Drivers inducing and preventing conversion to organic farming for dairy and vegetable farmers: findings of a large-scale survey in the French regions of Brittany and Pays de la Loire

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Deliverable 2 – Research Project 'PEPP' (AgriBio3 funded)
"Role of Farm and Sector Economic Performance and Public Policies in the Development of Organic Farming in France"

25 January 2013

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1. Introduction

The decision to adopt organic technology on a farm is a complicated one that takes into consideration the attributes of the farm itself and such factors as the farmer's characteristics, sector and market features, public policy and regulations (health and environmental) (see the review by Géniaux *et al.*, 2010).

This study takes a large-scale survey to analyse the determinants of the organic conversion decision among dairy farmers in the French regions of Brittany and Pays de la Loire and among vegetable producers in Brittany[1]. The main purpose of the exercise is to identify factors internal and external to the farm that influence the farmer's decision to convert to organic farming or stay with conventional farming. The advantage of a large-scale survey is that it enables the use of suitable statistical methods to quantify the impact of each of these factors on the farmer's decision. Statistical methods can also be used to statistically validate the linkages between the different factors and the decision to convert or keep farming conventionally.

This survey and the following analyses set out to understand how conventional farmers differ from organic farmers, and why some decide to go organic while others prefer to stick to conventional agriculture. To our knowledge, this is the first statistical analysis of its kind on a large sample of French farms. Policymakers will find the identification of organic conversion determinants useful to their policymaking.

The survey was restricted to two regions to guarantee a certain consistency of farming conditions and organic produce market access conditions. The survey work on Brittany and Pays de la Loire was assisted by local partners, whose expertise and knowledge were key to this project's success.

2. Survey description

The survey covered both organic and conventional farmers in order to identify the determinants of the decision as to whether or not a farm goes organic.

The accountancy company Cogedis-Fideor supplied the contact details of the conventional farmers and some of the organic farmers. The other organic farmers' details were provided by the regional organic agriculture federations: Fédération Régionale des Agrobiologistes de Bretagne (FRAB) in the Brittany region and Coordination AgroBiologique des Pays de la Loire (CAB) in the Pays de la Loire region.

Organic farmers were selected for the survey based on two criteria: 1) partial or total conversion to organic farming in progress or completed; 2) start of conversion in 2005 or

[1] Based on the European Union's Nomenclature of Territorial Units for Statistics (NUTS) (see http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction), the regions referred to in this document are NUTS2 regions and the sub-regions are NUTS3 regions.

later. With respect to the first criterion, the survey did not cover farmers who directly set up as organic farms, since the purpose was to identify the determinants of conversion from conventional agriculture to organic production. Organic farmers were selected for the survey if they were converting or had completed conversion of part or all of their farm. With respect to the second criterion, 2005 was chosen as the earliest conversion start date acceptable to produce a sample of fairly homogeneous farmers in terms of their regulatory and economic environment. The conventional farmers were selected based on the availability of their bookkeeping data for the year of the survey and the few years prior to the survey.

All the farmers who satisfied the abovementioned criteria were pre-selected and sent a letter in late August 2011 to explain the study and ask them to take part in the survey. The letter assured farmers that the information collected and analysed would be kept confidential and anonymous. The letter also informed organic farmers who were not members of Cogedis-Fideor that the survey would collect bookkeeping data covering a number of years. In early September 2011, the farmers to whom the letter was sent were contacted by telephone to ask them if they would agree to be respondents. The farmers who gave their consent by telephone were then contacted by student interviewers to make an appointment. A second letter was sent to the organic farmers who agreed to take part in the survey in September 2011 to let them know precisely which bookkeeping data were required, in case they wished to prepare for the interview with the students.

The survey took the form of face-to-face interviews with farm heads on their farms conducted by agricultural students from LEGTA in Le Rheu (in Brittany's sub-region of Ille-et-Vilaine) for the dairy sector in Brittany, from ESA in Angers (in Pays de la Loire's sub-region of Maine-et-Loire) for the dairy sector in Pays de la Loire, and from IREO in Lesneven (in Brittany's sub-region Finistère) for the vegetable sector in Brittany. The interviews were held from September 2011 to January 2012. They lasted one hour on average (up to two hours for organic farmers providing bookkeeping data).

The questionnaire was designed by the INRA in liaison with the project partners (Inter Bio Bretagne, FRAB, CAB and Cogedis-Fideor). It contained a number of sections and differed depending on whether the farmer was: a) conventional, b) organic, but a member of Cogedis-Fideor, or c) organic, but not a member of Cogedis-Fideor.

- First of all, the farmers were reminded that their answers would remain anonymous.

- The first section of the questionnaire was presented to all three types of farmers. It concerned the farm head and his/her household: household composition (ages, levels of education, organic training, etc.), membership of a farmers' union, membership of an environmental association, any off-farm paid work, percentage of household income from agricultural activities, agricultural press readership and Internet use.

- The second section, also presented to all three types of farmers, contained questions on the farm head's opinions about society and environmental issues, environmental regulations, and the health risk to farmers exposed to pesticides. An additional

question was presented to the conventional farmers regarding what they thought of organic farming.

- The third, relatively long section concentrated first of all on the study focus: conversion to organic agriculture. The questions presented to all three types of farmers concerned the different farm units' production methods, the factors inducing and preventing conversion, any assessment made of conversion to organic farming, availability of extension services on organic farming, and respondents' opinions on a possible link between the decision as to whether or not to convert to organic farming and the financial returns from conventional farming. The conventional farmers were also asked whether they had tested organic agriculture on their farms, whether they were considering going organic in the next five years, and what minimum annual sum of subsidies could encourage them to convert their farm. The questionnaire asked the organic farmers what really triggered their conversion and what problems they encountered following the switch. This third section also asked for a description of the farm and its environment (quality label production, contract farming, agri-environment schemes, soil type, rainfall, farm successor, distance to suppliers and production buyers, distance to a local open-air market, availability of a shared machinery cooperative or contract work company for organic production, and the number of conventional and organic farms in the municipality). The organic farmers were also asked to answer certain questions with respect to two dates: at the time of the survey (as with the conventional farmers) and before their farm's conversion to organic agriculture.

- The fourth and last section detailed structural and bookkeeping data over a number of years. For the conventional farmers, it covered 2010, 2009, 2008, 2007 and 2006. For the organic farmers, it concerned 2010, the first year of conversion (t), and the three years preceding the year of conversion (t-1, t-2 and t-3). The data collected for the three types of farmers (conventional, organic member of Cogedis-Fideor, and organic non-member of Cogedis-Fideor) concerned on-farm activities aside from production, the type of selling method (direct or indirect), dairy cattle grazing areas, the number of plots, nitrate pressure, subsidies received, and the yield from the main type of farming. The organic farmers who were not members of Cogedis-Fideor were also asked for "classic" accounts information (which this accounting company provided for member farmers): the different types of area, labour, animals, costs, income, capital and debts, and information on milk production and yield.

- At the end of the questionnaire, the farmers were asked if they had any comments to make about the survey, the questionnaire, their situation, etc. The students then thanked them for their time.

Table 1 shows that a total of 307 dairy farmers were interviewed: 233 conventional farmers (120 in Brittany and 113 in Pays de la Loire) and 74 organic farmers (37 in each region). In Brittany, survey coverage was denser in the sub-region of Ille-et-Vilaine than in the other

three Breton sub-regions. In Pays de la Loire, coverage was less dense in the Vendée and Sarthe sub-regions than in the other sub-regions. In the vegetable sector, 74 conventional farmers and 25 organic farmers were interviewed, with nearly all of them located in the Finistère and Côtes d'Armor sub-regions. However, the study's analyses on this sector concern just 72 conventional farmers and 11 organic farmers due to the poor quality of the data collected on the other farmers.

Table 1: Number of farmers interviewed

	Conventional farmers	**Organic farmers**	**All**
Dairy sector			
Brittany	120	37	157
Pays de la Loire	113	37	150
Total	233	74	**307**
Vegetable sector			
Brittany	74	25	99
Total	74	25	**99**

3. Respondent farmers' profiles

The interviewed farmers' profiles are based on their answers to the survey questions (end of 2011-beginning of 2012) and structural information for the most recent accounting year common to all the farmers, i.e. 2010 (with the exception of the organic farmers who started their conversion in 2011, since they are excluded from the statistics for 2010 as they were still conventional at this time).

3.1. Dairy farmers

Table 2 presents the average characteristics of the conventional farmers and organic farmers interviewed in the dairy sector. The comments below are presented in the order in which the characteristics appear in the table.

Approximately 45% of the conventional farm sample were sole proprietorship farms, which is a slightly lower percentage than for the organic farmers (approximately 51%). In 2010, the respondent conventional farmers had an average utilised agricultural area (UAA) of 83.5 hectares, as opposed to 75.2 hectares on average for the organic farmers interviewed. The

conventional farmers' area under cereals, oilseeds and protein crops (COP) accounted for an average 28.0% of the UAA, the main forage area for an average 69.6% of the UAA, and the grazing area for an average 38.4% of the UAA. These figures were 15.1%, 83.1% and 54.2% respectively for the organic farmers. The average number of plots was 24.5 for the conventional farmers as opposed to 22.2 for the organic farmers. The conventional farms used an average 1.81 annual work units (AWU) compared with 1.67 for the organic farms. An average 2.4% and 7.5% of these AWUs were hired labour on the conventional and organic farms respectively.

The average number of dairy cows and livestock units (LU) was higher on the conventional farms (80.6 and 81.5 respectively) than the organic farms (56.8 and 77.5 respectively). Stocking density per hectare was lower on the organic farms than on the conventional farms in terms of hectare of UAA, main forage area and grazing area. Average nitrate pressure was 137.1 kg of nitrogen per hectare on the conventional farms as opposed to 97.1 kg on the organic farms. A total of 47.3% of the respondent organic farmers had adopted one or more agri-environment schemes (AESs), excluding the organic conversion measure. This compares with 20.2% of the conventional farmers.

