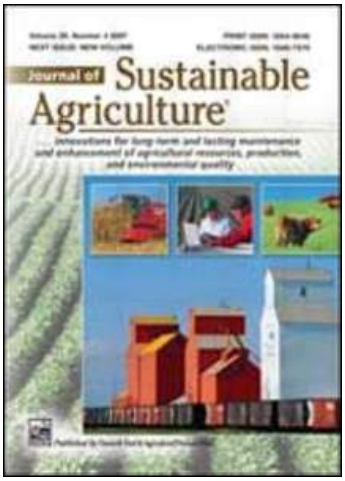

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The Diffusion of Organic Farming in Lithuania

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The institutions governing organic farming in Lithuania constitute an unusual mix: relatively low information and support services are coupled with a high level of subsidy and low market prospects in the short to medium term. While the literature emphasizes a complex set of reasons for conversion consisting of personal (financial, health, environmental and other concerns), farm-related, and sometimes institutional factors, the hypothesis for Lithuania is that financial support is the dominant reason for increasing diffusion, not least because adoption numbers match the development of subsidy levels fairly well. To investigate this, and to understand why the majority of farmers still do not convert in face of relatively high financial support, a survey with organic and conventional farmers was conducted during spring and early summer 2005.

The results suggest that the main motivations for future in-conversions are primarily connected with economic and farm management reasons. These depend primarily on the farm type; whether farmers believe that it is possible to manage an organic farm effectively; the subsidy, and related to this, the farmers' expectations of effects on land and land-rent prices. The survey points also to substantial farm-support deficits, with a low uptake of extension services in general and low availability of organic farming specific advisory services. By concluding, we recommend to rebalance direct subsidy levels with investments into support infrastructure and market development to increase the

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effectiveness of the whole organic farming 'system,' Finally, we critically discuss effects of land capitalisation of relatively high direct organic subsidies, which might have distorting effects if they are not linked to production levels.

KEYWORDS organic farming, agri-environmental measure, adoption, innovation diffusion, social influence, logistic regression

INTRODUCTION

The diffusion of organic farming is often seen as an option for increasing the income of farmers and showing positive effects on the environment in rural areas. According to the Food and Agriculture Organization of the United Nations (FAO, 2002) the term organic agriculture determines a system that relies on environmental protection and management, employment in rural areas, healthy lifestyle and natural fresh foods rather than production volume. Organic farming is sometimes also seen as having the potential to address problems caused by increased internationalisation of trade flows such as high food miles (ibid). Though, this can only be assured if this is connected with the development of appropriate standards. For a successful development of organic farming the FAO suggests that it is necessary to support cooperation of small farms, for example by encouraging the establishment of associations, and by developing organic farming together with rural tourism. In Lithuania, farming practices have partly been similar to organic farming standards for several reasons, of which an important one is that farmers could not afford costly inputs after the fall of the Berlin Wall. This should reduce thresholds for adoption as long as subsidy levels compensate for a slowly developing domestic market.

Organic farming has a short but recently buoyant history. It is likely that one of the reasons of such a rapid expansion of organic farms is noticeably higher financial support after Lithuania joined the EU. This study investigates whether this hypothesis is valid, which other determinants are relevant and whether amendments to the incentive structure should be made to support the development of the organic farming sector. Although mainly based on the innovation diffusion literature (Rogers, 1995), it is beyond the scope of this paper to make extensive theoretical links to previous findings (for recent applications and literature reviews, see Parra-Lopez et al., 2007 and Padel, 2001). Instead, the focus is on the specific institutional and farm-related circumstances in Lithuania as an example for a country on the way to full integration into the European Union.

This study is the first attempt to evaluate the diffusion of organic farming practices in Lithuania more comprehensively. In 2004, the Lithuanian Institute of Agrarian Economics (2005) carried out a survey of organic farmers only. In contrast, the present study investigates what differentiates

organic and conventional farmers, and what can be learned to adapt policy making towards a more effective and efficient diffusion path.

In the following section, we discuss shortly the organic farming literature with special focus on the situation in Lithuania. An overview of the methods applied for collecting and analysing the data is presented in chapter three. It follows a description of the study area, a historic view on the institutions influencing organic farming, the farm population, empirical results, and finally a discussion where policy lessons are drawn.

RESEARCH ON ORGANIC FARMING IN LITHUANIA AND BEYOND

Some research has already been done on organic farming in Lithuania, although it is still a relatively recent phenomenon. Rutkovienė and Zemeckis (2001) and Ribašauskienė and Kairytė (2004) describe the difficulties with developing markets for organic produce. This was updated by Rutkoviene and Abraityte (2006) who diagnosed that, in 2005, demand for organic products was somewhat higher than supply though price premiums were coming down on a number of products in comparison to the preceding year, presumably because of higher availability in supermarkets.

Baliukonienė and Bakutis (2003) and Jankauskas (2004) express concern about the comparatively high direct subsidies for organic farming following EU accession which was decided upon without, in their opinion, sufficient support from microbiological research about food quality and safety, or feed quality. This judgement needs probably to be interpreted against the background that conventional farming practices had already depleted the soil in large parts of Lithuania because of poor farming practices in the past. If the main focus of organic farmers would be to receive the subsidy without changing these practices substantially, food quality might still be poor. Also Mažvila, Pekarskas, and Arbačiauskas (2003) as well as Pekarskas (2005) emphasize that organic farming and conventional farming alike can lead to decreasing humus content in the soil if farm practices do not follow good practices.

Znaor (2002) concludes that only in case of an organic output of 10% to 20% of the total agricultural output organic farming becomes beneficial to the national economy due to discernable environmental improvements, in particular when it is related to the concentration of nitrogen in soil. However, the author also indicates that the extensive methods of farming prevailing in Central and Eastern Europe are unsustainable; they have no benefits from the economic viewpoint and often cause soil erosion and decrease nutrients in food. Thus, the prevailing farm system is not viable over the long-term. Since these studies were done, the knowledge about the effects of organic farming techniques has increased, and the international literature seems to

converge on organic farming having some discernable advantages over conventional farming, if applied appropriately (Fliessbach et al., 2007; Herencia et al., 2007; Hole et al., 2005; Mader et al., 2007; Marinari et al., 2006; Mitchell et al., 2007; Pacini et al., 2003; Pimentel et al., 2005; Saha et al., 2007; Srivastava et al., 2007), although some questions remain still unanswered, like for example effects on biodiversity on the farm (Clough et al., 2007; Gibson et al., 2007; Hyvonen, 2007), and its performance in colder climes like in Sweden and Norway (Eltun et al., 2002; Kirchmann et al., 2007).

