An evaluation of European regional R&D performance: efficiency and spatial dependence

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**Abstract**

In today's economy, knowledge, meaning research and development (R&D) together with innovation is an essential condition to remain competitive globally. European regional policy has consequently been steered towards these activities. Since R&D investment is one of the most crucial elements in the generation of knowledge and technological progress (Pakes y Griliches, 1984; Griliches, 1990), any region that uses resources inefficiently could bear a penalty in the form of achieving a much lower progress (Wan y Huang, 2007), and consequently, lower levels of economic growth and development. Therefore, understanding the nature of R&D efficiency/inefficiency is crucial for designing policies to improve resource allocation. Moreover, a major issue involved in the analysis of R&D activities is the role of geographically mediated knowledge externalities (Anselin et al., 2000; Acs et al., 2002). R&D may spill over across regions but the geographical extent of such effects is limited. Spillovers may follow particular patterns depending on economic, technological and geographical distances among regions, that is, on agglomeration phenomena which apply both to production and innovation activities (Moreno et al., 2005). Then, spatial interaction and spatial structure becomes an important aspect to understand R&D efficiency at the regional scale. This aim of this paper is to provide some insights into patterns of R&D activities across European regions. This paper considers R&D/knowledge generation in each region as a production process. Thus, each region is regarded as a decision-making-unit that employs R&D manpower and physical resources as inputs to produce R&D outputs. In this framework, we propose a two-stage approach, which involves: in the first place, applying data envelopment analysis (DEA) for the measurement of R&D efficiency across regions; and, in the second place, using Tobit regressions to estimate the impact of spatial dependence on efficiency results.