In 2010, total farm costs to UAA were lower on average on the organic farms (€1,866.7 per hectare) than on the conventional farms (€2,309.4 per hectare). The conventional farmers had slightly higher average machinery, seed and seedling, and irrigation costs per hectare of UAA than the organic farmers. However, their fertiliser, pesticide, animal feed and veterinary costs per hectare of UAA were much higher on average than they were for the organic farmers. The opposite is true of shared machinery cooperative and contract work company costs per hectare of UAA (with the organic farmers' costs being higher on average), whereas both groups of farmers reported similar insurance costs per hectare of UAA.

Both groups of farmers also had a similar indebtedness ratio (53.2% for the conventional farmers and 55.5% for the organic farmers). With respect to earnings per hectare of UAA, the organic farmers had a lower operating surplus on average (at €848.3 as opposed to €932.8 per hectare), although they presented a higher farm profit[2] (€316.8 versus €208.4 per hectare) than the conventional farms. In 2010, the respondent farmers received an average €352.5 in total subsidies (excluding investment subsidies) per hectare of UAA. Most of these were in the form of single farm payments (SFPs) (at €320.0 per hectare for the conventional farmers and €289.9 for the organic farmers). The organic farmers received more agri-environment payments (including organic conversion subsidies) than the conventional farmers (€94.3 compared with €9.0 per hectare on average). This placed them ahead of the conventional farmers in terms of total subsidies (€392.3 as opposed to €341.3 per hectare), despite having a lower average SFP per hectare. None of the farms in the sample received Less Favoured Area (LFA) payments in 2010.

[2] The operating surplus is given by farm revenue (farm sales, subsidies and insurance compensations) from which variable costs specific to crop and livestock production, as well as land, labour and insurance costs are subtracted. The farm profit is obtained by subtracting depreciation and interest from the operating surplus.

The conventional farms were larger on average in terms of their milk quotas and they had a higher milk yield per cow than the organic farms (6,960 litres as opposed to 5,502 litres per cow). The organic farms had a higher average milk price at €365.3 per 1,000 litres as opposed to €330.4 for the conventional farms.

Approximately 93% of the conventional farmers and 76% of the organic farmers had signed the French Charter for Good Agricultural Practices. Few farms were found to be producing under other quality labels, with the exception of 11% of the conventional farmers who had adopted sustainable farming. Over half (some 57%) of the respondent organic farmers contract farmed. Most (94.4%) of these agreements were written contracts. Only around 38% of the conventional farmers practised contract farming, with just 66.7% of these having written contracts. The majority of the contract farming organic farmers (86.1%) and conventional farmers (76.1%) had long-term contracts running for more than one year. The exclusivity criterion applied to approximately three-quarters of both types of farm.

Although 12% (respectively 14%) of the respondent conventional farms (respectively organic farms) reported that they practised direct selling on the farm, the turnover generated by this activity was low (less than 2% of turnover on average from direct retail: on-farm sales, cooperative farm shops, open-air markets, institutional catering operations and canteens). On both types of farm, sales were mainly indirect via cooperatives and processors. The share of turnover from sales through cooperatives was slightly higher in the sample of conventional farmers (52.6% as opposed to 43.8% in the sample of organic farmers on average). Lastly, 7.1% of the organic farms had agritourism operations, as opposed to 2.6% in the group of conventional farms.

The respondent farms received 757 mm of annual rainfall on average, without any marked difference between conventional and organic farms. However, the share of UAA found on wetlands was higher on average on the organic farms (22.0%) than on the conventional farms (7.7%). Soil textures were also comparable in both samples, with a predominance of medium soils (loam, clay loam and clayey sand) and heavy soils (clay, silty clay and sandy clay). An average 81.4% of the UAA of both types of farm was on non hydromorphic soil.

Approximately 18% of the farms, conventional and organic, had already chosen a successor for the farm. A larger share of organic farmers (31%) than conventional farmers (10.3%) were undecided about a successor.

The municipalities where the respondent conventional and organic farms were established had an average of 28 commercial farms. The proportion of commercial farms producing organically (certified or in transition) was slightly higher on average in the municipalities where the respondent organic farms were established (14.1% as opposed to 6.7% in the municipalities where the conventional farms were interviewed).

Table 3 presents the profiles of the farm heads and their households. The farm heads who took part in the survey were virtually exclusively male (100% of the organic farmer sample and 90.6% of the conventional farmer sample). The farm heads were 44 years old on average in

the sample of organic farms as opposed to 46 years old on average in the sample of conventional farms. The conventional farmers had been established for an average of 19 years as opposed to 16 years for the organic farmers. The two samples present different levels of education and training characteristics. Some 20% of the conventional farmers had two years of higher education (advanced technician's certificate or university technology diploma) or more as opposed to 55% of the group of organic farmers. The vast majority of the farm heads interviewed had an agricultural qualification (87.6% in the group of conventional farmers and 97.4% in the group of organic farmers). Not surprisingly, the majority of the organic farmers (57.9%) had taken one or more dedicated organic training courses, compared with just 6.6% in the sample of conventional farmers.

Approximately three-quarters of the respondent organic farmers (76.4%) were members of a farmers' union or an agricultural development association, as opposed to just 41% for the group of conventional farmers. This difference may be due in part to a sampling bias, since most of the organic farmers interviewed were drawn from regional organic farmer unions' membership lists. Around 15% of the organic farmers were members of an environmental or nature conservation association, compared with some 6% of the conventional group. Few respondent farmers (less than 7%) had off-farm paid work. Of those who did, most of the conventional farmers worked as employees (non-agricultural), with the minority being business heads, while the organic farmers with off-farm paid work did so either as business heads or self-employed.

Nearly all of the respondent farmers read the agricultural press, generally for more than an hour per week (two to three hours for the farmers in both groups). The organic farmers were more frequent Internet users (just 8.1% did not use it as opposed to 18.8% of the conventional farmers). A full 85.1% of the organic farmers who used the Internet consulted the weather forecast (versus 68.7% for the conventional group) and 63.5% used it to look up commodity prices or for advice (as opposed to 59.7% in the conventional group). Lastly, 25.7% of the organic farmers used the Internet to sell or promote their products, compared with 15% in the conventional group.

Household composition was similar on average in both samples, with just short of two people under 18, slightly more than two people aged 18 to 64 years old, and no one aged 65 or over.

The respondent organic farms appear to be more diversified than the conventional farms. In 64.8% of the respondent conventional farms, over 90% of gross income was generated by farming activities whereas this was the case with just 49.3% of the organic farms interviewed. A small share of gross income came from the farm head's off-farm paid work (14.7% and 10.2% on average for the conventional and organic farms respectively). The rest of the gross income came from off-farm paid work by other household members or on-farm non-agricultural activities.

The respondent farmers were then asked whether they agreed with a certain number of statements (Table 4). They were asked to rank each statement on a scale of one to four based on the following options: 1 (fully agree), 2 (agree), 3 (disagree), 4 (strongly disagree). Table 4

shows the average score given by the two types of farmers for each statement and the share of don't knows. The following presents the statements that drew significantly different opinions from the conventional and organic farmers. More organic farmers felt that most farmers did not make any real effort today to protect the environment and that some production methods were environmentally damaging: the average score for statement (a) was 2.7 for the organic farmers, whereas it was 1.6 for the conventional farmers. The organic farmers found the environmental regulations less restrictive than the conventional farmers (average score for statement (c) of 3.0 as opposed to 1.8). More organic farmers felt that environmental regulations are a good thing, whether for the agricultural sector (average score for statement (d) of 1.6 versus 1.9) or for society as a whole (average score for statement (e) of 1.6 as opposed to 2.0).

The farmers were subsequently asked to rank the following five society issues in order of importance (from 1: the most important; to 5: the least important): international tensions, economic problems in France, environmental problems in France, health crises in France, and social problems in France. Table 5 shows the average rankings for each issue. The group of conventional farmers felt, on average, that economic issues were the most important (average score of 1.8) and saw health crises as the least important problem (average score of 4.0). The group of organic farmers considered social issues to be most important (average score of 2.1) and also placed health crises at the bottom of the list (average score of 4.5). On average, the organic farmers attached more importance to environmental issues than the conventional farmers (average score of 2.8 as opposed to 3.4).

The survey then sought to find out how concerned respondent farmers were about the following environmental issues: water scarcity, air pollution, green algae, water pollution, GMOs, threat to biodiversity, soil degradation, and the disappearance of farming land (Table 6). Farmers were asked to state their level of concern for each of these issues on a scale of 1 to 5, where 1 was not at all concerned and 5 was very concerned. Table 6 presents the average scores across both types of farmer for each issue along with the share of don't knows. The organic farmers said they were more concerned, on average, than the conventional farmers about each of these issues, with a higher average score than the conventional farmers.

Following this, the farmers were asked to assess the risk associated with their exposure to pesticides (Table 7). Approximately 47% of the conventional farmers felt there was no, a very low or a moderate risk (40.3% deemed it moderate), as opposed to around 5% of the organic farmers (4.0% felt the risk was moderate). A full 93.2% of the organic farmers responded that the risk was high, as opposed to just 52.8% in the group of conventional farmers.

Lastly, the interviewers asked the conventional farmers what they thought about organic farming (Table 8). The majority of the conventional farmers had a fairly negative opinion of organic farming, seeing it as unproductive (59.2% of them), risky (53.6%), technically complicated (72%), restrictive (69%) and a fad (72.1% of them). However, a majority of these farmers (53.4%) also viewed organic farming as being environmentally friendly.

