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Using Arellano-Bover/Blundell-Bond Estimator in Dynamic Panel Data Analysis – Case of Finnish Housing Price Dynamics

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Abstract : A panel dataset is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample. Panel data models include a variety of fixed and random effects models which form a wide range of linear models. A special case of panel data models are dynamic in nature. A complication regarding a dynamic panel data model that includes the lagged dependent variable is endogeneity bias of estimates. Several approaches have been developed to account for this problem. In this paper, the panel models were estimated using the Arellano-Bover/Blundell-Bond Generalized method of moments (GMM) estimator which is an extension of the Arellano-Bond model where past values and different transformations of past values of the potentially problematic independent variable are used as instruments together with other instrumental variables. The Arellano–Bover/Blundell–Bond estimator augments Arellano–Bond by making an additional assumption that first differences of instrument variables are uncorrelated with the fixed effects. This allows the introduction of more instruments and can dramatically improve efficiency. It builds a system of two equations—the original equation and the transformed one—and is also known as system GMM. In this study, Finnish housing price dynamics were examined empirically by using the Arellano–Bover/Blundell–Bond estimation technique together with ordinary OLS. The aim of the analysis was to provide a comparison between conventional fixed-effects panel data models and dynamic panel data models. The Arellano–Bover/Blundell–Bond estimator is suitable for this analysis for a number of reasons: It is a general estimator designed for situations with 1) a linear functional relationship; 2) one left-hand-side variable that is dynamic, depending on its own past realizations; 3) independent variables that are not strictly exogenous, meaning they are correlated with past and possibly current realizations of the error; 4) fixed individual effects; and 5) heteroskedasticity and autocorrelation within individuals but not across them. Based on data of 14 Finnish cities over 1988-2012 differences of short-run housing price dynamics estimates were considerable when different models and instrumenting were used. Especially, the use of different instrumental variables caused variation of model estimates together with their statistical significance. This was particularly clear when comparing estimates of OLS with different dynamic panel data models. Estimates provided by dynamic panel data models were more in line with theory of housing price dynamics.

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