Alternative Food Networks in Piedmont: determinants of on-farm and off-farm direct sales by farmers

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Paper prepared for presentation at the 3rd AIEAA Conference
"Feeding the Planet and Greening Agriculture: Challenges and opportunities for the bio-economy"

25-27 June, 2014
Alghero, Italy

Summary

Direct sales are a widespread and important typology of the so-called Alternative Food Networks. The direct links between producers and consumers can take two basic forms: consumers going to buy agricultural products at the farm (on-farm sales), and farmers selling their products in urban areas. These practices are an alternative to traditional organizations of the agro-food chains, that typically involve several operators between producers and consumers. It is therefore important to analyse the reasons pushing farmers to adopt this new organization of their marketing chain. This research aims at analysing the territorial distribution of direct links between urban consumers and farmers in Piedmont (Italy), and to assess the main determinants of their choice.

Firstly, the territorial distribution of direct sales practices (on-farm or elsewhere) is analysed. This is made possible by the access to micro-data from the 2010 Agricultural Census for Piedmont, a region whose agriculture is characterized by a strong emphasis on quality products. The farms that chose direct sales, both on- and off-farm, are mostly concentrated in specific clusters, such as the hilly wine-growing areas of Langhe and Monferrato, the hilly belt surrounding Torino, and some low Alpine valleys. Secondly, we analyse the determinants of the choice to sell directly to consumers, separately for on-farm and off-farm sales, with probit models. Explanatory variables comprise the structural characteristics of the farms (farm size, type of farming, etc.), the personal characteristics of the operators and of the farm households, and the proximity to urban and commercial areas. Operators' and farm characteristics are found to affect the choice of selling directly, but rather weakly. The most important factors affecting these choices are farm location and, for on-farm direct sales, the complementarity with agro-tourism and recreational activities.

Keywords: direct sales, alternative food networks
JEL Classification codes: Q13, Q12, R12

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1. INTRODUCTION

Direct sales are a widespread and important typology of the so-called Alternative Food Networks (AFN). The concept of AFN is mainly used in the sociological literature (e.g., Marsden, 2000;Winter, 2003; Whatmore et al., 2003) and in the geographical literature (Murdoch et al., 2000; Sonnino and Marsden, 2006; Gattrell et al., 2011).In the economic literature, it is linked, on one side to the issue of the symbolic value of food products (local, traditional, etc.) for consumers, and on their choice of where to purchase; on the other side, on farmers' choice of the marketing channel. The economics literature dealing with farmers' choice to sell directly their products is nevertheless rather scarce. On-farm sales are sometimes included among multifunctional activities (Jongeneel et al., 2009); some research investigates the determinants of the weight of direct sales(Timmons and Wang, 2010) or the number of farms directly selling their produce (Lyson and Gutpill, 2004)using aggregate data. Some related literature concerns the choice of coffee producers to sell at the farmgate or to travel to the market (Fafchamps and Vargas Hill, 2005) or the choice of the sale mechanism, like forward contracts vs. cash sale (Fletcher and Terza, 1986; Fu et al., 1988; McLeay and Zwart, 1988). Verhaegen and Van Huylenbroeck (2001) assess the economic profitability for some case studies of direct sales (off the farm). Corsi et al. (2009)model the determinants of the choice of the marketing chain of organic producers distinguishing between conventional and alternative chains, the latter including direct sales.

In this paper, we specifically address the question of which are the factors that favour farmers' choice to sell their products directly to consumers. More specifically, this research aims at analysing the direct links between urban consumers and farmers in Piedmont (Italy). These links can take two basic forms: consumers going to buy agricultural products at the farm (on-farm sales), and farmers selling their products in urban areas (off-farm sales: farmers' markets, community supported agriculture and buying groups). The focus of this paper is on farmers' choice to undertake such practices.

