Spatial Competition and Farm Tourism

– A Hedonic Pricing Model

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Abstract

Changes in EU agricultural policies towards additional focus on rural development issues raise questions regarding the economic impact of local/spatial competition. Traditionally, farmers have typically been price takers in markets for major agricultural products. This is, however, not necessarily true in the case of local markets for "new enterprises". This article examines local/and spatial competition for farm tourism services, specifically "*Self catering*" in Sweden. The results show that spatial dependences exist and have to be considered in the econometric estimation of the hedonic pricing model. Using spatial econometrics it is shown that the price is affected by the average price, the demand for and supply of lodging in the regional market. Notable is that the results indicate that local competition has a positive effect on the price while regional competition has a negative effect. Marketing channels used as well as size and ranking of the service were found to affect the price of lodging. Diversification does not seem to positively affect prices. The findings illustrate the potential importance of local competition for rural developments studies. It also raises questions concerning policies promoting diversification and multifunctionality as a way of revitalizing urban areas.

In Europe as well as in North America rural tourism is a fast growing industry with an annual growth rate of 6%. Tourism and leisure consumption in general has increased due to income growth and reduced transportation costs. (Tchetchik, Fleischer, and Finkelshtain 2008) On the supply side, structural changes within the agricultural sector during the last half century have dramatically decreased the number of farmers and when searching for alternative sources of income many farmers have diversified into alternative activities such as tourism. (Tchetchik, Fleischer, and Finkelshtain 2008; Fleischer and Tchetchik. 2005).

Although farm tourism is promoted by many policy makers as an alternative source of income counteracting the economic and social challenges facing rural areas, farm tourism has a long standing history in many countries. (Sharpley and Vass 2006; Busby and Rendle 2000) In Austria, for example, up to 25% of the farmers have been receiving tourists for almost a century. (Hummelbrunner and Miglbauer 1994) Farmers wishing to diversify production into tourism have in several European countries (i.e. Denmark, France, Germany and Italy) been able to benefit from national support (Frater 1983; Nilson 2002). According to a survey conducted by Statistics Sweden (2007) one third of all farmers in 2005 had a diversified production including some kind of activity outside traditional farm production. Tourism and lodging accounted for 15.5% of these activities while contractor services remained the most common activity (62%). (Statistics Sweden, 2007)

The 20th century has been characterized by an increased concentration at the process and retail levels of the food marketing chain. Despite volume growth and increasing specialization at farm level farmers still remain small actors in ever larger

markets. However, diversifying into farm tourism implies that farmers face a different market where they become potentially relatively large agents in a local/regional market. Hence, diversification into tourism implies that the competitive relation between farmers changes. At the same time the possibilities to differentiate their products vastly increase. Consequently, the price and thereby the profitability of farm tourism potentially depends on location both due to the characteristics of the surrounding area and the number of competitors in the area as demonstrated in a study by Asplund and Sandin (1999) that examined competition among driver schools.

Given the growth of the tourism sector in general, and farm tourism in particular, it is important to examine what factors affect the pricing of farm tourism. In the tourist literature several papers have used a hedonic approach in examining how environmental externalities of agriculture affect farm tourism (see e.g. Le Goffe 2000; Fleischer and Tchetchik 2005; and Vanslembrouck, Van Huylenbroeck, and Van Meensel 2005). Although there is a considerable literature on this subject, economists have given little attention to the spatial dependence of farm tourism. The literature on farm tourism includes studies taking spatial aspects into account but these studies generally do not using spatial econometrics as done in this article. Agricultural economists have, on the other hand, examined spatial dependence from an econometric point of view in various applications such as high-tech industry (Goetz and Findeis 2002), policy intervention and poverty (Swaminathan and Findeis 2004), and agricultural production (Roe, Irwin, and Sharp 2002) although the issue of farm tourism has largely been neglected. The objective of this article is to examine the pricing of farm tourism in Sweden explicitly taking spatial considerations into account. The study examines the pricing of the services

provided by the members of the organization *Staying on a farm* (*Bo på lantgård*), henceforth abbreviated *SoF*.

