Accepted Manuscript

Exponentially tilted likelihood inference on growing dimensional unconditional moment models

Niansheng Tang, Xiaodong Yan, Puying Zhao

PII: S0304-4076(17)30171-9
DOI: http://dx.doi.org/10.1016/j.jeconom.2017.08.018
Reference: ECONOM 4425

To appear in: *Journal of Econometrics*

Received date : 10 June 2015
Revised date : 30 January 2017
Accepted date : 18 August 2017

Exponentially tilted likelihood inference on growing dimensional unconditional moment models

Niansheng Tang[1], Xiaodong Yan, Puying Zhao

Key Lab of Statistical Modeling and Data Analysis of Yunnan Province, Yunnan University, Kunming 650091, P. R. of China

Abstract

Growing-dimensional data with likelihood function unavailable are often encountered in various fields. This paper presents a penalized exponentially tilted (PET) likelihood for variable selection and parameter estimation for growing dimensional unconditional moment models in the presence of correlation among variables and model misspecification. Under some regularity conditions, we investigate the consistent and oracle properties of the PET estimators of parameters, and show that the constrained PET likelihood ratio statistic for testing contrast hypothesis asymptotically follows the chi-squared distribution. Theoretical results reveal that the PET likelihood approach is robust to model misspecification. We study high-order asymptotic properties of the proposed PET estimators. Simulation studies are conducted to investigate the finite performance of the proposed methodologies. An example from the Boston Housing Study is illustrated.

Keywords: Growing-dimensional data analysis; Model misspecification; Moment unconditional models; Penalized exponentially tilted likelihood; Variable selection.

1. Introduction

Exponentially tilted (ET) likelihood (Imbens et al., 1998) is a useful nonparametric approach to evaluate estimations and confidence regions of unknown parameters in unconditional moment models of the form $E\{g(x;\theta)\} = 0$, which provides a unified approach for parameter estimation in a class of statistical models with likelihood function unavailable, where $g(x;\theta)$ is a vector-valued nonlinear function of a random vector $x \in \mathcal{X} \subset \mathcal{R}^\iota$ and a parameter vector $\theta \in \Theta \subset \mathcal{R}^p$ in which Θ is a compact set of unknown parameters. The merits of the ET likelihood include (i) it behaves better than the empirical likelihood (EL) under model misspecification (Schennach, 2007), that is, the ET likelihood is robust to model misspecification, (ii) it allows a computationally convenient treatment of misspecified models (Kitamura, 2000), and (iii) it is flexible in incorporating some auxiliary information. Hence, several

[1]Correspondence to: Dr. Nian-Sheng Tang, Department of Statistics, Yunnan University, Kunming 650091, P. R. of China. E-mail: nstang@ynu.edu.cn