Wos and Joswiak (2003) suggest for Polish agriculture, which might be seen to be valid beyond the borders in Lithuania, that their agricultural products are currently not able to compete with the Western European countries. Therefore, it makes sense to develop high quality (niche) strategies, of which organic production can be one, especially as some of the presently practiced farming methods are already close to organic farming standards.

When it comes to the analysis of reasons for the adoption of organic farming, Lithuanian Institute of Agrarian Economics (2005) concluded from their survey of Lithuanian organic farms that these were motivated by producing healthy food, environmental protection, higher subsidies, a healthy lifestyle for the farming family, and because it is seen as a personally more fulfilling activity. These reasons seem to be similar to findings in other EU member states, except that market incentives are missing. Though, there is a question about why so many conventional farms do not contemplate conversion in face of relatively high subsidy levels for organic farming.

Although financial support is important for the viability of organic farming in both, Western and Eastern Europe, "both the design of the organic measures and the level of payments vary widely between countries (Offermann et al., 2009: 274).

We surveyed organic and conventional farmers to identify factors that made farmers to decide in favor of conversion, and what conventional farmers influences either to convert in the future or to continue their current farming practices. Based on recent literature (Burton et al., 2003; Drake et al., 1999; Egri, 1999; Fairweather and Campbell, 2003; Falconer, 2000; Lampkin et al., 1999; Lohr and Salomonsson, 2000; Mathijs, 2003; Padel, 2001; Lithuanian Institute of Agrarian Economics, 2005; Padel and Lampkin, 1994; Pietola and Lansink, 2001; Rigby et al., 2001), a wide range of potentially influencing variables had been included in the questionnaire and were tested for their influence in our survey area, as described in the empirical part and the Appendix.

METHODS

This study is based on several secondary data sources and interviews with organic and conventional farmers that were combined in a triangulate

fashion. Secondary data sources include the agricultural census of 2003, data from the Lithuanian certification agency for organic farming ("Ekoagros") and the Farm Accountancy Data Network (FADN). A survey was conducted during spring and summer 2005, which aimed at studying farmers' personal, structural and perceived institutional influences encouraging or distracting from conversion to organic farming practices, and was based on fully structured interviews covering groups of questions about the farm, the farmer, memberships in farming organisations, used information sources and attitudes, support schemes, etc. and were completed during one-to-one interviews with the farmers or the managers of the farm. The questionnaire included the same questions for both organic and conventional farmers and sets of questions for only one of the two groups.

To secure strict quality standards, only three trained and experienced interviewers were used. Pilot interviews were carried out before sampling to introduce the questionnaire to interviewers and refine the questions, which were partly supported by showcards to visualise more complex answer possibilities. The sampling frame was received from the Lithuanian statistical department. Systematic random sampling (with several starting points) was adopted in selecting respondents. For conventional farmers, the samples were first stratified along three classes of European Size Units (ESU) to potentially improve the efficiency of estimates when comparing subgroups, which implies that estimates for the whole population had to be weighted. The aim was to interview farmers above 1 ESU to select more market-oriented farms. As we defined only ESU derived from farming activities to be of interest for this study, and official statistics were naturally not fully up to date, it proved in hindsight that some farmers were actually below the threshold of one 'farming' ESU. As it turned out that these farms showed similar profiles and, where they did differ, did not influence the comparison with other size classes, they were kept for the analysis and integrated in the small size class. 220 respondents of both organic and traditional farms were selected for the survey, of which 210 were interviewed. Thus, the response rate was 95%. Of the 210 farmers interviewed, 102 are classified as adopters (registered organic farmers, farmers in conversion, and farmers who had already decided that they wanted to convert in the near future) and 108 interviewees are classified as non-adopters.

STUDY AREA

The Region and Its Socio-economic Context

Panevėžys County was chosen for the survey because it showed the highest diffusion rate for organic farming in 2004 and the whole region was served by the same extension service agency. This enabled us to keep the institutional and social environment for the surveyed farmers as similar as possible.

The diffusion of organic farming started in this part of the country already in the early 1990s because a pilot agri-environmental measure (AEM) was devised to protect the karst region from ground water pollution. Further, the County reflects the farming situation of the whole country rather well, as is argued in the following.

In 2003, agricultural land covered 482,082 hectares or 61% of the County's total territory. By 1 July 2004, there were 8,918 registered family farms with an average size of 15.5 ha. The agricultural sector in Panevėžys County is among the strongest in Lithuania. The production of grain is over 23% of the country's total, that of sugar beet—12%, cattle—16%, poultry—13%, milk—14%. The County also includes less favoured areas (Rokiškis district and several sub-districts in Biržai, Panevėžys and Pasvalys districts) that are typical to the country and cover over 30% of the County's total agricultural land.

According to Agricultural Census data and the FADN typologies, there were 30,250 commercial farms in Lithuania with a minimum size of 2 ESU. The dominating types of farming are combined field crops with grazing livestock; mixed cropping; and specialist cereals, oilseeds and protein crops. Farms in the size class 2 to 4 ESU made up 64% of the country's total commercial farms. The profile of Panevėžys County is similar with 3,686 farms or almost 60% of the county being made up by farms of 2 ESU and more. Also the same types of farms dominate.

History of Organic Farming in Lithuania

On the European level, Council Regulation (EEC) No. 2092/91 formed the basis for the national integration of these policy objectives into national policy frameworks, and Agenda 2000 established conditions to increase support for environmental protection in agriculture, but organic farming was not singled out. Member States were given the opportunity to modulate direct payments made to traditional farms and re-direct funds, to finance agri-environmental measures and organic farming. During EU accession, Lithuania adopted much of the legislative and administrative foundations to support organic farming, associated with increasing financial streams to encourage adoption. This is also reflected in the Agriculture and Rural Development Strategy of Lithuania, which emphasises that the integrated solution of economic and social rural problems is among the strengths of the organic farming concept (Lithuanian Institute of Agrarian Economics, 2002).

