Analysis of non-compliances in the organic certification system in Turkey

R. ZANOLI[1], *D. GAMBELLI*[1], *V. BRUSCHI*[2]

Abstract

Organic farming in Turkey is experiencing a strong growth in recent years, with a particular attention to export towards Europe. International and domestic trade opportunities require an efficient control system for organic products. In this paper we analyse the data from inspections of two European control bodies in Turkish farms to analyse risk patterns of non-compliance with the organic regulation. A proportion test is performed to identify the types of crops that are more likely related to non-compliant operators.

***Keywords**: proportion test, non-compliance, Turkish organic farming.*

Introduction

This study can be considered as a first attempt to analyse the issue of non-compliance in Turkish organic farming. The aim is to find empirical evidence for crops that could be considered as increasing the risk of non-compliance with the organic production rules.

Organic Farming in Turkey is still a small sector but is growing steadily over the last years, mainly driven from export of typical Turkish products like raisins, fruit, and vegetables. Small farms are "intrinsically organic", so they can more easily be converted from a technical point of view than large farms, but their small dimension in many cases does not allow bearing the additional costs of certification. For this reason small organic operators are often organised as collective "projects" to share the cost of certification (Sayin et al., 2005).

The Turkish Association of Organic Agriculture Movement (ETO) can be considered a main actor for the development of the organic sector in Turkey. Given that the largest part of organic production is exported to Europe and that the EU organic regulations have been taken as a reference by the Turkish Ministry of Agriculture and Rural Affairs, it is no surprise that six of the seven authorized companies in Turkey for organic certification are from Europe (Olhan et al., 2005).

In this paper we analyse archives from two control bodies concerning the results of sampling procedures of organic products. We want to analyse if the farms that are compliant with the organic production rules are different from those that are not compliant. This could help in designing more efficient inspection schemes, which could reduce the cost of certification, considered as a main obstacle for the competitiveness of Turkish organic farms (Rehber and Turhan, 2002). Given the available information, our analysis refers to possible differences between compliant and non-compliant farms, using a statistical testing based on the comparison of the proportion of crops produced. In what follows we consider an operator as non-compliant if he/she has received a sanction. Data and methods are described in the second section, results and discussion are shown in the third and fourth section, and the conclusions terminate the paper.

Material and Methods

Data are obtained from a sample of farms certified by two control bodies (which will be referred to as Control Body 1 and Control Body 2) in the period 2008-2009. The structure of the data archives for Turkey is quite different from that generally used for Western Europe countries. Basically two types of information are available: one referring to structural information for the certified farmers and processors and one referring to the sampling procedures implemented by the control bodies, that are used to check for possible non-compliances. Samples are taken from either unprocessed or processed products, and are submitted to appropriate laboratory analyses to check for use of chemicals in contrast with the organic regulation. If the samples result positive to illegal substances, a cross-check is done by analysing further samples: if the use of illegal substances is confirmed, the farmer/processors are considered non-compliant with the organic regulation and are sanctioned by de-certifying the whole product lot. In more severe cases, the whole farm/operator is excluded from further certification.

The number of inspected farms and the respective share of sanctioned farms are shown in Table 1.

The number of farms inspected by the two control bodies increases in the 2008-2009 period, and the share of sanctioned farms is not constant between the two datasets and through the two years. The share of sanctioned farms in 2008 for Control Body[1] is particularly high. The wide vari-

[1] Dipartimento di Scienze Agrarie, Alimentari e Ambientali – Università Politecnica delle Marche, Ancona-Italy, E-mail: zanoli@agrecon.univpm.it

[2] IAMO – Leibniz Institute of Agricultural Development in Central and Eastern Europe, Halle, Germany.

Table 1 - *Number of farms and non-compliances by year and control body.*

	Control Body 1		Control Body 2	
	2008	*2009*	*2008*	*2009*
Total Farms	960	1,397	1,911	2,816
Sampled farms	140	284	434	510
of which sanctioned	*52 (37%)*	*6 (2%)*	*19 (2%)*	*31 (6%)*

ability of the datasets is confirmed by the information shown in Table 2. Data from Control Body 1 shows a strong increase in the average size from 2008 to 2009, and an increase of the standard deviations. This is due to the inclusion of particularly large farms in the dataset, which are however not sampled, yielding a stable average size in the sampled farms. The situation for Control Body 2 is more stable between 2008 and 2009 for what concerns the average UAA size of total and sampled farms, but the size of sanctioned farms is particularly high in 2009. The high values of standard deviations confirm the general dispersion of data in both the datasets, which should be taken into consideration when interpreting the results of the analysis of potential determinants of non-compliance. With the exception of dimensional aspects, the differences between the two datasets are much lower for what concerns other structural aspects. The average age of the farmers is 54 and 51 respectively for Control Body 1 and Control Body 2; more than 90% of farmers are male in both datasets. Also, more than 40% of farms in both datasets only produce one type of crop. The most common crop types in both datasets are fruit, nuts, grapes, olives and vegetables (for Control Body 2 only).

