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Executive Summary:

The Regional Dimension of European Framework Programme Research Collaboration A Gravity Approach

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Abstract:

This diploma thesis investigates research collaboration under the 4th European Framework Programme among European Union regions: The central piece of data is a matrix of agglomerate collaborative links between 68 “NUTS-1” regions during 1994-1998. After a literature review and descriptive analysis, the matrix is estimated in an exploratory manner, along the guidelines of the gravity model concept. The main findings are that a region’s involvement into Framework Programme collaboration depends positively on its number of research personnel, but also on its relative importance on the national level. *Ceteris paribus*, two region’s bilateral collaboration intensity is decreased by dissimilarities in research sector structure, but increased by 10% if both regions belong to the Romanic-language area. Several regions are fundamentally under-represented in the Framework Programme (in particular Eastern German regions) or collaborate more than is to be expected (e.g. Athens).

KEYWORDS: Framework Programme, research collaboration, RJV, regional, EU, gravity model

JEL CODES: C21, O33, O38, R12

This diploma thesis focuses on the empirical analysis of agglomerated inter-regional research collaboration within the scope the fourth European Framework Programme (FP4), the European Union research and technology scheme from 1994 to 1998. The research question of this study divides into the two following:

1. *To which extent do a region's collaborative links within the FP differ from its European counterparts?*
2. *What are the underlying causes for regional differences in FP collaboration?*

The thesis' first part compiles an exhaustive review of academic literature on propulsive and impeding factors for research collaboration: While most articles in the field focus on micro-level analysis and rely on surveys for validation, comparatively few have analysed data agglomerated at the regional level. Nevertheless, about 60 theoretic and applied articles provide insights into the economics of research collaboration and hint on potential factors for the macro level: In particular, the findings allow to structure factors along the following lines:

- 1) Organisation-specific micro-level factors (e.g. organization size)
- 2) Region-specific environmental factors (such as stock of human capital)
- 3) Distance factors affecting the propensity to collaborate between two regions (for instance similarity in patent structure or geographic distance)

Table 1 (pp. 50-53) provides an overview over the findings and an assessment of their relevance to this study. Furthermore, several pages outline the FP4 institutional design and the extent to which its characteristics may incite differences to other research collaboration data.

The second, main part of the diploma thesis focuses on the empirical analysis of research collaboration: The central data piece is a matrix of agglomerate project links between 68 "NUTS-1" regions during 1994-1998. In total there were roughly 220,000 collaborative links between 58,000 organisations, split along 2,346 combinations among the respective regions.

In a descriptive chapter, the thesis first tries to structure the data: In line with spatial interaction literature, this is achieved by transforming the data into 'implied masses' (showing the relative importance of a region) and into 'implied distances', which illustrate the relative proximity of the regions; Figure 5 (p. 93) displays a map of implied distances between the 68 NUTS-1 regions. The descriptive analysis offers insight into several interesting features not yet highlighted in the literature: As has been suspected, the UK, France and Germany play central roles in European research collaboration, however this role is only shared by few of the regions in these member states. Moreover there appears to be a Germanic-Romanic divide, with the two language groups clustering closer among them than may be expected.

Subsequently, the thesis develops the design for identifying the underlying causes for this distribution: In this respect, I compiled about 90 indicators (compare pp.184-187) representing the propulsive and impeding potential factors highlighted by academic literature. These factors were then employed to estimate research collaboration in two frameworks: First, in a mass-distance-based gravity model approach, and, second, in a direct estimation structure. The prospective factors and their mutual pairings' impact were each evaluated for their overall performance in a repeated random split-sampling procedure. Both approaches yielded about the same handful of surviving factors. For the region-specific fixed effects, the total number of research staff unsurprisingly constitutes the most important propulsive factor. But apart from this, the importance of a region to the national (not the European) research sector raises the collaboration prospects over-proportionally: Although research participation is fairly evenly distributed between rich and poor EU members, there exist strong disparities between economic core and periphery regions within the states. To my knowledge, only one author has addressed this aspect so far. A higher share of the public, non-university research sector seems to reinforce this effect. Most other macro factors were found to exert only marginal or no significant influence.

Among the 'distance' factors affecting partner choice, dissimilarities in research funding (private, academic or public) hinder cooperation, while dissimilarity in patent structure and geographic distance are of lesser importance. However, the most important factor is the clustering among Germanic- and Romanic-language regions cited above.

Finally, the unexplained part of the fixed effects is examined: The analysis indicates that with respect to the indicators presented, Greece is fiercely over-represented in FP4 collaboration, whereas the poorer regions of the large countries are under-performing even when taking into account all the impeding factors cited above (particularly Eastern Germany). Figures 12 and 13 (pp. 164-165) illustrate these findings on a map.

Concluding, we find that inter-regional research cooperation is to a large extent driven by factors that have been barely examined in research collaboration literature. Moreover, the European commissions efforts to support cohesion in the European research sector apparently aggravates the disparities on the intra-national level.