Research Statement

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I am an econometrician studying inference tools fundamental to many empirical applications. My work improves cluster-robust and heteroskedasticity-robust inference in many settings by developing theory that shows that the population variance is often smaller than commonly supposed and developing new variance estimators that outperform the variance estimators most often employed in empirical practice. I received the Red Cedar Award from Michigan State University for the best third-year paper in spring 2024.

1 Cluster-Robust Inference when Treatment Effects Vary Across Clusters: A Design-Based Approach

How does sampling from finite clusters affect cluster-robust inference? Common approaches to clustering either assume that a population contains an infinite number of clusters or a fixed, small number of clusters. What if a population has a large enough number of clusters to be well-approximated by a population with an infinite number of clusters but a significant fraction of those clusters are observed? My job market paper, "Cluster-Robust Inference when Treatment Effects Vary Across Clusters: A Design-Based Approach", shows that modeling clustering in this way leads to a smaller population variance than commonly supposed. This in turn means that the standard errors commonly used in empirical work are too large. My work proposes an alternative variance estimator that robustly estimates the true population variance. When a significant fraction of a population's cluster are sampled, the proposed standard error can be as much as 95% than the conventional standard error in simulation studies.

This research is important as the results can greatly improve inference in a setting common in empirical economics. Moreover, it is a building block to improve inference in other common settings, such as in many panel-data applications in which two-way clustering is quite common.

2 Inference on Two-Stage Least Squares Estimators

How does sampling from finite populations affect heteroskedasticity-robust inference? Infinite population assumptions are common and powerful tools when modeling the properties of many estimators, but what information is lost in the leap from a finite population to an infinite population? My paper, "2SLS Variance Adjusting for Design-Based Uncertainty: Inference and Estimation", shows that modeling populations as finite leads to two-stage least squares estimator variances smaller than commonly assumed in many cases. This in turn means that the standard errors commonly used in empirical work are too large. My work proposes an alternative variance estimator that is at least as small as the conventional standard error while still conservatively estimating the population variance. When a significant fraction of a finite population is observed, the proposed standard error can be as much as 10% smaller than the conventional standard error in simulation studies.

3 Future Research

My work on inference can be applied to many more commonly used estimators and my future research will continue to improve the toolbox of empirical economists. In particular, I intend to apply the techniques developed in my existing work to the growing class of panel data models commonly used by empirical researchers. Broadly, I am interested in studying features of populations that are often looked over in empirical practice. Both of my papers exploit information already existing in samples to improve upon existing methods. However, this is merely one way of looking at these familiar problems in a new light. The literature on machine learning techniques that explore previously understudied features of common economic problems is constantly growing. My future research interests include applying these techniques to existing problems to improve common empirical methods by getting the most out of each sample.

My primary research motivation is creating tools that empirical economists can apply to existing datasets. This motivation and my technical understanding of developing methods inform my research direction.