The movement towards organic farming started in 1990 when the Lithuanian Society of Ecological Agriculture 'Gaja' was established at the University of Agriculture. In 1991 the Lithuanian Government adopted the "Tatula" programme to support conventional farms converting to organic. This programme was first implemented in an environmentally highly

sensitive territory—the karst zone in the northern part of the country (194,000 ha). The first nine organic farms were certified in 1993. In 1997, national direct payments for certified crop areas and the compensation of 75% of the certification costs were introduced. Following this, the area under organic crops increased 2.5 times by 1998 (see Table 3). The Tatula programme provides assistance to farmers with information and training. Tatula also assists in the sale of organic products, organises trade fairs of organic products in Vilnius and other cities as well as supports participation in international and domestic exhibitions and fairs that propagate organic products. By the end of 2004, the Tatula programme united 218 members: 189 family farms (of which 82 certified organic and the remaining being in-conversion); 15 processing enterprises (two certified); six agricultural companies and one cooperative.

Before Lithuania's accession to the EU, organic farming support was restricted to the means available to the national government. In 2004 payments to organic farms increased significantly as can be seen from Table 1.

For most categories, the level of financial support was already higher in 1997 than in 2001 without having much of an effect. The subsidy went up again in 2002, and was then increased three- to four-fold in 2004 after EU accession. The effects from EU accession are investigated in the following using data from secondary sources, and in the empirical part of this paper by analysing its impact on the decision-making of farmers using data from our own survey.

Farm Population

Before we embark on analysing the survey data, we shortly compare the farm populations on national and regional levels and the development of organic farms over time.

Only just over 10% of farms can be perceived as commercially oriented according to FADN, leaving the overwhelming majority to produce less then

TABLE 1 Organic Farming Subsidies: Levels of Payment in Euro per Hectare, 1997–2005

Year	1997	1998	1999	2000	2001	2002	2003	2004–2005
Cereals	0	52	52	28	35	58	87	419
Legumes	110	110	110	65	78	125	87	419
Grasslands	52	52	29	25	25	25	26	118
Vegetables, potatoes	110	110	110	65	78	125	145	551
Berry plantations	203	203	203	129	130	145	174	734
Orchards	203	203	203	129	130	203	203	752
Fallow	0	0	0	0	23	23	87	0
Herbs	0	0	0	0	0	0	0	456

Source: VšĮ "Ekoagros", RDP 2004–2006. 1 Euro = ~ 3.45 Litas. In-conversion farms are entitled to receive the same subsidy than fully certified farms.

two ESU.[1] According to national experts, 40% of to 50% of Lithuanian farms are managed part-time which could also be found in our random sample. This leaves a substantial share of full-time farmers who produce less than 2 ESU from agricultural activities, which is due to the expectation that they can earn a sufficient income from running a relatively small holding. But income levels are low and these farmers look increasingly for other income sources, retire, or sell their farm.

Organic farms are on average more than three times larger than conventional holdings, suggesting that mostly full-time farmers converted to organic (three quarters in our adopter sample) who were searching for additional income and/or new ways of farming. Anecdotal evidence by national experts suggests that larger farms were particularly attracted to convert because of lacking investment capabilities on the farms in combination with relatively high subsidies, although some did not aim to produce for the market at all, but instead ploughed their fields after having received the support.

Table 2 confirms that not only conventional farms show similar structures on country and regional levels, but this is also true for organic farms. The differences are somewhat above-average hectare sizes on the regional level for both ways of farming and a somewhat higher share of corporate farms, which is an indicator of the county's relatively strong orientation towards agriculture.

A steady increase in organic farming numbers gained additional momentum from 2003 onwards. The area of organic farms reached forty-three thousand hectares by 2004, and almost seventy thousand in 2005, just half a year after the survey was done (Table 3).

In 2004, the total number of certified organic and in-conversion farms in Lithuania added up to 1,178, of which 147 were in Panevėžys County.

TABLE 2 Total and Organic Farm Populations

Variable	Country	Region
Total no. farms*	272,111	29,192
No. farms >= 2 ESU	31,041	3,872
% of total no. farms	11.4%	13.3%
Total hectares farmed*	2,835,785	385,795
Average size of agricultural holdings* (ha)	10.4	13.2
Individual farms	271,501	29,082
Corporate farms	610	110
No. organic farms**	1,178	147
% of total no. farms	0.4%	0.5%
Hectares farmed organically**	42,955	6,167
% of total hectares farmed	1.5%	1.6%
Average size of organic holdings** (ha)	36.5	42.0

*Excluding household plots. Data of total farm population per 1.6.2003

**Including farms in conversion, per 31.12.2004

Source: VšĮ "Ekoagros" data per 31.12.2004; 2003 Agricultural census data.

TABLE 3 Number of Organic Farms and Hectares Cultivated Organically 1993–2005*

Year	93	94	95	96	97	98	99	00	01	02	03	04	05
Country	9	14	36	65	106	144	171	230	293	393	700	1,178	1,811
Region	6	9	1	1	2	5	7	9	9	17	45	147	252
Total ha in country	148	267	582	1,118	1,568	4,006	3,995	4,709	6,469	8,780	23,289	42,955	69,430
Total ha in region	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	6,167	11,209
Ha/farm in country	16.4	19.1	16.2	17.2	14.8	27.8	23.4	20.5	22.1	22.3	33.3	36.5	38.3
Ha/farm in region	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	42.0	44.5

*Including farms in conversion.
Source: VšĮ "Ekoagros" data.

In 2005, the number of organic farms grew by more than 50% and the area more than 60% on the national level, and even more in the County (70% and 80% respectively). The average size of holdings increased especially between 2002 and 2003, from 22 to 33 hectares. After EU accession in 2004 and its associated substantial increase of the AEM, farm sizes are still increasing. Also, some other regions caught up in diffusion numbers with the study region by 2005 (VšĮ "Ekoagros" data).

