Organic agriculture and sustainable practices: towards a typology of innovative farmers

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Key words: organic farming, conventionalisation, probabilistic model, innovation, certification,

Abstract

This paper aims to identify the factors that influence the choice of organic farmers to innovate for more sustainable practices that go beyond the strict limits imposed by the certification. Using survey data collected from 352 Italian and Portuguese certified organic farmers, a probabilistic model was estimated. The results show that farmers, in particular women, longest engaged in organic farming are more likely to adopt sustainable practices. They also indicate that farm size, landownership, the existence of some types of complementary activities and the sources of information used by farmers affect the adoption of such practices.

Introduction

Most definitions of organic farming emphasize a holistic approach that combines quality production with sustainable practices and positive impacts on resource conservation, biodiversity and animal welfare (e.g.FAO/WHO 1999, EU 2007). Its founding values were also connected to small-scale production, minimization of external inputs use, diversification and short market circuits. In the last decades, organic farming has grown very rapidly resulting in the subordination of their values to market forces. There was a greater specialization, an increase of scale, the involvement of large multinational corporations and the inclusion in global trade. This conventionalization process (Darnhofer *et al.* 2010) and the connected certification standards, primarily focused on banning the use of pesticides and chemical fertilizers, may weaken the vision of organic farming as a more sustainable alternative to conventional farming. Following the line of thought of Alrøe and Noe (2008), it cannot be said that the concept of organic agriculture is fully consolidated. There are several perspectives that offer different insights, may vary over time and are, in general, not easy to merge. Leaving aside more radical views, we are particular interested in the dialectic established between the protection of a system based on common values and the integration of it into the global market. The challenge remains to understand how to grow, to incorporate new actors and technologies and to integrate in global markets without losing the internal coherence and without deeply departing from the core values (IFOAM 2005). This lead to a huge debate in sustainability of organic farming, however we should recognize that sustainability is a moving target. In this sense it could be interesting to define innovations that goes in the direction of agricultural sustainability. In the case of EU SOLIBAM project (www.solibam.eu), in which this research is included, participation and diversity at different level are the main criteria to assess sustainability of innovations.

Material and methods

The main aim of this study is to identify the profile of organic farmers more likely to innovate and to adopt sustainable practices, drawing on the estimation of an empirical model based on a survey conducted in two European countries where this issue has not been addressed: Portugal and Italy.

The following analysis is based on a survey of 352 certified organic farmers, being 182 Italian and 170 Portuguese, held between 2010 and 2012, using a fully structured questionnaire. Several survey methods were applied. In Italy most of the data was collected by personal interviews, combined with telephone interviews. In Portugal, the data was mainly collected by mail, although some personal interviews took place. The questionnaire focused on different aspects of farmers, farm structure (including acreage, main crops and livestock), varieties and seeds, other activities besides farming and social network (market, main sources of information). Since the concept of sustainability is inherently multidimensional, covering at least economic, social and ecological issues, the dependent variable was also defined in a multilevel way to capture specialization, reliance on external inputs and type of marketing.

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Table 1: Variables

	Variable	Description
DEP.	Innovative	Dummy variable equal to 1 if yes; 0 otherwise
INDEPENDENT VARIABLES	*Characteristics of farmers*	
	Country Gender Experience	Dummy variable equal to 1 if Portuguese, 0 otherwise Dummy variable equal to 1 if male, 0 otherwise Experience in organic farming, in years
	Characteristics of farms	
	Total acreage (log acreage)	Logarithm of total cultivated area
	Percentage Area Owned	Categorical variable: own1 – 1 if 100% of total farm area owned by the farmer; 0 otherwise own2 – 1 if some part of farm area owned by the farmer; 0 otherwise own3 - if 0% of the total farm area owned by the farmer; 0 otherwise
	Labour	Categorical variable: lab1 –1 if 100% family labour; 0 otherwise lab2 – 1 if both types of labour; 0 otherwise lab3 – 1 if 100% hired labour; 0 otherwise
	Irrigation *Other activities on farm* Act *Main Information sources* 10 different sources considered.	Dummy variable equal to 1 if yes; 0 otherwise Dummy variable equal to 1 if there are other activities on farm; 0 otherwise Dummy equal to 1 if the source; 0 otherwise (family and friends, other farmers, private technical services, supply companies, org.farmers organizations, other producers organizations, universities/other public services, specialized press, others.

The possibility to innovate for sustainability was described by the following four criteria: 1) Crop diversity; 2) Presence of livestock; 3) On-farm reproduction of seeds; 4) Selling in local markets. A farmer was classified as able to innovate for sustainability if at least three of the late four criteria were met. The dependent variable – *Innovative* - is a binary variable, assuming the value 1 if the farmer is classified as innovative and 0 otherwise and a nonlinear probability model was specified relating several independent variables to the probability of an organic farm to innovate for sustainability (Long and Freese, 2006), described in table 1. The estimation method was logistic regression with 95% confidence intervals for estimated coefficients.

Results and discussion

The table 2 shows the result of the model estimation.