We wanted to test if the occurrence of sanctions is more likely when some crops are produced. We have therefore considered the sampled farms, and distinguished between those that after the inspection received a sanction from those that did not. For the two groups of farms (sanctioned and not sanctioned), we have measured the proportion of farms with a specific crop, and with land in conversion. This allows testing for possible differences in the proportions of crops produced in the two groups of farms. The proportion test is based on large sample statistics and considers as a null hypothesis that there is no difference in the proportion of the two groups (Wang, 2000; Acock 2008). The test is based on the following assumptions:

– samples are taken randomly;
– each sample can result only in two possible outcomes: sanction yes or no;
– samples are taken from a large population (i.e. the number of sampled farm is much smaller than the total population).

Table 2 - *Utilisable arable area: total, sampled and sanctioned farms.*

	Control Body 1			Control Body 2		
	Total farms	*Sampled farms*	*Sanctioned farms*	*Total farms*	*Sampled farms*	*Sanctioned farms*
Average UAA, 2008 (ha)	9.8	3.0	1.6	8.8	18.3	11.3
std dev	*21.2*	*5.1*	*1.1*	*44.7*	*91.4*	*12.2*
Average UAA, 2009 (ha)	29.0	5.1	7.7	7.1	17.5	54.6
std dev	*613.7*	*7.2*	*6.1*	*32.7*	*72.7*	*172.8*

Here we compare two proportions: p_{i1} referring to the proportion of sanctioned farms producing the *i-th* crop, and p_{i2}, referring to the proportion of non-sanctioned farms producing the *i-th* crop. A large sample confidence interval (1-α) for the difference of two proportions can be defined as:

$$(\hat{p}_{i1} - \hat{p}_{i2}) \pm z_{1-\alpha/2}\sqrt{\frac{\hat{p}_{i1}\hat{q}_{i1}}{n_{i1}} + \frac{\hat{p}_{i2}\hat{q}_{i2}}{n_{i2}}}$$

where:

$\hat{p}_{ij} = 1$, $\hat{p}_{ij}$, $j = 1, 2$, and z is the value of the inverse normal distribution, given the sample size and the significance level. A test of difference of the two proportions p_{i1} and p_{i2} is defined as:

$$z_i = \frac{\hat{p}_{i1} - \hat{p}_{i2}}{\sqrt{\hat{p}_{ip}\hat{q}_{ip}(1/n_{i1} + 1/n_{i2})}}$$

where $\hat{p}_{ip} = \frac{x_{i1} + x_{i2}}{n_{i1} + n_{i2}}$ and x_{i1} and x_{i2} are respectively the total number of sanctioned and non sanctioned farms producing the i-th crop.

Results

Table 3 shows the results of the proportion tests. Figures represent the percentage of farms producing the specific crops in the two groups of sanctioned and non-sanctioned farms. The aim is to analyse if the proportion of sanctioned farms is higher if they produce a specific crop. As we do not have information directly associating crops and sanctions (we do not know if a sanction was originated by a specific crop production), we can only associate the sanction occurrence with the crop structure of a farm. Therefore we can measure if the proportion of, say, farms producing nuts is statistically higher for sanctioned farms. In this example we can only conclude that sanction's occurrence is higher for farms producing nuts, but nuts production is not necessarily the one causing sanctions, as these could be due to other crops produced in the farm. Figures in bold refer to crops that have a significantly different proportion between sanctioned and non-sanctioned farms. In these cases, if the proportion of a crop is higher for the sanctioned farm, then we can conclude that this crop significantly increase the risk of sanctions, and vice versa. For example, the average of farms producing nuts in 2008 is significantly higher for the sanctioned farms of the Control Body 1, while it is higher for non-sanctioned farms of the Control Body 2.

Discussion

Results from Table 3 show a different situation from the sampling outcomes of the two control bodies. In particular the comparison of proportion of crops from Control Body 1 looks variable between 2008 and 2009, probably due to a general change of the certified farms and of the sample characteristics. Two crops show a statistically significant difference in proportions between sanctioned and non-sanctioned farms for both 2008 and 2009: herbs and vegetables.

Table 3 - *Proportions of crops for sanctioned and non-sanctioned farms, and respective results of proportion test.*

