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Landscape properties as drivers for farm diversification: A Dutch case study

Catherine Pfeifer^{a,b,*}, Roel A. Jongeneel^c, Marthijn P.W. Sonneveld^a, Jetse J. Stoorvogel^a^a Land Dynamics Group, Wageningen University, PO Box 47, 6700 AA Wageningen, The Netherlands^b Agricultural Economics and Rural Policy Group, Wageningen University, PO Box 8120, 6700 EW Wageningen, The Netherlands^c Agricultural and Economics Research Institute, Wageningen UR, PO Box 29703, 2502LS, The Hague, The Netherlands

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ABSTRACT

Farm diversification is stimulated by the societal demand to transform production countryside into consumption countryside. In most empirical studies on farmers' decision making for diversification, geographical information is either omitted or reduced to a variable that links the farm to an administrative unit. Therefore, the influence of the exact farm location on farmers' decision making is often lacking. The paper addresses the role of location, in terms of site specific natural conditions as well as neighboring dynamics, in influencing farmers' decision making to diversify. Moreover, it investigates to what extent low returns from primary production stimulate farmers to find new survival strategies, and therefore explains diversification. The Gelderse Vallei area, a region in the center of the Netherlands, is used as a case study. For this area an extensive farm survey data could be combined with topographic data and soil maps (GIS). Both the number of activities as well as the kind of activities that are taken up are analyzed. Landscape attractiveness turns out to be a driver of diversification. Daily recreation most frequently occurs close to national parks, green services are more likely to occur on relatively wet soils. Activities resulting from diversification might produce positive externalities: new activities have the tendency to emerge next to already existing ones, therewith explaining the formation of "hotspots" in the landscape. Finally, diversification was found to be sensitive to returns from primary agriculture production.

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Introduction

The current European Common Agricultural Policy (CAP) has been moving from production support subsidies to direct decoupled income support (European Union, 2003, 2006). Recent policy proposals for further CAP reforms confirm this trend. The emergence of the concept of multifunctional agriculture in policy making (OECD, 2001) is connected with the recognition that farmers produce more than food. They produce both commodity and non-commodity goods (green services such as landscape, biodiversity and wildlife habitat maintenance). New forms of governance, such as individual or collective contracts between farmers and government, have been developed to encourage the provision of these non-commodity goods. This stimulates the transformation of production countryside into consumption countryside (Marsden, 1999). Multifunctional landscapes are an expression of the societal demands for non-commodity goods. At farm level, farm diversification, *i.e.* the allocation of inputs to on-farm activities (*e.g.*, to provide recreational activities) apart from traditional food produc-

tion or taking up additional off-farm employment (Schmitt, 1988) can be observed. As such farm diversification contributes to multifunctional landscapes.

The driving forces behind farm diversification have been studied widely. Bateman and Ray (1994) showed that farm diversification is driven by farm size, farm type and education. Benjamin (1994) showed the role of farmers' age as a driving force, and more recently Vanslebrouck et al. (2002) showed that the participation in agri-environmental schemes that stimulate the production of green services not only depends on farmers' age and education but also on their attitude, such as the personal values that they place upon nature or their vision of farming. Similar results have been reported by Dupraz et al. (2003). Other studies have shown that diversification also correlates positively with trust in government (Vandermeulen et al., 2006; Jongeneel et al., 2008). The influence of location in farmers' decision making has been mentioned by a number of authors (Vanslebrouck et al., 2002; Vandermeulen et al., 2006; Dalgaard et al., 2007; Jongeneel et al., 2008), but most often geographical information is either omitted in empirical studies or reduced to a variable that links the farm to an administrative unit, such as a municipality or a province. Few studies on the factors affecting farm diversification have used a more detailed level of precision in measuring location

* Corresponding author. Tel.: +31 317482412; fax: +31 317419000.
E-mail address: catherine.pfeifer@wur.nl (C. Pfeifer).

