

Dynamic Panel Data Analysis when the Dynamics are Heterogeneous*

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Abstract

This paper considers the analysis of panel data whose dynamic structure is heterogeneous across individuals. Our aim is to estimate the cross-sectional distribution and/or some distributional features of the heterogeneous autocovariance. We do not assume any specific model of the dynamics. Our proposed method is simple and easy to implement. We first compute the sample autocovariance for each individual and then estimate the parameter of interest based on the empirical distribution of the estimated autocovariances. The asymptotic properties of the proposed estimators are investigated using double asymptotics under which both the cross-sectional sample size (N) and the length of the time series (T) tend to infinity. The functional central limit theorem for the empirical process of the proposed distribution estimator is proved. By using the functional delta method, we also derive the asymptotic distribution of the estimator of various parameters of interest. We show that the distribution estimator exhibits a bias whose order is proportional to $1/\sqrt{T}$. On the other hand, when the parameter of interest can be written as the expectation of a smooth function of the heterogeneous autocovariance, the bias is of order $1/T$ and can be corrected by the jackknife method. The results of Monte Carlo simulations show that our asymptotic results are informative regarding the finite-sample properties of the estimators. They also indicate that the proposed jackknife bias correction is successful.

Keywords: Panel data; heterogeneity; functional central limit theorem; autocovariance; jackknife; nonparametric estimation; double asymptotics.

JEL Classification: C13; C14; C23.

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