The choice between conventional and organic farming. a Hungarian example[1]

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Abstract: The paper deals with organic produce in one of the largest and, concerning organic production one of the most diffused counties in Hungary, Pest County located in the north-central part of the country. Factors influencing farmers' decision on adopting or not e.g. farm size, farm type, location, structure, market for organic products, existence of organic AEM were analysed. Hypotheses based on previous empirical literature were tested by a model explicitly accounting for the effects of farm-specific variables like age, education, size of farms and share of rented land. Logit model was estimated on a cross-section data set of Hungarian farmers for the period 2007. It appears that education has a positive impact on the choice between conventional and organic farming, and, the size of the farm in hectares has a negative effect on this choice. Age and some general considerations on environmental friendly technologies do not have a significant effect on choice between conventional and organic farming.

Key words: innovation, attitudes, organic production, diffusion, agri-environmental measures.

1. Introduction

The organic agriculture represents a promising alternative for the future of European agriculture. It is consistent with the notion of sustainable development set forth already in the 1992 CAP Reform. Despite of increasing importance of organic farming in European agriculture, the research on organic farming is rather limited. The recent papers analyse the situation and motivations of organic farms only in some European countries: for example in UK (*Burton* et al., 1997, 1999; *and Rigby* et al, 2001), in Spain (*Albisu and Laajimi,* 1998) in Portugal (*Costa* et al, 2005) and in Netherlands (*Gardebroek,* 2002). This scarcity of the research is especially true for New Member States of the enlarged EU. Our contributions to related literature are twofold. First, this paper investigates the choice between conventional and organic production technologies for individual farmers in a New Member State, namely in Hungarian agriculture. Second, similarly to previous research we apply simple binary logit model for investigation of farmers' motivations.

The rest of the paper is organized as follows. Section 2 describes the survey design and the variables. The results are presented in section 3. The last section summarizes and offers some conclusions on the implications for the development of organic farms in Hungary.

2. Survey design and variables

In Hungary focusing on organic produce started in early eighties of the last century by founding a Club of Organic Producers in 1983. The successor of the Club, the Hungarian Federation of Organic Producers (Biokultura Egyesület) (HFOP) was founded in 1987. HFOP has 13 members of legal entity covering organic production across the country. Its profile covers wide range of activities from diffusing philosophy of organic farming through representing the interests of stakeholders up to supporting related research. Meanwhile HFOP has established Biokultura Hungary Ltd and the latter was authorized to register new applicants, controlling them at least once in every year and, releasing certificate if the producer met the requirements. 95 per cent of released certificates of organic farming come from Biokultura Hungary Ltd.

Looking at main tasks of HFOP the following can be mentioned: Communicating organic produce to the public; representing the philosophy of organic production to authorities; supporting organic programs; making the administrative requirements of organic production clear to producers; receiving new applicants; collecting, processing and spreading information on organic produce; protecting to establish new local units for a network of organic producers; helping to develop rural tourism.

Legal basis for organic productions is provided by Council directive of 2092/91/EGK and two more national directives as

140/1999 released by the government and one, 74/2004 of Ministry of Agriculture and Rural Development (MoARD). HFOP keeps record of all organic producers in this country and provides producers with information related to production, quality, market and, technology issues. Producers can put data and information on the website of NFOP after having the permission of Biokultura Hungaria Ltd.

Organic production has had an upswing in the late 80s and 90s of the last century and early this decade in Hungary, however, the dynamic was slowed down during last years.

Table 1. Diffusion of organic production in Hungary (1995–2005)

Year	Number of organic farms	Total area covered by organic produce
1995	108	8232
1996	127	11937
1997	161	15772
1998	330	21565
1999	327	32609
2000	471	47221
2001	764	79178
2002	995	103672
2003	1255	113816
2004	1420	128690
2005	1353	122615

Source: http://www.biokontroll.hu/biokontroll.php

Data on organic production besides Central Statistical Office (CSO) has also been produced by HAOP and Biokultúra Hungária Kht, however, data from CSO and from the latter two sources were not in line with each other. CSO recorded 3300 organic farms with 217402 ha in 2000 (AMÖ, Agricultural Census) at national level and, 382 individual farms and 11 agricultural companies for Pest county. According to CSO report in 2004 the number of organic farms amounted to only 118 in Pest county half of them converted and another half in conversion, while for the Pest county HFOP recorded only 88 organic farms in the same year. During the survey, the latter made it possible to contact all recorded 88 organic farms, 52 of which were still in operation.

