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Environmental Quality and Entrepreneurial Activity in Rural Tourism in Italy

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Abstract

We estimate the relation between environmental quality and services in rural tourism in Italy. We use the average number of firms per region in 2003-07 to indicate entrepreneurial activity. We suggest that heterogeneity among administrative regions can be tied to environmental quality. Incorporated farms in rural tourism are relatively more common in regions with better environmental quality, and command higher average price from better quality in hospitality. Only 7% of entrepreneurial activity can be attributable to environmental quality. We conclude that rural tourism activity in Italy is not genuinely tied to environmental quality.

Keywords: environmental quality, entrepreneurhip, rural tourism, finite-mixture models

1. Introduction

Since the end of the Second World War Italy has become an industrialized country, as a result of a massive program of investments imposed by the central government in otherwise uncontaminated and unpolluted locations. This process of mass industrialization has loosened the ties with the country's peasant culture and heritage. While mass urbanization has not diminished at the turn of the millenium, the thrust of forced industrialization receded in the nineties, and a process of cultural awakening re-oriented people to a return to nature as a reaction to excessive pollution. Ecotourism has a gained a strong momentum to attract tourists wishing to get away from overcrowded cities to enjoy nature (Butler, 1999). This tourist segment shares many features with the "new traveller" (Weaver & Oppermann 2000: 357), the socially responsible green consumer who is sensitive to local cultures, conscious of social concerns, with an ethical drive (Zamagni 1999). In this market segment, tourists are becoming more aware and very sensitive to indicators of environmental quality, which not only give the motivation to go out of town, but are also used in forming one's expected gratifications from the trip.

The coming of the responsible tourist has attracted new investments towards agritourism (and rural tourism) in Italy. At the end of 2007 there were 14,822 agritourisms in Italy with a growth rate of 7% on 2006, 30% on 2004, and 128% on 1985 (from the Italian national census bureau, ISTAT). In the period of analysis agritourism earns 780 million euros in revenues in 2003, 810 in 2004, 880 in 2005, 964 in 2006, estimated 1008.7 in 2007 and estimated 1064 in 2008 (data from Agriturist and from ISTAT, in Regoliosi 2008).

The literature is mainly aimed at investigating the impact of tourism on the environment, indeed, a theme of paramount concern, in pointing to the need of responsible entrepreneurs to maintain environmental quality in agritourism. What happens if we reverse the chain of thought? It is commonplace to say that tourism heavily depends on the quality of the environment. This is true on the demand side of the market. What about the supply side? What if then, if we consider the problem the other way round, that is, if we ask whether environmental quality is a relevant motive to initiate the business. We analyze the moment just before the decision to start the business is made: At that point the farmer decides to become an entrepreneur in tourism by adding activities. The new activities will affect the environment, not only according to the proneness of the farmer to environmental protection, but also according to the state of preservation of the environs. It should be in the farmer's interest to preserve the site if it is in good conditions –and therefore improve upon the actual situation– but, if the location is already in bad conditions, they might still start the tourism activity. In either case, the continuation of the farm

is at least a form of cultural preservation.

Environmental quality is a pre-requisite in delivering better quality of service in rural tourism hospitality. There are hundreds of factors that influence quality of the service, and an entire literature devoted to measuring them (see Di Napoli & Hausmann, 2001, as far as Italy is concerned). Compared to that literature, our approach is very simplified and rests on the following argument. Many well-being investors have found a new opportunity to invest in rural resorts derived from abandoned farms that have been re-activated. Some of them might even be properly accounted for as amenity migrants (Moss, 2006) and might also be partially relevant for the Italian case. We suspect that these activities are initiated with more capital endowment, and hence exercised through incorporated entities. Since our database does not allow us to distinguish quality of service in agritourism, we infer quality from rural tourism instead.

After the Brundtland Commission introduced the concept of sustainable development (WCED, 1987), sustainability has become one of the main issues in tourism development (McCool, 1994; Croall 1995; Hunter & Green, 1995; Hammond *et al*., 1999; Huybers & Bennet, 2002). Sustainability is closely related to environmental protection and non-declining natural capital over time (Collins, 1999; Pearce & Turner, 1990; Pearce *et al*., 1989), while site stress, resident irritation, and carrying capacity are used as important signals to viable sustainable tourism (Butler, 1991, 1996).

