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Development of organic farming in Norway: A statistical analysis of neighbourhood effects

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ABSTRACT

The organic boom in agriculture at the turn of the new millennium culminated in ambitious political goals for further growth in organic agricultural production and consumption. In Norway, the present goal is to reach a level of 15% organic production and consumption by 2020. So far, the requested shift toward organic farming has not occurred at the anticipated level. Organic farming began in Norway with a few pioneers who questioned the conditions in conventional agriculture. Since the late 1980s, there has been a rise in the number of organic farms from the core 20 or so original farms to approximately 2800 certified organic farms in 2010. While several studies have explored the diffusion of organic farming as an innovation, little research has been carried out to specifically understand the spatial diffusion of organic agriculture. This paper explores spatial diffusion of organic farming in Norway by asking if the level of organic farming in one municipality is influenced by organic farming in its neighbouring municipalities. Spatial analyses are carried out on population, agricultural production and producer data. The dependent variable is the proportion of organic production in Norwegian municipalities ($N = 430$). Analyses in the paper show a connection between the level of organic production, the population level in the municipalities, and access to consumers. This research also shows a connection between the farm processing of organic products and the level of organic farming. The patterns are of a geographical nature, showing neighbourhood effects in the development of organic farming that are especially strong in particular regions of Norway. The results are discussed in light of previous research on organic farming and Hägerstrands ([1953] 1967) theory of spatial diffusion of innovations.

1. Introduction

Within the field of geography, as well as neighbouring fields within the social sciences, the spatial diffusion of innovation received considerable attention in the 1960s and 1970s (Tonts et al., 2010). The theoretical and methodological works of Torstein Hägerstrand (1953 in Swedish, 1967 English edition) on neighbourhood effects in the study of diffusion processes were pioneering. After some decades of less attention, new methodological and theoretical tools enable more sophisticated statistical analyses of this effect. In this paper we are analysing the effects of neighbours in the development of organic farming in Norway.

After many years of substantial growth in the number of organic farms, as well as growth in organic production and consumption in Norway and internationally, ambitious policy goals for production and consumption have emerged. It is a policy of the Norwegian Government to reach 15% organic agricultural production and 15% organic consumption by the year 2020 (Ministry of Agriculture and Food, 2009). In 2010, close to 6% of Norway's farmland had either been certified or was under conversion to organic (Debio, 2010) and 1% of sold food was organic (Norwegian Agricultural Authority, 2010) leaving a considerable discrepancy between policy aims and reality.

Several policy instruments have been developed to encourage growth in organic production and consumption, ranging from direct approaches promoting conversion to organic and marketing arrangements, to indirect means such as promoting extension services and research. While previous research has focused on the effect of these policy instruments (Daugbjerg and Halpin, 2010; Daugbjerg and Sønderskov, 2012), bottlenecks in the supply chain (Forbord, 2001), farmers' attitudes toward conversion (Bjørkhaug, 2009) and even cultural obstacles to conversion (Sutherland and Darnhofer, 2012), this paper explores the diffusion of organic farming in spatial terms. The overall research question in this paper is whether the level of organic farming in one municipality in Norway is influenced by the level of organic farming in its neighbour-

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ing municipalities. If such correlations exist, we can say that there is a neighbourhood-effect in the diffusion of organic farming in Norway.

This paper is structured in the following way; first we present a review of previous research on organic farming and its diffusion. Second, we present a theoretical framework for analysing diffusion of organic agriculture spatially. A section on policy instruments to develop organic production and consumption is then presented. The paper then moves on to present spatial regression models, hypotheses, data, and variables used in the analyses of neighbourhood effects in the development of organic farming. Finally the paper discusses spatial effects of the diffusion of organic farming and their implications for future agricultural policy in Norway.

2. Review of previous research

2.1. Diffusion of organic farming

Rogers (1962) argued in his theory of diffusion of innovation that individuals obtain information from those around them, especially those who have gone through the same processes and made new decisions. As a result, innovations diffuse. Diffusion processes are important in agriculture because farmers tend to rely on information from their colleagues (Berger, 2001) and neighbours (Buttel et al., 1990). Spatial diffusion processes in agriculture are especially good to study on a local level because they are highly visible to other inhabitants, anyone who passes the farm and other farmers (Burton, 2004; Scmit and Rounsevell, 2006).

Organic farming has also previously been studied as an innovation (e.g., Vartdal, 1993; Padel, 2001). Rogers (1962) defines an innovation as an idea, practice, or object that is perceived as new by an individual or other unit of adoption. Vartdal (1993) notes that organic farming might not be associated with new ideas, but rather it is seen as a backward way of farming. Modern organic farming, however, differs substantially from "conventional" (non-organic) farming systems in many ways, particularly in relation to rules, practices, and knowledge and skill requirements (Vartdal, op. cit.).

