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LOCATION DETERMINANTS OF ECO-INNOVATIVE FIRMS IN FRANCE

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This study analyses the location determinants of eco-innovative firms in France between 2003 and 2013. The analysis is based on a dataset obtained after merging firm-level microdata on the location of new firms from DIANE Mercantil Register (Bureau van Dijk) and patents information from the OECD REGPAT (2018) database. As there is a growing pressure towards the development of innovation with the aim of reducing the environmental impact and a more efficient use of natural resources, our results provide evidence to contribute to the implementation of regional policies promoting the creation of eco-innovative firms and regional knowledge spillovers.

INTRODUCTION

Since the 1990s, environmental issues have become a major concern for policy makers. Faced with the threat of global warming, it has been essential to reduce energy consumption, limit the use of fossil fuels, and promote the development of low-carbon energies. This requires a radical technological transformation of the global energy system, and the rapid establishment of policies to

encourage the development of innovation with the aim of reducing environmental impact and promoting more efficient use of natural resources.

The implementation of national and sectoral policies promoting eco-innovation has become a key issue for Europe's future competitiveness. With the Act of 17 August 2015 on Energy Transition for Green growth, France has displayed its ambition to be an

exemplary nation in terms of reducing its greenhouse gas emissions, diversifying its energy system and increasing the deployment of renewable energy sources. The Act sets out many quantitative goals, in particular, a commitment to reduce greenhouse gas emissions by 40% by 2030, compared to 1990 levels, and divide it by four by 2050 as well as to increase the share of renewables in final energy consumption up to 32% by 2030. And it is in this context that the creation of innovative firms highly specialised in environmental technologies may have a key role in the transition process to a sustainable economy (OECD 2016; EC 2012; French Government 2017). In this regard, France is responsible for a specific program that supports the creation of eco-innovative firms with a special focus on the development of innovation (ADEME 2018). The capacity of regions to develop new green technologies is also one of the bases of the Smart Specialisation Strategies (RIS3) proposed by European Commission over the last years to ensure (EC 2012). It seems clear, then, that the development of policies encouraging the creation of environmental technologies and their sustainable application in firms' activity may have many implications for the transition to a greener and sustainable economy of regions, in this case, for French départements.

The aim of this work, developed in Coll-Martinez et al. (2020), is to contribute to the literature on the location determinants of eco-innovative firms and shed light on the relationship between knowledge spillovers and the creation of new innovative firms

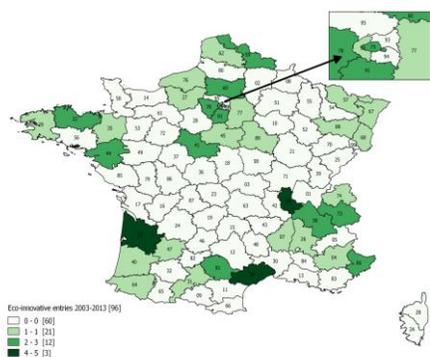
highly specialised in the environmental field. Concretely, we address the following research questions. First, does the accumulated knowledge coming from environmental technologies matters more than knowledge coming from non-environmental technologies in the creation of eco-innovative firms? Second, does the creation eco-innovative firms benefit more from related or from unrelated knowledge variety (in terms of the recombination of technologies that make up environmental inventions)? And third, is the creation of eco-innovative firms positively influenced by the local knowledge base and firm creation in neighbouring regions? The answers to these questions are useful for the development of regional policies to encourage the spatial concentration of environmental knowledge creation that, to some extent, may increase regional disparities in terms of environmental performance and knowledge creation or, on the contrary, reduce them. Moreover, the understanding of the dynamics of the eco-innovative firms' entry can provide useful information on how to boost local development through their direct and indirect spatial spillovers arising from the formation of eco-innovative activities in neighbouring regions. Finally, they would provide valuable ex-ante evidence of the Smart Specialisation Strategies (RIS3) proposed by European Commission to ensure the sustainable regional competitiveness in European Regions.

DATA, METHODS AND RESULTS

By using firm-level microdata on the location of new firms from DIANE Mercantil Register (Bureau van Dijk) and patent information from the OECD REGPAT (2018) database, we analyse the location determinants of new eco-innovative firms in France over the period 2003-2013.