Environmental resources determine the tourist vocation of a region and are a fundamental part of tourist's experience (Bizzarri, 2006), to the extent that it is necessary to avoid excessive exploitation of natural resources (Butcher, 2006; Fennell, 2003; Honey, 1999; Ziffer, 1989), even more so in those destinations which are ecologically fragile (Honey, 1999). Concerns over the negative effect of tourism development have brought about the normative resolution that development should never pass the limits of overexploiting natural resources (Aronsonn, 1994). The overexploitation of the natural resources is a constant threat to the integrity of natural environment. Once integrity is lost, the situation is almost certainly irreversible, the attractiveness of a location undermined, and regional development blocked. Protection of the natural capital preserves the tourist vocation of the region and the quality of the habitat, key factors for the quality of service to the tourists. Ecosystem quality of water, soil, and air (Ko, 2001) are essential part of natural capital.

If managed properly, agritourism and rural tourism can become part of a strategy towards sustainable tourism and development, especially for an industrialized country, because they preserve biodiversity, natural habitats, natural history, cultural heritage and indigenous cultures. First, they contribute to reducing the impact from tourists on the carrying capacity of a location and on its site stress. Second, they foster preservation of un-contaminated surroundings, of otherwise abandoned farms, of rural buildings, while lowering the possibility of potential construction rates of new sites. Third, they might be a way to achieve economical development while preserving the environment, while keeping traditions, heritage, and culture alive. Along these lines, see the Report prepared for the European Commission by the Tourism Sustainability Group (2007) and the more globally-oriented study concerning the relationship between sustainable tourism and biodiversity prepared by the UNWTO (2010).

For a highly industrialized and urbanized country such as Italy, we argue that agritourism (and rural tourism) can be considered viable form of sustainable tourism; in many respects, it is perhaps the only way to calm down irresponsible environmental waste, to preserve the natural history of the locations, to keep ancient traditions and indigenous cultures alive. Indeed, there are other forms of sustainable tourism which can be pursued and fostered, at least agritourism is supportive to preserve the rural landscape, the environment, the local community's uses and traditions, to pass them to new generations and to tourists in order to maintain the location's appeal (Leslie, 2005).

The Report on the 2012 Census (ISTAT, 2012, p. 97) indicates a strong growth of agritourism as an alternative to mass tourism and as an appropriate way to diversify agricultural revenues. The supply of services has evolved and become more specialized, witnessing a strong growth of sites that offer restaurant and lodging. In 2010 firms in Italy were around 20 thousand, with a growth of more than 42.5% in the period 2004-2010 (ISTAT 2010).

Our analysis is also a preliminary attempt at investigating spatial differentiation policies that firms can apply by founding their strategies on environmental factors. Can differentiation be detected according to location as influenced by environmental factors? What is new to the literature is the estimation procedure that is applied.

2. Method

Italy is in many ways an interesting case study; it has a strong tourist vocation and a mixed economy, wherein smokestack plants are located in the same region together with farms and hotels. Nowadays the twenty

administrative regions in which Italy is divided keep at the same time agricultural traditions, touristic vocation, and industrialization drive; regions are responsible for controlling pollution. Forms of sustainable tourism can be found in State national parks, while archeological sites are overcrowded and to the limit of carrying capacity. Agritourism in Italy shares many characteristics with rural tourism, which has a well-established role in sustainable tourism development and conservation (Lane 1994a, 1994b). Agritourism and rural tourism are clearly separated in principle, and the Italian Law no. 96 passed on February 20, 2006 recognizes the differences. This Law has given agritourism a definite discipline, and clearly separates it from rural tourism. The former has the purpose to allow farmes to diversify their income sources in activities complementary to farming. The latter concerns activities which, while located in rural or wild environs, do not need to be developed around a farm. However, available databases keep these activities blurred, therefore we are forced to consider them together.

The aim of the paper is to measure quality of service. With the available databases, this is possible only for rural tourism. In order to assess how much entrepreneurial activities in agritourism and rural tourism depend on environmental factors, our theoretical rationale is to connect the number of farms (dependent variable) to economic and environmental factors (regressors). Since industrial smokestack plants, farms, and hotels are common everywhere in Italy, our model estimates heterogeneity arising from environmental quality for each region, once the confounding factors from economic and environmental variables are controlled for.

Our sample is composed of the 20 administrative regions that subdivide Italy. This partition matches the purpose of our paper because environmental quality is controlled at a regional level, and can be considered an indicator of policy proneness towards sustainable tourism. Moreover, if the investigation were conducted at farm-level, it would have been impossible to measure the impact of environmental factors, because farmers very rarely are directly aware of the levels of environmental indicators. Our investigation is a mixture of regional level of analysis and farm management, therefore it is complementary to studies such as Cortés-Jiménez (2008). She presents a comparison of Spain and Italy from a regional growth perspective, whereas we distinguish regions according to geographical location.

