

ECON 5360 Midterm Exam

Spring 2009

Panel Data (100 pts). Consider the following two-way panel data model

$$y_{i,t} = \alpha_i + x'_{i,t}\beta + \gamma_t + \epsilon_{i,t}$$

where $i = 1, \dots, n$, $t = 1, \dots, T$ and one of the following four assumptions hold:

1. α_i and γ_t are unknown parameters and $\epsilon_{i,t}$ is a mean-zero independent random variable with variance $\sigma_{\epsilon,i}^2$.
2. α_i and γ_t are unknown parameters and $\epsilon_{i,t} = \rho\epsilon_{i,t-1} + \nu_{i,t}$, where $\nu_{i,t} \sim i.i.d.(0, \sigma_\nu^2)$.
3. γ_t is an unknown parameter, α_i is a mean-zero independent random variable with variance $\sigma_{\alpha,i}^2$ and $\epsilon_{i,t} \sim i.i.d.(0, \sigma_\epsilon^2)$.
4. α_i is an unknown parameter, γ_t is a mean-zero random variable, $\gamma_t = \rho\gamma_{t-1} + \nu_t$, $\nu_t \sim i.i.d.(0, \sigma_\nu^2)$ and $\epsilon_{i,t} \sim i.i.d.(0, \sigma_\epsilon^2)$.

Random variables α , γ and ϵ are mutually independent. For each of the four cases above, write out the full variance-covariance matrix of the errors when $n = 2$ and $T = 3$. For cases 1 and 2, outline an estimation strategy that will produce consistent and asymptotically efficient estimates of β when n and T are large.