

What drives innovation in the agricultural sector? A spatial analysis of knowledge spillovers



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ABSTRACT

This article analyses the spatial concentration of agricultural innovation in Ireland. Influenced by the importance of knowledge spillovers, the roles of key innovation drivers are discussed. The analysis reveals a clear spatial concentration of agricultural innovation and while some of this variation can be explained by the spatial concentration of the sector, there are also other factors at play that drive the spatial distribution of innovation. More specifically, the distributions of research, education and advisory services show a similar spatial pattern to agricultural innovation, providing support for the existence of regional knowledge spillovers.

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1. Introduction

Innovation is seen as one of the main drivers of productivity, profitability and competitiveness in the agricultural sector (OECD, 2013). Despite this, there is evidence that the European agricultural sector is not reaching its full potential in terms of innovation, which is seen as detrimental to the competitiveness of the EU agri-food industry (Islam et al., 2013). Moreover, there are considerable differences in agricultural innovation across countries (e.g., Spielman and Birner, 2008; OECD, 2013). This can partly be explained by the fact that policies, institutional settings, infrastructural environments or knowledge transfer systems differ between countries. While agricultural innovative performance differs across countries, it is also the case that innovative activity is generally not uniformly distributed across regions (Asheim and Gertler, 2006). That is, there may be regional dynamics at play that also affect innovation efforts.

A number of factors have been identified in the literature that can facilitate or constrain agricultural innovation. For example, demographic structures and agricultural systems are known to influence innovative performance (Läßle et al., 2015). In addition, it is also contended that geographical proximity has an impact on innovation. An increasing distance from innovation facilitators, for example, can have an adverse effect on innovation efforts, which can become more apparent in remote areas (Rand et al., 2009). There is also some contrasting evidence in the literature, namely

that peripheral locations may be beneficial for innovation and rural enterprises outperformed their urban counterparts (Hoffman et al., 1998; North and Smallbone, 2000). That is, there is mixed evidence in relation to proximity and innovation. Hence, some firms may innovate because they have no other options, while others innovate because they are exposed to an innovation stimulating environment, which is similar to the 'push' versus 'pull' factor idea in entrepreneurship (Dawson and Henley, 2010).

On the other hand, however, Boschma (2005) questions whether geographical proximity matters for innovation at all and argues that other dimensions of proximity (such as cognitive, organisational, social and institutional) are equally or even more important. For example, social learning is expected to foster substantial technological and institutional innovation (van Assche et al., 2013). Indeed, it is well accepted in the literature that spatial concentration can have a positive impact on knowledge exchange among economic agents, which may lead to spatially clustered technology adoption (e.g., Case, 1992; Läßle and Kelley, 2015). It has also been found that firms near knowledge centres show a higher innovative performance than more distant located firms (e.g., Jaffe et al., 1993; Audretsch and Feldman, 1996), though Breschi (2000) argues that while innovative activities tend to agglomerate within specific locations, the intensity of the geographical concentration and the spatial organization of the innovative processes may differ remarkably across sectors.

Thus, it is clear that there is an important spatial dimension in the emergence of innovation, which is corroborated by the fact that there is a relatively extensive literature on the impact of proximity on innovation (e.g., Audretsch and Feldman, 1996; Boschma, 2005).