Firstly, the territorial distribution of direct sales practices (on-farm or elsewhere) in Piedmont is analysed, so to have a geographical picture of the distribution of these practices. Secondly, we analyse the determinants of the choice to sell directly to consumers. We depart from previous literature in using individual farm data to model the choice of selling directly, and we distinguish between on-farm and off-farm direct sales, since in principle they entail different determining factors.

2. THEORETICAL AND METHODOLOGICAL APPROACH

Farmers' choice to sell directly their products rather than using the conventional marketing chains can be modelled as a comparison between the utility they get from the alternative vs. the conventional chain. Utility for each choice stems from the income each chain provides, and possibly from non-pecuniary benefits deriving from the same chain. Usually, direct sales give higher revenues, since selling prices are higher. The price premium may depend on product's characteristics, since some lend themselves to direct sales more than others do. It also depends on the place where they are produced, so that, e.g., products from the mountains or from specific areas can have a higher appreciation by consumers buying directly than the ones from other areas. However, direct sales also imply higher costs, since the distribution costs are borne by the farmers. For instance, on-farm direct sales may imply to have a place for selling, and labour must be devoted to this activity. When practicing off-farm direct sales, farmers bear transportation costs, administrative and other out-of-pocket costs for permits to sell and, obviously, the labour cost for time devoted to this activity. Monetary revenues and costs are therefore a function of the type of product (T); of farm characteristics (F); of production and marketing skills of operators, as represented by personal characteristics (O); and of farm location (L), that affects transportation costs for off-farm sales, and demand (and, hence, prices) for on-farm sales.

On the other hand, direct sales may have non-pecuniary benefits, like pleasure in having personal contacts with consumers, the possibility to explain the virtues of one's products, or the like. They can be assumed to be a function of operators' personal characteristics (O), like age, education, gender, etc.

Overall, the choice of direct sales can be modelled as:

$S = 1$ if $D = U_s - U_i > 0$ for any $i \neq s$

i.e. $S = 1$ if $\{U_{s1}[M(F,T,O,L] + U_{s2}[NM(O)]\} - \{U_{i1}[M(F,T,O,L] + U_{i2}[NM(O)]\} > 0$

where S is a dummy indicator of the choice to sell directly; D is the difference between the utility from the direct sales and the utility of the conventional chain; U_s is the utility stemming from practising direct sales and U_i is the utility from any alternative choice; M and NM are monetary and non-monetary net benefits from the relevant choice. Attaching random components to the variables, and assuming a linear form, the model is:

$$Prob(S=1) = Prob[P(F,T,O,L)\ ] > 0] = Prob(\alpha_0 + \alpha_1 O + \alpha_2 F + \alpha_3 L + \alpha_4 T + \varepsilon > 0)$$

Under the assumption that ε is distributed normally, the model has been estimated as a probit by maximum likelihood techniques.

3. DATA

The analysis is based on data collected through the 2010 Census of Agriculture. The access to census data using the regional data warehouse "CensimentoAGile" allowed the analysis of Census individual farm records.

In 2010 the number of agricultural holdings in Piedmont was 67,148. As a first step, individual farms and group holdings (group of natural persons) were selected (66,459 holdings)[1]. This selection was made in order to focus on family farms and to exclude stock companies, public administrations and cooperatives from

[1] The selected holdings were recorded in the agricultural census with the following legal status: "Azienda individuale", "Società semplice" or "Altra società di persone (S.n.c., S.a.s., ecc)".

the analysis. Likewise, to exclude hobby farming and self-consumption farms, farms with a percentage of gross revenues from sales equal to zero were excluded from the survey. In the end, 58,304 farms were selected for the analysis.

For each farm and for all types of farm products (vegetable, animal, processed and forest products), the regional database provides the percentage of sales that are marketed through the different marketing channels, i.e. direct on-farm, direct off-farm, manufacturing firms, commercial companies, other farms and producers' cooperatives. The attention was focused on farm-direct marketing channels and on the relevant group of products: cereals (rice inclusive), vegetables, fruits, grapes, milk, dairy products, wine and other processed agricultural products (vegetable and animal).