Methodology

A hedonic pricing model is applied in order to examine what factors affect the pricing of farm lodging in Sweden. The purpose of this article is to analyze what affects the pricing in a regional market and examine what types of spatial dependencies that may be present. Naturally, the price charged by suppliers may differ depending on firm-specific factors without any direct spatial aspect. Examples of such factors can be the size of operation, the activities offered, and the number of beds per cabin. If the pricing of the services provided by farmers are affected by the geographic location of the farmer this can be manifested mainly in three different ways in the statistical analysis: i) Variables describing the market situation specific for the local/regional market may explain the pricing. Examples of such variables are the number of potential customers and competitors in the local/regional market. ii) There may exist a spatial dependence not captured by the specified model resulting in a spatial dependence in the error terms. This problem can be addressed by including the error terms as an additional weighted explanatory variable in a modified model. iii) The price charged by a supplier in a given market can partly be explained by the price (or other characteristics) of competitors in the same and/or related markets. All of these aspects are taken into account in the subsequent analysis. Some descriptive statistics of the data used is presented in table 1.

Let X denote a vector of dependent variables containing variables without any explicit spatial aspect, X_A, and variables explicitly incorporating some spatial aspect, X_B, such that $X = \{(X_A' X_B')'\}$. Farmers differ in many different aspects that do not depend on

the location per se. For example, farmers differ in size (both pertaining to lodging and farm production), type of farm production, types of activities offered guests (hunting, conferences, fishing, boat rental etc), labor cost (hours worked per bed rented) etc. Variables that do incorporate a spatial aspect, X_B, include e.g. the number of competitors in the vicinity – be it other BPLs or substitutes such as other types of B&B, youth hostels or hotels –, distance in kilometers to competitors, average price of competitors in the region.

In order to estimate the model a general spatial autoregressive model (*SAC*) that incorporates spatial dependence in the price variable and in the disturbances, is specified (Anselin 1988; LeSage 1999) as,

$$P = \rho W_a P + X\beta + u, \tag{1}$$

$$u = \lambda W_b u + \varepsilon,$$

$$\varepsilon \sim N(0, \sigma^2 I_n),$$

where P is a $n \times 1$ vector of the dependent variable, W_a and W_b are $n \times n$ contiguity matrixes, X is a $n \times k$ matrix of the explanatory variables, and u is a $n \times 1$ vector of the residuals of an *OLS* – regression. The contiguity matrixes indicating the relative vicinity of competitors are constructed on the basis of the area code of each *SOF* – member. Although it may be argued that what constitutes a local market varies between different geographic areas it is necessary to use a common delimitation for all regions. As it is not self-evident what constitutes a local/regional market all models are evaluated using first–, second–, and third–order contiguity matrixes.[1]

[1] For example, the second order contiguity matrix includes all neighboring area codes and all the area codes bordering to these.

The general spatial autoregressive model (*SAC*) encompasses several potential alternative models. If ρ but not λ is statistically significant, this would indicate that a spatial autoregressive model (*SAR*), also referred to as a mixed regressive-spatial autoregressive model, may be appropriate while the reverse suggests that a spatial autoregressive error model (*SEM*) is preferred. In the empirical estimations alternative functional forms are estimated (linear, log-linear, log-log) based on an econometric toolbox developed by LeSage (1999).

Data

A survey was conducted of all farmers that in 2005 where members of the organization *Staying on a farm* (*Bo på lantgård*), henceforth abbreviated *SoF*. Members of the organization offer "*Self-catering*" and/or "*Bed & breakfast*" (*B&B*) . In general *self-catering* involves offering a house/cabin for rent, most commonly per week, without breakfast. *B&B* more commonly involves offering a room, most frequently per night. Due to these differences between the services offered, this article focuses on the more common type "*Self-catering*".

At the time of the survey there were 437 registered members of *SoF* offering "*Self-catering*" and/or *B&B*. After excluding members that answered that they had or planned to exit the organization, that they had moved, or replied that they either where not active or had joined the organization so recently that they could not answer the questions, we had a potentially active population of 428 members.[2] Of these, 311 members responded to the questionnaire which corresponds to a response rate of approximately 73%. As

[2] It should be noted that presumably the active population was even smaller as those not answering probably included eg. non-active members.

many respondents did not provide answers to all questions the response rate to different questions varied which limited the variables that can be considered in the estimation. Members were asked about what kind of services besides lodging they provided (eg. activities, food), what kind of marketing channels they used, geographic location, vicinity to other types of lodging alternatives, perceptions concerning competitors, labor and other inputs, capacity, vacancy rates etc. It is evident from the results that the members constitute a very heterogeneous group. That suppliers of farm tourism are quite different is consistent with what has been found in other studies. In the estimations a total of 205 observations could be used for the respondents offering *self-catering*.