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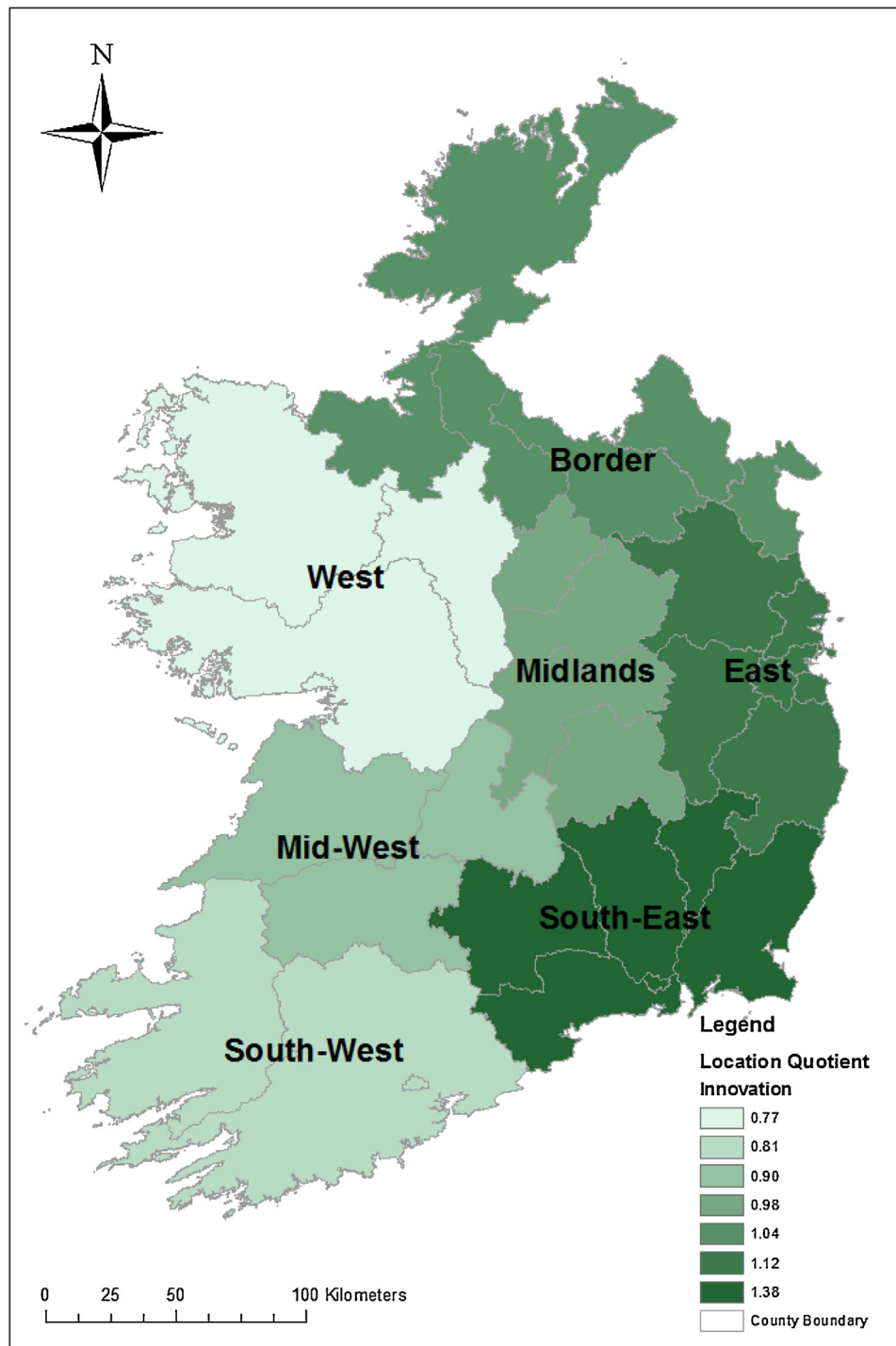


Fig. 1. Spatial distribution of agricultural innovation.

However, to date this literature is mainly confined to studies in economics or economic geography, while remarkably few studies have addressed innovation in the agricultural sector in a spatial context. This article aims to address this deficit by analysing the spatial distribution of agricultural innovation and by discussing key innovation drivers in a spatial context. In particular, this study focuses on knowledge spillovers by evaluating the influence of research, education and advisory systems on the spatial distribution of innovation using Ireland as a case study.

The article proceeds as follows: the next section defines innovation and reviews the most relevant literature followed by a

description of the case study. Methods and data are then introduced, followed by a brief description and discussion of the results. The article ends with some concluding remarks.

2. Agricultural innovation and spatial influence factors

Innovation can broadly be divided into technological (product and process) and non-technological (organization and marketing) innovations (OECD/Eurostat, 2005; OECD, 2010). However, these broad distinctions do not recognise that most firms' innovations encompass a vast array of activities. A set of innovation activities

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