For both on-farm and off-farm direct marketing, a dummy variable equal to 1 for the farms with a positive share of direct sales for one or more products (0 for farms not involved in direct marketing) was created[2].

The explanatory variables for the choice to sell directly to consumers were mostly drawn from the agricultural census, with particular reference to:

- personal characteristics of the farm operators: gender; age; years of education undergone, secondary-school diploma or university degree in agriculture; attendance to professional courses in the last twelve months;
- farm location with reference to altimetry (plains, hills, mountains);
- structural characteristics of the farms: standard output (SO) and type of farming (TF);
- other characteristics linked to the quality of products: organic farming, protected designation of origin (PDO), protected geographical indication (PGI);
- other farm activities: agro-tourism, supply of on-farm recreational activities
- distance of the farm to the main commercial cities[3].

4. RESULTS

Table 1 shows the percentage of farms that market directly at least one product among those considered in the analysis. Arguably, the possibility of selling directly differs with the type of products. For instance, some products need processing in dedicated plants before they are consumed (e.g., animals need slaughtering, cereals need milling, etc.). Overall, direct sales appears to be a minor marketing channel. Only 14.0% of all farms sell directly on-farm, and 8.1% off-farm (the two channels can be combined), but the shares differ with the type of farming (TF). On-farm direct sales are higher for unspecialized farms (mixed cropping, mixed livestock, field crops and grazing livestock combined, various crops and livestock combined). Unspecialized farms engaged in direct on-farm and off-farm marketing are 24.4%.The specialist viticulture exhibits almost the same weight (24.3%), while other permanent crops (15.3%), specialist sheep (14.1%), dairying (13.5%) and horticulture (13.2%)are at a lower level. The lowest percentage is – not surprisingly – for fieldcrops and specialist cattle.

[2] The Census data concern the share of each group of products marketed through the different channels but, unfortunately, it is not possible to calculate the share of total farm sales marketed through the different channels when a farm produces different products. This is the reason why we use a dichotomous variable rather than the overall share of products marketed directly.

[3] The reference is to the 37 cities and towns, which Regione Piemonte identifies as "commercial poles" and to the homologous towns in the neighbouring regions (Liguria, Valle d'Aosta, Lombardy and Emilia-Romagna). This variable was created with the Microsoft MapPoint software.

Table 1. Percentage of farms that practise direct sales by type of farming.

Type of farming (1242/2008 (EC))	Direct market (%)	
	on-farm	off-farm
Fieldcrops (specialist cereals - rice inclusive - and general field cropping)	5.0	3.5
Specialist horticulture	13.2	16.1
Specialist vineyards	24.3	13.6
Other permanent crops (specialist fruit, olives and various permanent crops combined)	15.3	8.6
Specialist dairying	13.5	5.6
Specialist cattle (rearing and fattening and dairying, rearing and fattening combined)	7.5	2.7
Specialist sheep, goats and other grazing livestock	14.1	4.7
Specialist granivores (pigs, poultry and various combined)	8.3	4.4
Other types[1]	24.4	14.7
Total	14.0	8.1

Source: 2010 Agricultural Census, own elaboration
[1] mixed cropping, mixed livestock, field crops and grazing livestock combined, various crops and livestock combined