EMPIRICAL RESULTS

The descriptive statistics of the sample is shown in the Appendix, including the significance levels resulting from comparisons of the adopter and non-adopter samples. We first discuss noteworthy descriptive results before the outcome of a logistic regression is presented. The sample data is weighted to account for stratification of the non-adopter sample when assessment of the whole regional conventional farm population is done. Treating the sample as complex was not necessary for descriptive analyses because the variance inflation factor *(deft)* was between one and 1.25 for all variables except, naturally, the stratification variable ESU and the closely associated hectares (each 0.5), making the analysis for these two variables more efficient in comparison to simple random sampling. The mentioned *deft* values indicate that the variance was not much different to a purely random sample.

As we can see from Table 9 in the Appendix, adopters are significantly younger and farm larger holdings than non-adopters. Since we avoided to interview subsistence farms, it follows that the farm samples are on average larger than the overall farm population shown in Table 2. 36% of adopters in contrast to 26% of non-adopters are female, though the difference is not significant. Aggregating the FADN typology to three categories shows, somewhat surprisingly, that a substantially higher part of adopters farm crops or horticulture (29% vs. 8%), there is hardly any difference for specialist animal farms, and accordingly, the share of mixed crops-livestock type of farms is higher for non-adopters (64% vs. 84%).

The respondents of the survey are rather inactive members of different unions or organisations related with their professional needs: over 80% do not belong to any of the main organisations such as the Lithuanian Association of Farmers, Lithuanian Association of Organic Agriculture "Gaja" or other associations of agri-producers. However, 44% of adopters are members of the "Tatulos Programme," which functions as an organic support organisation in the region.

The majority of farmers receive general information on agricultural issues from the responsible officials of local/regional institutions (agricultural divisions of municipalities, National Paying Agency, etc.) and during conversations with conventional farmers as well as from family members.

TABLE 4 Use of Selected Information Sources for Agricultural Issues (%)

Variable	Local/ regional public officials	Conventional farmers	Family members, farm workers	Extension service (visits, training)	Private consultants, (visits, training)	Organic farmers
Non-adopters	94	94	74	19	54	23
Adopters	92	93	79	27	51	93

Next follow visits of private consultants (more than 50%), but only 19% of conventional farmers make use of the public extension service, in comparison to 27% of adopters. Not surprisingly, organic farmers are only a major information source for other organic farmers as can be seen from Table 4.

It is notable that private consultants are considerably more in demand than public extension service workers. While organic farmers still see conventional farmers as an important source of information, this is not so the other way round, which might partly be due to the overwhelmingly higher numbers of conventional farmers. Adopters discuss farming problems on average with eleven other farmers, of which five are organic farmers. Conventional farmers discuss on average with 8.5 other farmers, of which only less than one is an organic farmer. Thus, it is not that organic farmers substitute conventional with organic farmers in their network, but instead, they mainly enlarge their network with other organic farmers but stay in contact with most of their previous peers.

Only 15% of adopters think that they are very well informed, and further 30% that they are well informed about the organic farming scheme, but most adopters are on the positive side of the semantic differential scale. On the other hand, only 17% of conventional farmers were on the positive side of the scale. For the results reported in Table 5, conventional farmers were asked about their past engagement with the idea to convert their own farm. Only half of the conventional farm population had never envisaged converting, which unveils a considerable potential even in the short to medium term.

TABLE 5 Status of Conventional Farmers in Relation to Organic Farming Conversion

Status	Column N %
Never envisaged to convert my farm	53
Briefly considered, but did not pursue the issue	33
Seriously considering, but have not decided yet	11
Seriously considered, but decided finally against	3
Total	100

Though, this relatively high potential seems to be hampered by the handling of the AEM (see Appendix). The greatest deficiencies are seen by adopters in the timing of the payments, but also in the administration of the paperwork. However, the satisfaction with the payment levels of the AEM is relatively high. Also certification costs are not much of a hurdle. For conventional farmers, the main arguments against conversion are not that the AEM would be seen to be low or ideological reasons. Instead, farmers see a lack of communication of the AEM by public officials, also that converting the own farm would be too complicated, and that market development is slow.

Adopters hold significantly higher attitudes towards organic farming contributing to the economic development of the region, as well as the opportunity to manage a farm effectively. A large share of conventional farmers does not really have an opinion on this and indicated the middle value of the semantic differential scale. Interestingly, there are no differences between adopters and non-adopters when it comes to the assessment of the contribution of organic farming towards human health, and the preservation of animal wildlife and plants. Nearly all farmers are very convinced of that. There are also no differences between adopters and non-adopters regarding their attitude towards GMO. Farmers are strongly against the use of gene technology in farming (89% and 88% opposed) and they would not buy genetically modified food (94% and 93% opposed).

We also find that organic farmers are more optimistic than their conventional counterparts about the future development of their income. 50% vs. 28% believe that their income will at least increase slightly over the coming 5 years.

Farmers are fairly divided on whether organic farming practices increase the value of the land: 19% of conventional farmers are on the positive vs. 64% on the negative side of the semantic differential scale; this is the other way round for adopters (65% on the positive vs. 15% on the negative side).

The risk of crop failure or feed shortage is unimportant for adopters, but is of some relevance for non-adopters. Location of the farm, labour availability, and development of the market for organic products are more important factors. But most important is the financial support for organic farming and providing a healthy environment for the family as Table 6 shows.

Adopters and non-adopters are fairly similar in the factors shown above, except when it comes to the importance of market development and the AEM support. These financial arguments weigh significantly heavier for conventional farmers. Though not important overall, there seems to be some influence by experiences with other support schemes, at least for conventional farmers.

The lower financial orientation of current organic farmers is supported by 54% of organic farmers indicating to keep producing organically even if the support scheme was stopped, with 33% being uncertain about it.

TABLE 6 Importance of Factors on the Development of Organic Farming (%)

Variable	Availability of labour	Location of the farm	Development of the market for organic products	Financial support for organic farming	Experience with other support schemes	Healthy environment for family
Non-adopters	48	60	59	89	23	85
Adopters	44	59	49	61	14	85

Note: Percent of farmers rating the criterion as influential, i.e. 6 or 7 on a 1 (not at all) to 7 (very much) scale.

