

Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Patents	35.59	362.88	0	13 433
Revenue (Mio. €)	339.01	2 384.16	25.00	114 891
Employees	1 154.96	8 292.29	51	443 767
Cost per employee (th.€)	55.30	493.66	0.05	49 876.76
Labor intensity	0.2168	0.1535	0.0001	0.9679
Capital intensity	0.0155	0.04315	-0.0002	2.6607
Material intensity	0.5518	0.2248	0.0000	7.1146
Sectoral R&D expenditure (Mio. €)	359.79	856.69	0	4 255.30
East	0.0970	0.2960	0	1
Observations	10 217			

Weighting Matrix

- We want to analyze the influence of firms' procurement relationships on the transmission of knowledge: → innovation spillovers
- This information is summarized on a sectoral level in the national input-output data. Our weighting matrix is therefore basically based on the input-output matrix with some further refinement.
- We define backward spillovers as going up the value chain from the users to the producers of intermediate goods and forward spillovers vice versa.
- We ignore all other types of firm interaction that might lead to spillovers such as geographical location or labor mobility.

Estimation

- We estimate a spatial autoregressive process:

$$Pat = \rho \mathbf{W} Pat + \mathbf{X} \beta + u, \quad (1)$$

where Pat is the logarithm of the firm-specific patent stock, \mathbf{W} is a spatial weighting matrix, \mathbf{X} is a matrix of observable variables and u is a normally distributed error term.

- Estimating this equation (including the weighted exogenous variables as additional regressors) with OLS is not feasible due to simultaneity bias.
→ Maximum Likelihood Estimation