Spatial competition in the dairy sector

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Organizers: Christine Wieck and Thomas Heckelei, University of Bonn

Contact information:
Dr. Christine Wieck, Institute for Food and Resource Economics (ILR), University of Bonn
Nussallee 21
53123 Bonn, Germany
Email: christine.wieck@ilr.uni-bonn.de, Tel: +49 228 732322, Fax: +49 228 734993

Focus of the session

The objective of this organized session is to focus the attention to the spatial dynamics in the dairy sector that are induced by the abolition of the milk quota, market price developments, and the increasing scarcity of land-based resources. This session will present new research findings on the spatial competition in the dairy sector to a broad audience in order to understand these ongoing spatial dynamics. Common to the research papers to be presented in this session is that they explicitly consider the spatial interaction and spatial competition in their analysis of the dairy sector.

Motivation

Farm structural change, competition for land and land-based resources, technological change and efficiency improvements, environmental concerns regarding nutrient concentration and emissions, increasing milk price volatility, and concentration in the processing industry are some of the challenges the dairy farm sector is facing in current times. Underlying all this, we observe a steady and increasing trend towards stronger competition in the dairy sector as spatial concentration processes take place on all scales. This trend is mainly driven by two factors: the abolishing of the concentration-restricting instrument “milk quota” in the near future and the establishment of a new land- and fodder-competing bio-energy sector.

Location specific dynamics and determinants may affect each region and farms within regions differently and lead to the development of region specific dairy systems. Regional dairy systems are characterized by different relations of factor endowments, specifics in management and technological developments, and different competitive dynamics in the local and regional land market and processing sector. These differences impact on the ability of dairy farms and regional production systems to successfully respond to developments that arise from the above characterized ongoing concentration, quota liberalization, and globalization processes.

Most of the dairy literature up to this point focuses on issues in a specific region without explicitly analyzing the spatial dimension of the problem. One way of considering implications of spatial differences is by comparing the same issue across regions, but also this approach is chosen in few applications. Exceptions are HUETTEL and JONGENEEL, 2011; ZIMMERMANN and HECKELEI, 2010; LASSEN et al., 2009; WIECK and HECKELEI, 2007; and BREUSTEDT and GLAUBEN, 2007. A second way
to consider spatial issues in the analysis is undertaken by ISIK (2004) for U.S. dairy production, and BEN ARFA (2009) for France, using spatial econometric frameworks which explicitly account for differences and linkages between regions. Large modeling systems also consider the spatial dimension by linking interaction between different member states or regions (e.g. KEMPEN et al., 2011; WITZKE and TONINI, 2009; BOUAMRA-MECHAMACHE et al., 2008), but given that these types of analysis usually take place at very aggregate level, their accuracy with respect to the impact analysis for different dairy production systems and a spatially heterogeneous sector as a whole is limited. These examples show that in particular on farm level but also within and across regional production systems, there is still room for a better understanding and analysis of the ongoing spatial dynamics and interactions. This organized session helps to bridge this knowledge gap by bringing together research papers that explicitly consider the spatial interaction.

Four research papers will be presented followed by about 30 minutes of discussion with the audience opened up by a discussant. The papers consider issues of spatial interaction and competition on different scales: starting with the farm level, the first two papers focus on paths of technology diffusion and strategic interactions between farms in the land market and discuss implications for farm structural change and the spatial development in a region. The next paper deals with spatial competition between dairies in the raw milk market and explicitly consider the unequal spatial distribution of suppliers and demanders and the implications for market power. Finally, the last paper moves another step up the scale, analyzing and comparing determinants for the development of regional production systems across important dairy production regions in the EU using spatial econometric techniques. Thus, all these papers have in common that they approach topics in the dairy sector from a different perspective considering the spatial dimension and competitive interaction between farms and regions. The discussion with the audience will be opened up by a discussant analyzing in succinct manner strength and weaknesses of the papers and what remains done for the future. The full program is presented below.

