

## **Geographic and Technology Based R&D Spillovers Within the TRIAD: Micro Evidence From US Patent and Citation Data**

**Aldieri Luigi, Cincera Michele**  
**Université Libre de Bruxelles**  
**mcincera@ulb.ac.be**

The aim of this paper is to assess the magnitude of R&D spillover effects on large international R&D companies' productivity growth. In particular, we investigate the extent to which R&D spillover effects are intensified by both geographic and technological proximities between spillover generating and receiving firms.

To this end, we use three different methodologies to construct the stock of R&D spillovers: i) technological proximity; ii) geographic distance; and iii) patent citations.

The approach for modelling technology based R&D spillovers builds on the methodology first empirically implemented by Jaffe (1986). This method rests on technological proximities between firms in a technological space. The firms' positions in the technological space are characterized by the distribution of their patents over patent classes.

Locational R&D spillovers rest on the geographical distances between firms which uses the latitude and longitude coordinates of corporate headquarters (Orlando, 2000). Firms falling inside a circle around the geographic centroid of the firm's location are defined as geographically near.

Finally, following Mancusi (2004), self-citations to firms patents are used to measure the level of knowledge accumulation internal to the firm and the importance of absorptive capacity in enhancing the ability to benefit from geographic and technology based R&D spillovers.

An extended production function (Griliches, 1979) is used to estimate the impact of R&D spillover components and absorptive capacity besides traditional inputs and own R&D stock. As additional determinant, the level of market competition is also considered.

The dataset consists of a representative sample composed of 964 worldwide R&D-intensive manufacturing firms over the period 1988-1997. This information is matched to the USPTO dataset of Hall, Jaffe and Trajtenberg (2001).

The preliminary results estimated by means of panel data econometric methods (system GMM) indicate a positive and significant impact of R&D spillovers on productivity performance. On the whole, the elasticity associated with the geographic (resp. technological) R&D spillover pool is four times (resp. six times) the one of the firm's own R&D stock and US firms are mainly sensitive to spillover effects generated by domestic firms while European and Japanese firms appear to mainly benefit from the international R&D spillover stocks.