We could not conduct a questionnaire-based research, therefore we had to rely on two databases developed from secondary sources: the Italian census bureau (ISTAT), and AIDA. Our databases pre-date the introduction of the law, so we cannot clearly separate the two segments –agritourism and rural tourism. We consider that ISTAT mixes the two segments, whereas we can safely infer that AIDA indicates the latter only, on the basis of the adopted legal vest of the firms. ISTAT is mainly used for the explanatory variables.

The other database we use is a business source, AIDA. It contains a very tiny group of farmers who have gone so far as to incorporate their enterprise; the equityholders benefit from limited liability. These incorporated entities allow us to infer that these enterprises might be more capital intensive. These firms take care of business with a tourism-oriented, professional mind (e.g. this group might be more prone to hire people from outside of the family circle). We suspect these farms are built with lower preservationist attitude towards the landscape on the part of their founders. Most of all, the incorporated entities are required to deposit the income statement and the balance sheet, therefore data on turnover is available. Whereas we cannot distinguish between agritourism and rural tourism in the ISTAT database, we consider this group from AIDA to represent rural tourism farms only. The description of the variables is in Tab.1.

Table 1. Description of the variables, and sources (average values in 2003-07)

Variable	Description	Sorce (year for which that data is relevant)
CORP	Incorporated farms	AIDA: https://aida.bvdep.com/ (ATECO code: 2002 55235).
waterpollution	Potential pollution burden of water after use, per inhabitant-equivalent	Istat 2009 (2005, 2006)
airpollution	Families declaring problems concerning air pollution, per 100 families in the area (%)	Istat Annuario statiche ambientali 2007, settore Ambiente e territorio (dati anni 2003-2005), Tab. 2.10 p. 46 Istat Annuario Statistiche Ambientali 2008, settore Ambiente e territorio (2006), Tab. 3.16 p. 166
cultivatedarea	Surface utilized in agriculture (hectares)	Istat Annuario statiche ambientali 2007 (2005), Tab. 10.2 p. 216 Istat Statistiche ambientali 2008 n.10, settore Ambiente e territorio Tab. 4.5 p. 188

noiseproblems	Families declaring problems with noise in their area of living, per 100 families in the area (%)	Istat Annuario statiche ambientali 2007 (2005), Tab. 3.1 p. 57 Statistiche ambientali 2008 n.10, Ambiente e territorio, Tab. 14.5 p. 535 (2003-2005-2006)
airclearness	Families declaring bad smell in the air, per 100 families in the area (%)	Istat Annuario statiche ambientali 2007 (2003-2005), Tab. 2.10 p. 46 Istat Annuario Statistiche Ambientali 2008, settore Ambiente e territorio (2006), Tab. 3.16 p. 166
forestfires	Number of fires in the woods	www.incendiboschivi.org (2003); Legambiente Dossier Incendi boschivi 2005 (2004) Istat Annuario Statistiche ambientali 2007, settore Ambiente e territorio, Tab. 5.10 p. 127 (2005) Istat Annuario Statistiche ambientali 2008 Tab. 4.4 p. 186 (2006) Legambiente and Protezione civile, ed., Dossier "Ecosistema Incendi 2008" (2007)
arrivals	Arrivals at touristic firms	Istat Capacità e movimento degli esercizi ricettivi Tab. 2.16 (2003) Istat Capacità e movimento degli esercizi ricettivi Tav 2.16 (2004) Istat Annuario statiche ambientali 200/, Tab. 14.4 p. 412 (2005) Istat Annuario statistiche ambientali 2008, Tab. 11.2 p. 467 (2006) Istat Capacità e movimento degli esercizi ricettivi Tab. 2.13 (2007)
presences	Days of stay at touristic firms	Istat. Capacità e movimento degli esercizi ricettivi Tab. 2.16 (2003) Istat. Capacità e movimento degli esercizi ricettivi Tab. 2.16 (2004) Istat. Annuario statiche ambientali 2007, Tab. 14.4 p. 412 (2005) Istat. Annuario statistiche ambientali 2008, Tab. 11.2 p. 467 (2006) Istat. Capacità e movimento degli esercizi ricettivi Tab. 2.13 (2007)
addedvalue	Added value in euros, at base prices, per inhabitant	Istat Occupazione e valore aggiunto nelle province (2003-2004-2005-2006)
turnover	Revenues in euros	https://aida.bvdep.com/ (ATECO code 2002 55235)

3. Results

The dependent variable is the number of incorporated farms (*CORP*) in the region, a proxy for entrepreneurial activity from AIDA, therefore *CORP* is rural tourism for sure.