Of those who would carry on practicing organic farming, 61% would not change their organically farmed area, but 25% would farm on a smaller scale, and 14% would even want to increase the organically farmed area. The latter farms are managed by relatively young people, and they plan to start an additional business in the near future. They already have taken out loans more often in the past. In summary, these are the entrepreneurial spearheads of the farming population who want to benefit from anticipated market developments and/or identified niches.

In the following logistic regression, we investigate in a more analytical way what differentiates organic and conventional farmers in the region. Based on empirical results of past studies as mentioned earlier and additional hypotheses of researchers, a wide variety of variables potentially contributing to explain differences between adopters and non-adopters were screened to fit the model. As quite a number of variables could be identified that were significant to a certain extent with potentially several interaction effects, the strategy was to fit a model with only the important variables explaining the underlying determinants of adoption.

Of the range of influences tested, variables significantly correlated with adoption were the number of agricultural information sources used by the farmer, the number of memberships in formal and informal farmer associations and groups, the number of farmer colleagues with whom the interviewee regularly discusses farming issues, the subjective measure of how well informed farmers feel about organic farming, the attitudinal measures of how they think that organic farming influences the economic development of the farming business, and how it influences the opportunity to manage a farm effectively. Further significantly related variables were the age of the farmer, whether farmers had non-farming experience during their professional life before taking over the farm, whether they planned to start a business besides farming, whether the experience with other subsidy schemes influences their decision to convert to organic, whether farmers thought that organic farming increases the value of the land, the farm type in form of an aggregated FADN classification, and finally, the level of indebtedness of the farm.

TABLE 7 Units and Expected Signs for Independent Variables

Variable	Unit	Predicted sign
Number of agricultural information sources used (from a list of 18 organisations, individuals, media sources) (InfoG)	Number	+
Number of organic farmers with whom regularly discussed (DiscO)	Number	+
Influence of organic farming to manage a farm effectively (OFmanagement)	1 (bad) – 7 (good)	+
OF increases the value of the land (Value)	1 (not at all) – 7 (very much)	+
Farm type (aggregated FADN classification into three classes: (1) arable, (2) specialist animals, (3) mixed)	1–3	

Other variables like the education of the farmer, and of the spouse, hectares and European Size Units of the holding, restrictions on rented land, use of consultants, availability of a successor, memberships in non-farming associations, location of the farm, and whether farming is the household's main income source were even non-significant when introduced as single independent variables in the logit model.

The final model has some noise with several conventional farmers showing rather close overlap with organic farmer profiles. The reason is that some farmers deliberated about conversion during the interview phase, as we have seen from Table 5. Three farms were removed from the analysis because they only produced honey, which was deemed to be not of primary interest here. Five cases were excluded from the analysis because of their high influence. These farmers were either seriously considering organic farming during the interview phase or they had seriously considered in the past, but decided against organic farming by the time of the interview. The remaining cases still warranting closer investigation of residuals were kept in the analysis because it is assumed that they can be found in the farm population on a regular basis and their exclusion could bias the results too much. The effects of keeping them in the analysis is that odds ratios are a little less distinctly different and the Pseudo R-Squares are slightly lower, but these cases had only little leverage. The logistic regression was performed using 102 non-adopters and 100 adopters with the SPSS complex samples option.[2] Out of the above-mentioned variables, the following model proved to be the most parsimonious, of which the descriptive statistics is reported in the Appendix.

The logistic regression model is thus specified as a function of information search, social capital, attitudinal, economic, and farm related variables as

$$y = \beta_0 + \beta_1 \text{ (Info G)} + \beta_2 \text{ (Disc O)} + \beta_3 \text{ (OF management)} + \beta_4 \text{ (Value)} + \beta_5 \text{ (Farm type)} + \varepsilon_i \quad (1)$$

where y_i is the log odds of adoption for the ith farmer, and ε_i is the base of natural logarithms; β_0 is the intercept constant, the beta weights represent the relative contribution of each independent variable.

Table 8 shows regression coefficients, standard error, Wald statistics, significance, odds ratios and 95% confidence intervals for odds ratios for each predictor. The low *deft* values result from the very high proportion of the adopter population interviewed, thus increasing the accuracy of the statistics.

A test of the full model with all five predictor variables against a constant only model was statistically reliable in distinguishing between adopters and non-adopters, Wald $\chi^2(6) = 133.24$, $p < 0.001$, and accounts for a considerable share of variance, with McFadden's Pseudo R Square = 0.62, and Nagelkerke R Square = 0.64.

Overall, we see that the signs of continuous coefficients are as predicted. Only the categorical farm type variable is somewhat surprising. The odds of a farmer being an adopter and also being an arable farmer is 4.76 times higher than for a farmer who farms a mixed holding. On the contrary, the odds of a farmer being an adopter and at the same time being a specialist animal farmer tends to be lower than for a farmer who farms a mixed holding. Though, because of the low number of specialist animal

TABLE 8 Logistic Regression Results of Non-adopters/Adopters

Variables	B	SE	Wald test	*p* value	Odds ratio	95% confidence interval for odds ratio		*Deft*–value
						Lower	Upper	
(Intercept)	−20.380	2.246	74.15	.000				
InfoG	.635	.184	11.89	.001	1.89	1.312	2.712	.311
DiscO	1.026	.182	31.78	.000	2.79	1.949	3.996	.384
OFmanagement	1.196	.261	20.98	.000	3.31	1.976	5.534	.270
Value	.969	.235	17.00	.000	2.64	1.658	4.188	.258
Farm type			9.330	.009				
Farm type (arable vs. mixed)	1.599	.685		.024	4.76	1.232	18.331	.364
Farm type (spec. animal vs. mixed)	−1.635	1.052		.122	.20	.024	1.553	.340

SE = standard error; *deft* (the square root of *deff*) is the inflation factor for the standard errors (>1 means an inflated SE, and <1 means a deflated SE). Collinearity between predictors is low. The relationships between continuous predictors and the logit transform of the dependent variable are linear.

farmers in the sample and their heterogeneity (see the standard error), this relationship is not significant. This may of course not be confused with most organic farms being mixed, as shown earlier.