To sum up, the characteristics that differentiate the conventional farms from the organic farms (on average) in the sample of dairy farms are:

- Farm size (larger among the conventional farmers),
- Forage and grazing areas (larger among the organic farmers),
- Dairy cow stocking density (higher among the conventional farmers),
- Nitrate pressure (higher among the conventional farmers),
- Participation in AESs (more widespread among the organic farmers),
- Shared machinery cooperative and contract work company costs (higher among the organic farmers),
- Fertiliser, pesticide, animal feed and veterinary costs (higher among the conventional farmers)
- Earnings (higher or lower among the conventional farmers depending on the indicator used),
- Presence of commercial organic farms in the municipality (higher among the organic farmers),
- Level of education (higher among the organic farmers),
- Concern about environmental issues (greater among the organic farmers), and
- Assessment of the health risks associated with the use of pesticides (considered greater on average by the organic farmers).

These differences in characteristics between conventional and organic farmers are consistent in general with the findings of other samples. Of note, however, is the large difference with respect to level of education, which is much higher among the organic farmers than the conventional farmers. A higher level of education is probably conducive to conversion, since the farmer can get more of a perspective on the farming system and the practices put in place.

Table 9 summarises some of the organic farming characteristics of the 74 organic dairy farmers interviewed. At the time of the survey, 43 farms were fully certified, 25 farms were fully transitional, and six farms were mixed (in transition and certified). Most of the respondent organic farmers started to convert their farm in 2008, 2009 and 2010. Despite the care taken over farmer selection, two respondents converted their farms before 2005, which we had set as the respondent selection cut-off point (they started their conversions in 1999 and 2004 respectively). One or two farmers reported that they had started up or shut down a production unit for vegetables, COP, other major crops, pigs or poultry when they converted their farm to organic production, and 14 farmers said they had shut down their meat unit.

The respondent organic farmers were asked to put a figure to the retail price differential between their organic label production and similar conventional production. The 72 farmers who answered this question (of the 74 interviewed) all felt that the differential was positive for their dairy production and that, on average, their organic produce was 26.4% more expensive (the differential ranging from 7% to 45% across respondents).

Table 2: Respondent dairy farmers' farm profiles

		Conventional farmers	Organic farmers	All
Legal form				
Legal form	Share (%) of sole proprietorship farms in the sample	45.5	51.4	46.9
Surface areas				
Total UAA	Average for the sample (hectares)	83.5	75.2	81.7
Share of area under COP in UAA	Average for the sample (%)	28.0	15.1	25.0
Share of main forage area in UAA	Average for the sample (%)	69.6	83.1	72.5
Share of grazing area in UAA	Average for the sample (%)	38.4	54.2	42.0
Number of plots	Average for the sample	24.5	22.2	24.0
Labour				
Total number of AWUs	Average for the sample	1.81	1.67	1.78
Share of hired AWUs	Average for the sample (%)	2.4	7.5	3.5
Animals				
Number of dairy cows	Average for the sample	80.6	56.8	75.3
Total number of LUs	Average for the sample	81.5	77.5	80.6

Number of dairy cows per hectare of UAA	Average for the sample (number/hectare)	1.0	0.8	1.0
Number of dairy cows per hectare of main forage area	Average for the sample (number/hectare)	1.5	0.9	1.4
Number of dairy cows per hectare of grazing area	Average for the sample (number/hectare)	3.8	2.9	3.6
Environment				
Average nitrate pressure on the farm	Average for the sample (kg nitrogen/ hectare)	137.1	97.1	127.8
AESs	Share (%) of farms in the sample involved in one or more AESs excluding the conversion to organic farming scheme	20.2	47.3	26.7
Costs				
Total costs per hectare of UAA	Average for the sample (€/hectare)	2,309	1,867	2,221
Machinery costs per hectare of UAA	Average for the sample (€/hectare)	498	431	459
Shared machinery cooperative and contract work company costs per hectare of UAA	Average for the sample (€/hectare)	57	107	68
Fertiliser costs per hectare of UAA	Average for the sample (€/hectare)	92	24	76
Seed and seedling costs per hectare of UAA	Average for the sample (€/hectare)	68	61	67
Pesticide costs per hectare of UAA	Average for the sample (€/hectare)	49	6	39

Irrigation costs per hectare of UAA	Average for the sample (€/hectare)	2.0	1.7	1.9
Animal feed costs per hectare of UAA	Average for the sample (€/hectare)	341	239	317.0
Veterinary costs and fees per hectare of UAA	Average for the sample (€/hectare)	53	38	50
Cost of insurance per hectare of UAA	Average for the sample (€/hectare)	43	48	44
Debt				
Indebtedness ratio	Average for the sample (%)	53.2	55.5	53.7
Earnings				
Operating surplus per hectare of UAA	Average for the sample (€/hectare)	933	848	913
Farm profit per hectare of UAA	Average for the sample (€/hectare)	208	317	233
Subsidies				
Total subsidies (excluding investment subsidies) per hectare of UAA	Average for the sample (€/hectare)	341	392	352
SFP per hectare of UAA	Average for the sample (€/hectare)	320	290	313
Agri-environmental payments per hectare of UAA	Average for the sample (€/hectare)	9	94	30
LFA payments per hectare of UAA	Average for the sample (€/hectare)	0	0	0

Milk production				
Quota	Average for the sample (litres)	361,951	300,629	348,975
Yield	Average for the sample (litres/dairy cow)	6,960	5,502	6,659
Milk price	Average for the sample (€/1,000 litres)	330	365	338
On-farm production and other activities				
Quality label production	Share (%) of farms in the sample with the following quality label: - Controlled Designation of Origin, Protected Geographical Indication - Label Rouge - Sustainable farming - "Farm-produced" - Charter for Good Agricultural Practices - Certificate of Product Compliance - Other	 1.3 4.3 11.2 1.3 92.7 6.0 0	 0 2.7 2.7 1.3 75.7 8.1 2.7	 1.0 3.9 9.1 1.3 88.6 7.5 1.0
Contract farming	Share (%) of contract farming farms in the sample Average share of turnover from contract farming for the sample (%) Share (%) of farms in the sample with a written contract Share (%) of farms in the sample with a contract for more than one year Share (%) of farms in the sample with an exclusive contract	37.8 88.9 66.7 76.1 72.4	56.8 92.7 94.4 86.1 75.0	42.3 90.0 74.8 79.0 73.2

Direct and indirect sales	Average sample share of turnover from direct sales (%)			
	- On the farm	0.9	0.9	0.9
	- In cooperative farm shops	0	0.1	0
	- By box scheme	0.1	0.4	0.1
	- In open-air markets	0.1	0.3	0.2
	- To institutional catering operations/ canteens	0	0	0
	Average sample share of turnover from indirect sales (%)			
	- In cooperatives	52.6	43.8	50.5
	- To processors	38.1	41.0	38.8
	- To shops and supermarkets	0.2	0	0.1
	- By other indirect selling methods	5.9	13.9	7.9
Other farm activities	Share (%) of farms practising			
	- Direct on-farm sales	12.0	14.3	12.5
	- Processing	1.7	0	1.3
	- Craft trades	0	0	0
	- Agritourism	2.6	7.1	3.6
	- Contract work	5.1	1.4	4.3
	- Other types of activities	1.3	2.9	1.6
Soil and climate				
Average annual rainfall on the farm	Average for the sample (millimetres per year)	764	741	757
Share of UAA on wetlands	Average for the sample (%)	7.7	22.0	11.2
Main soil textures on the farm	Sample average share of UAA (%) of			
	- Heavy soil (clay, silty clay, sandy clay)	34.0	33.2	33.8
	- Medium soil (loam, clay loam, clayey sand)	47.3	45.3	46.8
	- Light soil (sand or loamy sand)	18.7	21.5	19.4

	Sample average share of UAA (%) of - Hydromorphic soil - Non hydromorphic soil	 18.6 81.4	 18.6 81.4	 18.6 81.4
Successor				
Successor identified for the farm	Share (%) of farms in the sample - With a successor - Without a successor - Undecided	 18.0 71.7 10.3	 17.6 51.4 31.0	 17.9 66.8 15.3
Other farms in the municipality				
Number of commercial farms in the municipality	Average for the sample	27.6	27.7	27.6
Number of commercial farms producing organically (certified or in transition) in the municipality	Average for the sample	1.8	3.3	2.2
Share of commercial farms producing organically (certified or in transition) in the municipality	Average for the sample (%)	6.7	14.1	8.6

Table 3: Profiles of respondent dairy farm heads and their households

		Conventional farmers	Organic farmers	All
Description of the farm head				
Gender	Share (%) of male farm heads in the sample	90.6	100	93.1
Age	Average for the sample (years)	46.0	43.7	45.4
Number of years since establishment	Average for the sample (years)	19.4	16.0	18.5
Education and training	Share (%) of farm heads in the sample with: - Primary education only - Lower secondary school education only - Higher secondary school education only - Maximum advanced technician's certificate (two years after secondary school) - Maximum university technology diploma or top university degree - Maximum PhD	 2.9 44.8 32.4 19.0 0.9 0	 0 18.4 26.3 42.1 13.2 0	 2.1 37.8 30.8 25.2 4.2 0
	Share (%) of farm heads with an agricultural qualification	87.6	97.4	90.2