It is a non-negative integer, therefore our methodology rests on count data models (Cameron & Trivedi 1998), to our knowledge applied for the first time to tourism activity. The Italian civil code and the bankruptcy laws guarantee a peculiar regime and several exemptions to farmers. There are very few farms left in Italy whose production is aimed at self-sustaining the family. Farmers are oriented to selling the produce, therefore we take this activity as the threshold from which entrepreneurship departs, as the law considers agritourist activity. (Some of them just have inherited a (semi-)abandoned farm that they transform into a lodge.) We endow these farmers with the virtue of entrepreneurs' foresight: they invest if they anticipate good opportunities in some tourist activity, up-to-now unexploited but closely-tied and affine to what they are already doing. This is enough for us to indicate that they are transforming themselves into entrepreneurs, hence we consider entrepreneurs as people who foresee an opportunity to profit and act accordingly to exploit it (Kirzner 1973). As far as the type of activity is concerned, indeed, not all agritourism can be considered entrepreneurial activity. We include any kind that can be considered commercial tourism on working farms (Busby & Rendle, 2000; Frater 1983) or the

re-activation of abandoned farms (rural tourism according to the Law).

There are two sets of explanatory variables: environmental and economic. Environmental quality variables include air and soil protection, and some factors to detect human impact in destroying nature, such as water shortage, confidence in quality of the water, water pollution, air pollution, extension of cultivated area, noise, air clearness, forest fires, burnt ground. We collected chemical indicators on environmental quality reported by ISTAT on the entire population of 20 administrative regions, on whose territory the environmental policies to reduce emissions are the responsibility of local public authorities at the regional level.

Economic variables are included to control for propensity (vocation) of the region to tourism, as determined by arrivals, presences, turnover.

In Tab.2 we report the summary statistics for the variables, the averages in 2003-07. Fig.1 depicts the Epanechnikov kernel density for the dependent variables.

Table 2. Summary statistics of the variables in the model

Panel 1 – *CORP* is incorporated enterprises

	Mean	Std. dev.	Min	Max
CORP	2.4	2.7	0	9

CORP is 0: Basilicata, Friuli Venezia Giulia, Liguria, Trentino Alto Adige, Valle d'Aosta. 1: Abruzzo, Calabria, Molise, Piemonte, Puglia, Veneto. 2: Lazio. 3: Campania, Emilia Romagna, Lombardia, Sardegna. 5: Toscana. 7: Marche, Umbria. 9: Sicilia. Overall Mean in the period: 48

Panel 2. Economic regressors

	Mean	Std. dev.	Min	Max
arrivals	4,461,834	3,870,234	197,393	12,800,000
presences	17,900,000	15,400,000	733,362	57,500,000
turnover	933,895.5	1039031	0	3,035,073
addedvalue	20,764.35	5,155.37	13,837	28,519

Panel 3. Environmental regressors

	Mean	Std. dev.	Min	Max
waterpollution	8594703	7585978	573092.5	31,700,000
airpollution	.3332835	.11539	.1513333	.5563333
cultivatedarea	645072.7	380936.5	49697.3	1260354
noiseproblems	.3327667	.0766968	.2286667	.4956667
airclearness	.1933002	.0559635	.115	.332
forestfires	404.61	424.5513	17.8	1334.4

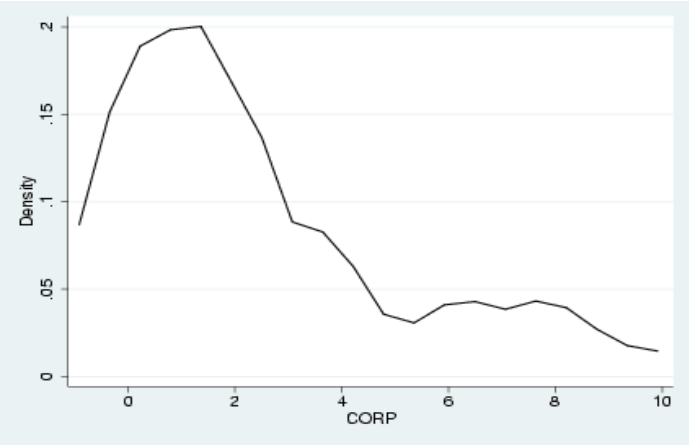

Figure 1. Epanechnikov kernel estimate (Bandwidth = .92)

Consider the number of incorporated farms, *CORP*. This sample of farms which indirectly release information on the price of their service through revenues. The more complex their services are, the more farms earn from tourist activity, hence the turnover is used as an immediate indicator of the extent of diversification practices into tourist activity. Even though the connection is not direct, and cannot be traced for sure, the higher the revenues the more tourist-focussed is the farm's activity. Now, suppose that farmers who already conduct their business in a partnership in the family, want to expand their activity into tourism, in this case there is not a need to incorporate the enterprise. We cannot say this with certainty, because the breakdown of the firms in the smaller sample is not available, but it is reasonable to imagine that this group (*CORP*) is mainly composed of people who have invested in renovating abandoned farms, maybe these farms have been founded by amenity migrants. This is a form of rural tourism in which the comfort in hospitality is a major motivation for the tourist, rather than the quest for authentic and meaningful experiences in connection with rural culture and heritage. As such, this is an attitude which implies a less direct and more sophisticated contact with nature. We presume that in this group of rural tourism activity we are facing what is more a lodge than a farm, and what, paraphrasizing Busby & Rendle (2000), is tourism on farms rather than farm tourism on working sites.

