Indiana University-Purdue University Indianapolis
Department of Mathematical Sciences

Statistics Seminar

12:15pm—1:15pm, Tuesday, November 26, 2019
LD 265

Speaker: **Wei Zhao**
Department of Mathematical Sciences, IUPUI

Title: **Nonparametric Additive Instrumental Variable Estimator: A Group Shrinkage Estimation Perspective**

Abstract:

Instrumental variable (IV) regression is useful to solve the endogeneity problem in applied economic research and its inference depends on the strength and validity of instrumental variables. In this paper, we study a nonparametric approach regarding a nonlinear reduced form equation to achieve the better approximation of the optimal instrument. Accordingly, we propose the nonparametric additive instrumental variable estimator (NAIVE) with the group LASSO. The proposed NAIVE enjoys several appealing advantages. First, we theoretically demonstrate that the proposed estimator is root-n consistent, asymptotically normal and achieves the semi-parametric efficiency bound. Second, the implementation of the group LASSO helps us to select the strong instruments while the dimensionality of potential instrumental variables is allowed to be greater than the sample size. Third, we utilize the BIC method to make a fully adaptive method to choose the degree of B-spline series for each nonparametric component. For the truly linear reduced model, the proposed NAIVE adaptively becomes the linear IV estimator. Thus, our proposed method nests the traditional linear IV approach as a special case. Forth, our method is computationally efficient and easy to implement using R packages. In Monte Carlo simulations, we show the proposed NAIVE performs better in terms of bias and mean squared errors compared to other alternative methods under various model settings. We further illustrate our method in an empirical study of international trade and growth. Our findings provide a stronger evidence that international trade has a significant positive effect on economic growth.