	Share (%) of farm heads who have taken one or more dedicated organic training courses	6.6	57.9	20.1
Membership of a farmers' union or agricultural development association	Share (%) of member farm heads in the sample	41.0	76.4	49.5
Membership of an environmental or nature conservation association (local, national or international)	Share (%) of member farm heads in the sample	5.6	14.9	7.9
Off-farm paid work (excluding elected office or representative of a professional organisation)	Share (%) of farm heads with such work in the sample	5.7	6.8	6.0
	Of these, average percentage of working time spent on this work (%)	16.9	10.0	15.0
	Of these, share (%) of farm heads who are:			
	- Head of a business/organisation/ association other than a farm	23.1	20.0	22.2
	- Employee of a non-farm business/organisation/association (public or private sector)	46.2	0	33.3
	- Employee on one or more other farms	0	0	0
	- Self-employed	0	20.0	5.6
Agricultural press readership	Share (%) of farm heads in the sample who never read the agricultural press	2.1	0	1.6
	Share (%) of farm heads in the sample who read the agricultural press			
	- Less than one hour per week	27.5	24.3	26.7
	- More than one hour per week	70.4	75.7	71.7
Internet use	Share (%) of farm heads in the sample who do not use the Internet	18.8	8.1	15.6

	Share (%) of farm heads in the sample who use the Internet for			
	- The weather forecast	68.7	85.1	72.6
	- Information, advice, commodity prices	59.7	63.5	60.6
	- Purchasing inputs, animals or equipment	43.3	43.2	43.3
	- Selling, promoting or advertising agricultural products	15.0	25.7	17.6
	- Other agricultural activities	52.8	74.3	58.0
	- Personal non-agricultural activities	63.9	79.7	67.8
Description of the farm head's household				
Household composition	Average for the sample of the number of people aged			
	- Under 18 years old	1.3	1.9	1.5
	- 18 to 64 years old	2.4	2.4	2.4
	- 65 and over	0.04	0	0.03
Household share of gross income from agricultural activities	Share (%) of farms where the percentage is			
	- Less than 10%	1.3	1.4	1.3
	- From 10% to 29%	2.2	1.4	2.0
	- From 30% to 49%	10.7	9.6	10.4
	- From 50% to 69%	13.3	28.7	17.0
	- From 70% to 89%	7.7	9.6	8.2
	- 90% and over	64.8	49.3	61.1
Household share of gross income from farm head's off-farm paid work	Average for the sample (%)	14.7	10.2	13.4

Table 4: Respondent dairy farmers' opinions of the statements about agriculture and the environment

		Conventional farmers	Organic farmers	All
(a) Most farmers today make a real effort to protect the environment	*Share of don't knows (%)* Average score*	*0.4* 1.6	*0* 2.7	*0.3* 1.8
(b) Some of today's agricultural production methods are environmentally damaging	*Share of don't knows (%)* Average score*	*4.3* 2.5	*0* 1.5	*3.3* 2.2
(c) The environmental regulations for agriculture are too restrictive	*Share of don't knows (%)* Average score*	*1.7* 1.8	*2.7* 3.0	*1.9* 2.1
(d) Environmental regulations for agriculture are a good thing for the future of farming	*Share of don't knows (%)* Average score*	*6.9* 1.9	*2.7* 1.6	*5.9* 1.9
(e) Environmental regulations for agriculture are a good thing for the future of society	*Share of don't knows (%)* Average score*	*5.1* 2.0	*5.4* 1.6	*5.2* 1.9

* Scores on a scale of 1 to 4, where 1 – fully agree; 2 – agree; 3 – disagree; 4 – strongly disagree

Table 5: Respondent dairy farmers' opinions about society issues

		Conventional farmers	Organic farmers	All
International tensions (terrorist threat, international conflicts, etc.)	Average ranking*	3.5	3.2	3.4
Economic problems in France (unemployment, inflation, etc.)	Average ranking*	1.8	2.5	2.0
Environmental problems in France (waste, air pollution, water pollution, etc.)	Average ranking*	3.4	2.8	3.3
Health crises in France (E. Coli, mad cow, dioxins, etc.)	Average ranking*	4.0	4.5	4.1
Social problems in France (poverty, housing, discrimination, violence, etc.)	Average ranking*	2.3	2.1	2.2

* Ranking from 1 to 5 where 1 is the most important issue

Table 6: Respondent dairy farmers who feel concerned about general environmental problems

		Conventional farmers	Organic farmers	All
Water scarcity	*Share of don't knows (%)* Average score*	*0.4* 3.4	*1.3* 3.7	*0.6* 3.5
Air pollution	*Share of don't knows (%)* Average score*	*2.1* 2.6	*0* 3.4	*1.6* 2.8
Green algae	*Share of don't knows (%)* Average score*	*3.4* 2.1	*1.3* 3.3	*2.9* 2.4
Water pollution	*Share of don't knows (%)* Average score*	*0* 3.2	*0* 4.2	*0* 3.4
Genetically modified organisms (GMOs)	*Share of don't knows (%)* Average score*	*6.4* 2.5	*1.3* 3.9	*5.2* 2.8
Threat to habitats and biodiversity	*Share of don't knows (%)* Average score*	*4.3* 2.7	*1.3* 3.8	*3.6* 3.0
Soil degradation (erosion, salinisation, etc.)	*Share of don't knows (%)* Average score*	*0.9* 2.9	*0* 3.9	*0.6* 3.1
Disappearance of farming land (artificial land cover, urbanisation, etc.)	*Share of don't knows (%)* Average score*	*0.9* 4.2	*0* 4.5	*0.6* 4.3

* Scores on a scale of 1 to 5, where 1 – not at all concerned and 5 – very concerned

Table 7: Respondent dairy farmers' opinions of the health risk to farmers exposed to plant protection products used in agriculture

		Conventional farmers	Organic farmers	All
No risk	Share of farmers with this assessment of the health risk (%)	0.9	0	0.7
Very low risk	Share of farmers with this assessment of the health risk (%)	5.6	1.4	4.6
Moderate risk	Share of farmers with this assessment of the health risk (%)	40.3	4.0	31.6
High risk	Share of farmers with this assessment of the health risk (%)	52.8	93.2	62.5
Don't know	Share of don't knows (%)	0.4	1.4	0.6

Table 8: Respondent conventional dairy farmers' opinions of organic farming

Share of respondent conventional farmers who agree with the statement (%)	Conventional farmers
(a) A farming method like any other	43.8
(b) An environmentally friendly farming method	53.4
(c) A farming method that produces quality food	33.5
(d) A farming method that increases a farm's independence	27.5

(e) A farming method that earns a good living	23.2
(f) A farming method that creates jobs	30.9
(g) A marginal farming method	33.5
(h) An unproductive farming method	59.2
(i) An unprofitable farming method	22.3
(j) A farming method with a high risk of production loss	53.6
(k) A technically complicated farming method	72.1
(l) A restrictive farming method	68.7
(m) A farming method that is hard to operate in the current economic climate	48.5
(n) A farming method unable to meet the world's food needs	71.2
(o) A farming method that meets a real consumer demand	51.5
(p) A farming method that is a popular fad	72.1

Table 9: Characteristics of the respondent organic dairy farmers' organic activity

		Organic farmers
Type of organic farming		
Fully certified organic farm	Number of farmers	43
Fully transitional farm	Number of farmers	25
Mixed farm (in transition and certified)	Number of farmers	6
Conversion date		
1999	Number of farmers who started the conversion of their farm on this date	1
2004		1
2005		2
2006		2
2007		3
2008		10
2009		25
2010		25
2011		5

3.2. Vegetable farmers

Table 10 presents the average characteristics of the conventional farmers and organic farmers interviewed in the vegetable sector. The comments below are presented in the order in which the characteristics appear in the table.

Approximately 54% of the conventional farm sample were sole proprietorship farms, which is virtually the same percentage as for the organic farmers. In 2010, the conventional farmers interviewed had an average UAA of approximately 42 hectares, here again a very similar figure to the organic farmers interviewed (41.5 hectares). The area under COP for both types of farmers accounted for an average 19.0% of the UAA. One difference concerned labour, since the conventional farms used an average 2.7 AWU compared with 3.6 for the organic farms. An average 18.6% and 25.1% of these AWUs were hired labour respectively on the conventional and organic farms.

Average nitrate pressure was 126.9 kg of nitrogen per hectare on the conventional farms as opposed to 101.0 kg on the organic farms. A total of 27.3% of the organic farmers interviewed had adopted one or more AESs, excluding the organic conversion scheme. This compares with 6.9% of the conventional farmers.

In 2010, total farm costs to UAA were similar on both types of farm (approximately €4,900 per hectare). The conventional farmers had lower average machinery, seed and seedling, and insurance costs per hectare of UAA than the organic farmers. However, their fertiliser, pesticide and irrigation costs per hectare of UAA were much higher on average than the organic farmers.

The conventional farmers had a much higher indebtedness ratio than the organic farmers (40.8% and 22.5% respectively). With respect to earnings per hectare of UAA, the organic farmers had a slightly higher operating surplus on average (at €2,390 as opposed to €2,146 per hectare) as well as a higher profit (€1,117 versus €753 per hectare) than the conventional farms. In 2010, the respondent farmers received an average €163 in total subsidies (excluding investment subsidies) per hectare of UAA. Most of these were in the form of SFPs for the conventional farmers, but agri-environment payments (including organic conversion subsidies) for the organic farmers.

Approximately 53% of the conventional farmers and 73% of the organic farmers produced under a Certificate of Product Compliance. Nearly half (some 45%) of the respondent organic farmers contract farmed. Most (80%) of these agreements were written long-term contracts running for more than one year. Only around one-quarter of the conventional farmers practised contract farming, but most of these had written contracts. However, just 16% of these had long-term contracts running for more than one year. The exclusivity criterion applied to approximately 63% and 40% of each type of farm respectively.

Some farms (27% of the organic farms and 15% of the conventional farms) reported that they practised direct selling on the farm. Nevertheless, the turnover generated by this activity was low (less than 3% of turnover on average from direct retail: on-farm sales, cooperative farm

shops, open-air markets, institutional catering operations and canteens). On both types of farm, sales were mainly indirect via cooperatives and processors. The share of turnover from sales through cooperatives was similar in both samples at approximately 84%.