	Control Body 1				Control Body 2			
	2008		2009		2008		2009	
Crops	Sanction Yes	Sanction No	Sanction Yes	Sanction No	Sanction Yes	Sanction No	Sanction Yes	Sanction No
Cereals	0.08	0.10	0.33	0.17	0.05	0.09	0.06	0.15
Dried pulses	0.08	0.02	0.00	0.03	0.00	0.05	0.13	0.06
Root crops	0.02	0.01	0.00	0.03	0.00	0.00	0.00	0.00
Ind. crops	0.00	0.01	0.00	0.04	**0.21*** **	**0.02*** **	**0.16*** **	**0.01*** **
Herbs	**0****	**0.09****	**0.66*** **	**0.05*** **	0.21	0.11	0.19	0.18
Green fodder	0.00	0.02	0.33	0.04	0.00	0.06	0.00	0.06
Other arable	0.00	0.00	0.00	0.00	0.00	0.07	**0.16*** **	**0.04*** **
Perm. grass.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Fruit	0.85	0.84	1.00	0.74	**0*** **	**0.27*** **	**0.13****	**0.31****
Nuts	**0.25*** **	**0.04*** **	0.00	0.12	**0*** **	**0.27*** **	0.13	0.22
Citrus	0.00	0.00	0.00	0.00	0.05	0.03	**0.26*** **	**0.002*** **
Grapes	0.00	0.06	0.00	0.09	0.37	0.30	0.13	0.25
Olives	0.00	0.01	0.00	0.12	**0.05***	**0.24***	0.13	0.23
Fallow land	**0.19*** **	**0.03*** **	0.17	0.06	0.16	0.11	**0***	**0.09***
Vegetables	**0.96*** **	**0.44*** **	**0****	**0.46****	**0.21****	**0.07****	**0.13*** **	**0.03*** **
Land in conv.	0.04	0.06	0.00	0.64	**0.42****	**0.18****	**0.74*** **	**0.16*** **

*Significance levels: * $0.1 \leq p < 0.05$; ** $0.05 \leq p < 0.01$; *** $p \leq 0.001$.*

However, in both cases the results are opposite for the two years: the proportion of sanctioned farms producing vegetables is significantly higher in 2008, and is lower in 2009. The opposite results apply to herbs. Finally, the proportion of farms with nuts and fallow land is higher for sanctioned farms but only for 2008. The situation referring to Control Body 2 looks more consistent across the two years. Sanctioned farms are consistently showing a higher proportion of industrial crops, vegetables and in-conversion land for both years. The relevance of vegetables for sanctioned farms is the only one for which some analogy between the two control bodies can be found, even if the results are not consistent through time. Sanctioned farms are also showing a higher proportion of citrus and other arable crops, but only in 2009. Also interesting for what concerns Control Body 2, is the higher share of sanctions associated to the land under conversion, and to industrial crops production for both years. Unfortunately there is no literature on the issue of non-compliance in the organic sector in Turkey, to make any comparison of results. We can however refer to similar analysis made for Italy (Gambelli et al., 2011a, Gambelli et al., 2011b). Despite the obvious structural differences between the two countries, the Italian case provides relevant information for Mediterranean organic production, which will be used as a benchmark for the main findings of the analysis of the Turkish organic farms. On one hand, in Italian organic farms olives, fruit, and citrus production are associated to a reduction of the risk of non-compliance, a result analogous to the proportion test based on Control Body 2 data. On the other hand, the higher risk of non-compliance of farms producing vegetables and exhibiting non-organic land is consistent with the results from the Italian situation, too.

[3] To our knowledge the only systematic – yet a priori, non-empirical – approach to non-compliance risk assessment is that of Accredia (2009).

Conclusions

Non-compliance in organic farming is still a topic not well explored. Very little literature exists, and even the practitioner's approaches are few and not well documented.

Results of this study show some regularities but also many inconsistencies between the two datasets, and through time which limits generalisations. Vegetable production is the only product showing evidence for both Control Bodies (though not for all years) of a higher share of sanctions.

On the other hand, a higher proportion of non-sanctioned farms is referring to fruit for both 2008 and 2009, and to olives and nuts in 2008, though these results are only referring to one Control Body. Fruits and nuts represent the main organic production in Turkey (Sayne et al. 2005). Results concerning the relatively lower risk of sanctions associated to these products represent therefore a positive aspect in terms of development of export potentials. These results are also relevant for what concerns the domestic demand for organic products. Our results, though partially, indicate a rather reassuring situation concerning the risk of non-compliance, and therefore the overall quality, at least for the main Turkish organic products. Akgüngör et al. (2010) show a relevant interest of urban Turkish consumers for certified organic products, and considerable concern for aspects like health and hygienic characteristics of the products, while İlyasoğlu et al., (2010), show how Turkish consumers confidence in organic food is still moderate. Given these considerations, the potential of a reliable and efficient certification system seems particularly relevant. The development of domestic consumption for organic products puts the basis for the diversification of the demand for organic products, making the sector depending not only on export. However this should be considered only a preliminary insight on these issues, and the variability of the sample of data, and of results clearly show the need for further analysis, and data collection.

In term of policy, the implications of this study are twofold. On one hand, a more structured framework to guide risk-based inspections and sampling is advisable, and this would need some additional information at the operator's level, as it is reasonable to expect that structural data alone cannot completely explain non-compliant behaviours. On the other hand, the Turkish inspection system appears quite advanced and well integrated in the EU system. A transition from a full equivalent certification system into the current EU-wide system – in case of Turkey accession to the EU – would not be so difficult.

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