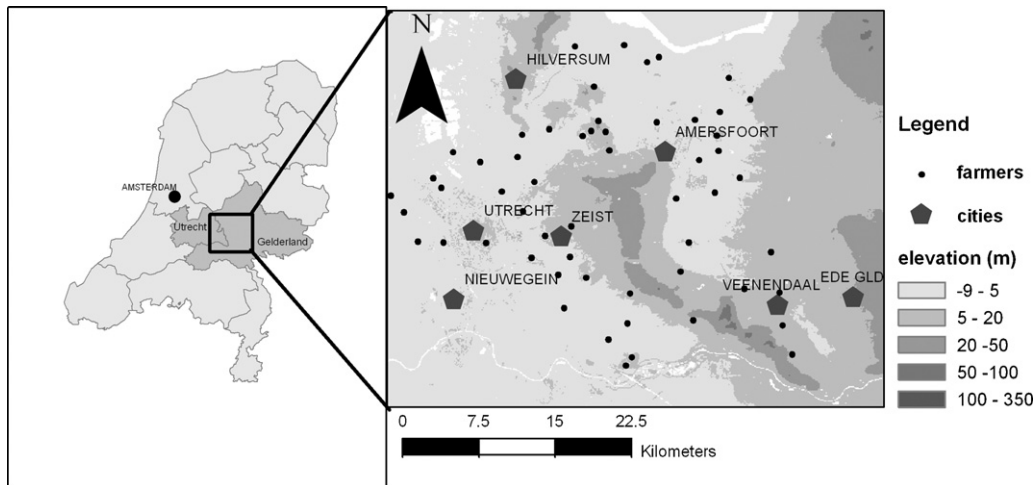


Fig. 1. Location of the study area in the Netherlands and location of the farmers with respect to elevation.

when making empirical estimations (Van Huylenbroeck et al., 2007). This study uses a dataset for the Gelderse Vallei region in the Netherlands where farms are geo-referenced on the basis of their postal code. By using Geographic Information System (GIS) techniques it was possible to measure site specific conditions and local neighborhood effects and link these to individual farms.

The objective of this paper is two-fold. First, it seeks to address the role of location, in terms of site specific natural conditions as well as neighboring dynamics, in influencing farmers' decision making to diversify. Attention is paid to the number of activities farmers start as well as the specific types of activities, notably green services, recreation activities and other farm-linked services (on-farm shop, care farms etc.). Second, it investigates to what extent low returns from primary agriculture production might stimulate farmers to find new survival strategies, and therefore contribute to explain diversification.

The paper starts with a description of the study area and the data used. It then describes the modeling approach used to link landscape scale to the individual farm level. This is followed by the construction of the variables used for the econometric estimations that allow for testing the importance of location and return from agriculture for farm diversification. Finally we present and discuss the econometric estimations and draw conclusions.

Methods

Study area

The Gelderse Vallei study area measures approximately 1100 km² and is located in the center of the Netherlands straddling the two provinces of Utrecht and Gelderland (see Fig. 1). Soil formation has resulted in considerable soil heterogeneity (Stiboka, 1997). The southern and most of the northern parts consist of sandy soils whereas the north-western part is characterized by poorly drained peat soils. Soil variability has led to varied land-use in the area, which alongside dairy farming, arable farming and intensive live-stock production includes forested hills, national parks, historical villages and cities. The eastern part is dominated by intensive live-stock production. With a junction of highways and railroads, the western part of the study area has become a central position in the Netherlands. There is an increasing number of claims on the land for various functions, such as housing, recreation and flood protection (Province of Gelderland, 2005).

Data description

In 2005, the Dutch Agricultural Research Institute (LEI) sent a survey to all 1821 farmers in the region, of which 258 (14.2%) were returned. The structured survey covered different topics such as general farm characteristics, farm type and location, land-use together with the activities that have been taken up by farmers and their attitudes towards diversification. The last part of the survey covered management issues and future perspectives, including trust in the government and membership of stakeholder groups or other voluntary associations. Of all respondents, 241 farmers indicated their postal code (at least four digits, with most indicating at least the first of the two letters that indicate the street). These farms could be geo-referenced to postal code areas with an average size of 0.8 km². They were located in 57 postal code areas and represented as points by the centroid of the postal code area. Fig. 1 indicates these locations. The survey indicated the importance of farm diversification in the region: 34% of the farmers had taken up at least one activity apart from food production (Table 1). The most popular activity was green services, followed by renting out storage space, off-farm work and activities linked to horses.

The survey information was compared to data from the Geographical Information System for Agricultural Businesses (GIAB) dataset (Naeff, 2006). This dataset is based on an annual survey

Table 1

Diversification of the respondents in the sample compared with the GIAB dataset.

	Sample	GIAB
(A) Diversification	83 (34%)	28%
(B) Green services	76 (32%)	16%
(C) Recreation including horse-riding	28 (12%)	*
of which daily recreation	22 (9%)	*
(D) Other services (e.g., on-farm shop, direct selling, renting out space)	62 (25%)	**
(B + C) Green services and recreation	10 (4%)	
(B + D) Green services and other services	26 (11%)	
(B + C + D) Green services, recreation and other services	21 (9%)	

* The GIAB does not include horse riding in recreation. Recreational activities excluding horse-riding among farmers in the survey are 4%, the same as in the GIAB, the daily recreational activities excluding horse riding among sample without horse riding are 2.5%, while in the GIAB it is 2%.

** Renting out space is measured differently in the GIAB than in the survey and therefore the datasets cannot be compared. Two percent of farmers in the survey have a shop compared to 1% in the GIAB, and 7% directly sell farm products, compared to 6% in the GIAB.

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