

CSSS/POLS 512 - Time Series and Panel Data Methods

Lab 6: Nickell Bias and GMM Dynamic Panel Estimators

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Preview

- ▶ Dynamic Panel Estimators
 - ▶ Nickell Bias
 - ▶ Generalized Method of Moments
- ▶ Application
 - ▶ Computation and visualization

Nickell bias

Nickel bias is a downward bias that arises in low T panels, and it is originated in the connection between the lag dependent variable and the fixed effects.

$$y_{it} = \phi y_{it-1} + \alpha_i + \epsilon_{it}$$
$$y_{it} - \bar{y}_i = \phi(y_{it-1} - \bar{y}_i) + (x_{it} - \bar{x}_{it})\beta + (\epsilon_{it} - \bar{\epsilon}_{it})$$

Generalized Method of Moments

- ▶ Method that uses a weighted matrix \hat{W} that returns uncorrelated covariances between the instruments and the errors $E[\mathbf{z}_t \epsilon_t]$, it is computed as follows:

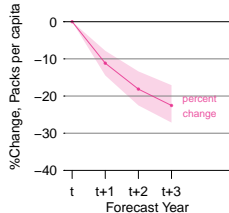
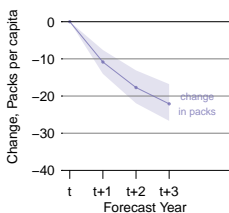
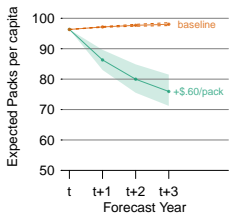
$$\hat{\beta}_{\text{gmm}} = \arg \min_b \left[\sum Z_i'(y_i - X_i b) \right]' \hat{W} \left[\sum Z_i'(y_i - X_i b) \right]$$

Application: How Does Tax Affect Cigarette Consumption?

- ▶ We will do the same application that we saw in class.
- ▶ Besides estimating dynamic panels, we will also forecast scenarios of interest.
 - ▶ For today's lab, you will need to install [Chris's packages](#) `simcf` and `tile`.

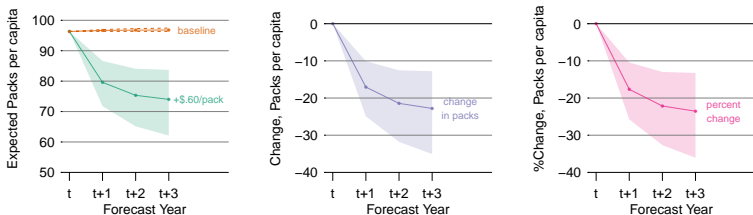
Counterfactual: dynamic panel

Cigarette Taxes & Consumption: 1a. Linear Difference GMM, Individual Effects



Counterfactual: dynamic panel with period FE

Cigarette Taxes & Consumption: 1c. Linear Difference GMM, Two-way Effects



Let's get started!

Please, open the file [Lab6.Rmd](#).