



The paradox of geographical proximity for innovators: A regional study of the Spanish agri-food sector

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ABSTRACT

This paper analyses the geographical proximity impact and the proximity paradox in a regional study of the Spanish agri-food industry. This study is mainly based on the Community Innovation Survey database, from which we get a representative group of agri-food companies in Murcia, Spain. The regional character of this research allows us to discount the institutional effects which could cause differences between companies in different regions. In addition, we consider individual innovative actors and alternative innovation outcomes. Our findings corroborate the significant impact of geographical proximity for the innovation in agri-food companies. We get differences between innovators when the geographical impact on absorptive capacities and innovation is examined: geographical proximity between agri-food companies and industrial states and R&D centres has a significant impact on firms' absorptive capacities whereas geographical distance to large companies and transport facilities play an important role in determining R&D activities. Our results corroborate the proximity paradox for the geographical dimension finding a non-linear relationship for the absorptive capacity in agri-food companies.

1. Introduction

There is an extensive literature focused on the role of geographical proximity on innovation. These studies are based on the theoretical argument that short distances provide more intense face-to-face interactions, strengthening the exchange of information and favouring the assimilation of external knowledge (Audretsch and Feldman, 1996). Recent research in this area is based on new assumptions with alternative proximity dimensions and non-linearities in the proximity impact on firms' innovation. In this sense, Boschma (2005) states that geographical proximity is neither a necessary nor a sufficient condition for the exchange of knowledge between economic agents but geographical proximity facilitates other proximity dimensions (institutional, cognitive and social). However, the latter are not substitutes for geographical proximity, even when the development of new technologies could propitiate alternative communication methods (Torre, 2008). Thus, Boschma and Frenken (2010 pp.5) argue: “*there is a strong claim that geographical proximity is a prime mover of network formation despite globalization, implying that a great deal of interactions still takes place between agents that are geographically proximate*”. Consequently, geographical proximity is still a fundamental element to be analysed when considering innovation activity, even though there are additional

elements promoting the exchange of knowledge (Rodríguez-Pose and Crescenzi, 2008). More recent studies have raised the issue of a proximity paradox (Broekel and Boschma, 2012): the impact of geographical proximity on innovation is not linear and too great a geographical proximity between economic agents might disrupt the exchange of knowledge, hence the optimal effect on innovative agents is often a combination of distances, based on different potential spillover effects.

Our study analyses the geographical proximity impact and the proximity paradox in a regional study of the Spanish agri-food industry. This regional analysis allows us to discount the institutional effects which could cause differences between companies in different regions. In this sense, knowledge is both firm and place specific providing organisational and institutional effects (Boschma and Frenken, 2010). The former is based on evolutionary theory from which knowledge is firm specific and accumulated within workers skills and firms procedures (Gertler, 2003). But, knowledge has also an institutional component, so firms' procedures tend to share characteristics when they are affected by similar institutional conditions (Storper and Venables, 2004). The different institutional procedures may provide place specific assets which favours innovation activity and which would be difficult to transfer to other institutional scenarios in other regions (Boschma, 2005). Therefore, the development of a territorial specific analysis in

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this context suggests needing to test the role of proximity using a homogeneous sample of agents which are affected by similar institutional characteristics.

This study is mainly based on the CIS (Community Innovation Survey) database for Spain, from which we get detailed information about innovation activities over the period 2005–2007 of a representative group of agri-food companies in Murcia, Spain¹ (see Fig. 1). We selected this territory because of the importance of agrarian activities in total production for this region, representing 5.4% of GDP for Murcia. This value is above the Spanish average value of 2.7% of GDP. In addition, we find that the agri-food subsector in Murcia is especially important with respect to Fruits, Cereals and Meat activities (almost 11% of industry GDP in 2017 is in Murcia – National Institute of Statistics)².

This study has two main objectives. The first is to test empirically the extent to which geographical proximity between companies and different innovative actors and transport facilities impact on innovation and absorptive capacity in agri-food companies, while controlling for institutional effects. From this analysis, we confirm the significant role of geographical proximity on agri-food companies' innovation identifying the most relevant innovative agents whose distance should be considered. The second objective is to corroborate the existence of non-linearities in geographical proximities for the agri-food sector. In this regard, our study provides empirical evidence for the proximity paradox. In contrast with previous studies (Hansen, 2014), we find significant non-linearities in the geographical dimension when we distinguish between innovative actors and innovation sources. Many studies on this topic seem to be more interested in mapping the existence of these geographical interactions than to determine how the degree of proximity may vary between innovative agents. Therefore, our study adds additional understanding on the way in which knowledge is exchanged between innovative actors analysing not only innovation outcomes but also firms' absorptive capacities.

