# Spatial Econometrics Lab Exercises

Essex Summer School 2024

Day 06

**Task 1**

Let's first continue with the Texas unemployment example used in the tutorial session.

1. Calculate the average direct, indirect, and total effects of `college` – with uncertainty (500 simulations) – without using the built-in `impact(.)` function;
2. ** Did you use $\frac{1}{n}\sum_i \sum_j m_{ij}\beta_k$ to calculate the average total effect? Given the row-standardized $\mathbf{W}$, can we simplify such calculation? Reflect upon row-standardization's substantive implications with the following article:
   Neumayer, Eric, and Thomas Plümper. 2016. "W." *Political Science Research and Methods* 4(1): 175–93.

**Task 2**

Data: `2-1_AFDC.dta`; $\mathbf{W}$: `2-2_W_US_adm1_adj.RData`; shapefiles: `2-3_3_cb_2021_us_state_20m`

1. Estimate with maximum likelihood the following SAR model using the row-standardized spatial weights: `ben95` $\sim$ `rskpovpc + wage95 + instcoad + ipcfold + teitrend + match`;
2. Calculate the point estimates of the direct, indirect, and total effects of all right-hand side (RHS) variables;
3. Approximate the spatial multiplier using $\mathbf{I} + \rho\mathbf{W} + \ldots + \rho^5\mathbf{W}^5$ and calculate the total effect (point estimate) of `match` — how close are the results?;
4. Summarize the uncertainty of the direct, indirect, and total effects of all RHS variables with 1,000 simulations;
5. Calculate how a unit-increase of `teitrend` in New York would affect `ben95` in New York's neighboring states in equilibrium;
6. Visualize the effects of a unit-increase of `ipcfold` in Alabama on itself and all other states.