

Making science at a distance



Universiteit Utrecht

Jarno Hoekman
Supervisors: Koen Frenken, Ron Boschma

J.Hoekman@geo.uu.nl

Scientific research collaboration

This poster presents results of a study on the spatial evolution of research collaboration in Europe as judged by scientific papers that list multiple institutions. Although science still invokes images of the practice of the *'lone, long-haired genius, mouldering in an attic or basement workshop...motivated by the flame burning within him'* (Price 1963, p. 3), the creation of scientific knowledge has made an apparent shift towards a practice that is mainly driven by collaborative efforts. This raises new questions related to the spatial structure that underlies scientific practice. On the one hand, collaborators can easily travel back and forth between distant places making dispersion of research activities in the scientific landscape likely to occur. On the other hand, collaborators may prefer close physical proximity to each other as to rein in the costs of search and coordination activities. The prevalence of joint scientific practice between those spatial archetypes is constantly mediated by the state of communication and transportation technologies.

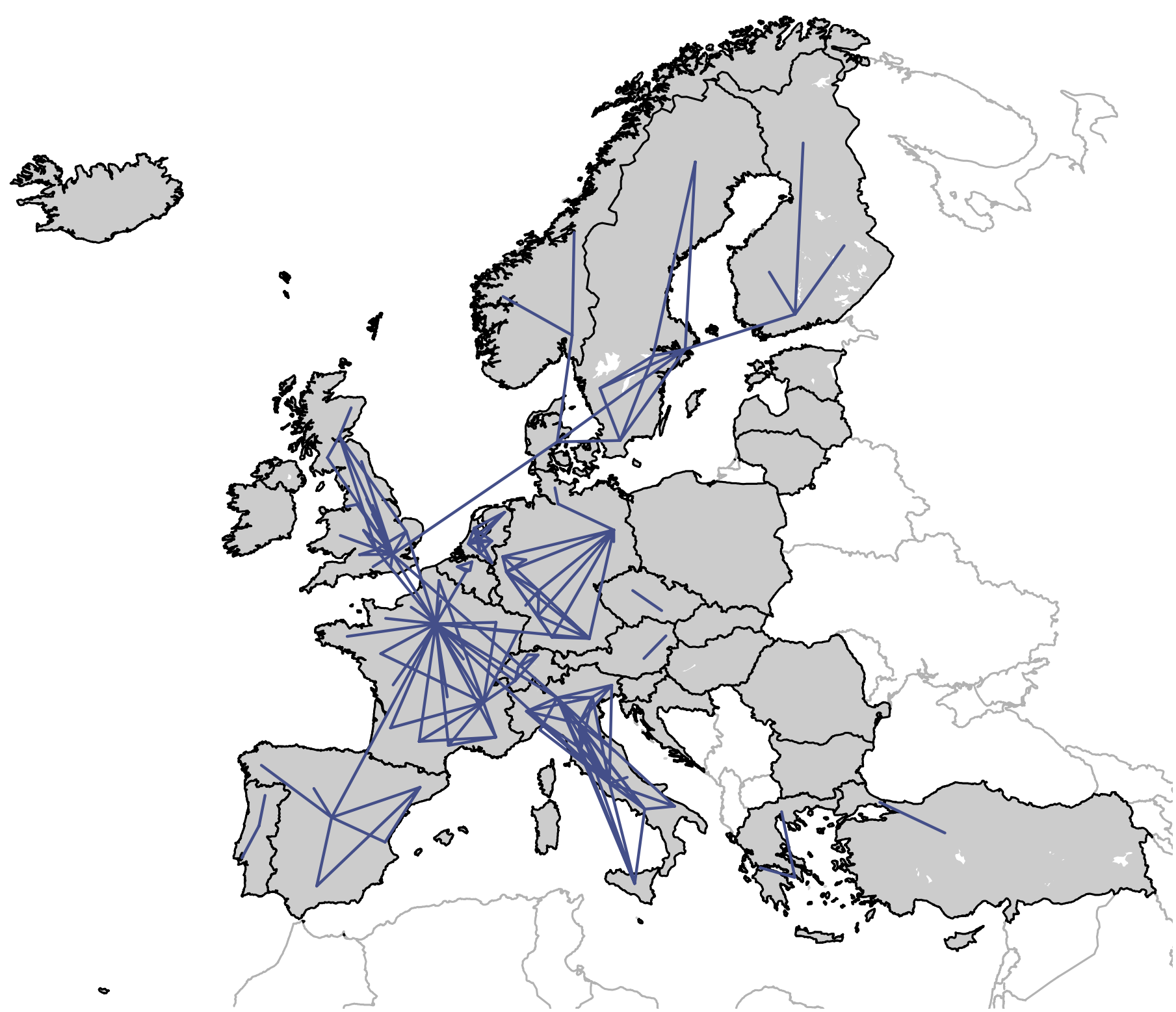


Figure 1: Total number of co-publications between regions (threshold = 1000)