Having made these necessary warnings we can now turn to the estimation. We present a sequence of three models, whose order follows model selection criteria, according to which the latter model is the preferred one. We indulge on the first two because we can derive some considerations that are interesting beside matters concerning model selection. The coefficient β_j in the following regressions is $\partial \mathrm{E}(y \mid K_j)/\partial K_j$, where j=air pollution, water pollution, etc., and each explanatory variable is an index of environmental quality, which is the average value over five years,: $\sum_t K_{tj}/T$ where T=5 and t=2003, …, 2007. The models share the idea that environmental quality mostly drives location, whereas economic variables influence the decision to activate the firm.

Prediction 1b. The number of incorporated enterprises (*CORP*) in a region should depend on (1) the characteristics of the region as a tourist destination and (2) on the expected revenues.

Prediction 2. The probability of activating a firm in a high-vocation tourist region should be determined by environmental and economic conditions.

First, we estimate a finite mixture model (FMM), according to which the dependent variable derives from the combination of n distinct populations with proportions Λ_1, .., Λ_n in the sample (Cameron & Trivedi, 1998: 4.8; 2009: 17.3.6; Deb, 2007). Choosing the number of probability distribution components does not follow a pre-determined pattern; in our case the small sample advises us to opt for two components (i.e. latent classes), n=2, one for the high-vocation-in-agritourism region (more firms) and one for a low-vocation-in-agritourism region (less firms). We follow Greene (2008: 16.9.7), but avoid matrix notation. The unconditional (marginal) density for region i is: $f(CORP_i) = \Lambda\, f(CORP_i \mid class_i=1) + (1-\Lambda)\, f(CORP_i \mid class_i=2) = \Lambda\, \mathrm{P}(\mu_1) + (1-\Lambda)\, \mathrm{P}(\mu_2)$.

In our FMM the dependent variable derives from the mixture of: (1) two Poisson P with different expected value (and variance) μ_1, μ_2, each parameterized by a set of economic variables; (2) a logit model that parameterizes the probability of being in one class or the other: Λ=Prob(being in high-vocation agritourism region) = prob(*class*=1| environmental variables, economic variables)=exp(environ., economic variables)/[1+exp(environ., economic variables)], and of course, 1–Λ= Prob(being in a low-vocation agritourism region) = 1–Prob(being in high-vocation agritourism region) = prob(*class*=2 | environmental, economic variables).

The results of the estimation, using a robust estimator for the variance-covariance matrix, are reported in Tab. 3, which includes the usual information criteria (Akaike's and the Bayesian) and the log pseudo-likelihood. The prior probabilities of being in class region 1 (34.9%) calculated after the estimation do not substantially differ from sample probabilities (32.7%). The FMM predicts 3 incorporated farms in Class 1, 50% more than those in Class 2 (2 farms).

Table 3. Finite Mixture Model estimation for incorporated enterprises, *CORP*

	CORP	
regressors	$\mathrm{P}(\mu_1)$	$\mathrm{P}(\mu_2)$
constant	-.074 (.233)	-22.05*** (1.33)
presences	8.8e-09	1.3e-07***
	(8.1e-09)	(4e-09)
turnover	7.1e-07***	7.8e-06***
	(7.1e-08)	(4.3e-07)
predicted *CORP*	3	2

sample (estim.) prob.	.21 (.30)	.79 (.70)
Logit model (Λ)		
arrivals	-1.51e-06 ***	
	(3.02e-07)	
addedvalue	.0027 ***	
	(.0004)	
waterpollution	2.74e-06 ***	
	(1.95e-07)	
airpollution	-635.4 ***	
	(40.7)	
cultivatedarea	.00006***	
	(3.76e-06)	
noiseproblems	455***	
	(42)	
airclearness	135.2***	
	(31.4)	
forestfires	.038***	
	(.008)	
constant	-66.87***	
	(8.79)	
Log pseudo-Lik -23.3; AIC 76.5; BIC 91.5		

A two-component FMM Poisson model (P(μ), where μ is the parameter). 20 obs. Robust std. errors in parenthesis. AIC, BIC: Akaike, Bayesian information criterion.

