

# Small sample estimation in dynamic panel data models

Lorelie Santos and Erniel Barrios

*University of the Philippines Diliman, Philippines*

## Abstract

This paper uses simulated data to investigate both the small and large sample properties of the within-groups (WG) and first difference generalized method of moments (FD-GMM) estimators of a dynamic panel data (DPD) model. The magnitude of WG and FD-GMM estimates are almost the same for square panels. WG estimator performs best for long panels such as those with time dimensions as large as 50. The advantage of FD-GMM estimator however, is observed on panels that are long and wide, say with time dimension at least 25 and cross-section dimension size of at least 30. For small-sized panels, we developed parametric bootstrap versions of WG and FD-GMM estimators. Simulations indicate the advantages of the bootstrap methods under small sample cases wherein the variances of the individual effects and the disturbances are of similar magnitude. Thus, while WG and FD-GMM estimators are asymptotically optimal, small samples can still exhibit such optimality through the integration of the bootstrap method.

## Keywords

Dynamic panel data model, Within-groups estimator, First-difference generalized method of moments estimator, Parametric bootstrap.

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