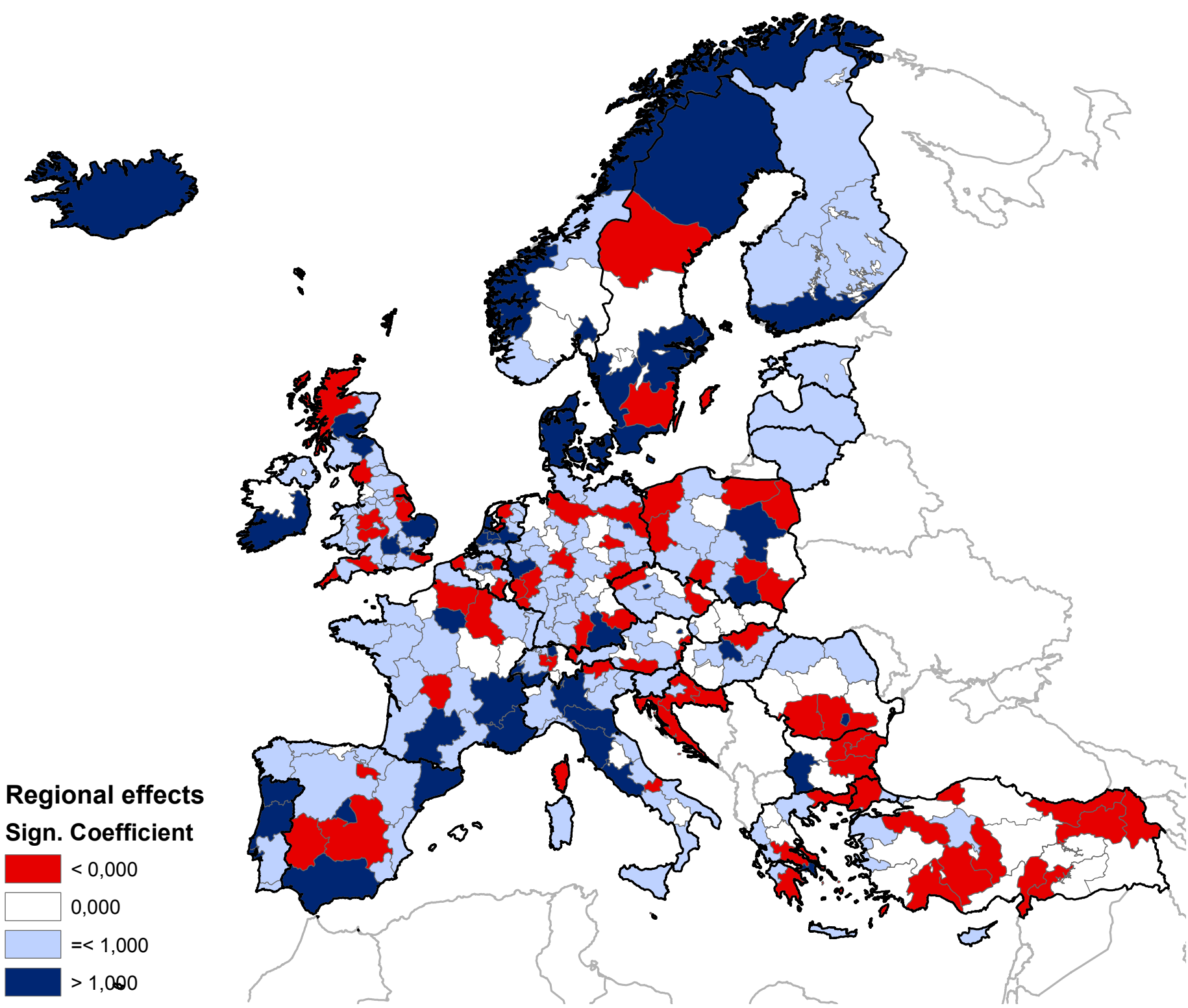


Figure 3: Estimated regional effect in collaboration intensity after controlling for variables in Spec. I

Conclusion

- Research collaborations in science is geographically localized
- The effect of physical distance on research collaboration is diminishing over time
- Small European countries are less internationalized than large ones
- The countries that joined the EU early are less affected by physical distance
- Regions that have the same research portfolio are more inclined to collaborate
- Regions that host the same quality of researchers are more inclined to collaborate
- Figure 3 shows regional effects controlled for variables in specification I

Methodology

By counting multiple institutes that are listed on publications archived in the Web of Science database, we construct a matrix with inter-regional co-publications between 314 regions in 33 European countries for the period 2000-2007. We estimate longitudinal gravity models to describe the spatial structure of research collaboration. Our model consists of:

- The weights of both regions in terms of publications
- The squared term of the weights in order to control for non-linear effects
- Differences in a region's research portfolio
- Variables estimating the yearly sensitivity to physical distance
- A parameter indicating the crossing of a regional, country or lingual border
- Differences in quality as measured by normalised average citation rates
- The duration of the EU integration process (ie. EU6, EU15, EU25)
- Regional effects

