Panel Data Analysis with Heterogeneous Dynamics[*]

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November, 2015

Abstract

This paper proposes the analysis of panel data whose dynamic structure is heterogeneous across individuals. Our proposed method is easy to implement and does not rely on any specific model for the dynamics. We first compute the sample mean, autocovariances, and/or autocorrelations for each individual, and then estimate the parameter of interest based on the empirical distributions of the estimated mean, autocovariances, and/or autocorrelations. We illustrate the usefulness of our proposed procedures by applying them to the study of earnings and productivity dynamics and find that both exhibit substantial heterogeneity. We then investigate the asymptotic properties of the proposed estimators using double asymptotics under which both the cross-sectional sample size and the length of the time series tend to infinity. We prove the functional central limit theorem for the proposed distribution estimator. Further, if we can write the parameter of interest as the expectation of a smooth function of the individual mean and/or autocovariances, we can reduce bias using split-panel jackknife bias-correction. We also develop an inference procedure based on the cross-sectional bootstrap. The results of Monte Carlo simulations confirm the usefulness of our procedures in finite samples and show that our asymptotic results are informative regarding the finite-sample properties.

Keywords: Panel data; heterogeneity; autocorrelation structure; functional central limit theorem; jackknife; bootstrap.

JEL Classification: C13; C14; C23.

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[*]This paper was previously circulated under the title "Dynamic Panel Data Analysis when the Dynamics are Heterogeneous."

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