***=significant at 1%, **=significant at 5%, *=significant at 10%

The results show that economic variables are relevant, which suggests emulation on the part of farmers and an economic motive to start the business. The coefficient of *presences* is significant only for the less-vocated sub-group (Class2), and the coefficient of *turnover* is 10 times in Class 2 than that in Class 1. This indicates that as regards incorporated farms: (1) presences have more impact in the low-vocation regions, which implies that even a low level of presences can be enough stimulus to the farmer to start an activity in the low-vocation region; (2) the level of turnover in absolute value has more impact in the low-vocation regions, since a given level of revenues has a 10-fold stronger effect.

The ratio of the coefficients (β_{j1}/β_{j2}) represents the relative effects of changes in the regressors (Cameron & Trivedi, 1998: 3.5), and here the ratio of turnover over presences is price. The ratio of the coefficient of *turnover* on *presences* is 81 for Class 1 and 60 for Class 2. We interpret this as pointing to a quality differential in the location, as tied to the environment: regions with lower overall activity show lower average prices, presumably from worse quality of service in hospitality, since these activities are part of a diversification policy of operating farms that look for an increase in income. Note that quality here is measured in monetary terms, and we know that this is not always a proper measure to detect quality in sustainable tourism.

Environmental variables do matter, with surprising results. The probability of falling in the high-vocation region (Class 1 is more populated) increases when the environmental variables get *worse*, a result in line with that obtained for *PART*. This means that notwithstanding negative environmental factors, openings of incorporate farms increase, presumably driven by the economic motive to invest in the sector. It seems that entrepreneurs consider pollution as a negative, yet unavoidable, factor, that does not prevent them from activating the business. The only exceptions are air-pollution and the other unknown variables that end up in the constant (note the negative coefficient). Note also that the positive sign in forest fires can be justified by the fact that arson is aimed at destroying forests and drift land away from an agriculture-oriented employment, with the hope of developing buildings, indeed an alarming result. These results are coherent with the evidence in the main part of the model.

The probability of falling in the high vocation region increases if arrivals decreases, presumably from other market segments (e.g. cultural tourism). An increase in added value increases the probability of being in the high vocation region. These results support the idea that for incorporated farms the increase in activity is more devoted to tourism to farms rather than farm tourism, which implies a certain cultural orientation on the part of the vacationers.

The estimated density for incorporated farms after the FMM model is compared to observed values in Fig. 2,

where we report only the curve obtained by the Poisson 1 because in the graph the Poisson 2 will not be easily seen. However, note that the two distributions overlap a lot.

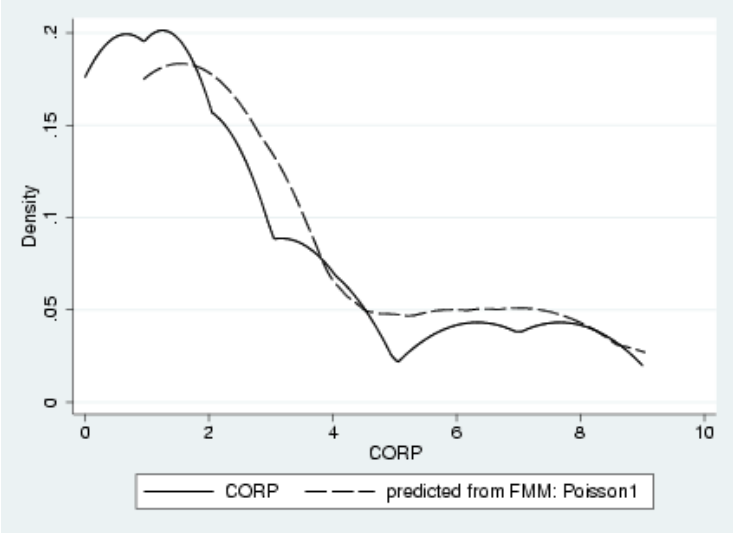

Figure 2. Density estimates after the FMM model

The FMM has a Bayesian interpretation. We can calculate posterior probabilities that a given farm belongs to a high or low agritourism region; for each region we obtain *ps1* and *ps2*. Note that *ps1* and *ps2* can be the basis for creating dummy variables indicating Class 1 (high rural region) and Class 2 (low rural region). We use them as explanatory variables to predict the number of incorporated farms, for the 20 observations. As *ps1* and *ps2* sum to 1, and span the entire set of possible states of the world, any regression that includes both on the right hand side is the same as the one that includes the whole set of dummy variables as regressors. Therefore, to avoid the dummy variables trap the intercept must be dropped. We obtain:

