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Repot 1: Partially Linear Models

Abstract: In the last ten years, there has been increasing interest and activity in the general area of partially linear regression smoothing in statistics. Many methods and techniques have been proposed and studied. This monograph hopes to bring an up-to-date presentation of the state of the art of partially linear regression techniques. The emphasis of this monograph is on methodologies rather than on the theory, with a particular focus on applications of partially linear regression techniques to various statistical problems. These problems include least squares regression, asymptotically efficient estimation, bootstrap resampling, censored data analysis, linear measurement error models, nonlinear measurement models, nonlinear and nonparametric time series models. We hope that this monograph will serve as a useful reference for theoretical and applied statisticians and to graduate students and others who are interested in the area of partially linear regression. While advanced mathematical ideas have been valuable in some of the theoretical development, the methodological power of partially linear regression can be demonstrated and discussed without advanced mathematics. This monograph can be divided into three parts: part one–Chapter 1 through Chapter 4; part two–Chapter 5; and part three–Chapter 6. In the first part, we discuss various estimators for partially linear regression models, establish theo- retical results for the estimators, propose estimation procedures, and implement the proposed estimation procedures through real and simulated examples. The second part is of more theoretical interest. In this part, we construct several adaptive and efficient estimates for the parametric component. We show that the LS estimator of the parametric component can be modified to have both Bahadur asymptotic efficiency and second order asymptotic efficiency. In the third part, we consider partially linear time series models. First, we propose a test procedure to determine whether a partially linear model can be used to fit a given set of data. Asymptotic test criteria and power investigations are presented. Second, we propose a Cross-Validation (CV) based criterion to select the optimum linear subset from a partially linear regression and estab- lish a CV selection criterion for the bandwidth involved in the nonparametric kernel estimation. The CV selection criterion can be applied to the case where the observations fitted by the partially linear model (1.1.1) are independent and identically distributed (i.i.d.). Due to this reason, we have not provided a sepa- rate chapter to discuss the selection problem for the i.i.d. case. Third, we provide recent developments in nonparametric and semiparametric time series regression. This work of the authors was supported partially by the Sonderforschungs-bereich373“QuantifikationundSimulationO konomischerProzesse”.Thesecond author was also supported by the National Natural Science Foundation of China and an Alexander von Humboldt Fellowship at the Humboldt University, while the third author was also supported by the Australian Research Council. The second and third authors would like to thank their teachers: Professors Raymond Car- roll, Guijing Chen, Xiru Chen, Ping Cheng and Lincheng Zhao for their valuable inspiration on the two authors’ research efforts. We would like to express our sin- cere thanks to our colleagues and collaborators for many helpful discussions and stimulating collaborations, in particular, Vo Anh, Shengyan Hong, Enno Mam- men, Howell Tong, Axel Werwatz and Rodney Wolff. For various ways in which they helped us, we would like to thank Adrian Baddeley, Rong Chen, Anthony Pettitt, Maxwell King, Michael Schimek, George Seber, Alastair Scott, Naisyin Wang, Qiwei Yao, Lijian Yang and Lixing Zhu. The authors are grateful to everyone who has encouraged and supported us to finish this undertaking. Any remaining errors are ours.

Report 2: Nonlinear Time Series: Semiparametric and Nonparametric Methods

Abstract: Useful in the theoretical and empirical analysis of nonlinear time series data, semiparametric methods have received extensive attention in the economics and statistics communities over the past twenty years. Recent studies show that semiparametric methods and models may be applied to solve dimensionality reduction problems arising from using fully nonparametric models and methods. Answering the call for an up-to-date overview of the latest developments in the field, "Nonlinear Time Series: Semiparametric and Nonparametric Methods" focuses on various semiparametric methods in model estimation, specification testing, and selection of time series data.After a brief introduction, this book examines semiparametric estimation and specification methods and then applies these approaches to a class of nonlinear continuous-time models with real-world data. It also assesses some newly proposed semiparametric estimation procedures for time series data with long-range dependence. Even though this book only deals with climatological and financial data, the estimation and specifications methods discussed can be applied to models with real-world data in many disciplines. This resource covers key methods in time series analysis and provides the necessary theoretical details. The latest applied finance and financial econometrics results and applications presented in this book enable researchers and graduate students to keep abreast of developments in the field.