Variables included in the estimation were chosen to reflect the characteristics of demand (potential customers, marketing channels used), the competitive situation (number of beds in county, farms in close vicinity offering lodging), characteristics of the farm (livestock, cash crop production, size of tourism operations, offers *B&B*) and the service offered (size of cabin, activities offered, rating). Descriptive statistics of the sample used in the estimations and of all respondents that offered *self-catering* are given in Table 1. The characteristics of the sample do not seem to differ in any major respect from the characteristics of all respondents offering *self-catering*.

Table 1. Descriptive statistics

	Sample used in estimations		All respondents with *self-catering*	
	average	st.dev	average	st.dev
Price	3559,29	776,68	3542,41	750,23
Potential customers [a)]	6,41	1,41	6,41	1,43
Marketing via firm specific web page	0,55	0,50	0,52	0,50
additional channels	0,55	0,50	0,55	0,50
Supply, 1000 beds in county [b)]	4.73	3.94	4.82	4.18
Farms within 5 km offering lodging	2,10	2,07	2,02	1,96
Commercial livestock production	0,66	0,47	0,65	0,48
cash crop production	0,60	0,49	0,59	0,49
Number of cabins	1,44	1,09	1,49	1,18
Also offers *B&B*	0,29	0,46	0,30	0,46
Size of cabin, average number of beds [d)]	6,34	1,64	6,34	1,71
Offers no activities	0,21	0,41	0,24	0,43
farm related activities	0,59	0,49	0,57	0,50
Relative rating [e)]	0,00	0,15	0,00	0,15
No rating	0,06	0,24	0,06	0,25

a) Customer potential in million guest nights in cabins, hostels etc. (Statistics Sweden 2006). b) Number of beds available at hostels and cabin villages/resorts (Statistics Sweden 2006). c) During peak season. d) Average number of beds including extra beds per cabin. e) Relative quality rating = (Rating – average rating for cabins/ (Average rating for cabins).

Model specification

In order to select an appropriate model *OLS* –regressions were initially estimated (linear, log-linear, log-log). Testing for heteroscedasticity and multicollinearity reveals no evidence of the former and that the latter is more severe in the logarithmic models.[3] This indicates that a linear specification may be preferable and, hence, we in the following focus the presentation on the results of this model. Furthermore, Cropper, Leland, and McConnell (1988) argue that the linear form performs best when some attributes are replaced by proxies.

The null hypothesis of no spatial correlation in the *OLS* – residuals can be decisively rejected as shown in table 3. Consequently it is necessary to evaluate alternative models that potentially can account for this spatial correlation. The next step is to estimate a spatial autoregressive error model (*SEM*) which is obtained by setting $\rho = 0$ in the *SAC* model. That *OLS* is not appropriate is further corroborated by the fact that λ is statistically significant in the *SEM* regardless of which contiguity matrix that is used. As the results indicate that *SEM* may potentially be a reasonable model, the estimates obtained using contiguity matrix *W2* are reported in table 4.[4]

Table 2. Test for heteroscedasticity and multicollinearity

	White's Heteroscedasticity Test		Multicollinearity
	Test statistica	Probability	Max Condition Index
Linear	102.6	0.6298	25.3

[3] An index > 30 indicates potentially considerable problems of multicollinearity (Belsley, Kuh , and Welsch 1980; Kennedy 1998; Gujarati 2003).
[4] Similar results are obtained using contiguity matrix *W3*.

