

# ARE REGIONAL SYSTEMS GREENING THE ECONOMY? THE ROLE OF ENVIRONMENTAL INNOVATIONS AND SPILLOVER EFFECTS

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The adoption of environmental innovations (EI) is crucial to green the economy and achieve win win environmental – economic gains. EI are extensively related to various meso conditions which are external to the firm. The latter mainly refer to stakeholder's pressures, policy pressures, spatial spillovers of local and global level. Notwithstanding the importance of micro levers that back EI, we here especially focus the attention to relatively overlooked issues such as local spatial spillovers. This is relevant since growth depends upon the development of strong idiosyncratic regional factors – agglomeration economies are one important element - that must be integrated with the challenges posed by global markets.

This papers aims at enriching the discussion over the relational/spatial factors (De Marchi, 2012) that might be behind EI in some regional settings. We additionally include within this reasoning the way local and global issues – climate change in primis - interact. Spatial and spillover effects arise crucially important under a perspective that defines 'regional competitive advantages' as a key factor to achieve sustainability and competitiveness aims. It is well known that the role of SMEs and district based industry is relevant in many EU industrial economies. Environmental and innovation economics scholars should deepen the analysis of how EI spreads and is adopted in economic environments that are rich in SMEs (Brioschi et al., 2002; Cainelli and Zoboli, 2004). Too much emphasis has probably been placed on the behavior of large firms (e.g. corporates), which in some settings constitute about 5% of the firm population. This would allow fruitful integration between environmental economics and regional studies as well. In this regard, it is noticeable to observe that a sector based and regional perspective is coherent with new policy and growth approaches in the EU. The role of EI for local growth is analysed within the Proter hypothesis framework, which explores the links between 'well designed' environmental regulation and innovative activities on the one hand, and between the performance/competitiveness of firms and innovation strategies on the other hand. Indeed, we are here able to fully analyse the chains of relationships starting with an investigation of EI correlated factors and consequentially explore the 'economic effects' of such EI, namely impacts on labour productivity and sales.

We carry out the empirical analysis on the basis of an original survey that covers more than 500 firms in the Emilia Romagna Region in the North East of Italy and of balance sheets data stemming from the AIDA -BureauVanDijk. The survey is temporally comparable with the CIS 2006-2008. In addition, we remarked that knowledge of firm's information in relation to its spatial location and balance sheets allows a deeper understanding of the 'firm behavior'. We deliberately introduced 'CIS-like' questions (see appendix for the specific question's formulation in the questionnaire) on EI issues, as we had been following the process that brought to the formulation of EI questions in CIS5. We analyse firm's performances through a two steps conceptual model.

First, we look at the relevance of spatial levers (we are able to fully exploit the spatial dimension given that we exactly know the geographical location of the firm), namely whether

agglomeration of EI adoption induces EI in a given firm. We estimate an environmental innovation function with the following specification:

$$(1) \text{ ENV\_INNO}_i = c + a_1(\text{CONT})_i + a_2(\text{GEO})_i + e_i$$

where ENV\_INNO is a variable of the environmental innovative behavior of the firms, while the main group of regressors here highlighted is: GEO. With this variables, capturing the local density (at municipality level) of environmental innovations, we want to capture the potential presence of local spillovers.

Second, we test whether EI have significantly increased firm economic performances. The research question, at the basis of the second line of analysis, can thus be formulated as follows: is the firm economic performance positively related to the environmental innovative behaviour of the firm, supporting the Porter Hypothesis? The econometric specification is as follows:

$$(2) \text{ PERF}_{i,t} = c + b_1(\text{CONT})_{i,t-1} + b_2(\text{ENV\_INNO\_FITTED})_{i,t} + b_3(\text{INTERACTED\_INNO})_{i,t-1} + u_i$$

where PERF is an indicator of economic performance (e.g. labour productivity in the form of value added per capita), stemming from balance sheets and referring (possibly) to post survey-data years: the subscript t indicate a time period subsequent to 2006-2008, which is denoted by the subscript t-1. When possible, the potential integration of the results of the first line of analysis will be included in the second one, in order to mitigate likely problems of endogeneity. Indeed, ENV\_INNO\_FITTED are the fitted values stemming from the first line of econometric analysis on environmental innovative actions. In order to capture the existence of synergies and complementarities among innovation activities and environmental innovation, when the fitted values are not included in the specification, we can use instead interacted terms (INTERACTED\_INNO).

We observe that the role of agglomeration turns out to be fairly local in nature, given that spillovers are significantly inducing innovation within the municipality boundaries, and show up sector independent effects.

In terms of economic performances we expect they are driven by EI, which turn out as a potential key source of growth in the green economy.