Spatial Econometrics

- In standard cross-sectional data observations are independent of each other.

- Sometimes the assumption of independence is not plausible and we cluster observations into groups, e.g. firms grouped by countries, workers by company or education, etc.

- However, firms might also interact directly with other firms, workers with other workers, etc. The mathematical limit for the number of interactions is $N \times N$.

- A demonstrative example is the location of observations in space. We can observe $N \times N$ bilateral distances and maybe would like to account for them.

- The technique of spatial econometrics is to assume a (more or less complex) interdependence structure and then estimate only one coefficient to account for this interdependence.

- Our interdependence structure is determined by procurement relationships. We ignore all other types of interactions.

Technique

- The $N \times N$ bilateral interactions can be visualized in a weighting matrix.

- The weighting matrix specifies for each observation (row) the strength of interaction with every other observation (column).

- The main diagonal of the weighting matrix consists of zeros. Observations do not interact with themselves. Technically, this is necessary to avoid an explosive process.

Variable Definitions

Variable	Description
Patents	Stock of patents registered by a firm
Revenue (mio. €)	Revenue of a firm in 2007
Employees	Employees of a firm in 2007
Cost per employee (th. €)	Cost of employees divided by number of employees in 2007
Labor intensity	Cost of employees divided by revenue in 2007
Capital intensity	Depreciation divided by revenue in 2007
Material intensity	Cost of material input divided by revenue in 2007
Sectoral R&D expenditure (mio. €)	Sum of private R&D expenditure in each industrial sector
East	Dummy for firm located in East Germany (not incl. Berlin)