Table 3. Tests of the null-hypothesis of no spatial correlation in the *OLS* – residuals

	Alternative contiguity matrix		
	W1	W2	W3
Morans I-statistika	5.1	7.6	7.9
Marginal Probability	0.00000044	0.00000000	0.00000000
LR statistika	20.9	30.2	24.7
Marginal Probability	0.00000482	0.00000004	0.00000068

It is, however, necessary to examine whether an autoregressive term should be included in the specification.[5] Hence, a complete *SAC* model is estimated. The results of this estimation given $P = \rho\, W3\, P + X\,\beta + u$, $u = \lambda\, W2\, u + \varepsilon$ are displayed in table 4 along with the results from the *SEM* model.[6] The fact that ρ as well as λ are statistically significant indicates that a *SAC* model may be reasonable. A comparison of the results of the *SEM* and the *SAC* estimations reveals that the latter has a smaller variance, that the models have similar R^2-values, and that the parameter estimates have the same signs and are of similar magnitude in the two models. Furthermore, this model results in slightly more variables being statistically significant at the 5 % and the 10 % level of significance. Given these findings and given that ρ is highly statistically significant, the following presentation focus on the *SAC*-model. Prior to proceeding with the economic interpretation of the parameter values of this model it is worthwhile to comment on the stability of the model given alternative specifications. Using contiguity matrix *W3* in the *SEM* model and a reversed configuration in the *SAC* model yields similar results in terms

[5] A SAR model indicated spatial correlation in the error terms.
[6] Similar results are obtained given $P = \rho\, W2\, P + X\,\beta + u$, $u = \lambda\, W3\, u + \varepsilon$.

of the signs of the parameter estimates and the p-value of the estimates although with less appealing statistical properties. The conclusion that *SAC* is appropriate is robust with respect to the sign of the estimates, to alternative contiguity matrices and to whether linear or logarithmic specifications are used.

In conclusion, testing for spatial correlation in the OLS – regressions the existence of spatial dependence cannot be refuted. Examining alternative specifications leads to the conclusion that the location of firms indeed is important and that a specification according to a general spatial autoregressive model as in (1) is preferable to OLS as well as to the SAR and SEM models. In the following section the empirical results of the general spatial autoregressive model, which from a statistical perspective has proven to be preferable among all the specifications examined, is presented and discussed.

Results of estimation

Differences in demand between different regional markets are captured by the number of nights spent in hostels and cabin villages/resorts. The results show that the number of potential customers in the region as expected has a positive effect on the price (p-value 0.021). A 10% increase in the number of overnights in the region increases the price of by almost 2%.[7] This shows that fundamental demand conditions in the region is important for the pricing of cabins on farms (*self-service*).

Two variables measuring the extent of competition were included in the estimation; the number of beds in hostels and cabin villages/resorts in the county, and the number of farms within 5 km that offers lodging. The number of beds in the county has, as economic theory would suggest, a negative (p-value 0.030) impact on the price. A 10%

[7] Evaluated at the mean.

increase in the supply of lodging facilities decreases the price by approximately 0.5%, i.e. the effect is fairly small.

Somewhat surprisingly, the results indicate that the extent of local competition of other farms offering lodging in the immediate vicinity has a positive effect on the price (p-value 0.007). A 10% increase in the number of farms offering lodging in the immediate vicinity increases the price by approximately 0.3%. This may be explained by the fact that local characteristics of value to visitors different from the features of the extended region, as captured by the number of potential customers, play an important role for the price structure. Furthermore, synergy effects between farms offering housing may exist in the sense that it may contribute to enhance the attractiveness of visiting the local area. Although the survey showed that respondents on average ranked other BPL members as the type of competitor perceived as the toughest (among the alternatives hotels, hostels, B&B, cabin villages/resorts, camping, other members of BPL), the perceived degree of competition from alternative lodging options varied substantially among the respondents. Almost 60% perceived other members as at least as tough a competitor as any other kind of competitor and 23% perceived other members as a tougher competitor. At the same time 37% of the respondents perceive other members as a kind of competitor that is no more prominent than any other type. Finally, 7% regard all other alternative types of competitors as posing more severe competition.[8] These opposite views are further corroborated in the observed disparity of comments made by some respondents who state that they cooperate with other members while other respondents perceive the competition between members as a fundamental problem in achieving profitability in farm tourism activities.