References:
Program of the session “Spatial competition in the dairy sector”

Brief introduction (Christine Wieck)

Research papers (presenting author in bold)

Discussant: Vincent Réquillart (INRA Toulouse)

1. The relevance of technology diffusion for structural change: An exemplary Agent-Based-Model application in the dairy sector

Sebastian Rasch (ILR, University of Bonn)

Abstract: Technology innovation-diffusion is considered to be an important determinant of structural change in agriculture. Especially threshold models investigated the diffusion process. However, studies exploring the relation to structural change are rare and lack a comparative impact assessment of the underlying theoretical assumptions. In order to fill this gap, several implementations of the threshold model were integrated in an exemplary agent based model of spatially competing dairy farms. Sensitivity analysis revealed faster structural change when socio-demographic dynamic processes were considered compared to static versions of adoptive behaviour. Moreover, spatial diffusion via networks resulted in less extreme rates of structural change in comparison to models with homogenous information access.

2. Strategic interactions in the land market and implications for spatial development

Silke Huettel (HU Berlin), Anne Margarian (vTI Braunschweig), Vanessa von Schlippenbach (DIW Berlin)

Abstract: Land but also milk quotas are crucial production factors that are not freely available resources in agricultural production. Thus, the possibility of farm growth is subject to the availability of land or milk quotas which, in turn, depends on the farms’ decision either to exit the market or to reduce their farming activity. This causes an interdependence of farms. We aim at exploring how the initial regional farm size structure measured in terms of land endowment may determine farm exits. These, in turn, induce free land capacities that are allocated to the remaining farms in a region where the allocation again may depend on the given regional farm size distribution. Descriptive and basic econometric models’ results give first empirical evidence and reveal the relation between farm size structure, farm exits and growth of the large farms. Based on these insights we provide a theoretical analysis to explore the drivers of the observed phenomena. We use a three-stage game: First, firms decide whether to leave the market or to stay. Then, the capacity of the leaving firms is distributed by an auctioneer to the remaining firms in the market and finally, the firms decide about their produced quantities and profits. We find that larger farms allocate more additional quantity than small farms; the latter are more likely to leave the market.
3. **Spatial competition in the German raw milk market: Price discrimination and cooperative behaviour**

Alfons Balmann\(^1\), **Marten Graubner**\(^1\), Ines Koller\(^2\), Klaus Salhofer\(^2\), Richard J. Sexton\(^3\)

\(^1\)Leibniz-Institute of Agricultural Development in Central and Eastern Europe (IAMO), Halle (Saale), Germany; \(^2\)Environmental Economics and Agricultural Policy Group, Technische Universität München, Germany; \(^3\)Department of Agricultural and Resource Economics, University of California-Davis, Davis (CA), USA;

In our project we investigated the firms’ choices of spatial pricing policy and the competitive behaviour of milk processing firms under spatial competition. Significant transport costs and spatially distributed supply and processing create oligopsony power in agricultural markets. Price discrimination expressed in the form of partial or complete absorption of freight charges by processors is often observed in these environments, but we understand little about how these pricing decisions are made. Under a general spatial competition model, instead of the commonly presumed free-on-board pricing, we find that buyers choose price discrimination either through partial freight absorption or uniform delivered pricing. The latter pricing rule is commonly observed in the German raw milk market, as is the horizontal organization of milk producers in marketing cooperatives. Based on a respective duopsony model we compare spatial cooperative price matching with non-cooperative Hotelling-Smithies behaviour. Utilizing a vector error correction model, we show that the observed low price transmission in Germany is in line with cooperative behaviour. This seems rational since it increases processors profits. As one conclusion, the abolition of the quota system may increase price transmission.

4. **Determinants of the spatial structure of regional dairy production systems**

**Claire Mosnier** (INRA, Clermont-Ferrand), Christine Wieck (ILR, University of Bonn)

Geographic restrictions of quota transfer have enabled some Member States (MS) of the EU to control spatial location of dairy production. In 2015, this system will be abolished and the evolution of dairy production will no longer be controlled by public policy. In this study, we compare the spatial structure, production dynamics, and their determinants in three MS with contrasted quota policy (France, UK and Germany) using spatial regression. Preliminary results indicate that main determinants of dairy production change in the studied countries are production costs, rate of employment in agriculture and GDP per inhabitant. In the UK which has not geographic restriction, we observe larger production shifts and sector concentration than in France and Germany.