According to Rogers (1962) innovators are divided into several categories. The first individuals to adopt an innovation, the innovators, are often highly educated, young, and willing to take risks and interact with other innovators. The proportion of time needed before an innovation is realised can vary substantially. Early adopters are the second category of individuals to adopt an innovation. Their social status is similar to innovators, but they are more integrated into the local community. These adopters are the local players who can speed up the process of diffusion (Rogers, 1962). Next come the early majority, who are well integrated in the local community and may take a long time before choosing to adapt. The late majority adapt only if they have to. The last group is the laggards, who have an aversion to change-agents and tend to be advanced in age (Rogers, 1962). While innovations are often studied in relation to technological developments, the social dimension of the innovation has been considered in studies of organic farming (Vartdal, 1993; Sutherland and Darnhofer, 2012).

Previous research identified three groups of organic farmers in Norway: anthroposophists, ecosophists, and reformist farmers (Vartdal, 1993). Anthroposophists were pioneers (innovators in Rogers' terminology) in biodynamic farming using Rudolf Steiner's ideology and, until the 1980s, biodynamic was the dominant method of organic farming in Norway. Next came the ecosophists, marking the second break from "conventional" methods (Vartdal, 1993). For the ecosophist, one reason for farming organically was the concern over the fundamental failure of conventional farming. The Norwegian philosopher Næss (1974) was one of the founders and pioneers of this philosophy. He saw ecology as the cross-study of an organism's conditions of life and mode of living in interplay with their surroundings, both living and non-living (Ariansen, 1992). Vartdal (op. cit.) conceptualised these ecosophists as early adopters. The third group, the reformists, reorganized their farming on the basis of both environmental and economic considerations. Vartdal explains how "the reformist wishes to ecologise the farming and in that way influence conventional agriculture in an environmental way, without any ideological standpoints" (1993, p. 88). According to Vartdal (op. cit.), this group resembles the early majority, and their ideals differ less from conventional agriculture. For the reformist, organic farming is dependent on both sufficient prices for products and public subsidies. Organic production methods are now much more dominant than biodynamic methods.

Padel (2001, p. 56) concludes that there exist enough similarities between studied organic farmers and early adopters of other innovations to justify using Rogers' (1962) model to gain an understanding of the diffusion of organic farming. Padel (2001, p. 57) adds that the model emphasises how famers in the same category of adopters share similar values and characteristics and therefore are likely to be interested in the adoption of a particular innovation at the same time. For some innovations, this involves an interest in profits; for others, the focus is on environmental improvements. Padel (op. cit.) places the organic system somewhere in the middle because it includes both environmental and financial goals and holds a range of different motives at the individual level.

Organic farmers are often new to farming, a pattern also found in international studies (e.g., Rigby et al., 2001; Lobley et al., 2009). Correspondingly, research in Norway (Storstad and Bjørkhaug, 2003; Storstad, 2006) and internationally (Rigby et al.; Lobley et al., op. cit.) has shown that organic farmers on average are younger and better educated than non-organic farmers (Bjørkhaug, 2009). Organic farmers have also been found to be more willing to take risks and try new things, both of which are characteristic of an innovator (Koesling et al., 2004). There has also been found to be a higher proportion of women among organic farmers (Bjørkhaug, 2006). Studies from the EU show a trend in which new organic farms are larger than those of both pioneer organic farms and the average non-organic farm (Padel, 2001). By the end of 1999, there were few differences in size or type of production in organic farms in Norway (Bjørkhaug and Flø, 1999). However, since then a study of Norwegian dairy farms has revealed that organic dairy farms use larger areas than conventional farms (Flaten et al., 2005). Farms under conversion to organic in Norway have also been found to contain more agricultural land than established organic farms as well as non-organic farms (Bjørkhaug, 2009).

Previous research has shown that there are significant differences between Norway's organic and non-organic farmers, principally in attitudes and motives (see e.g., Bjørkhaug and Flø, 1999; Storstad and Bjørkhaug, 2003; Storstad, 2006). Organic farmers have been found to be more concerned about the environment and conservation as well as being motivated by a desire to produce healthy foods in a natural way. Non-organic farmers are more financially motivated and are more likely to be farming because of family obligations (Bjørkhaug and Flø, 1999). Organic farmers have been found to believe that animals on organic farms have better welfare, that their "organic footprint" is lighter and that organic food is better for human health; non-organic farmers disagree, arguing that Norwegian agriculture is already almost organic (Bjørkhaug, 2009). This has been used as an explanatory factor for the low conversion rate into organic (Storstad and Bjørkhaug, 2003; Storstad, 2007). Organic farmers, on the other hand, do not agree that non-organic farming is close to organic. These findings suggest that organic farming is still associated with specific meth-