[8] Based on all respondents offering *self-service.*

Many farms use additional marketing channels apart from the marketing services provided by the organization *SoF*. While marketing activities come at a cost, efficient marketing activities potentially increase the demand for the service offered. Firm specific web-based marketing (p-value 0.000), which is a low cost alternative, has a positive impact on price. Results indicate that this effect is substantial and increases the price with almost 10%.[9] One explanation to the large impact may be that firm specific web-based marketing to a larger extent reaches foreign tourists with a potentially higher willingness to pay.[10]

While firm specific web-based marketing has a positive effect on price, other additional channels (p-value 0.008) have a negative impact. A possible explanation to the negative effect may be that farms located in less attractive areas face a lower demand and therefore require more extensive and costly marketing efforts. Results indicate that this effect is substantial and decreases the price with approximately 6%.

Four variables describing the characteristics of a farm were included in the analysis. Two of these describe the type of commercial agricultural production, if any, on the farms, specifically livestock production and cash crop production, respectively. Livestock production has a negative effect on demand (p-value 0.077) while cash crop production indicates a positive, although not statistically significant, (p-value 0.162) effect on demand. Livestock production substantially decreases the price for lodging (approximately 4.5%). That livestock production tends to have a negative impact while cash crops tend to have a positive impact on the rental price is also supported by previous studies not applying spatial econometrics. Le Goffe (2000), for example, found that

[9] The effect of each dummy variable is evaluated at the mean for all other variables.
[10] Foreign tourists constituted approximately one third of all the guests.

livestock density and fodder crops had a negative impact on price while grassland and cereal crops had a positive impact. Vanslembrouck, Van Huylenbroeck, and Van Meensel (2005) found that fodder crops had a negative impact while grassland had a positive impact on price. Fleischer and Tchetchik (2005) found that farming activities was not valued by visitors. They did, however, not make any distinction between livestock and cash crops.

The size of the operation, measured as the number of cabins available for lodging, does not have any statistically significant (p-value 0.553) effect on the price of the service. This has also been found in other studies, see e.g. Fleischer and Tchetchik (2005) and Vanslembrouck, Van Huylenbroeck, and Van Meensel (2005). Furthermore, there seems to be no synergy effect offering both *self-service* and *B&B* (p-value 0.411). One reason for this may be that many farmers operate a small-scale tourism business where 75% of the respondents only have one house to offer, sometimes for *self-service* and sometimes as *B&B*.[11]

Four variables describing the characteristics and quality of the service were included in the analysis; number of beds per cabin, two variables concerning activities offered, and quality ranking of lodging. As expected the size of the service, as measured by the number of beds in a cabin, affects the price positively (p-value 0.000). One additional bed increases the price by almost 6 %. That the capacity has a positive impact on price has also been found by Fleischer and Tchetchik (2005) and Mollard et al (2006).

A central aspect of the concept of *SoF* is to offer guests additional services in the form of different activities. Concerning the activities offered the variables included in the

[11] It is evident from the survey that the lodging on farms is a small-scale business with the average number of cabins is less 1.5 and the average number of beds is just a little more than 6. In fact, two thirds of all members renting out cabins, only have one cabin and no more than 7 beds to offer.

model measures if no additional activities are offered or if farm related activities are offered. Hence, if both these dummies are zero, activities not related to the farm are offered. The results show that offering no activities has a substantial positive impact on price (p-value 0.018). This may seem counterintuitive but a possible explanation to the positive impact on price may be that farms emphasize lodging as the core business and consider activities as complementary. Results indicate that offering farm related activities does not have any statistically significant impact on price (p-value 0.173) although the effect, as may be expected, is positive. That farm related activities do not affect the price can be interpreted as this activity being part of "the basic package".

The quality of the service as measured by the relative rating made by the organization *SoF*, as expected, has a positive impact on the price (p-value 0.013). This effect is considerable and a rating one step higher than the average increases the price by approximately 19%. As not all farms were ranked at the time of the survey a dummy was included to account for this. This dummy had a positive effect on price (p-value 0.016). That rating, be it a rating of comfort or quality, have a positive impact on price has also been found by Le Goffe (2000), Fleischer and Tchetchik (2005), Vanslembrouck, Van Huylenbroeck, and Van Meensel (2005) and Mollard et al (2006).[12]

Spatial dependence, in addition to what is captured in some of the explanatory variables, is as previously discussed accounted for by the terms ρ and λ in the *SAC* model. Both of these parameters are highly statistically significant (p-values < 0.01). If the price in the region, as measured by contiguity matrix W3, increases by 10% the price for lodging increases by almost 1.5%.