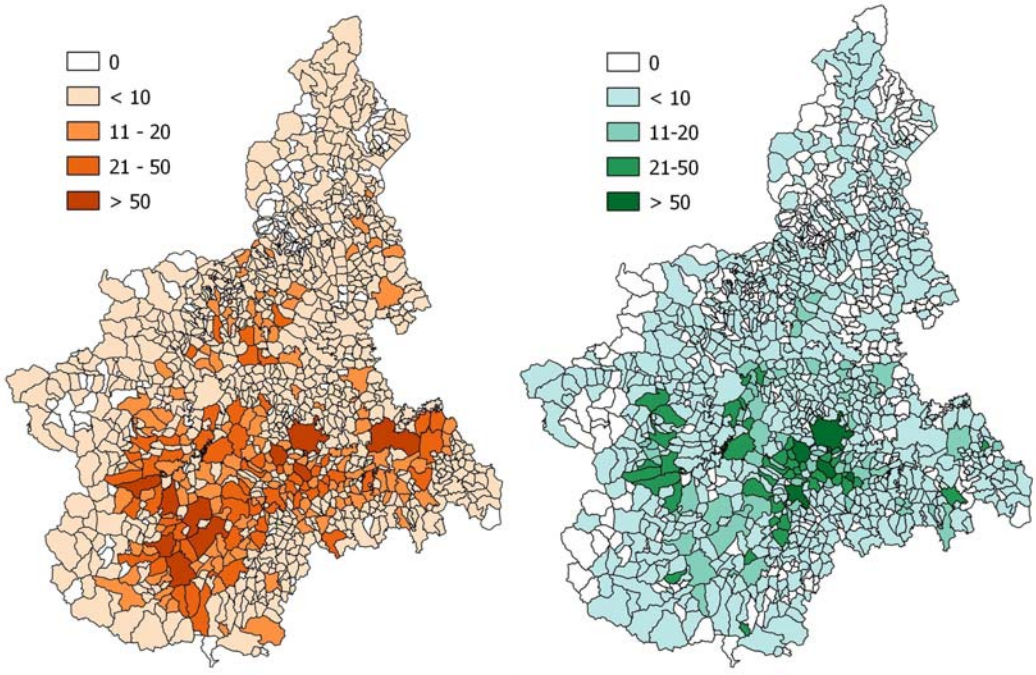
As to off-farm direct sales, horticulture has the highest percentage (16.1%), while for mixed farming and viticulture the percentages are 14.7% and 13.6%, respectively. Again, fieldcrops and cattle have the lowest percentages.

A second important feature of direct sales is the territorial distribution of farms using this marketing chain. This aspect is relevant for both on-farm and for off-farm direct sales. However, the reasons are different. With on-farm sales, it is the consumers that move to the farm to buy. The number of consumers at a close distance from the farm might be relevant, since not a large share of them does go to the farms to buy, and a larger population implies more potential consumers. For off-farm sales, it is the ease for farmers to find urban markets that is more relevant, so that the vicinity to urban centres where to sell one's products is expected to be an important determinant. Moreover, other non-pecuniary factors may be at work. These include, for instance, the relationship that dwellers may have with the surrounding territory, including the cultural heritage, the appreciation of local food, and the network of social relationships between the city and the countryside. The strict relationship between practices of Alternative Food Networks (such as direct sales) and the new rural development patterns at a regional scale brought scholars to talk about *alternative geographies of food* (Murdoch et al., 2000), or *new geographies of food* (Gatrell et al. 2011). It is therefore useful to give a short description of the distribution of these practices in Piedmont.

As Figure 1 shows at the municipal scale, the farms that chose off-farm direct sales, are mostly concentrated in specific clusters, such as the hilly wine-growing areas of Langhe and Monferrato, the hilly belt surrounding Torino, and some low Alpine valleys (again in the province of Torino). There seems to be an attraction of the urban centre of Torino behind the two latter areas, whereas Langhe and Monferrato are rather agro-tourism areas. The picture is different concerning farms selling directly on-farm: there is again a widespread presence in the Langhe and Monferrato areas, which can be linked to agro-tourism, and in the hills around Torino, that can be easily reached from the city; but some concentrations can also be found in the Cuneo province plain and in the Canavese (Ivrea) area.

