Econometrics

PhD
Comprehensive Exam

Dynamic Panel Data Models

Question: Consider the dynamic, linear, cross country, random effects regression model

$$y_{it} = \alpha + \beta x_{it} + \delta_i z_{it} + \gamma y_{i,t-1} + u_i + \varepsilon_{it}, \ t = 1, ..., 4$$

where y_{i0} is observed, i is a country and t is a year; y_{it} is national income per capita, z_{it} is domestic investment and x_{it} is a measure of national labor input. The sample consists of 30 countries and 4 years of data. Note that the coefficient on z_{it} is allowed to differ across countries.

1) [25%] Assuming for the moment that δ_i is constant across countries, discuss whether the pooled ordinary least squares estimator is consistent or inconsistent.

2) [25%] Continuing to assume that δ_i is the same for all countries, show two approaches, (1) Anderson and Hsiao and (2) Hausman and Taylor, could be used to obtain consistent estimators of β, δ and γ.

3) [20%] Consider a different strategy. Let $w_{it} = (y_{it} - \alpha - \beta x_{it} - \delta z_{it} - \gamma y_{i,t-1})$. Consider the set of instruments $f_{it} = (1, x_{it}, z_{it}, x_{i,t-1}, z_{i,t-1})$. Does the simple strategy of pooling the panel and simply using two stage least squares with $\mathbf{F}$ as the set of instruments produce a consistent estimator of the parameters? Explain.

4) [30%] Now allowing δ_i to differ across countries, comment on the consistency of the estimator you used in 3). Is it consistent? Can you propose a consistent estimator of this model when δ_i varies across countries?