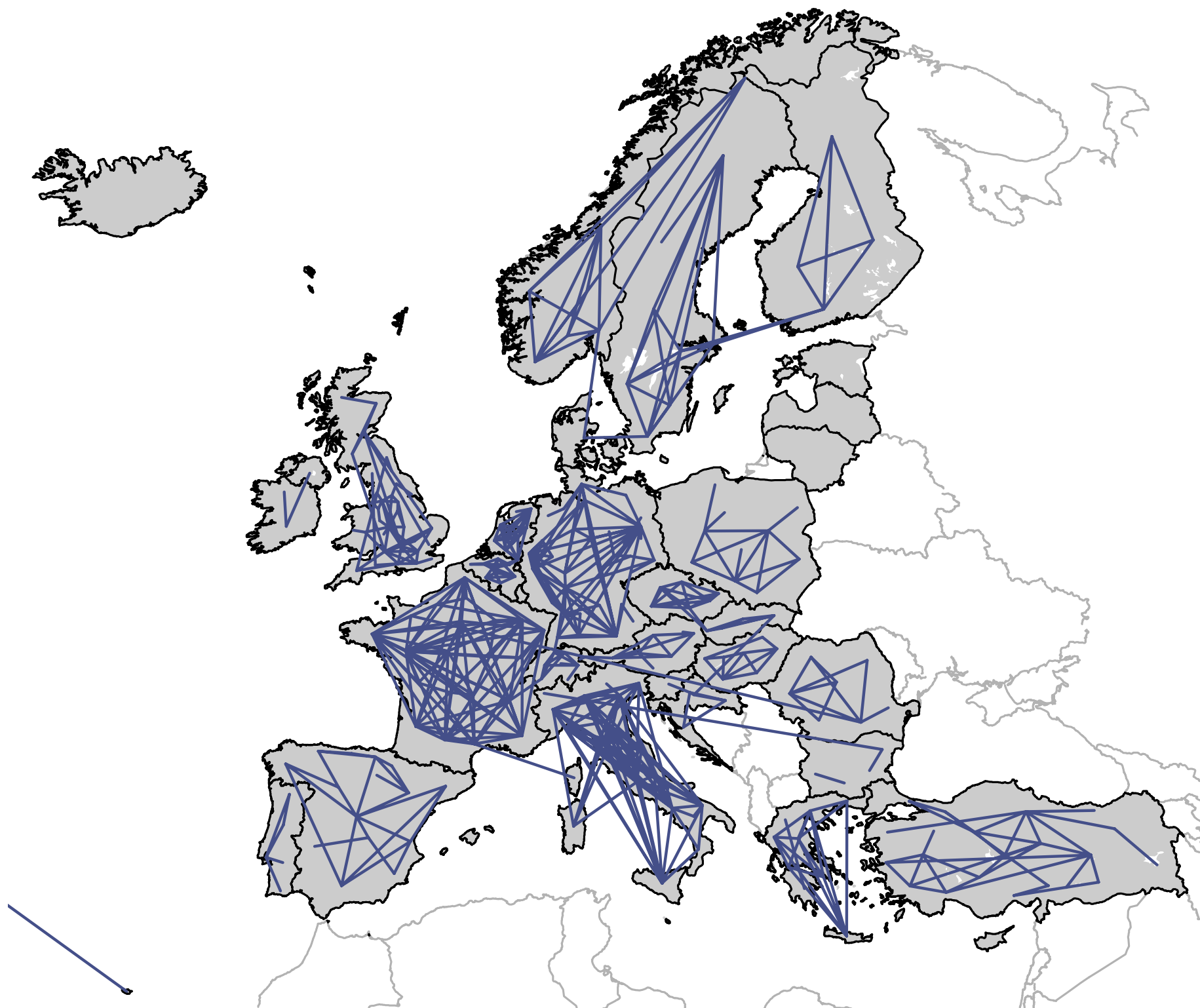


Figure 2: Total number of co-publications divided by the total number of publications (threshold = 0,05)

Table 1: Estimated number of co-publications between regions in Europe

Number of collaborations	Specification I		Specification II	
	β	SE	β	SE
Number of publications	0,459	0,005	-0,226	0,020
Number of publications ²	--	--	0,027	0,001
Research portfolio distance	-1,027	0,025	-0,795	0,028
Geographical distance				
2000	-0,660	0,004	--	--
2001	-0,651	0,004	--	--
2002	-0,647	0,004	--	--
2003	-0,641	0,004	--	--
2004	-0,636	0,004	--	--
2005	-0,630	0,004	--	--
2006	-0,624	0,004	--	--
2007	-0,626	0,004	--	--
Within EU6	--	--	-0,721	0,005
Within EU15	--	--	-0,746	0,004
Within EU25	--	--	-0,740	0,005
Other	--	--	-0,851	0,005
Crossing regional border	-2,818	0,023	-2,062	0,024
Crossing language border	-0,672	0,010	-1,722	0,007
Crossing country border				
Austria	-2,053	0,045	--	--
Belgium	-1,574	0,034	--	--
Germany	-1,331	0,014	--	--
Spain	-1,630	0,025	--	--
France	-2,134	0,020	--	--
Greece	-2,225	0,042	--	--
Italy	-1,750	0,021	--	--
Netherlands	-1,355	0,032	--	--
Poland	-2,104	0,031	--	--
Turkey	-3,958	0,031	--	--
United Kingdom	-0,840	0,017	--	--
Other	-2,102	0,019	--	--
Quality Distance	--	--	-0,879	0,027
Regional dummies (see fig. 3)	YES		YES	
Observations	383160		383160	
Log-likelihood	-478926		-451239	
Adjusted R2	0,371		0,352	