Research Statement

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I am interested in developing and analyzing practical econometric methods with a focus on unobserved heterogeneity. Unobserved heterogeneity is pervasive in economics, and there is ample empirical evidence of heterogeneity in coefficients, marginal effects, and other parameters of interest in applied work. Accordingly, I focus on identifying and estimating distributional features of such heterogeneous objects in all my projects.

There are two common themes in my work. First, I adopt a nonparametric approach to unobserved heterogeneity and its relation to the observed variables. Such a perspective enables the methods to be applicable regardless of how unobserved heterogeneity arises. Second, the methods proposed are always grounded in empirical questions, and I seek to provide a substantial empirical application in each project.

An example of a challenge I address is how to nonparametrically identify and estimate the moments and the distribution of marginal effects when unobserved heterogeneity is multidimensional. Allowing heterogeneity to be multidimensional is often important. For example, an agent's labor supply is determined by her individual-specific utility function – a potentially infinite-dimensional object. However, identification has previously been limited to average marginal effects in settings with multidimensional heterogeneity [7, 11, 12].

I show that the moments and the distribution of marginal effects may be nonparametrically identified and estimated in a class of panel data models with multidimensional time-invariant heterogeneity in my job market paper "***Estimating the Moments and the Distribution of Heterogeneous Marginal Effects Using Panel Data***" [3]. In contrast to the previous literature, I identify the variance, higher-order moments, and the distribution without restricting the dimension of time-invariant heterogeneity or how it affects the outcome. Only two periods of data are needed for identification. I propose simple estimators for the moments and the distribution. I establish consistency and convergence rates of the estimators. Further, the moment estimators are asymptotically normal, enabling inference on moments.

This methodology can be applied in a broad range of fields, including labor, environmental, and public economics, among others. In particular, I consider Engel curves for food at home. The average Engel curve is downward-sloping, in line with previous literature [5, 7]. However, a proportion of households have upward-sloping sections in their Engel curves at lower expenditures; in other words, Engel's law does not necessarily hold at individual level, even though it holds on average. This result is not captured by average effects.

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In my paper "***Inference on Extreme Quantiles of Unobserved Individual Heterogeneity***" [2], I propose a methodology for doing inference on extreme quantiles of heterogeneous objects. Importantly, only noisy estimates of these objects are available. The setup is applicable to grouped cross sections, panel data, or meta-analysis. Objects of interest may include coefficients, treatment effects, etc. I derive sharp conditions under which the noisy estimates are informative about the true extreme quantiles of interest. Under these conditions, I construct suitable extreme value theorems which may be used for inference. The paper complements recent results for central quantiles of unobserved heterogeneity [13]. In an empirical application, I revisit the issue of differences in firm productivity between firms in denser and less dense areas. I find that there is no minimal productivity level needed for survival in denser and less dense areas. This strengthens a previous finding that such levels must be equal between the two kinds of areas (at some unknown level) [8].

In "***Unit Averaging for Heterogeneous Panels***" [1] (R&R at *Journal of Business and Economic Statistics*), C. Brownlees and I consider the problem of efficiently estimating a parameter specific to a particular unit in a panel. For example, interest may lie on country-specific GDP growth, multiplier, slope, or some other parameter in a linear or nonlinear model [4, 14, 15]. We propose an averaging procedure that uses panel-wide information to efficiently estimate the individual parameter of interest. The averaging weights are selected by optimizing an approximation to the mean square error (MSE) of the averaging estimator that we derive. We provide a local asymptotic approximation to the distribution and the MSE of the resulting estimator. We apply our method to nowcast the GDP for a panel of European countries. Our approach reduces the MSE, compared to no averaging, simple averaging, or using information criteria weights.

In my future work, I plan to develop further methods for analyzing features of heterogeneous objects, following the same direction as my previous work. In "***Deconvolution Estimation of the Distribution of Heterogeneous Marginal Effects Using Panel Data***", I revisit the problem of recovering the distribution of marginal effects with multidimensional heterogeneity. I provide a moment-free approach that uses deconvolution. The framework complements the moment-based setting of my job market paper. Deconvolution may be applied when the data displays heavy tails, though may be inapplicable in settings with bounded data. In "***Distribution Equality Tests With Noisy Observations***", A. Sy and I consider how to formally compare distributions based only on noisy observations. Such comparisons are conducted informally in the study of differences in worker or firm productivity between different areas [8–10]. We propose a novel Anderson-Darling test that corrects for the bias induced by using noisy observations. Empirically, we test whether sector-level distributions of firm productivities differ between denser and less dense areas.

Candidate's Work

[1] C. Brownlees and V. Morozov. Unit Averaging for Heterogeneous Panels. 2022.

[2] V. Morozov. Inference on Extreme Quantiles of Unobserved Individual Heterogeneity. 2023.

[3] V. Morozov. Estimating the Moments and the Distribution of Heterogeneous Marginal Effects Using Panel Data. 2023.

Further References

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