Dissertation Abstract
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First Chapter: “Fixed Bandwidth Asymptotics for Regression Discontinuity Designs”

This paper analyzes the asymptotic distribution of local polynomial estimators in the context of regression discontinuity designs. The standard "small-h" approach in the literature (Hahn Todd and van der Klaauw 2001, Porter 2003, Imbens and Lemieux 2008 and Lee and Lemieux 2009) is to assume the bandwidth, h, around the discontinuity shrinks towards zero as the sample size increases. However, in practice, the researcher has to choose an h>0 to implement the estimator. This paper derives the fixed-h asymptotic distribution that allows for the bandwidth to be positive, providing refined approximations for the estimator's behavior. When h>0, the small-h asymptotic variance is equivalent to assuming that the density of the running variable and the conditional variance of the dependent variable are constant around the cutoff. Simulations provide evidence that fixed-h asymptotic distributions better describe the behavior of both bias and variance of the estimator, leading to improved inference. Estimators for fixed-h standard errors are proposed and incorporate the theoretical gains of the improved approximations. The fixed-h variance estimators improve markedly over small-h estimators in the presence of some forms of heteroskedasticity. Interestingly, in the special case of homoskedastic errors using a local linear estimator, the variance estimators based on small-h asymptotics produce tests with similar size to the fixed-h variance estimators proposed in this paper.

Second Chapter: “GMM Efficiency and IPW Estimation for Nonsmooth Functions”

This paper provides a general parametric framework that can be used to obtain estimates and perform adequate inference for quantile regression in the presence of missing data. In a GMM setting this paper analyzes the problem in which we have two sets of moment conditions, where two sets of parameters enter into one set of moment conditions, while only one set of parameters enters into the other, extending Prokhorov and Schmidt's (2009) redundancy results to nonsmooth objective functions, and obtains relatively efficient estimates of interesting parameters in the presence of nuisance parameters. One-step GMM estimation for both set of parameters is asymptotically more efficient than two-step procedures. These results are applied to Wooldridge's (2007) inverse probability weighted estimator (IPW), generalizing the framework to deal with missing data in this context. Two-step estimation of β is more efficient than using known probabilities of selection, but this is dominated by one-step joint estimation. Examples for missing data quantile regression and instrumental variable quantile regression are provided.

Third Chapter: “Inference Methods for Quantile Regression under Stratified Sampling.”

This paper provides procedures to perform inference about quantile regression estimates under stratified sampling. I derive the asymptotic distribution of the quantile regression estimator when data is obtained by stratified sampling and provide consistent estimators for its standard errors. Future versions of this paper will include an application to the widely used Panel Study of Income Dynamics (PSID).

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