Table 2. Model estimation

Logistic regression			Number of obs =	299	
LR chi2(20) = 71.23			Prob> chi2 =	0.0000	
Log likelihood = -162.646611			Pseudo R^2 =	0.1796	
Sustainable	Coef.	Std. Err.	dy/dx	z	P>z
country ***	-1.1982	0.4022	-0.2623	-2.98	0.003
Gender***	-1.0062	0.3229	-0.2079	-3.12	0.002
Experience*	0.0432	0.0262	0.0098	1.65	0.099
Logacreage**	0.2156	0.0937	0.0487	2.30	0.021
own2	0.4588	0.3489	0.0996	1.32	0.189
own3	-0.5289	0.3949	-0.1244	-1.34	0.180
lab2*	-0.5792	0.3475	-0.1313	-1.67	0.096
lab3*	-0.7429	0.4126	-0.1757	-1.80	0.072
Irrigation*	0.6555	0.3717	0.1544	1.76	0.078
act***	1.0528	0.2993	0.2313	3.52	0.000
inf1	0.0846	0.3303	0.0190	0.26	0.789
inf2	0.3506	0.2906	0.0794	1.21	0.228
inf3	-0.4189	0.3417	-0.0948	-1.23	0.220
inf4	-0.6725	0.4345	-0.1607	-1.55	0.122
inf5	0.0820	0.2923	0.0185	0.28	0.779
inf6	-0.4436	0.3221	-0.1017	-1.38	0.168
inf7 ***	1.0091	0.3790	0.2024	2.66	0.008
inf8	-0.2658	0.2973	-0.0604	-0.89	0.371
inf9	-0.1146	0.3205	-0.0259	-0.36	0.721
inf10	0.5198	0.4924	0.1084	1.06	0.291
_cons	0.6162	0.6454	0	0.95	0.340

***Statistically significant at p-value<0.01; **Statistically significant at p-value<0.05; *Statistically significant at p-value<0.1
For dummy variables dy/dx is for the discrete change from 0 to 1.

The main descriptive statistics show that 63.3% of the participant farms can be classified as innovative for sustainability, using the criteria previously defined. In relation to gender there is a predominance of men, as it happens in the population of organic farmers in both countries. The average age of participants is 46 years and average experience in organic farming is about 8 years, ranging between 0 and 36. Acreage has a great variability with values from 0.05 to 4000 ha. Most of the farmers are landowners and 34% of farms are typically household farms, employing only family labour. Marginal effects for all independent variable were evaluated at their mean. From the estimation results (success 72.3%) we can conclude that the dependent variables with significant effect on the probability of adoption of innovative sustainable strategies by organic farmers are: *country*, *gender*, *experience*, *acreage*, *lab2* and *lab3*, *irrigation*, *act* and *inf7*.

Looking at these outcomes in more detail, one may conclude that, other things remaining constant, Italian farmers are 26% more likely than Portuguese to adopt sustainable farming practices. The same applies to women who are significantly more likely than men to adopt such practices. Although in the limit of statistical significance, it is possible to conclude that earlier organic farming exerts a significant effect on sustainability practices. The coefficient is positive, confirming the dominant idea in the literature about conventionalisation of organic agriculture, but not large. For each year in organic farming, the probability of being “sustainable” increases less than 1%. Acreage is also significant, even though with an influence opposite of the expected. Ceteris paribus, the higher the acreage, the higher is the probability of sustainable practices adoption. Controlling for the other variables, the probability of a farm being sustainable is about 5% higher for each percentage point increase in the total agricultural area. In other words, large-scale producers are more likely than small-scale producers to apply diversity as a driver of farm management. Although opposing the conventionalization hypothesis, this result is not entirely unexpected, since traditional organic farming practices include, among other things, crop rotation, fallow and extensification, which requires additional agricultural area. In what concerns labour, results show that family farms are probably more innovative in sustainability. This probability reduces 13% when comparing farms that only rely on family labour to those that also employ hired labour and 17% when comparing the former with those that only employ hired labour. As expected, irrigation has a positive impact in the probability of innovate for sustainability, mainly because it allows diversification in spring-summer crops. The existence of other activities on farm also exerts a strong influence. Other things remaining constant, having such activities raises 23% the probability of an organic farmer to innovate with “sustainable” practices. To conclude, the model shows that farmers who have universities or other public services as one of their main sources of information have 20% higher probability of innovate for sustainability than others.

Conclusions

The model estimation gave important indication on the characteristic of organic farms that are more likely to innovate to increase their sustainability. A need to focus on the farmer much more than on the farm to look at value and principles emerge from the results. A particularly relevant result is related to the source of information that more influence the capacity to innovate of organic farmers. The role of universities and public advisory services represent a potential impact of innovation policies oriented to sustainability.

References

Alroe, H., andNoe, E. (2008). What makes organic agriculture move: protest, meaning or market? A polyocular approach to the dynamics and governance of organic agriculture. International *Journal of Agricultural Resources, Governance and Ecology*, 7(1-2), 5-22.

Darnhofer, I.; Lindenthal, T.;Bartel-Kratochvil, R. and Zollitsch, W. (2010). Conventionalisation of organic farming practices: from structural criteria towards an assessment based on organic principles. A review. *Agronomy for Sustainable Development*, *30*(1), 67–81.

Council Regulation (EC) N.834/2007

FAO/WHO (1999). *Guidelines for the production, processing, labeling and marketing of organically produced foods.* Codex Alimentarius Commission.

IFOAM. (2005). *Principles of Organic Agriculture* (p. 4). IFOAM - International Federation of Organic Agriculture Movements, Bonn.

Long, J. and Freese, J. (2006).*Regression Models for Categorical Dependent Variables Using Stata*. Stata Press Publication, College Station, Texas.