As accessing individual data of organic and conventional producers is very limited and such data cannot be found in published statistics, finally, two databases were used for sampling. First, a nationwide database of HFOP covering all counties and keeping records on organic producers on a voluntary basis. Second, concerning conventional producers a database of Agricultural Chamber of Pest county was used.

Concerning conventional farms the target was to have 99 farms in the sample with more or less equal distribution between sub-groups of ESU 1.00–1.99, ESU 2.00–5.99 and ESU 6.00–49.99. As no data on farm size by ESU was available in the database an iterative approach in sampling was required to be applied. In the Agricultural Chamber's database 677 conventional farms were recorded with ESU mostly above one. Farms with less than one ESU (not market oriented) were dropped. Only during the interviews it was

turned out which size category the farm belongs to. In the first run 99 conventional farms out of those with ESU above one were selected. However, to find the right number of farms for the sample in each category additional runs of sampling were needed. In the second, the third, and the fourth run further 35, 30, and 30 farms were selected. In number of cases it also turned out that the farms did not exist any more. In the four runs we have randomly selected total 194 farms. 127 out of 194 were interviewed. Among them there were 31 farms with 1.00–1.99 ESU and 31 with 2.00–5.99 ESU, and 35 farms with 6.00–49.99 ESU. In addition, interviews with further 30 farms with 50 ESU and above were done. Data on the latter farms were not dropped, but used in the analysis.

Descriptive analysis shows that organic farmers are on average almost in the same age and higher educated. Furthermore, organic farms have on average less land with smaller rent.

3. Results

We analyse the farmers' intentions in two steps. First, we investigate the motivations of farmers for being organic producers using descriptive and multivariate statistics. Second, we analyse the potential determinants of the adoption decision (both economic and demographic variables) using logit analysis.

3.1. Reasons for being organic producers

The theme concerned with potential reasons for being an organic producer employed a 12-item scale that measured the importance of these features in a co-operative choice context (1 = not at all important, 7 = very important). *Figure 1* shows the importance in descending orders attached by producers to various factors for being an organic producer. The most important factors are for being an organic producer healthy environment, market for organic products, existence of organic AEM and existing contract. Interestingly, successor and risk of crop failures are unimportant factors. Furthermore, other factors such as farm type, labour availability, structure, and farm size are also not too important factors for farmers.

Figure 1: Importance of various factors in the decision to produce organically (1 no importance; 7 very important)
Source: Own estimations based on the survey

The factors were further analysed to explore underlying dimension of the producers' decisions for being organic farmers. The original variables consisted of 12-item seven-point scale concerned with the importance of factors for the decision of organic producers. However, the communalities for the attributes concerned with "Successor" and "Labour availability" and "Risk of crop failures" were judged to be too low (< 0.50) indicating that the set of derived factors explained a low proportion of the variance of those attributes. Consequently the three attributes were excluded from the subsequent analysis. The final solution was derived on the basis of varimax rotation and the extraction criterion was to derive factors with eigenvalues greater than unity which generated a solution in two factors.

Table 1: Rotated factor matrix solution:
the factor influencing on farmers' decisions

	1	2	communalities
farm size	0.7563	0.2336	0.6275
farm type	0.7891	0.2977	0.7171
Location	0.7743	0.2260	0.6522
Structure	0.8059	0.2487	0.7217
healthy environment	0.5498	0.4928	0.5553
market for organic products	0.2835	0.7052	0.6492
existing contracts	0.2720	0.6760	0.6135
existence of organic AEM	0.2357	0.8334	0.7511
experience with other state scheme	0.2684	0.7737	0.6786
Variance (per cent)	0.5754	0.1576	
Cummulative variance (per cent)	0.5754	0.7330	
Eigenvalue	5.1787	1.4186	
Bartlett test (p value)	0.000		
Kaiser-Meyer-Olkin measure of sampling adequacy	0.891		

Source: Own estimations based on the survey

The Kaiser-Meyer-Olkin measure of sampling adequacy is 0.891, indicating that data matrix has sufficient correlation to justify the application of factor analysis. Bartlett's test of sphericity accounts for the significance of the correlation matrix. In our case it is large and statistically significant at the one per cent level, so that hypothesis that analysed matrix is the identity matrix can be rejected. Consequently, the factor analysis is meaningful.

The two-factor solution explains 73.3 per cent of the total variance in the data set, which is satisfactory. The cut-off for interpretation purposes is factor loadings greater or equal to 0.5 on at least one factor. The first factor is most strongly correlated with the variables "farm size", "farm type", "location", "structure" and "healthy environment" (Table 1). The second factor is associated with "market for organic products", "existing contracts", "existence of organic AEM" and "experience with other state scheme".