The respondent farms received 792 mm of annual rainfall on average, with the conventional farms reporting slightly higher rainfall than the organic farms. However, the share of UAA found on wetlands was similar (6%-7%) on both organic and conventional farms. Soil textures were also comparable in both samples, with a predominance of medium soils (loam, clay loam and clayey sand) and heavy soils (clay, silty clay and sandy clay). Most of the UAA of both types of farm was on non hydromorphic soil.

Approximately 9% of the farms, conventional and organic, had already chosen a successor for the farm. A smaller share of organic farmers (9%) than conventional farmers (17%) were undecided about a successor.

The municipalities where the respondent conventional and organic farms were established had an average of 38 commercial farms. The proportion of commercial farms producing organically (certified or in transition) was slightly higher on average in the municipalities where the respondent organic farms were established (10.9% as opposed to 8.9% in the municipalities where the conventional farms were interviewed).

Table 11 presents the profiles of the farm heads and their households. The farm heads who took part in the survey were virtually exclusively male (100% of the organic farmer sample and 92.3% of the conventional farmer sample). The farm heads were 48 years old on average in both samples. The conventional farmers had been established for an average of 23 years as opposed to 25 years for the organic farmers. The two samples present different levels of education and training characteristics. Some 36% of the conventional farmers had completed secondary school or obtained a higher qualification as opposed to 17% of the group of organic farmers. The vast majority of the farm heads interviewed had an agricultural qualification (84.6% in the group of conventional farmers and 100% in the group of organic farmers). A mere 16.7% of the organic farmers and 2.6% of the conventional farmers had taken one or more dedicated organic training courses.

Over half of the respondent farmers (54% of the conventional farmers) were members of a farmers' union or an agricultural development association. Around 9% of the organic farmers were members of an environmental or nature conservation association, compared with just 1% of the conventional group. A higher percentage of respondent farmers had off-farm paid work in the organic sample (18%) than in the conventional sample (14%).

Nearly all of the respondent farmers read the agricultural press, generally for more than an hour per week. The organic farmers were more frequent Internet users (just 9.1% did not use it as opposed to 26.4% of the conventional farmers). A full 81.8% of the organic farmers who used the Internet consulted the weather forecast (versus 52.8% for the conventional group) and 81.8% used it to look up commodity prices or for advice (as opposed to 52.8% in the

conventional group). Lastly, 18.2% of the organic farmers used the Internet to sell or promote their products, compared with 22.2% in the conventional group.

Household composition was similar on average in both samples, with approximately one person under 18 and slightly more than two people over 18 years old.

The respondent organic farms appear to be more diversified than the conventional farms. In 62.5% of the respondent conventional farms, over 90% of gross income was generated by farming activities whereas this was the case with just 54.53% of the organic farms interviewed. A not-inconsiderable share of gross income came from the farm head's off-farm paid work (36.2% and 27.5% on average for the conventional and organic farms respectively). The rest of the gross income came from off-farm paid work by other household members or on-farm non-agricultural activities.

The respondent farmers were then asked whether they agreed with a certain number of statements (Table 12). They were asked to rank each statement on a scale of one to four based on the following options: 1 (fully agree), 2 (agree), 3 (disagree), 4 (strongly disagree). Table 12 shows the average score given by the two types of farmers for each statement and the share of don't knows. Slightly more organic farmers felt that most farmers did not make any real effort today to protect the environment and that some production methods were environmentally damaging: the average score for statement (a) was 1.8 for the organic farmers, whereas it was 1.4 for the conventional farmers. The organic farmers found the environmental regulations less restrictive than the conventional farmers (average score for statement (c) of 2.5 as opposed to 1.6). More organic farmers felt that environmental regulations are a good thing, whether for the agricultural sector (average score for statement (d) of 1.6 versus 1.9) or for society as a whole (average score for statement (e) of 1.7 as opposed to 2.0).

The farmers were subsequently asked to rank the following five society issues in order of importance (from 1: the most important; to 5: the least important): international tensions, economic problems in France, environmental problems in France, health crises in France, and social problems in France. Table 13 shows the average rankings for each issue. The group of conventional farmers felt, on average, that social issues were the most important (average score of 2.6), whereas the most important issue for the organic farmers was international tensions (closely followed by social issues) with an average score of 2.5. On average, both types of farmers saw environmental issues as having little importance (average scores of 3.2 and 3.3).

The survey then sought to find out how concerned respondent farmers were about the following environmental issues: water scarcity, air pollution, green algae, water pollution, GMOs, threat to biodiversity, soil degradation, and the disappearance of farming land. Farmers were asked to state their level of concern for each of these issues on a scale of 1 to 5, where 1 was not at all concerned and 5 was very concerned. Table 14 presents the average scores across both types of farmer for each issue along with the share of don't knows. Aside from the problem of green algae, the organic farmers said they were more concerned, on

average, than the conventional farmers about each of these issues, with a higher average score than the conventional farmers.

Following this, the farmers were asked to assess the risk associated with their exposure to pesticides (Table 15). A total of 63.6% of the organic farmers responded that the risk was high, as opposed to 48.6% in the group of conventional farmers.

Lastly, the interviewers asked the conventional farmers what they thought about organic farming (Table 16). The majority of conventional farmers saw organic farming as risky (58.3% of them), restrictive (66.7% of them), unable to meet the world's food needs (77.8%), restrictive (69%) and a fad (80.6% of them). However, a large proportion of farmers also viewed organic farming as being environmentally friendly (43.1% of them) and very few saw it as unprofitable (13.9%).

To sum up, the characteristics that differentiate the conventional farms from the organic farms (on average) in the sample of vegetable producers are:

- Nitrate pressure (higher among the conventional farmers),
- Participation in AESs (more widespread among the organic farmers),
- Shared machinery cooperative and contract work company costs (higher among the organic farmers),
- Fertiliser, and pesticide costs (higher among the conventional farmers),
- Indebtedness ratio (higher among the conventional farmers),
- Earnings (higher among the organic farmers),
- Contract farming (more widespread among the organic farmers),
- Direct on-farm sales (more widespread among the organic farmers),
- Level of education (lower among the organic farmers),
- Concern about environmental issues (greater among the organic farmers), and
- Assessment of the health risks associated with the use of pesticides (considered greater on average by the organic farmers).

Although some differences are to be expected (e.g. less nitrate pressure for the organic sample), others are more surprising such as the lower level of education and higher earnings.

Table 17 summarises some of the organic farming characteristics of the 11 organic vegetable farmers interviewed. At the time of the survey, five farms were fully certified organic, one had part of the farm certified and another part in transition, and one was fully transitional. Despite the care taken over farmer selection, two respondents converted their farms before

2005, which we had set as the respondent selection cut-off point (they started their conversions in 1998 and 1999 respectively).

The respondent organic farmers were asked to put a figure to the retail price differential between their organic label production and similar conventional production. A total of 7 of the 11 organic farmers felt that the differential was positive for their main output and that, on average, their organic products were 30% more expensive (the differential ranging from 10% to 50% across respondents). Three farmers answered that the price for their main organic produce was about the same as the price for similar conventional produce. One respondent stated that conventional produce had a higher price tag (by 50%) than his organic produce.

Table 10: Respondent vegetable farmers' farm profiles

		Conventional farmers	Organic farmers	All
Legal form				
Legal form	Share (%) of sole proprietorship farms in the sample	54.2	54.6	54.2
Surface areas				
Total UAA	Average for the sample (hectare)	42.2	41.5	42.1
Share of area under COP in UAA	Average for the sample (%)	19.2	18.6	19.1
Number of plots	Average for the sample	23.0	29.3	23.9
Labour				
Total number of AWUs	Average for the sample	2.7	3.6	2.8
Share of hired AWUs	Average for the sample (%)	18.6	25.1	19.4
Environment				
Average nitrate pressure on the farm	Average for the sample (kg nitrogen/hectare)	126.9	101.0	127.8
AESs	Share (%) of farms in the sample involved in one or more AESs excluding the conversion to organic farming scheme	6.9	27.3	27.3

Costs				
Total costs per hectare of UAA	Average for the sample (€/hectare)	4,953	4,918	4,950
Machinery costs per hectare of UAA	Average for the sample (€/hectare)	1,131	1,312	1,154
Shared machinery company and contract work company costs per hectare of UAA	Average for the sample (€/hectare)	79	101	82
Fertiliser costs per hectare of UAA	Average for the sample (€/hectare)	273	117	253
Seed and seedling costs per hectare of UAA	Average for the sample (€/hectare)	465	646	486
Pesticide costs per hectare of UAA	Average for the sample (€/hectare)	230	76	212
Irrigation costs per hectare of UAA	Average for the sample (€/hectare)	1.4	0.5	1.3
Cost of insurance per hectare of UAA	Average for the sample (€/hectare)	71	85	73
Debt				
Indebtedness ratio	Average for the sample (%)	40.8	22.5	58.6
Earnings				
Operating surplus per hectare of UAA	Average for the sample (€/hectare)	2,146	2,390	2,174
Farm profit per hectare of UAA	Average for the sample (€/hectare)	753	1117	795

Subsidies				
Total subsidies (excluding investment subsidies) per hectare of UAA	Average for the sample (€/hectare)	133	387	163
SFP per hectare of UAA	Average for the sample (€/hectare)	121	91	117
Agri-environmental payments per hectare of UAA	Average for the sample (€/hectare)	1	175	23
On-farm production and other activities				
Quality label production	Share (%) of farms in the sample with the following quality label: - Controlled Designation of Origin, Protected Geographical Indication - Sustainable farming - Other	 5.6 11.2 52.8	 9.1 0 72.7	 6.0 13.3 55.4
Contract farming	Share (%) of contract farming farms in the sample Average share of turnover from contract farming for the sample (%) Share (%) of farms in the sample with a written contract Share (%) of farms in the sample with a contract for more than one year Share (%) of farms in the sample with an exclusive contract	26.4 44.4 94.7 15.8 63.2	45.4 62.6 80.0 80.0 40.0	28.9 60.6 91.7 29.2 58.3
Direct and indirect sales	Average sample share of turnover from direct sales (%)			