To identify eco-innovative firms' entry we define environmental-based firms as those to have at least 50% of their inventions in the period of time observed classified as environmental technologies and that have applied for the first eco-patent within the first 5 years after their creation (Corradini 2019). Figure 1 shows a non-homogenous spatial distribution of eco-innovative firms' entry throughout French departments between 2003 and 2013.

Figure 1. Geographical distribution of eco-innovative firms' entry (2003-2013)



Source: Authors with DIANE and OECD REGPAT 2018 data

The GLM results for the location determinants of eco-innovative firms' entries show that unrelated knowledge variety for environmental technologies and the political support in terms of investments for the protection of the environment are the most important factors explaining the location of

eco-innovative firms. In fact, the greater significance of unrelated variety for environmental technologies suggests that due to the higher complexity and degree of novelty that characterise environmental technologies they may require a greater recombination of different pieces of knowledge that are cognitively distant, compared to non-environmental technologies (Barbieri et al. 2016; Quatraro and Scandura 2019). When accounting for spatial dependence in our model (see Table 1), we found that the creation of eco-innovative firms in neighbouring départements may incentivise the eco-innovative entry in the local département, while the impact of knowledge spillovers from both related and unrelated technologies on the creation of eco-innovative firms is quite local, that is, they remain within the boundaries of each département. These results suggest that spatial path dependence and regional dynamics are important in fostering eco-innovation.

Table 1. Direct, indirect and total effects of the relevant variables after SDM estimation

	Direct	Indirect	Total
STOCK_ALL	0.0001*** (0.000)	0.0000 (0.000)	0.0001*** (0.000)
STOCK_ENV	0.0007*** (0.000)	0.000 (0.000)	0.0008*** (0.000)
STOCK_NENV	0.0001*** (0.000)	0.0000 (0.000)	0.0001*** (0.000)
COH	0.0212 (0.027)	0.0012 (0.002)	0.0224 (0.028)
KV_Y	0.1267*** (0.034)	0.0081 (0.007)	0.1348*** (0.037)
RKV_Y	0.1820** (0.059)	0.0113 (0.009)	0.1933** (0.065)
UKV_Y	0.1918** (0.067)	0.0119 (0.011)	0.2038** (0.072)
Control variables	Y	Y	Y
N	960	960	960
Departments	96	96	96

Source : Authors

POLICY IMPLICATIONS

Even though our results focus on the French case and should not be generalised to other countries, they have important territorial implications on the transition process to green regional development providing valuable evidence of the role that local specificities and the extension of knowledge spillovers play on the formulation of the smart specialisation policies such as the RIS3 developed in the European context.

First, the significant and robust effect of unrelated variety for environmental technologies on eco-innovative firms' entry suggests that policies should account for the context-specific environmental recombination of existing activities in which the départements are specialised. For example, those regions specialised in the automotive industry would have a comparative advantage in developing the electric car in comparison to regions where the automotive industry is not developed. And this is a key implication for the success of RIS3 policies, since it implies that even regions that are not

specialised in environmental technologies can also foster the creation of eco-innovative activities through the recombination of pre-existing non-environmental and new environmental knowledge. Second, our results highlight the importance of environmental political support. In this regard, environmental regulation may exert an incentive for firms to introduce innovations have a key role in the creation eco-innovative firms. Finally, the positive neighbouring effect in terms of entrepreneurial dynamics in environmental technologies appears also to be consistent with policies supporting eco-innovative entrepreneurship at regional level such as the Green Action Plan for SMEs or its French version, the Programme d'investissement d'avenir (PIA). However, given that the spatial scope of knowledge indicators is quite local, the effectiveness of policies aimed at enhancing knowledge spillovers for environmental technologies should carefully assess the local specificities rather than be designed at a regional or national level consistent with the Smart Specialisation logic.

Implications

- The recombination of environmental and non-environmental technologies and environmental political support are the main factors explaining the location of eco-innovative firms.
- There is a clear spatial dependence on their creation while the impact of knowledge spillovers is quite local.
- Our results suggest that more attention should be paid to the context-specific recombination of existing technologies in which the departments are specialised consistently with the Smart Specialisation Strategies.

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