

Spatial Econometrics Lab Exercises

Essex Summer School 2024

Day 09

Task 1

Data: 09-2-data/2-1_WWI.csv; **W**: 09-2-data/2-2_WWII.csv

1. Drop all “islands” from the data as well as the spatial weights matrix;
2. Estimate a non-spatial probit model with the following specification:
 $\text{join} \sim \text{cap} + \text{polity} + \ln_trade + \text{europe}$
3. Estimate the spatial-autoregressive probit model with the same specification via MCMC (5,000 iterations, 1,000 burn-in);
4. Calculate the effect of Romania joining World War I on the probability of Italy’s involvement.

Hint

- To calculate $\Pr(y_{i=1})$ in R: `pnorm(S[i], 0, sqrt(Sigma[i, i]))`, in which:
$$\mathbf{S} = (\mathbf{I} - \rho \mathbf{W})^{-1} \mathbf{X} \boldsymbol{\beta},$$
$$\mathbf{Sigma} = (\mathbf{I} - \rho \mathbf{W})(\mathbf{I} - \rho \mathbf{W})';$$
- To calculate $\Pr(y_{i=1} \cap y_{j=1})$ in R: `pmvnorm(lower = c(-Inf, -Inf), upper = c(S[i], S[j]), mean = mu, sigma = sigma_star)`, in which:
$$\mu = [0, 0]'$$
$$\text{sigma_star} = \begin{bmatrix} S[i, i] & S[i, j] \\ S[j, i] & S[j, j] \end{bmatrix}$$
- To calculate $\Pr(y_{i=0} \cap y_{j=1})$ in R: `pmvnorm(lower = c(S[i], -Inf), upper = c(Inf, S[j]), mean = mu, sigma = sigma_star)`, in which:
$$\mu = [0, 0]'$$
$$\text{sigma_star} = \begin{bmatrix} S[i, i] & S[i, j] \\ S[j, i] & S[j, j] \end{bmatrix}$$

Task 2

Data: 09-2-data/3-1_VoteNAFTA_Darmofal2009PA.csv;

W: 09-2-data/3-2_W_103rdCongressionalDistricts.csv (to be row-standardized)

1. Estimate the spatial-autoregressive probit model with the following specification:
 $\text{vote} \sim \text{pscenter} + \text{pecenter} + \text{mexbordr} + \text{hhcenter} + \text{corptpct} + \text{labtpct} + \text{partyid}$

- `vote`: voted for (1) or against (0) NAFTA
 - `pscenter`: union membership (centered)
 - `pecenter`: vote share for Ross Perot in the 1992 presidential election (centered)
 - `mexborder`: whether the congressional district is in a state bordering Mexico
 - `hhcenter`: household income (centered)
 - `corptpct`: corporate PAC \$ / total PAC \$ in %
 - `labtpct`: labor PAC \$ / total PAC \$ in %
 - `partyid`: Dem. = 1, Rep. = 0;
2. Instead of the diffusion of the outcome variable, now you argue that the spatial interdependence here is only due to the clustering patterns of political donations – estimate an appropriate spatial regression model to substantiate your argument.