	- On the farm	1.7	2.7	1.8
	- In cooperative farm shops	2.4	0	2.1
	- By box scheme	0	0.4	0.01
	- In open-air markets	0	0	0
	- To institutional catering operations/canteens	0.1	6	0.1
	Average sample share of turnover from indirect sales (%)			
	- In cooperatives	83.4	84.5	83.6
	- To processors	1.0	0	0.8
	- To shops and supermarkets	1.6	0	1.4
	- By other indirect selling methods	9.0	12.3	9.4
Other farm activities	Share (%) of farms practising			
	- Direct on-farm sales	15.38	27.3	16.9
	- Processing	2.8	0	2.4
	- Craft trades	0	0	0
	- Agritourism	5.6	0	4.8
	- Contract work	4.2	0	3.6
	- Other types of activities	2.8	0	2.4
Soil and climate				
Average annual rainfall on the farm	Average for the sample (millimetres per year)	798	750	792
Share of UAA on wetlands	Average for the sample (%)	7.0	6.2	6.9
Main soil textures on the farm	Sample average share of UAA (%) of			
	- Heavy soil (clay, silty clay, sandy clay)	28.4	25.4	28.0
	- Medium soil (loam, clay loam, clayey sand)	52.0	48.2	51.5
	- Light soil (sand or loamy sand)	19.5	26.4	20.4
	Sample average share of UAA (%) of			
	- Hydromorphic soil	6.2	4.0	5.9

	- Non hydromorphic soil	93.8	96.0	94.1
Successor				
Successor identified for the farm	Share (%) of farms in the sample - With a successor - Without a successor - Undecided	 9.7 73.6 16.7	 9.1 81.8 9.1	 9.6 74.7 15.7
Other farms in the municipality				
Number of commercial farms in the municipality	Average for the sample	39.6	24.0	37.7
Number of commercial farms producing organically (certified or in transition) in the municipality	Average for the sample	2.9	1.9	2.7
Share of commercial farms producing organically (certified or in transition) in the municipality	Average for the sample (%)	8.9	10.9	9.1

Table 11: Profiles of respondent vegetable farm heads and their households

		Conventional farmers	Organic farmers	All
Description of the farm head				
Gender	Share (%) of male farm heads in the sample	92.3	100	93.3
Age	Average for the sample (years)	47.8	47.8	47.8
Number of years since establishment	Average for the sample (years)	22.9	25.5	23.2
Education and training	Share (%) of farm heads in the sample with: - Primary education only - Lower secondary school education only - Higher secondary school education only - Maximum advanced technician's certificate (two years after secondary school) - Maximum university technology diploma or top university degree - Maximum PhD	 0 51.3 35.9 12.8 0 0	 0 66.7 16.7 16.7 0 0	 0 53.3 33.3 13.3 0 0
	Share (%) of farm heads with an agricultural qualification	84.6	100	86.7

	Share (%) of farm heads who have taken one or more dedicated organic training courses	2.6	16.7	4.4
Membership of a farmers' union or agricultural development association	Share (%) of member farm heads in the sample	58.3	54.5	57.8
Membership of an environmental or nature conservation association (local, national or international)	Share (%) of member farm heads in the sample	1.4	9.1	2.4
Off-farm paid work (excluding elected office or representative of a professional organisation)	Share (%) of farm heads with such work in the sample	13.9	18.2	14.5
	Of these, average percentage of working time spent on this work (%)	28.2	5.0	24.3
	Of these, share (%) of farm heads who are:			
	- Head of a business/organisation/ association other than a farm	30.0	0	25.0
	- Employee of a non-farm business/organisation/association (public or private sector)	20.0	0	16.7
	- Employee on one or more other farms	0	0	0
	- Self-employed	10.0	0	8.3
Agricultural press readership	Share (%) of farm heads in the sample who never read the agricultural press	1.4	0	1.2
	Share (%) of farm heads in the sample who read the agricultural press			
	- Less than one hour per week	31.9	54.5	34.9
	- More than one hour per week	66.7	45.4	63.9
Internet use	Share (%) of farm heads in the sample who do not use the Internet	26.4	9.1	24.1

	Share (%) of farm heads in the sample who use the Internet for			
	- The weather forecast	52.8	81.8	56.6
	- Information, advice, commodity prices	52.8	81.8	56.6
	- Purchasing inputs, animals or equipment	30.6	45.4	32.5
	- Selling, promoting or advertising agricultural products	22.2	18.2	21.7
	- Other agricultural activities	37.5	27.3	36.1
	- Personal non-agricultural activities	55.6	81.8	59.0
Description of the farm head's household				
Household composition	Average for the sample of the number of people aged			
	- Under 18 years old	1.1	1.1	1.1
	- 18 to 64 years old	2.4	2.2	2.3
	- 65 and over	0.03	0	0.02
Household share of gross income from agricultural activities	Share (%) of farms where the percentage is			
	- Less than 10%	4.1	0	3.6
	- From 10% to 29%	2.8	0	2.4
	- From 30% to 49%	4.2	9.1	4.8
	- From 50% to 69%	15.3	27.3	16.9
	- From 70% to 89%	11.1	9.1	10.8
	- 90% and over	62.5	54.5	61.5
Household share of gross income from farm head's off-farm paid work	Average for the sample (%)	36.2	27.5	34.6

Table 12: Respondent vegetable farmers' opinions of the statements about agriculture and the environment

		Conventional farmers	Organic farmers	All
(a) Most farmers today make a real effort to protect the environment	*Share of don't knows (%)* Average score*	*0* 1.4	*0* 1.8	*0* 1.5
(b) Some of today's agricultural production methods are environmentally damaging	*Share of don't knows (%)* Average score*	*5.6* 2.7	*9.1* 2.0	*6.0* 2.6
(c) The environmental regulations for agriculture are too restrictive	*Share of don't knows (%)* Average score*	*1.4* 1.6	*0* 2.5	*1.2* 1.8
(d) Environmental regulations for agriculture are a good thing for the future of farming	*Share of don't knows (%)* Average score*	*2.8* 1.9	*0* 1.6	*2.4* 1.9
(e) Environmental regulations for agriculture are a good thing for the future of society	*Share of don't knows (%)* Average score*	*4.2* 2.0	*9.1* 1.7	*4.8* 1.9

* Scores on a scale of 1 to 4, where 1 – fully agree; 2 – agree; 3 – disagree; 4 – strongly disagree

Table 13: Respondent vegetable farmers' opinions about society issues

		Conventional farmers	Organic farmers	All
International tensions (terrorist threat, international conflicts, etc.)	Average ranking*	3.0	2.5	2.9
Economic problems in France (unemployment, inflation, etc.)	Average ranking*	3.1	3.4	3.1
Environmental problems in France (waste, air pollution, water pollution, etc.)	Average ranking*	3.2	3.3	3.2
Health crises in France (E. Coli, mad cow, dioxins, etc.)	Average ranking*	3.1	3.1	3.1
Social problems in France (poverty, housing, discrimination, violence, etc.)	Average ranking*	2.6	2.7	2.6

* Ranking from 1 to 5 where 1 is the most important issue

Table 14: Respondent vegetable farmers who feel concerned about general environmental problems

		Conventional farmers	Organic farmers	All
Water scarcity	*Share of don't knows (%)* Average score*	*0* 2.9	*0* 3.3	*0* 3.0
Air pollution	*Share of don't knows (%)* Average score*	*0* 2.6	*0* 3.1	*0* 2.7
Green algae	*Share of don't knows (%)* Average score*	*4.2* 2.9	*0* 2.5	*3.6* 2.8
Water pollution	*Share of don't knows (%)* Average score*	*0* 3.3	*0* 3.4	*0* 3.3
Genetically modified organisms (GMOs)	*Share of don't knows (%)* Average score*	*4.2* 2.1	*9.1* 3.1	*4.8* 2.2
Threat to habitats and biodiversity	*Share of don't knows (%)* Average score*	*1.4* 2.8	*0* 3.5	*1.2* 2.9
Soil degradation (erosion, salinisation, etc.)	*Share of don't knows (%)* Average score*	*0* 2.9	*0* 3.4	*0* 3.0
Disappearance of farming land (artificial land cover, urbanisation, etc.)	*Share of don't knows (%)* Average score*	*0* 3.6	*0* 4.4	*0* 3.7

* Scores on a scale of 1 to 5, where 1 – not at all concerned and 5 – very concerned

Table 15: Respondent vegetable farmers' opinions of the health risk to farmers exposed to plant protection products used in agriculture

		Conventional farmers	Organic farmers	All
No risk	Share of farmers with this assessment of the health risk (%)	0	0	0
Very low risk	Share of farmers with this assessment of the health risk (%)	9.7	0	8.4
Moderate risk	Share of farmers with this assessment of the health risk (%)	41.7	36.4	41.0
High risk	Share of farmers with this assessment of the health risk (%)	48.6	63.6	50.6
Don't know	Share of don't knows (%)	0	0	0

Table 16: Respondent conventional vegetable farmers' opinions of organic farming

Share of respondent conventional farmers who agree with the statement (%)	Conventional farmers
(a) A farming method like any other	45.8
(b) An environmentally friendly farming method	43.1
(c) A way of producing quality food	19.4
(d) A farming method that increases a farm's independence	16.7