3.2. Adoption of Organic Agriculture

We apply a model that explicitly accounts for the effects of farm-specific variables like age and education, size of farms, share of rented land. We focus on the following hypotheses based on previous empirical literature (*Padel and Lampkin,* 1994; *Burton* et al., 1999).

Age. It is often stated that organic farmers are younger on average than conventional farmers. The hypothesis for this observed difference in age is that organic farms' practices are often implemented with a change of farm ownership (e.g. farmer's child taking over farm control from parents). An additional hypothesis is that older farmers are more conservative than younger farmers are and therefore more resistant to organic farming.

Education. Another often stated difference between organic and conventional farmers is the education level. Explanations are given those organic farmers that are new entrants to organic farming are usually high-educated and idealistic. However, it could also be that higher educated farmers expect to cope with difficulties in organic farming better than conventional farmers.

Size of farm. The relation between organic farming and farm size differs by country. However, the hypothesis is that there exists a positive relation between organic farming and number of hectares. Organic farms are more extensive than conventional farms requiring more land for pasture. Moreover, organic farms use more roughage than concentrated feed and this roughage may be produced on the farm, requiring more land.

Rent. If the major part of the farm is rented, deciding to farm organically may raise objections from the landlord. This conflict may also have an impact on the decision process.

In addition, we consider three additional control variables, namely being full time farmers and family farms, and diversification of production.

Therefore, the theoretical model we test is:

Prob(Adoption of organic farms)=f(Age, Education, Size of farms, Rented land, Full-time farm, Family Farm, Diversification).

The expected signs of the variables are as follows:

f1<0, f2>0, f3>0, and f4<0. For f5-f7 variables we do not have any a priori expectations

Dependent variable. The dependent variable in our model is Adoption, taking value one if farm is organic, otherwise zero.

Explanatory variables.

Age: the age of farmers.

Education: farmers' final level of education.

The size of farm. The size of the operation is measured by two variables: the total area in hectare (Hectares) and number of European Size Unit (ESU).

Rented land. The share of rented land in total area.

Full-time farm. Binary variable taking value one if a farm is full-time otherwise zero.

Family farm: Binary variable taking value one if a farm is family otherwise zero.

Diversification. Production diversity is measured number of products in production

We consider various specification estimating two farm size proxies separately. In addition, we check whether does

Table 2 Binomial Logit Results for Adoption of Organic Agriculture

	1	2	3	4
Age	0.003	0.004	0.001	0.004
Education	0.341**	0.360**	0.363**	0.373**
Hectars	-0.000		-0.002	
Hectars2			0.000	
ESU		-0.003		-0.005
ESU2				0.000
Rented land	-0.003	-0.002	-0.002*	-0.002
Full-time	0.848**	0.855**	0.826**	0.874**
Family farm	-0.930*	-1.047**	-0.981*	-1.089**
Diversification	1.743***	1.805***	1.787***	1.821***
constant	-4.014***	-4.069***	-3.849***	-4.088***
N	179	179	179	179
Pseudo R^2	0.1591	0.1653	0.1626	0.1662
Correctly classified	73.18%	73.18%	71.51%	73.18%

Source:Own estimations based on the survey
legend: * p<0.1; ** p<0.05; *** p<0.01

nonlinear relationship exist between the size of farm and the adoption of organic farm, thus we apply squared size variables (Hectars2 and ESU2). Our estimations reveal that being family farmers has negative, whilst being full time farmers, higher education and having more diversified production structure have positive impact on the adoption organic farmers. Interestingly, age of farmers and size variables in both forms have no significant impacts on the farmers' decision.

4. Conclusions

Bio-production was rather low in the first half of the eighties but expanded very fast and production by land use was 14 times more in 2004 than that of 1995 followed by a decline in production. Against expectations, mid-term projection on fast expansion of organic produce has not been justified.

Motivations on encouraging adoption were connected with healthy environment, market for organic goods, existence of Agro Environmental Measures and existing contracts.

Determinants for switching to organic produce can be grouped into two main factors. First: farm size, farm type, location, structure, healthy environment. Second: market for organic products, existing contracts, existence of AEM and experience with other state schemes.

Looking at estimation on becoming organic producer one can conclude: positive impact on adoption came from the following factors: full time farmers were more ready for starting organic production. Farmers with higher education background found more convincing arguments and were more prepared to start organic produce. Diffusion was more significant among farms with more diversified production. Age of farmer had no significant impact on adoption, although, it was expected that young farmers are less resistant to organic farming. Size of farm did not play an important role on adoption either. Surprisingly, being family farmer had a negative impact on switching the farm to become an organic one.

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