

# **Small Sample Estimation in Dynamic Panel Data Models**

by

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## **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 dimension as large as 50. FD-GMM estimator's good performance is apparent on both long and wide panels, that is, panels with time dimension as large as 25 and cross-section dimension size of at least 30. The parametric bootstrap of WG and FD-GMM estimators work well for small sample cases wherein the variances of the individual effects and the disturbances are almost of the same magnitude. Thus, WG and FD-GMM can be used to estimate a DPD for a more general setting. The bootstrap can be used when sample size is small enough to achieve asymptotic optimality of estimators.

*Keywords:* dynamic panel data model, within-groups estimator, first-difference generalized method of moments estimator, parametric bootstrap.