

Spatial Econometrics: Problem Set 5

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This problem set is due on Monday 4th, December at 18:00. The solutions must be submitted in a **printed form**.

1 THEORY

1. Consider the following model:

$$\begin{aligned}\mathbf{y} &= \mathbf{X}\boldsymbol{\beta} + \mathbf{u} \\ \mathbf{u} &= \lambda\mathbf{W}\boldsymbol{\varepsilon} + \boldsymbol{\varepsilon}\end{aligned}$$

where $|\lambda| < 1$, $\boldsymbol{\varepsilon}$ has zero mean and variance $\sigma^2\mathbf{I}_n$, respectively. Determine equations for a GMM approach you would use to estimate λ and σ^2 . (Hint: This model is known as the spatial moving average model for the error term)

2. Consider the following model:

$$\begin{aligned}\mathbf{y} &= \mathbf{X}\boldsymbol{\beta} + \rho_1\mathbf{W}_1\mathbf{y} + \rho_2\mathbf{W}_2\mathbf{y} + \mathbf{u} \\ \mathbf{u} &= \lambda\mathbf{M}\mathbf{u} + \boldsymbol{\varepsilon}\end{aligned}$$

where $\boldsymbol{\varepsilon}$ has zero mean and variance $\sigma^2\mathbf{I}_n$, respectively, and \mathbf{W}_1 , \mathbf{W}_2 and \mathbf{M} are observed exogenous weighting matrices. Suggest an instrumental variable estimation procedure for this model which accounts for the endogeneity of $\mathbf{W}_1\mathbf{y}$ and $\mathbf{W}_2\mathbf{y}$, as well as for the spatially correlated term.