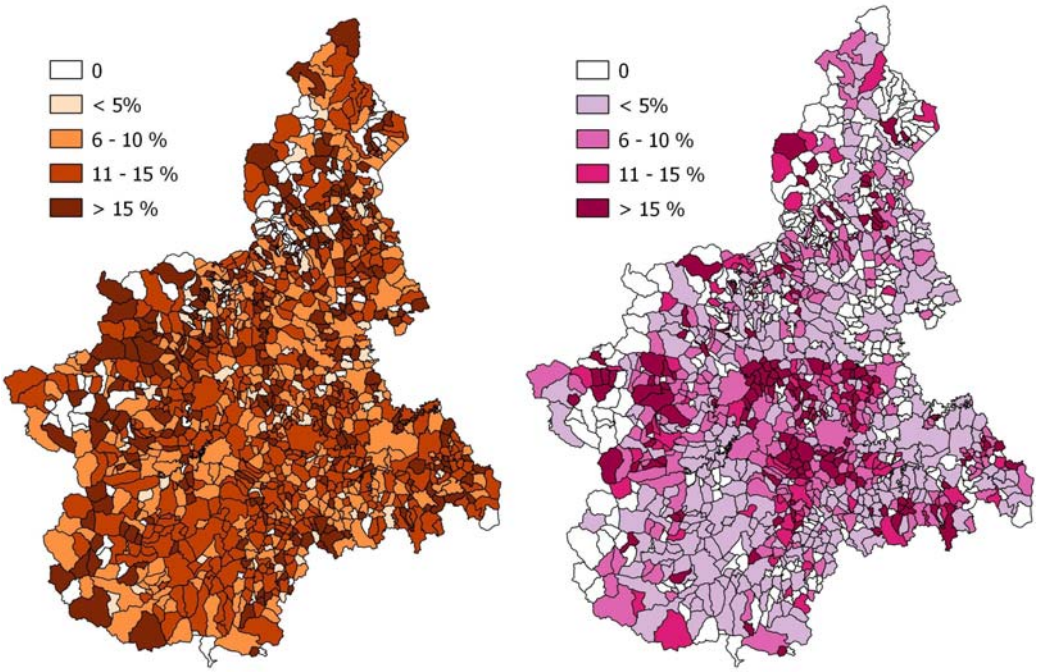
If we consider the ratio of the farms practising direct sales to the total number of farms in each municipality, the picture partly changes (Figure 2). On-farm sales result much more homogeneously distributed across Piedmont, with higher values in the mountains (both Alps and Apennines) and in the hilly areas, possibly due to the lower total number of farms. Off-farm sales, on the other hand, still appears as quite concentrated in the hills and mountains surrounding the metropolitan area of Torino.

Figure 1. Number of farms practicing direct sales by municipality in Piedmont (on the left, on-farm sales; on the right, off-farm sales).



Source: 2010 Agricultural Census, own elaboration

Figure 2. Ratios of the number of farms practicing direct sales to the total number of farms by municipality. (on the left, on-farm sales; on the right, off-farm sales).



Source: 2010 Agricultural Census, own elaboration

Overall, the picture of the territorial distribution of farms practising direct sales is not much clear. Along with the influence of the metropolitan centre, other factors seem at work. Hence, a quantitative analysis of the factors influencing farmers' choice to sell directly was performed, according to the theoretical approach as illustrated above.

Table 2 shows the descriptive statistics of the variables included in the probit model.

Table 2. Descriptive statistics of the variables.