[12] Rambonilaza (2006) compared labeled and non-labeled lodgings in the French market for recreational cabin rentals and found that labels are valued positively by consumers.

Table 4. Estimates

Variable	*OLS*	*SEM (W2)*	*SAC(W3/W2)*
Constant	1863.4183***	1385.7358***	925.0794**
Potential customers[a)]	32.2324	81.0921*	104.8834**
Marketing via firm web page	300.9661***	348.5794***	336.6713***
additional channels	-311.9137***	-220.0447***	-217.4479***
Supply, 1000 beds in county [b)]	-22.4807*	-32.7886**	-34.4976**
Farms within 5 km offering lodging	75.3789***	57.6454***	53.0168***
Commercial livestock production	-175.5253	-163.0813*	-162.3576*
cash crop production	134.0196	138.4038	122.1792
Number of cabins	65.7921	35.6251	22.4753
Also offers *B&B*	-184.3171	-117.8031	-81.2355
Size of cabin (beds) [d)]	206.6923***	213.8504***	210.3581***
Offer no activities	200.1147	328.3786***	297.4800**
farm-related activities	85.50321	141.5086	141.5461
Relative rating [e)]	413.3664	624.7166**	691.3661**
Commercial livestock production	580.2425***	496.5554***	431.2327**
ρ		0.6500***	0.1490***
λ			0.6060***

*** 1 %, ** 5 %, * 10 % level of significance. a) Customer potential in million guest nights in cabins, hostels etc. (Statistics Sweden 2006). b) Number of beds available at hostels and cabin villages/resorts (Statistics Sweden 2006). c) During peak season. d) Average number of beds including extra beds per cabin. e) Relative quality rating = (Rating – average rating for cabins/ (Average rating for cabins).

Table 4. cont. Estimates

R^2	0.3535	0.4676	0.4833
Adj R^2	0.3058	0.4284	0.4452
σ^2	418731	319561	310157
log-likelihood		-1524	-1403

Concluding remarks

This article shows that it is important to consider the spatial aspects of competition when analyzing the pricing of "new enterprises" such as farm tourism. Furthermore, the results indicate that the pricing of farm lodging is affected by the characteristics of the local market condition, marketing efforts, the quality rating of the service, and to a lesser extent by the farm type. Policy makers tend to promote rural development e.g. for environmental and recreational purposes and rural tourism may be an important element in promoting rural and regional development. The results of this article indicate that regional competition negatively affects the rental price of cabins on farms. Entrepreneurs do not, however, appear to face more extensive problems with local competition in the direct vicinity which is encouraging from the perspective of policy makers that promote local ventures.

Irrespective of the extent of regional and local competition in the immediate area some additional results of substantial relevance are found. First of all, it is quite apparent from the analysis that quality control is of great importance for the success (in terms of a higher price) of "new enterprises". One unit increase in the quality rating increases the

effective price with approximately 19 %. Furthermore, the notion that already highly diversified farms with for example livestock production would be able to benefit even more from operating farm tourism is to some extent challenged by the empirical findings. The results reveal that excessive diversification tends to have an adverse impact on the price charged. Hence, caution need to be exercised by policy makers when promoting "new enterprises" in structurally different agricultural areas.

Given the increasing interest in "new enterprises" it is important that economists pay more interest to issues relating to spatial dependence and local competition. These factors may adversely affect the potential of "new enterprises" although this specific study provides little empirical support for that entry of new competitors in the local vicinity (ceteris paribus) affects the price adversely. In general, the results raise the question to what extent "new enterprises" should be policy or demand driven. If these enterprises are policy driven there may be a concern that the effectiveness of the policy is mitigated by impact of local/regional competition. Hence, given the increasing interest in "new enterprises" it is important that economists pay more attention to issues relating to spatial dependence and local competition since these factors may adversely affect the potential of "new enterprises".

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