

# Uniform Inference for Nonlinear Endogenous Treatment Effects with High-Dimensional Covariates\*

Qingliang Fan<sup>a</sup>, Zijian Guo<sup>b</sup>, Ziwei Mei<sup>a</sup>, and Cun-Hui Zhang<sup>b</sup>

<sup>a</sup>Department of Economics, The Chinese University of Hong Kong

<sup>b</sup>Department of Statistics, Rutgers University

September 4, 2023

## Abstract

The nonlinear and endogenous effect is common in empirical studies with observational data. This paper proposes new estimation and inference procedures for nonparametric treatment effect functions with endogeneity and potentially high-dimensional covariates. One innovation of this paper is the uniform confidence band of the marginal effect function, defined as the derivative of the nonparametric treatment function, which is essential in policy-making. The asymptotic honesty of the confidence band is verified in theory. Simulation studies and an empirical study of air pollution and migration show the validity of our procedures.

**JEL classification:** C14, C21, C26, C55

**Keywords:** Heterogeneous treatment effect, endogeneity, control function, double bias correction, high-dimensionality.

---

\*Emails: michaelqfan@gmail.com (Q. Fan), zijguo@stat.rutgers.edu (Z. Guo), zwmei@link.cuhk.edu.hk (Z. Mei), czhang@stat.rutgers.edu (C.-H. Zhang)