$$\hat{CORP} = 2.86\ ps1 + 1.33\ ps2$$
$$(.7)^{***} \qquad (1.1)$$

centered $R^2 = 0.0723$

adj. $R^2 = 0.4442$

prob F(2,18) = 0.002

Standard errors in parenthesis

***= significant at 1% level

The coefficients represent the average number of firms that populate the two types of region and can be compared to those predicted by the full FMM. Our main motivation to estimate an FMM model is to obtain the squared correlation between the fitted and the actual *CORP*, which is 0.0723, and to which we are presently giving an interpretation. For a situation such as this one, Wooldridge (2008: 235) warns that we should use the centered R^2, which can be drastically different from the adjusted R^2. Since the centered R^2 can also be negative, and since we want to give a probabilistic interpretation to 0.0723, a theoretical precaution is to rely on the squared correlation, because the squared correlation lies in [0, 1]. (Anyway, it happens that in our case this precaution is not really necessary, since the centered R^2 is not negative.) Our probabilistic interpretation is that only 7.2% of overall variability of the dependent variable relies on environmental factors.

The FMM model was introduced only to derive this result concerning the probabilistic interpretation of overall environmental variables, but more parsimonious model should be preferred when other purposes are more relevant. The Poisson model, which has a more parsimonious structure than the FMM, is our second model in order. Using the same explanatory variables to keep the exposition as simple as possible, it gives better information criteria (lower), hence it should be preferred to the FMM. Essentially, the results on the environmental variables do no change: *increasing* water pollution and noise problems *increases* activity, whereas more intuitive results derive from the quality of the air.

We now turn to the third model, which is the best in the group. Since 5 out of 20 observations are zero, suspicions arise that a Zero Inflated Poisson (ZIP) model could be a fitter model (Cameron and Trivedi, 1998: 4.7). The Vuong test compares the ZIP versus the standard Poisson (Cameron and Trivedi, 1998: 5.7) and supports this idea: z = 2.96, with Pr>z = 0.0015, therefore the ZIP is overall preferred. The ZIP model is composed of two parts: (1) the main model and (2) the inflate model which governs the presence of excess zeros. The ZIP can be considered a peculiar FMM in which there is a degenerate distribution whose mass is concentrated at zero. The entrepreneur's decision not to start the activity generates a zero. The decision is influenced by the same economic and environmental variables as before, now used to explain the inflate process, modelled according to a logit. If the environmental quality decreases (i.e. pollution increases) coefficients of the variables should come out with a positive sign, which means more zeros in the dependent variable *CORP*, thus, lower entrepreneurial activity in rural tourism. This hypothesis is so synthesized:

Prediction 3. Bad environmental quality should have a negative impact on the number of incorporated farms active in rural tourism, thus creating (excess) zeros in the inflate process.

Table 4. Poisson and zero-inflated poisson (ZIP) models for incorporated enterprises, CORP

	CORP			
regressors	Poisson	Marg. eff.	ZIP	Marg. eff.
constant	-8.02***		.28	
	(1.56)		(.23)	
presences	2.1e-08	2.8e-08	-6.4e-09	-1.4e-08
	(2.6e-08)		(8.9e-09)	
turnover	9.95e-07***	1.3e-06	6.35e-07 ***	1.4e-06
	(1.1e-07)		(7.6e-08)	
arrivals	-1.8e-07	-2.3e-07	-.00002***	*inflate*
	(1.2e-07)		(9.2e-07)	*process*
addedvalue	.00024***	.0003	-.007***	*inflate*
	(.00004)		(.0004)	*process*
waterpollution	6.1e-08*	8.1e-08	3.6e-06***	*inflate*
	(3.5e-08)		(2.9e-07)	*process*
airpollution	-24.7***	-32.6	3847.7***	*inflate*
	(8.8)		(66.7)	*process*
cultivatedarea	4.5e-07	6e-07	-.0002***	*inflate*
	(5.7e-07)		(4.5e-06)	*process*
noiseproblems	19.1***	25	-4037***	*inflate*
	(5.8)		(69)	*process*
airclearness	21.5 ***	28	-4459***	*inflate*
	(7.3)		(74)	*process*
forestfires	-.0009	-.0011	.39***	*inflate*
	(.0006)		(.007)	*process*
constant			985***	*inflate*
			(18)	*process*
Pred. events:	1.3		2.1	
Log pseudo-Lik	-25.3		-23.8	
AIC	72.6		71.6	
BIC	83.6		83.6	

20 obs. Robust std. errors in parenthesis. AIC, BIC: Akaike, Bayesian information criterion.