This paper is structured as follows. Section 2 provides some background by examining the relationship between geographical proximity and both absorptive capacity and innovation in agri-food companies. We also give some theoretical arguments about the proximity paradox in this context. Section 3 presents our empirical research starting with data and methodology and highlighting the main results. Finally, some discussion and conclusions are presented in Section 4.

2. Geographical proximity, absorptive capacity and innovation

2.1. Geographical proximity and absorptive capacity in agri-food companies

Getting access to new knowledge requires networking between linked firms (Hansen, 1999); mere exposure does not guarantee the assimilation of new information by the company. Although dense networks provide important access to new knowledge, its impact on companies, in terms of innovation and performance, depends on the extent to which a unit can absorb such new knowledge (Tsai, 2001). Zaheer and Bell (2005) demonstrated that firms that bridge structural gaps in a network tend to be better able to exploit their internal capabilities. Giuliani (2007) analyses knowledge networks in geographically close areas in the wine industry; the author finds that when firms are more densely connected in knowledge networks they have higher absorptive capacities. Giuliani and Bell (2005) find that the distribution of local resources and of knowledge affects innovation activity. The individual firm's knowledge base is an additive and distinct attribute of its systemic resources and capacities. Consequently,

¹ Spain is divided by Autonomous Communities that are territorial aggregations corresponding to the NUTS (Nomenclature of Territorial Units for Statistics) III classification. The NUTS is a hierarchical system for dividing up the territory of the European Union for analytical purposes (European Commission, 2011).

² www.ine.es

firms vary in their capacity to exploit opportunities (Munari et al., 2012). The differences in the amount of internal knowledge held by a firm generate an uneven and selective distribution of resources as well as knowledge being transferred and received in a close environment (Giuliani and Bell, 2005). Among a company's internal attributes, R&D efforts related to the firm's knowledge base, and thus its absorptive capacity are particularly significant (Hervas-Oliver et al., 2012). The core hypothesis behind these studies is that geographical proximity fosters interconnections between economic agents, conditioning positively their capacity to assimilate innovation (Barbosa and Faria, 2011).

2.2. Geographical proximity and innovation in agri-food companies

There is an extensive literature dealing with the effect of geographical proximity on firms' innovation (Bouba-Olga et al., 2015). Those geographically close to external agents should develop dense network structures (Granovetter, 1985). This conclusion is based on the assumption that geographical proximity favours social connections among individuals working in different local companies. Therefore, geographical proximity allows firms to connect more easily, overcoming barriers to knowledge exchange among economic agents (Tsai, 2001).

In the agri-food sector, there are only a few studies examining the impact of geographical proximity between companies and external agents on agri-food companies' innovation. Hence, Capitanio et al. (2010) conclude that interrelationships among geographically close economic agents are relevant in enhancing the innovation performance of agrarian firms. Bertolini and Giovannetti (2006) highlight that the interaction between economic agents and local environmental resources are relevant factors in the growth of these companies. Gellynck et al. (2007) explore the role of regional networks in the processes of innovation within a number of food companies. The authors find that firms enrolled in regional networks have a stronger innovation competence. Trigueros et al. (2013) examine the differences in the behaviour of innovation between agri-food and manufacturing firms. Their results suggest that environmental characteristics are more decisive in explaining innovation in agri-food companies. García-Alvarez-Coque et al. (2013) note that specific locations can provide advantages for agri-food firms in the form of local resources, such as favourable natural conditions or technological inputs. Läßle et al. (2016) undertake an external analysis considering innovation behaviour in spatially concentrated areas of agricultural activity; their study highlights the importance of local knowledge spillovers on the innovation of these companies. Hoffmann et al. (2017) find that strategic location, such as producing or processing agricultural products obtained in the territory where they are located, is a source of competitive advantage.

2.3. The proximity paradox in the geographical dimension

Regarding previous sections, the general conclusion is that geographical proximity positively impacts on innovation activities. But, this general understanding is not as simple as it was expected. Sorenson et al. (2006) highlight that the advantages of being geographically close to external knowledge sources varies with regard to the type of knowledge and, therefore, we cannot conclude there is always a general positive effect. In this sense, networks between geographically close innovative agents have also related costs to their initial establishment and maintenance which have to be taken into account when the proximity impact is examined (Eriksson, 2011). In addition, a negative effect in the geographical proximity impact could be caused by involuntary knowledge spillovers through which information escapes to other companies. Apart from these arguments, an excessive proximity between innovative actors could cause lock-in situations (Boschma, 2005) in which companies with similar characteristics in terms of innovation have little knowledge to exchange. Therefore, in order to get positive effects on innovation, interactions derived from geographical

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