The attitudinal question, how interviewees consider organic farming to influence the opportunity to manage a farm effectively, shows the second largest influence in the model. Organic farmers are clearly more optimistic while conventional farmers are rather impartial towards this question (means: 5.0 vs. 4.1). This argument discriminates even more between the two farm categories than the question how organic farming influences the economic development of the region. This is because also conventional farmers see a slightly positive contribution to the latter (means: 5.0 vs. 4.3). This variable was not included in the final model because it showed a considerably lower χ^2 and had a relatively high collinearity with the management variable.

The social capital variable, asking with how many organic farmers interviewees discuss on a regular basis, shows similar importance to explain adoption. It comes with no surprise that organic farmers have more organic farmers in their social network. And they mostly add these new contacts to their original network (see Appendix). This points again towards a permeable social system between organic and conventional farmers as already hypothesized earlier.

Whether farmers believe that organic farming increases the value of the land is also an important predictor. The odds ratio of 2.64 shows a considerable change in the likelihood of adoption on the basis of a one-unit change in the assessment that organic farming would increase the value of the land.

The number of agricultural information sources used by the farmer shows still an odds ratio of 1.89, indicating that organic farmers use agricultural information more intensely than their conventional counterparts.

DISCUSSION

The main hypothesis, that the increase of subsidies is the main driver for enhanced organic farming diffusion can be confirmed. The economics and future expectations concerning the effect of increased subsidy levels, also on the value of land, are an important argument in an environment with underdeveloped organic markets. This is somewhat in contrast to what classical diffusion and early organic farming literature would expect from early diffusion processes (Lampkin and Padel, 1994; Rogers, 1995). This can probably be explained by farms starting from low levels of income and subsidies being established early in the process.

Farm type is an important predictor. While arable farmers show (surprisingly) the highest likelihood of conversion, this is somewhat less so

for mixed holdings although the latter account for the highest number of organic farms. Also Gabriel et al. (2009) and Michelsen et al. (2001) among others, report that farm type is important for organic farm conversion (in the UK) whereby the earlier used mainly physical variables for their quantitative analysis and the latter gathered qualitative information. Both papers conclude that organic farming is predominantly observed in marginal and mountain areas and in farm types characterised by less intensive farming practices. This suggests that the arable farm numbers as reported above for Lithuania might have reasons that go beyond the conventional wisdom. One can hypothesize that these were partly the farms that did not want to produce for the market, but instead aimed to target the subsidy.

There are a range of qualifications questioning the efficiency of the size of the subsidy. Until 2004, the additionality of the AEM was small with 70% of adopters indicating that they farmed very close to organic principles already before registering as organic. But there were indications that this could be changing with increasingly larger, more commercially oriented farmers entering the scheme for which the existence of an organic farming support scheme is more important than for parts of the existing organic farmers.

Further, there are considerable caveats for an enhanced diffusion purely resting on the financial argument. It has been shown that information deficit and a lack of quality support are main barriers. This is a function of low take-up rates of consultancy services, in connection with the knowledge embodied in these support services, the administration of the subsidy, and low shares of memberships with agricultural associations and groups.

Whether farmers think that organic agriculture enables oneself to manage the holding effectively and contributes positively to the economic development of the region are further influential qualification for an enhanced diffusion. Especially, as most conventional farmers have not yet formed an opinion on this. Here, the knowledge base of the support infrastructure comes again into play. While the main information sources for farmers are officials e.g. from the agricultural division of municipalities and the National Paying Agency, there is a conspicuously low level of reliance on the public agricultural extension service (Agricultural Advisory Service), which is partly compensated by private consultants, although the latter seem to offer a more superficial service because farmers only rarely rate their service to be important for them. The low interest to use advice from the Agricultural Advisory Service can be explained by the historical division of roles. The Lithuanian Advisory Service provides support concerning conventional farming methods, but almost none concerning organic agriculture. The Tatulos programme and some private consultants covered the organic specific advice only partly. Beyond the overall undersupply of organic farming support, it seems also questionable whether the strict division of responsibilities between the consultancies is very effective as this could keep thresholds higher than necessary.

This could be tackled by investments into the basic support infrastructure including institution building, the scaling up of extension services/consultancy in general and to include some form of organic farming advice for all consultancy services. Building up capacities for the processing of produce and market development seem to be further, rather urgent, areas for investment.

Informal social networks are very important in a situation with relatively low institutional support. It seems to be an interesting finding that organic farmers do not replace their previous network with organic farmers, but instead add them onto their existing. This suggests no ideological barriers against organic farming in the region, but instead, pragmatic management and economic arguments being decisive. This seems to be confirmed by their attitudes because all farmers think that organic farming is better for health and the environment. Against the background of the substantial increase of the subsidy in 2004, this seems to suggest that the enhanced diffusion depends mainly on improved information and support, as a considerable market pull factor is not very likely in the short term.

Diffusion among arable farms is higher than for the overwhelming majority of mixed farms. This is because subsidy payments are linked with the area, and not with keeping animals. Also, Lithuania did not yet have organic milk processing units and certified meat processing facilities during the interview phase.

Whether respondents believe that organic farming increases the value of the land captures the assessment of organic farmers that the area-based subsidies might have a positive influence on land and land rent prices. Agricultural experts from new Member States estimate that direct area payments are used to a large extent for land capitalisation.[3] In other words, when subsidies are linked with land area but not with the production value, it increases land and land rent prices. For example, if an organic farmer receives area payments for cereals and if the land has least-favoured-area status linked with a subsidy like in our study region, organic farmers become rather optimistic about land prices in the future. But this is not (yet) met with a parallel appreciation by conventional farmers, as we learned from the descriptive part of this paper.

The question of capitalisation of subsidies into the price of land puts a somewhat critical light on the CAP principle of decoupling without any requirement to produce outputs for the market. Especially in Lithuania, where the subsidy level is high in comparison to other new EU Member States (Kaufmann et al., 2006), the soil quality is partly low due to adverse incentives up to the late 1980s, and with only little stimulus from the market, organic farming could become an example for landowners receiving subsidies while producing only on very low levels. In the case when subsidies are not linked with production or at least with standards to provide some minimum soil quality, policy objectives might not be reached. This situation

could result in landowners benefitting from subsidies while farmers working with rented land, who still want to engage seriously in agricultural activities, get squeezed because of higher land prices.