Report 3: Semiparametric Localized Bandwidth Selection for Kernel Density Estimation

Abstract: Since conventional crossâ€“validation bandwidth selection methods donâ€™t work for the case where the data considered are dependent time series, alternative bandwidth selection methods are needed. In recent years, Bayesian based global bandwidth selection methods have been proposed. Our experience shows that the use of a global bandwidth is however less suitable than using a localized bandwidth in kernel density estimation in the case where the data are dependent time series as discussed in an empirical application of this paper. Nonetheless, a difficult issue is how we can consistently estimate a localized bandwidth. In this paper, we propose a semiparametric estimation method, for which we establish a completely new asymptotic theory for the proposed semiparametric localized bandwidth estimator. Applications of the new bandwidth estimator to the kernel density estimation of

Eurodollar deposit rate and the S&P 500 daily return demonstrate the effectiveness and competitiveness of the proposed semiparametric localized bandwidth.

Report 4: Bayesian Bandwidth Estimation in Nonparametric Time-Varying Coefficient Models

Abstract: Bandwidth plays an important role in determining the performance of nonparametric estimators, such as the local constant estimator. In this paper, we propose a Bayesian approach to bandwidth estimation for local constant estimators of time-varying coefficients in time series models. We establish a large sample theory for the proposed bandwidth estimator and Bayesian estimators of the unknown parameters involved in the error density. A Monte Carlo simulation study shows that (i) the proposed Bayesian estimators for bandwidths and parameters in the error density have satisfactory finite sample performance; and (ii) our proposed Bayesian approach achieves better performance in estimating the bandwidths than the normal reference rule and cross-validation. Moreover, we apply our proposed Bayesian bandwidth estimation method for the time-varying coefficient models that explain Okun's law and the relationship between consumption growth and income growth in the US. For each model, we also provide calibrated parametric forms of the time-varying coefficients.

Report 5: A Computational Implementation of GMM

Abstract: In this paper we study a statistical method of implementing quasi-Bayes estimators for nonlinear and nonseparable GMM models, that is motivated by the ideas proposed in Chernozhukov and Hong (2003) and Creel and Kristensen (2011) and that combines simulation with nonparametric regression in the computation of GMM models. We provide formal conditions under which frequentist inference is asymptotically valid and demonstrate the validity of the use of posterior quantiles. We also show that in this setting, local linear kernel regression methods have theoretical advantages over local kernel methods that are also reflected in finite sample simulation results. Our results also apply to both exactly and over identified models. These estimators do not need to rely on numerical optimization or Markov Chain Monte Carlo simulations. They provide an effective complement to the classical M-estimators and to MCMC methods, and can be applied to both likelihood based models and method of moment based models.

Report 6: Nonparametric Regression Approach to Bayesian Estimation

Abstract: Estimation of unknown parameters and functions involved in complex nonlinear econometric models is a very important issue. Existing estimation methods include generalised method of moments (GMM) by Hansen (1982) and others, efficient method of moments (EMM) by Gallant and Tauchen (1997), Markov chain Monte Carlo (MCMC) method by Chernozhukov and Hong (2003), and nonparametric simulated maximum likelihood estimation (NSMLE) method by Creel and Kristensen (2011), and Kristensen and Shin (2012). Except the NSMLE method, other existing methods do not provide closed-form solutions. This paper proposes non- and semi-parametric based closed-form approximations to the estimation and computation of posterior means involved in complex nonlinear econometric models. We first consider the case where the samples can be independently drawn from both the likelihood function and the prior density. The samples and observations are then used to nonparametrically estimate posterior mean functions. The estimation method is also applied to estimate the posterior mean of the parameter-of-interest on a summary statistic. Both the asymptotic theory and the finite sample study show that the nonparametric estimate of this posterior mean is superior to existing estimates, including the conventional sample mean.