Panel Vector Autoregression in R with the Package panelvar

Michael Sigmund[1], Robert Ferstl[2]

Abstract

In this paper we extend two general methods of moment (GMM) estimators to panel vector autoregression models (PVAR) with p lags of endogenous variables, predetermined and strictly exogenous variables. We first extend the first difference GMM estimator to this extended PVAR model. Second, we do the same for the system GMM estimator. We implement these estimators in the R package panelvar. In addition to the GMM estimators, we contribute to the empirical literature by implementing common specification tests (Hansen overidentification test, lag selection criterion and stability test of the PVAR polynomial) and classical structural analysis for PVAR models such as orthogonal and generalized impulse response functions, bootstrapped confidence intervals for impulse response analysis and forecast error variance decompositions. Finally, we implement the first difference and the forward orthogonal transformation to remove the fixed effects.

Keywords: Panel vector autoregression model, generalized method of moments, first difference and system GMM, R
JEL: Classification Numbers G20, G30

1. Introduction

Over the past decades important advances have been made in the study of dynamic panel data models with fixed effects for the typical setting that cross-sectional dimension (N) is large and the time dimension (T) is short. Classical OLS-based regression methods cannot be applied because of the Nickell bias (Nickell, 1981) that does not disappear asymptotically if $N \longrightarrow \infty$ and T is fixed. One solution to this problem is to apply generalized method of moments estimators popularized by Hansen (1982) in economics. Important contributions are Anderson and Hsiao (1982), Holtz-Eakin et al. (1988), Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998).

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Panel Vector Autoregression In R The Panelvar Package

DJ Losen

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