Variables	Mean	Std. Dev.
On-farm direct sales (0,1)	0.140	0.347
Off-farm direct sales (0,1)	0.081	0.273
Operator's age (years)	56.117	14.565
Operator's gender (1=M)	0.723	0.447
Operator's schooling (years)	8.465	3.501
Op.'s agricultural school (0,1)	0.052	0.222
Op.'s professional training (0,1)	0.067	0.250
Plains (0,1)	0.366	0.482
Hills (0,1)	0.506	0.500
Mountains (0,1)	0.128	0.334
Standard Output (0,000 €)	62.708	22.022
Agro-tourism (0,1)	0.017	0.129
Recreational activities (0,1)	0.003	0.052
Organic farming (0,1)	0.034	0.180
PDG-PGI (0,1)	0.044	0.205
Fieldcrops(0,1)	0.313	0.464
Horticulture (0,1)	0.026	0.161
Vineyards (0,1)	0.205	0.404
Other permanent crops (0,1)	0.151	0.358
Dairying (0,1)	0.038	0.192
Beef (0,1)	0.092	0.289
Sheep and goats (0,1)	0.036	0.186
Granivores (0,1)	0.016	0.125
Other types	0.123	0.329
# commercial poles within 1/2 hr. driving distance	3.456	2.346

Source: 2010 Agricultural Census, own elaboration

Table 3 shows the results of the probit models for both on-farm and off-farm direct sales, as well as the marginal effects, which indicate the change in probability in the outcome due to a unit change of the explanatory variables. As usual, marginal effects are calculated at the mean values of the variables, or at their median, when they are dummies.

Starting with the determinants of on-farm direct sales, operator's characteristics significantly affect the probability of practising on-farm direct sales. Males are 0.8% more likely to do it, and every additional schooling year adds 0.2% probability. The operator having attended an agricultural school or university increases the probability by 5%, as well as having attended professional training courses in the last two years. The altimetry is also important. Relative to plains, farms located in the mountains are 12.2% more likely to sell their products on the farm, and farms in hills 7%. By contrast, the effect of the economic size, as measured by the Standard Output (SO), though statistically significant, is almost negligible in economic terms. A rise in SO by 10,000 euro only increases the probability by 0.02%.

Much more important is the effect of diversification activities undertaken by the farm. If the farm has some agro-tourism, or recreational activity, the likelihood of selling directly on the farm is increased by 25% and 11%, respectively. This is an expected result, as receiving guests on the farm gives opportunities to sell one's products. Organic farming too is relevant, as it increases the probability by almost 7%. An interesting finding concerns the type of farming (TF). All specialised TFs have a lower probability to sell directly on the farm relative to the mixed TFs, taken as reference.

Table 3. Results of the probit models of the determinants of direct sales.

	On-farm			Off-farm		
	Coeff.	Std. Err.	Marginal effect	Coeff.	Std. Err.	Marginal effect
Constant	-1.121***	0.055		-1.293***	0.063	
Operator's age (years)	-0.004***	0.001	-0.0011	-0.007***	0.001	-0.0010
Operator's gender (1=M)	0.049***	0.016	0.0079	0.041**	0.018	0.0045
Operator's schooling (years)	0.018***	0.002	0.0017	0.009***	0.003	0.0003
Op.'s ag. school (0,1)	0.207***	0.031	0.0487	0.081**	0.034	0.0138
Op.'s profess. training (0,1)	0.224***	0.025	0.0512	0.214***	0.028	0.0316
Hills (0,1)	0.445***	0.021	0.0705	0.433***	0.024	0.0444
Mountains (0,1)	0.631***	0.028	0.1221	0.301***	0.034	0.0331
Standard Output (0,000 €)	0.001*	0.000	0.0002	0.000***	0.000	0.0002
Agro-tourism (0,1)	0.883***	0.042	0.2519	0.301***	0.049	0.0488
Recreational activities (0,1)	0.453***	0.110	0.1067	0.226*	0.127	0.0322
Organic farming (0,1)	0.248***	0.033	0.0690	0.344***	0.038	0.0595
PDG-PGI (0,1)	-0.154***	0.037	-0.0168	-0.283***	0.047	-0.0227
Fieldcrops(0,1)	-0.786***	0.024	-0.1099	-0.644***	0.027	-0.0582
Horticulture(0,1)	-0.441***	0.044	-0.0515	-0.013	0.043	0.0041
Vineyards(0,1)	-0.052***	0.022	-0.0054	-0.098***	0.025	-0.0082
Other permanent crops (0,1)	-0.338***	0.024	-0.0470	-0.298***	0.027	-0.0266
Dairying(0,1)	-0.357***	0.040	-0.0491	-0.435***	0.049	-0.0345
Beef (0,1)	-0.714***	0.032	-0.0817	-0.846***	0.041	-0.0542
Sheep and goats (0,1)	-0.558***	0.040	-0.0841	-0.637***	0.052	-0.0516
Granivores(0,1)	-0.576***	0.071	-0.0696	-0.624***	0.086	-0.0429
# commercial poles within 1/2 hr. driving distance	0.008*	0.004	0.0018	0.050***	0.004	0.0058
Log-likelihood	-20957.2			-14962.02		
Chi-squared	5403.479			2853.966		
(d.f.)	(21)			(21)		
N. Observations	58304			58304		

