preprint no. 2019-14

Abstract

Varying-coefficient models are widely used to analyze the relationship between a response and a group of covariates. Existing research shows different convergence rates for the estimators of coefficient for the stationary part and the nonstationary part. It brings difficulties in statistical inference for the coefficient functions since an appropriate sampling distribution has to be carefully chosen. In this dissertation we propose a unifying two-step estimation procedure for varying-coefficients models, which facilitates the unifying inference for coefficients. In step one, a local smoother (LS) is adopted to give estimates of coefficients for the stationary part. In step two, we propose a weighted local score equation(WLSE) method for estimating the nonstationary part coefficients. The proposed two-step procedure will provide a unifying estimation procedure for the varying-coefficients models. The asymptotic joint distribution of the proposed estimators is established, which provides a Wald type of confidence regions for the coefficient functions. However, this confidence region does not work well when the conditional variance of the error changes. To solve this problem, we propose an empirical likelihood inference tool for the coefficient functions. Simulations demonstrate good finite sample performance of our estimators and coverage probability of proposed empirical likelihood confidence regions. A real example illustrates the value of our methodology.

Department of Mathematics and Statistics, UNC Charlotte, Charlotte, NC 28223