***=significative at 1%, **=significative at 5%, *=significative at 10%

Results in Tab. 4 do not contradict the hypothesis expressed in Prediction 3: water pollution, air pollution, and forest fires have positive coefficient in the logit that governs the presence of zeros.

We interpret these results as saying that supply of agritourism is tied to environmental quality when incorporated farms are considered, which presumably are more selective in the location, maybe because they invest in a previously abandoned facility, and offer more quality in the service. In this case environmental quality matters

relatively more, but only in what might be considered the high-end segment of the market. In the ZIP model *airclearness* is the only variable that gives a counterintuitive result, and we think this is connected with the same sign of the coefficient of *addedvalue* (more industrial activity) and of *arrivals* (which means that industrialized regions have intensive tourism activity, and in turn, rural tourism). This is not a surprise for Italy, where population density is high on average in any region, and any region has a mixed economy.

As for the marginal effects, the partial derivatives of the dependent variable with respect to each regressor, they are calculated for the average individual in the sample (itself the hypothetical region endowed with the average value of each regressor). Note that the marginal effect (Cameron and Trivedi 1998: 3.5) is $\partial \mathrm{E}(y \mid K_j)/\partial K_j \mid_{Kav}$, where j=air pollution, water pollution, etc., and Kav is the average value for each K_j.

4. Discussion

An anonymous referee correctly pointed out that "Very well established scientific experience proves that the quality of the environment where agritourism situates is a very important success factor of the agritourism activity itself (the quality of environment therefore can also influence the farmer, entrepreneur in undertaking this activity; however, this relationship is not straightforward, and it is not clear whether this would be the question on which the research focuses)". Our research is aimed at investigating entrepreneurs' motivations in starting the business in the first place, and our results show that the quality of the environment does not play a substantial role. Evidence suggests that environmental quality has a minor role in fostering agritourism activity, as only around 7% of entrepreneurial activity can be attributed to it, thus implying that other unobserved variables play a major role in the decision. We can only be tentative in listing these motives, and a direct questionnaire would be advisable, as pursued by Ollenburg and Buckley (2007). Moreover, we can only derive some preliminary conclusions on the relationship between entrepreneurial activity and environmental quality, we do not aim at adding to the already huge literature on quality assessments. However, since success is measured in relative terms, Italian agritourist farms can be successful when compared one another, once competition is restricted inside the Italian border. Italy is not recognized worldwide as place to look for wilderness, therefore the Italian "new tourist" is the main target in this market segment. If the Italian "new tourists" are die-hard naturalists, they will look for more wilderness-oriented locations, maybe outside of the border, whereas the more aged, more sophisticated and comfort oriented vacationer, relatively less interested in the authenticity of the experience, will be satisfied (and pay a lot) for a little bit of countryside life while not rejecting total comfort altogether. This vacationer might be well satisfied to remain inside the Italian border for a rejuvenating week-end.

Having chosen regions as individuals in the sample brings about a remark on environmental controls, because local authorities are responsible for them. Evidence suggests that agritourism, as perceived by farmers at the inception of their tourist activity, is loosely influenced by environmental policy. Farmers consider agritourism an opportunity to increase revenues, as regions having worse environmental quality witness more entrepreneurial activity by farmers who start tourism services to diversify their main activity. On the other hand, quality differentials are detected for incorporated farms: better environmental quality increases agritourism activity with more intensive capitalization. Results also hint that environmental quality fosters an improvement in hospitality service in incorporated farms. We are left with the hope that in the future more attention on agritourism activities will improve preservation of the environment; maybe a feedback effect will activate, according to which more agritourism activity in a region fosters better environmental quality. Our empirical evidence rises the suspicion that farmers are looking at agritourism with the diversification eye only, only with the aim to rise income, and this limited perspective might reduce potential to improve environmental protection from their part. Communities are not well aware of the implication of preservation of local cultures that might derive from agritourism, to the extent that some pursue the jazz festival route to promote the location, which we consider paradoxical as far as cultural specificity affirmation is considered. That money could be spent to improve quality in nature preservation or is fostering cultural heritage preservation.

Our results suggest several directions for future research. One is to directly measure how the farmers and local communities perceive environmental quality in their location. Another one would be to investigate the motivations to start the agritourism directly. We suspect that investment motive from tourist entrepreneurs (and to a lesser extent, amenity migrants) are strong factors in the upheaval of agritourism activity in Italy. If such conjecture were true, then in Italy we would witness more of the sophisticated tourism to lodges (and resorts with spa) than of the farm tourism to working sites (with the motivation to meet countryside culture and traditions, while in the wilderness). To our knowledge these aspects have been neglected in the Italian literature on the subject.

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