Source: 2010 Agricultural Census, own elaboration

The difference ranges between -11% for cereals to -0.5% for viticulture, and even vegetables and flowers, a TF that was expected to have a greater share of farms selling directly, is 5% less likely to make direct sales. It is apparent that a mixed type of farming lends itself to on-farm direct sales more than specialised TFs.

Finally, the number of “pole” municipalities that can be reached in a half hour drive was taken as an indicator of the potential demand for agricultural products purchased on the farm, as the distance affects the relevant cost for consumers. Although statistically significant, the effect of this variable is weak, as each additional municipality only increases the probability by 0.2%. To sum up, the most important determinants for on-farm direct sales are the farm location in mountain or hilly areas, and the connection with other diversification activities (agro-tourism and recreational activities), but personal characteristics (younger and more skilled and educated operators) also play a role.

The results concerning off-farm direct sales are largely similar, but with some significant differences. Personal characteristics bear the same signs as for on-farm direct sales, even with weaker effects. The farm being located in mountain or hilly areas significantly increases the likelihood of off-farm direct sales, though in a lower measure relative to on-farm direct sales. Agro-tourism and recreational activities were not expected to influence off-farm sales, but they are nevertheless significant and positive. These variables, in our view, can then be interpreted as indicators of the operator’s general propensity to explore alternative marketing chains, as there is no evident direct link between these activities and the choice to sell directly to

consumers off the farm. In general, specialised TFs have a negative and significant effect on off-farm direct sales, relative to mixed TF. Nevertheless, vegetables and flowers TF is not significantly different from mixed TF. This is probably because vegetables production usually concerns several products, and follows the seasons, so that different products can be sold directly all-year round, as required by consumers. Finally, the variable concerning marketing places that can be reached within short driving distance is in this case an indicator of potential transportation costs that farmers deciding to sell directly have to bear. This variable is significant and positive, meaning that more towns where it is possible to sell do increase the probability that the farmers sell directly. But the effect is rather weak (an additional town increases the probability only by 0.6%). This suggests that transportation costs, though relevant, are not crucial in this field.

5. CONCLUSIONS

This paper investigated the determinants of the choice of farmers to sell their products directly to consumers. Some evidence is presented, showing that mixed types of farming lend themselves to this practice more than specialised ones, and showing that in general terms these farms cluster around urban poles. Nevertheless, a probit analysis shows that operators' and farm characteristics do affect this choice, but rather weakly. The most important factors affecting these choices are farm location and, for on-farm direct sales, the complementarity with agro-tourism and recreational activities.

AKNOWLEDGMENTS

This research was funded by the University of Torino, Progetti di Ateneo, Call 3 "Strategic Research Grants", Project "Alternative Food Networks: an Interdisciplinary assessment". We wish to thank Regione Piemonte for allowing the use of Agricultural Census data, and Lorena Cora of CSI-Piemonte for very helpful assistance in using the relevant data warehouse.

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