CONCLUSIONS

Joining the European Union led to an increase of financial support for Lithuanian farmers overall, and especially for organic farmers. Since then adoption of organic farming has increased strongly. Apart from the main conclusion, that the finances and the onsite management of organic farming are main determinants for diffusion, a relatively complex picture emerges, which policy makers are well-advised to take into account when developing the implementation of the organic farming scheme further.

We conclude that the main motivations for future in-conversions are related to economic and farm-management reasons. Results also point to substantial farm-support deficits, with a low take-up of extension services in general and low availability of organic farm advice. We recommend rebalancing subsidy levels with investments into support infrastructure (consultancy, trainings, processing units, and marketing) to increase the effectiveness and efficiency of the organic farming 'system.' This is in line with Genius et al. (2006) and Lohr & Salomonsson (2000) who argued that conversion is enhanced more through structural measures like support services than (high) subsidies. Also, the 'economic conversion potential' varies between farm types as we can conclude from the observation that the uptake differs markedly, for example, between arable and mixed farms (see also Kerselaers et al., 2007 who explicitly modelled the farm-level economic potential for conversion in Belgium).

The high subsidy for conversion brought some unintended consequences, especially the unproportionally high conversion rates of larger farms, which were historically plagued by underinvestment and some of which are not interested in producing organic food for the market. In these cases, the intervention had distorting effects because neither soil quality was enhanced nor was the organic market advanced by these farms.

This raises also the question of the balance between different support schemes, between pillar one and pillar two of the CAP, and also within pillar two because an effective and efficient approach necessitates close monitoring of profitability under different schemes to tailor further policies (see also Nieberg et al., 2007 and Offermann et al., 2009). In a probable scenario of somewhat higher world food prices in comparison to what we experienced around the turn of the millennium, this could mean that the practically abandoned land would get back into production, either organically or conventionally farmed. Though, society would pay a price in the meantime for a questionable result.

The survey also showed first indications for land capitalisation effects caused by relatively high direct organic subsidies. Thus, it seems to have some merits to discuss how we want to see the more marginal areas in Europe to look like in the medium to long-term future as it could be possible that area-based subsidies lead to a considerably altered landscape in these regions. This could entail a considerable time lag to reinstate previous production volumes if the world food situation should demand this.

Because the Lithuanian agricultural system is currently developing somewhat faster to adjust to EU and world market conditions, one can interpret this stage as a special opportunity to make steps towards a sustainable food system (see also the four levels towards such a system as suggested by Gliessman, 2009). Such a systemic view requires analysts and decision-makers to focus not only on the contribution of organic farming to the environment and the agricultural sector, but also some of the public goods characteristics of organic production in respect to "employment and 'other local economic benefits' of organic farming alongside its contribution to climate change mitigation, animal welfare improvements and biodiversity protection" (Defra, 2008, cited in Lobley et al., 2009: 160).

NOTES

1. We excluded from our survey farms of less than one ESU originating only from farming activities. If the threshold would have been 2 ESU, the overwhelming share of farms would not have been included in the study (year 2005), and one can still presume at least some market orientation by farmers above 1 ESU.

2. Social science researchers often use general regression models (with and/or without weights) for data that was either clustered or stratified. This is strictly speaking wrong as this likely underestimates standard errors and thus overestimates the fit of the model. Also in our case, applying a general logit model would have resulted in a somewhat better fit statistics although the variance inflation factor was low as reported earlier (e.g., McFadden's Pseudo $R^2 = 0.62$, and Nagelkerke $R^2 = 0.83$, Wald $\chi^2(6) = 198$, $p < 0.001$).

3. See Goodwin et al. (2003) for a general discussion on how policy can affect land values. Also Gömann, et al. (2007) and Key and Roberts (2006) discuss that subsidies (might) push the price for land.

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APPENDIX TABLE Descriptive Statistics

Variable (including measuring units or intervals)	Adopters		Non-adopters	
	Mean	SD	Mean	SD
Age (yrs)***	47.7	12.9	54.0	11.7
Total hectares (excl. woodland)*** (Median in parentheses)	57.4 (26.8)	102.4	38.6 (18.0)	78.7
Hectares owned (Median)*	28.2 (13.2)	68.0	17.8 (11.4)	21.2
Hectares rented (Median)***	29.2 (9.5)	55.2	20.9 (2.0)	63.1
Percent of farmland unsuitable for machinery use*	.8	3.0	0.75	3.7
Information sources:				
†Number of general agricultural information sources***	9.0	2.2	6.8	1.9
Number of general information sources seen as important***	1.7	1.5	1.1	0.9
Number of organic farming information sources***	5.4	1.9	2.8	1.5
Number of organic farming information sources seen as important***	1.5	1.4	0.3	0.6
Number of conventional farmers with whom regularly discussed (ns)	6.3	5.9	7.7	5.7
†Number of organic farmers with whom regularly discussed***	4.7	5.0	.8	1.8

(*Continued*)

APPENDIX TABLE (Continued)