(e) A farming method that earns a good living	12.5
(f) A farming method that creates jobs	50.0
(g) A marginal farming method	25.0
(h) An unproductive farming method	36.1
(i) An unprofitable farming method	13.9
(j) A farming method with a high risk of production loss	58.3
(k) A technically complicated farming method	48.6
(l) A restrictive farming method	66.7
(m) A farming method that is hard to operate in the current economic climate	43.1
(n) A farming method unable to meet the world's food needs	77.8
(o) A farming method that meets a real consumer demand	44.4
(p) A farming method that is a popular fad	80.6

Table 17: Characteristics of the respondent organic vegetable farmers' organic activity

		Organic farmers
Type of organic farming		
Fully certified organic farm	Number of farmers	5
Fully transitional farm	Number of farmers	1
Mixed farm (in transition and certified)	Number of farmers	1
Conversion date		
1998	Number of farmers who started the conversion of their farm on this date	1
1999		1
2007		1
2008		4
2009		2
2010		2

4. Drivers inducing and preventing conversion to organic farming for respondent farmers

Table 18 and Table 19 present the main drivers inducing and preventing conversion to organic farming for the group of respondent farmers in the dairy sector and the vegetable sector respectively. The main motives for organic farmers in the dairy sector (Table 18) were ideological reasons (environmental protection, farm independence, etc). Among the other possible important reasons that encouraged them to convert, some farmers mentioned its being easier to pass on the farm and more contact with consumers. The group of conventional farmers saw economic grounds (increase capital gain, find a new niche, etc.) as the main drivers for conversion. However, the main obstacles for these farmers were technical (complicated technology, hard to manage weeds and pests, lack of advice or references, lack of labour, too strenuous, etc.). Some conventional farmers also mentioned that coming to the end of their working lives would be an important reason not to convert. The economic aspect was very important in the vegetable sector (Table 19). Economic reasons would encourage the conventional vegetable farmers to convert. Economic reasons were also ranked first by the organic vegetable farmers, along with ideological reasons. In addition, the main obstacles in the way of conversion by the conventional farmers were also mainly economic.

The survey asked the farmers whether they thought there was a link between their past decision to convert (for the organic farmers) or a hypothetical decision to convert (for the conventional farmers) and their earnings as a conventional farm (i.e. before the conversion date for the organic farmers). Three statements were put to them: i) there is no link between the earnings from conventional farming and the conversion decision; ii) there is a positive link; iii) there is a negative link (Table 20 for the dairy farms and Table 21 for the vegetable farms). In the dairy sector, the two groups of farmers differ mainly in terms of their opinions of the second statement. The organic farmers agreed that, “Good earnings made it possible to take the risk to convert”, whereas the conventional farmers disagreed with this statement on average. In other words, the conventional farmers disagreed with the idea that, “Good earnings would make it possible to take the risk to convert.” However, both groups of farmers disagreed with the statement that, “Poor earnings made/could make conversion the best solution to keep the farm viable.” In the vegetable sector, the organic and conventional farmers differed in their views of the second and third statements. The organic farmers agreed more than the conventional farmers with the statement that, “Good earnings made it possible to take the risk to convert.” However, the organic farmers agreed less than the conventional farmers with the statement that, “Poor earnings could make conversion the best solution.”

The conventional farmers were then asked about the amount of annual subsidies that could encourage them (first of all) to convert and (subsequently) to keep their farm organic (Table 22 for the dairy farms and Table 23 for the vegetable farms). A full 47% of the respondent conventional dairy farmers said they would not convert at any price (“No amount of support would provide the incentive to convert”), 36% did not know what to answer (“Don’t know”) and 17% gave a subsidy amount that would give them the incentive to convert. Nine farmers gave a sum per hectare of €400 to €1,000 per year. The average was €525 per hectare per year

and the median (the value that divides the population of respondents into two groups of the same size) was €600 per hectare per year. Two farmers estimated the subsidy per livestock head (€100 for one and €200 for the other). Ten farmers answered that there was a sum that would encourage them to keep the farm organic. One of them estimated the subsidy to keep the farm organic at €100 per livestock head and the others estimated it at €0 to €900 per hectare, with the average at €475 per hectare per year and a median of €500 per hectare per year. In the vegetable sector, half of the respondents said that no amount of support could prompt them to convert to organic farming. Five farmers put a figure to a subsidy at €820 on average per hectare per year for conversion support (minimum and maximum estimated: €500 and €1,000) and at €540 per hectare per year for support to keep the farm organic (minimum and maximum estimated: €500 and €600 per hectare).

The organic farmers were then asked what triggered their conversion to organic farming (Table 24 for the dairy farms and Table 25 for the vegetable farms). In the dairy sector, 61% said that they converted because they had a technical opportunity (e.g. suitable system or appropriate rotation). A meeting or discussion with a key person and a market opportunity were given as triggers by 43% of these dairy farmers. Only 31% mentioned a support opportunity (especially the level of subsidies). In the vegetable sector, the trigger was mainly a market opportunity (64%). Among the other triggers, the farmers mentioned a poor price context (a year of low prices for conventional produce).

Just two conventional farmers in the vegetable sector had tried organic farming before. In the dairy sector, six conventional farmers (out of the 233 interviewed) had already tried organic farming on their farms in the past, whether in milk, field crops or beef production. Four of them embarked on conversion in the 2000s and dropped organic farming one to two years later. The other two farmers started their conversions in 1996 and 1997 and dropped organic production in 2004 and 2006 respectively. Table 26 shows that the main reason for withdrawing from organic farming was the technical aspect (score of 1.3) followed closely by the economic reason (score of 1.8).

These technical reasons are confirmed by the Table 27 figures, which report on the main problems encountered by the organic dairy farmers when they converted and still to date. The problems encountered by the organic farmers when they converted are virtually the same as the problems mentioned at the time of the survey. Technical problems were the most frequently mentioned, with weed management top of this list. Next in line are economic problems, especially earnings considered to be too low, selling prices seen as too low, inadequate subsidies and uncertainty over the level of future subsidies. Then come administrative constraints and psychological constraints, including pressure from friends and relatives against the conversion. Table 28 shows that economic problems were and still are the most important problems for the vegetable farmers, followed by technical and then administrative problems.

Lastly, respondent farmers were asked what their plans were for the next five years (with respect to organic farming). Table 29 presents the answers for the dairy farms and Table 30

the answers for the vegetable farms. A full 89% of the conventional farmers interviewed in both the dairy and vegetable sectors had no plans to convert all or part of their farm to organic production. A total of 8% of the dairy farmers were undecided and 3% planned to convert all or part of their farm to organic production. Among the vegetable producers, 11% were undecided and no one was planning to convert at that particular point. A full 83% of the organic dairy farmers did not plan to make any changes to their current situation, 7% planned to convert their entire farm to organic production, and 8% planned to expand their organic farming areas or convert other units to organic farming. The respective figures for the organic vegetable farmers in this regard were 64%, 9% and 18%. No organic farmer interviewed in either sample planned to switch all or part of the farm back to conventional farming.

Table 18: Drivers inducing and preventing conversion to organic farming for respondent farmers in the dairy sector

		Conventional farmers	Organic farmers	All
Main motive for conversion				
Health reasons (personal health or entourage's health)	Average ranking*	2.6	2.9	2.6
Ideological reasons (environmental protection, farm independence, etc.)	Average ranking*	2.6	1.7	2.3
Technical reasons (method best suited to the farm structure, etc.)	Average ranking*	2.6	2.9	2.7
Economic reasons (increase capital gain, find a new niche, easier to sell, etc.)	Average ranking*	2.1	2.5	2.2
Other reasons	Average ranking*	4.0	3.7	4.0
Main obstacle against conversion				
Technical reasons (complicated technology, hard to manage weeds and pests, lack of advice or references, lack of labour, too strenuous, etc.)	Average ranking*	1.8		

Economic reasons (too risky, earnings too low, prices too low, inadequate subsidies, uncertainties over future subsidies, inadequate outlets, etc.)	Average ranking*	2.3		
Psychological or sociological reasons (little interest in organic farming, entourage against it, negative attitude to the production method, etc.)	Average ranking*	2.8		
Administrative reasons (too many administrative constraints, etc.)	Average ranking*	2.9		
Other reasons	Average ranking*	4.7		

* Ranking from 1 to 5, where 1 is the most important motive or obstacle

Table 19: Drivers inducing and preventing conversion to organic farming for respondent farmers in the vegetable sector

		Conventional farmers	**Organic farmers**	**All**
Main motive for conversion				
Health reasons (personal health or entourage's health)	Average ranking*	2.8	3.2	2.8
Ideological reasons (environmental protection, farm independence, etc.)	Average ranking*	2.9	2.4	2.8

Technical reasons (method best suited to the farm structure, etc.)	Average ranking*	2.8	2.8	2.8
Economic reasons (increase capital gain, find a new niche, easier to sell, etc.)	Average ranking*	1.9	2.4	2.0
Others reasons	Average ranking*	2.4	3.2	2.6
Main obstacle against conversion				
Technical reasons (complicated technology, hard to manage weeds and pests, lack of advice or references, lack of labour, too strenuous, etc.)	Average ranking*	2.1		
Economic reasons (too risky, earnings too low, prices too low, inadequate subsidies, uncertainties over future subsidies, inadequate outlets, etc.)	Average ranking*	1.9		
Psychological or sociological reasons (little interest in organic farming, entourage against it, negative attitude to the production method, etc.)	Average ranking*	3.3		
Administrative reasons (too many administrative constraints, etc.)	Average ranking*	2.7		
Other reasons	Average ranking*	4.7		

* Ranking from 1 to 5, where 1 is the most important motive or obstacle

Table 20: Respondent farmers' opinions on the link between earnings and the conversion decision in the dairy sector