Variable (including measuring units or intervals)	Adopters		Non-adopters	
	Mean	SD	Mean	SD
Agreement with the administration of the AEM (1–7):				
Access conditions of organic farming scheme	5.0	1.3	–	
Time scale of the contract	5.2	1.7	–	
Certification costs	4.5	1.6	–	
Payment levels of the organic farming scheme	5.3	1.7	–	
Timing of payments	2.1	1.5	–	
Administration	3.7	1.8	–	
To what extent do these arguments speak against conversion of your farm? (1–7)				
Don't believe in idea	–		3.0	1.6
Conversion would conflict with other business I pursue	–		3.6	1.4
Conversion would be too complicated	–		4.7	1.3
Development of organic market is generally seen too positively	–		4.7	1.3
Direct payments of organic farming scheme are too low	–		4.1	1.6
AEM is not well communicated by relevant organizations	–		5.0	1.3
Influence of OF on economic development (1–7)***	5.0	1.1	4.3	1.1
†Influence of OF on opportunity to manage effectively (1–7)***	5.0	1.2	4.1	0.9
Influence of OF on health of people (1–7) (ns)	6.7	0.6	6.6	0.7
Influence of OF on wildlife and plants (1–7) (ns)	6.7	0.6	6.6	0.8
How did/would the following aspects influence the decision to convert to OF? (1–7):				
Farm size***	4.2	2.2	3.4	1.8
Farm type***	4.4	2.2	3.8	1.7
Location of farm (ns)	5.4	1.9	5.3	1.5
Structure of farm**	4.6	1.9	4.2	1.6
Successor situation*	4.7	1.8	3.7	1.6
Providing healthy environment for own family (ns)	6.4	.9	6.3	1.3
Labour availability, including own time (ns)	4.9	1.7	5.4	1.3
Development of the market for organic products (0.067)	5.0	1.8	5.6	1.2
Existing quotas and other contracts for sale of farm products (ns)	3.6	2.1	4.2	1.8
Risk of crop failure or feed shortage*	3.9	2.0	4.8	1.4
Existence of an organic farming support scheme***	5.5	1.6	6.5	1.0

(*Continued*)

APPENDIX TABLE (Continued)

Variable (including measuring units or intervals)	Adopters		Non-adopters	
	Mean	SD	Mean	SD
Experience with other support schemes (0.08)	3.0	2.0	3.7	2.0
Extent of labour shortage (1–7)***	3.6	1.5	3.0	1.7
Need for change of current farming practices (1–7)***	4.2	1.6	3.4	1.6
†Does org. farming increase the econ. value of land (1–7)***	4.9	1.6	3.1	1.5
†Farm type ($\chi^2(2) = 14.75$, $p = .001$)				
Arable (crops / horticulture)	29%		8%	
Specialist animal (livestock / granivores)	7%		8%	
Mixed crops-livestock	64%	100%	84%	100%
Gender ($\chi^2(1) = 2.63$, p = .105)				
Male	64%		74%	
Female	36%	100%	26%	100%
Work in non-agricultural profession before taking over farm ($\chi^2(1) = 11.20$, p < .001)				
No	54%		76%	
Yes	46%	100%	24%	100%
When has farm been taken over ($\chi^2(3) = 7.50$, $p = .058$)				
<5 yrs	17%		10%	
5 < 10 yrs	20%		10%	
10 < 15 yrs	60%		77%	
15 < 20 yrs	3%		3%	
20 yrs and more	0%	100%	0%	100%
Full-time in farming ($\chi^2(1) = 7.52$, $p = .006$)				
No	26%		44%	
Yes	74%	100%	56%	100%
Planning to start an additional business ($\chi^2(1) = 10.36$, $p < .001$)				
No	76%		93%	
Yes	24%	100%	7%	100%
Planning to change size of organically farmed area over the next 5 yrs				
Increase	46%			
Reduce	0%			
No change	39%			
Don't know	15%	100%	–	
Continue with OF if subsidy scheme stopped				
No	13%			
Yes	54%			
Don't know	33%	100%	–	
If yes, what influence would it have				
None	61%			
Smaller	25%			
Increase	14%	100%	–	
Education of farmer/manager ($\chi^2(4) = 17.68$, $p < .001$)				
None	0%		0%	

(*Continued*)

APPENDIX TABLE (Continued)

Variable (including measuring units or intervals)	Adopters		Non-adopters	
	Mean	SD	Mean	SD
Primary school	2%		6%	
Lower secondary	5%		21%	
Upper secondary (general)	31%		30%	
Upper secondary (pre-vocational/technical)	38%		32%	
College/university	24%	100%	11%	100%
Education of spouse/partner ($\chi^2(4) = 5.47$, $p = .242$)				
None	0%		0%	
Primary school	1%		6%	
Lower secondary	6%		11%	
Upper secondary (general)	29%		19%	
Upper secondary (pre-vocational/technical)	48%		49%	
College/university	16%	100%	15%	100%
Highest agricultural training of farmer/manager ($\chi^2(4) = 7.26$, $p = .123$)				
None (incl. learned on your own and from other farmers)	1%		0%	
On-farm (e.g. by parents)	0%		5%	
Courses (not full-time)	54%		58%	
Agricultural high school	28%		26%	
Agricultural college or university	17%	100%	11%	100%
Highest agricultural training of spouse/partner ($\chi^2(4) = 6.14$, $p = .189$)				
None (incl. learned on your own and from other farmers)	2%		4%	
On-farm (e.g. by parents)	5%		12%	
Courses (not full-time)	58%		43%	
Agricultural high school	28%		30%	
Agricultural college or university	7%	100%	11%	100%
Expectation of income/ha from conventional farming in next 5 yrs (by non-adopters), and from organic farming (adopters)				
Strong decrease	3%		2%	
Slight decrease	19%		20%	
Same	28%		49%	
Slight increase	47%		26%	
Strong increase	3%	100%	2%	100%
Level of indebtedness ($\chi^2(2) = 17.25$, $p < .001$)				
No or minor loans	66%		90%	
Loan is no major factor in deciding how the land is farmed	30%		8%	
Loan is manageable, but it influences the way land is farmed	4%		2%	
Loan is largest single factor in the decision	0%	100%	0%	100%
Wanted to use gene technology (ns)				
No	89%		88%	
Yes	11%	100%	12%	100%
Wanted to purchase genetically modified food (ns)				

(*Continued*)

APPENDIX TABLE (Continued)

Variable (including measuring units or intervals)	Adopters		Non-adopters	
	Mean	SD	Mean	SD
No	94%		93%	
Yes	6%	100%	7%	100%
Started as organic farmer right away (without prior exposure to conventional farming on this farm, e.g. bought farm, restitution)?				
No	85%			
Yes	15%	100%	–	
Produced practically organic already before conversion?				
No	30%			
Yes	70%	100%	–	

Note: SD = Standard Deviation; Significance tests use two-tailed Mann-Whitney test; (ns) = not significant; *Difference between adopters and non-adopters $p < 0.05$; **$p < 0.01$; ***$p < 0.001$. Pearson χ^2 is calculated for differences between 102 adopters and 108 non-adopters. † = descriptive statistic for variables used in the logistic regression.