		Conventional farmers	**Organic farmers**	**All**
i) The earnings made from conventional farming **did not influence/would not influence** the farming conversion decision	*Share of don't knows (%)* Average score*	*4.7* 2.1	*4.0* 1.9	*4.6* 2.0
ii) **Good earnings** made from conventional farming **made it possible/would make it possible to take the risk to convert** the farm	*Share of don't knows (%)* Average score*	*5.6* 3.2	*12.2* 2.5	*7.2* 3.1
iii) **Poor earnings** made from conventional farming made/could make **conversion the best solution** to keep the farm viable	*Share of don't knows (%)* Average score*	*6.0* 3.4	*12.2* 3.5	*7.5* 3.4

* Scores on a scale of 1 to 4, where 1 – fully agree; 2 – agree; 3 – disagree; 4 – strongly disagree

Table 21: Respondent farmers' opinions on the link between earnings and the conversion decision in the vegetable sector

		Conventional farmers	**Organic farmers**	**All**
i) The earnings made from conventional farming **did not influence/would not influence** the farming conversion decision	*Share of don't knows (%)* Average score*	*8.3* 3.5	*0* 3.3	*7.2* 3.4
ii) **Good earnings** made from conventional farming **made it possible/would make it possible to take the risk to convert** the farm	*Share of don't knows (%)* Average score*	*2.8* 3.1	*9.1* 2.4	*3.6* 3.0
iii) **Poor earnings** made from conventional farming made/could make **conversion the best solution** to keep the farm viable	*Share of don't knows (%)* Average score*	*5.6* 1.9	*0* 3.4	*4.8* 2.2

* Scores on a scale of 1 to 4, where 1 – fully agree; 2 – agree; 3 – disagree; 4 – strongly disagree

Table 22: Amount of subsidies that could give respondent conventional dairy farmers the incentive to convert and keep their farms organic

		Conventional farmers
Annual subsidies during the conversion period		
A certain amount would provide the incentive to convert No amount of support would provide the incentive to convert Don't know	Share of farmers for each statement (%)	16.7 47.2 36.1
Amount of conversion subsidies	Average for the respondents in € per hectare Average for the respondents in € per livestock head	525 150
Annual subsidies to keep the farm organic		
A certain amount would provide the incentive to stay organic No amount of support would provide the incentive to stay organic Don't know	Share of farmers for each statement (%)	15.1 47.6 37.3
Amount of subsidies to keep the farm organic	Average for the respondents in € per hectare Average for the respondents in € per livestock head	475 100

Table 23: Amount of subsidies that could give respondent conventional vegetable farmers the incentive to convert and keep their farms organic

		Conventional farmers
Annual subsidies during the conversion period		
A certain amount would provide the incentive to convert No amount of support would provide the incentive to convert Don't know	Share of farmers for each statement (%)	12.5 50.0 37.5
Amount of conversion subsidies	Average for the respondents in € per hectare	820
Annual subsidies to keep the farm organic		
A certain amount would provide the incentive to stay organic No amount of support would provide the incentive to stay organic Don't know	Share of farmers for each statement (%)	12.5 50.0 37.5
Amount of subsidies to keep the farm organic	Average for the respondents in € per hectare	540

Table 24: Organic farming conversion trigger for respondent organic farmers in the dairy sector

Share of respondent organic farmers who agree with the statement (%)	**Organic farmers**
Conversion due to a meeting or discussion with a key person	43.2
Conversion due to a market opportunity (customers, outlets, etc.)	43.2
Conversion due to a technical opportunity (suitable system, appropriate rotation, etc.)	60.8
Conversion due to a support opportunity (subsidies became adequate, more certain, etc.)	31.1
Other trigger	0

Table 25: Organic farming conversion trigger for respondent organic farmers in the vegetable sector

Share of respondent organic farmers who agree with the statement (%)	**Organic farmers**
Conversion due to a meeting or discussion with a key person	18.2
Conversion due to a market opportunity (customers, outlets, etc.)	63.6
Conversion due to a technical opportunity (suitable system, appropriate rotation, etc.)	40.0
Conversion due to a support opportunity (subsidies became adequate, more certain, etc.)	18.2
Other trigger	45.4

Table 26: Reasons for withdrawal from organic farming by respondent conventional dairy farmers who have tried organic farming before

		Conventional farmers
Technical reasons (complicated technology, hard to manage weeds and pests, lack of advice or references, lack of labour, too strenuous, etc.)	Average ranking*	1.3
Economic reasons (too risky, earnings too low, prices too low, inadequate subsidies, uncertainties over future subsidies, inadequate outlets, etc.)	Average ranking*	1.8
Psychological or sociological reasons (little interest in organic farming, entourage against it, negative attitude to the production method, etc.)	Average ranking*	3.0
Administrative reasons (too many administrative constraints, etc.)	Average ranking*	3.0
Other reasons	Average ranking*	5.0

* Ranking from 1 to 5, where 1 is the most important reason

Table 27: Problems encountered by respondent organic dairy farmers during their conversion and to date

		Organic farmers: during their conversion	Organic farmers: to date
Technical problems (complicated technology, hard to manage weeds and pests, lack of advice or references, lack of labour, too strenuous, etc.)	Average ranking*	1.9	1.9
Economic problems (too risky, earnings too low, prices too low, inadequate subsidies, uncertainties over future subsidies, inadequate outlets, etc.)	Average ranking*	2.4	2.5
Psychological or sociological problems (little interest in organic farming, entourage against it, negative attitude to the production method, etc.)	Average ranking*	3.0	3.1
Administrative problems (too many administrative constraints, etc.)	Average ranking*	2.7	2.6
Other problems	Average ranking*	3.6	3.2

* Ranking from 1 to 5, where 1 is the most important problem

Table 28: Problems encountered by respondent organic vegetable farmers during their conversion and to date

		Organic farmers: during their conversion	Organic farmers: to date
Technical problems (complicated technology, hard to manage weeds and pests, lack of advice or references, lack of manpower, too strenuous, etc.)	Average ranking*	2.4	2.3
Economic problems (too risky, earnings too low, prices too low, inadequate subsidies, uncertainties over future subsidies, inadequate outlets, etc.)	Average ranking*	1.7	2.0
Psychological or sociological problems (little interest in organic farming, friends and relatives against it, negative attitude to the production method, etc.)	Average ranking*	3.1	3.2
Administrative problems (Too many administrative constraints, etc.)	Average ranking*	2.9	2.9
Other problems	Average ranking*	4.7	3.7

* Ranking from 1 to 5, where 1 is the most important problem

Table 29: Respondent dairy farmers' organic farming plans for their farm

		Conventional farmers	Organic farmers
Conventional farmers' plans for the next five years			
Plans to convert all or part of the farm to organic production	Share of farmers (%)	3.4	
No plans to convert all or part of the farm to organic production	Share of farmers (%)	88.9	
Don't know	Share of farmers (%)	7.7	
Organic farmers' plans for the next five years			
(a) **No plans to change** the current situation	Share of farmers (%)		83.3
(b) Plans to **convert the entire** farm to organic production if it is not yet the case	Share of farmers (%)		7.0
(c) Plans to **expand organic farming areas** or convert other units to organic farming (but without total conversion)	Share of farmers (%)		8.3
(d) Plans to **switch part of the farm back to conventional farming**	Share of farmers (%)		0

(e) Plans to **expand organic farming areas** or convert other units to organic farming **AND to switch part of the farm back to conventional farming** (c + d)	Share of farmers (%)		0
(f) Plans to **switch all of the farm back to conventional farming**	Share of farmers (%)		0
(g) **Don't know**	Share of farmers (%)		1.4

Table 30: Respondent vegetable farmers' organic farming plans for their farm

		Conventional farmers	**Organic farmers**
Conventional farmers' plans for the next five years			
Plans to convert all or part of the farm to organic production	Share of farmers (%)	0	
No plans to convert all or part of the farm to organic production	Share of farmers (%)	88.9	
Don't know	Share of farmers (%)	11.1	

Organic farmers' plans for the next five years			
(a) **No plans to change** the current situation	Share of farmers (%)		63.6
(b) Plans to **convert the entire** farm to organic production if it is not yet the case	Share of farmers (%)		9.1
(c) Plans to **expand organic farming areas** or convert other units to organic farming (but without total conversion)	Share of farmers (%)		18.2
(d) Plans to **switch part of the farm back to conventional farming**	Share of farmers (%)		0.
(e) Plans to **expand organic farming areas** or convert other units to organic farming **AND to switch part of the farm back to conventional farming** (c + d)	Share of farmers (%)		0
(f) Plans to **switch all of the farm back to conventional farming**	Share of farmers (%)		0
(g) **Don't know**	Share of farmers (%)		9.1

5. Relationship between respondent farmers' profiles and their opinions on the link between conversion decision and earnings

This section studies the farmers' profiles based on their opinion of the statements regarding a possible link between conversion decision and farm earnings (i.e. the statements listed in tables 20 and 21). The comments here concern only those characteristics for which there is a statistically significant difference between the farmers who fully agree or agree with the statement and the farmers who disagree or strongly disagree with the statement.

The conventional dairy farmers who fully agreed or agreed with statement (i), i.e. that there is no link, had a higher milk yield per cow and higher insurance costs per hectare of UAA on average in 2010 than the conventional farmers who disagreed or strongly disagreed with statement (i). In this same group of conventional farmers, those who fully agreed or agreed with statement (ii), i.e. that there is a positive link, had a lower milk yield per dairy cow and lower seed and pesticide costs per hectare of UAA on average in 2010 than the conventional farmers who disagreed or strongly disagreed with statement (ii). The conventional farmers who fully agreed or agreed with statement (iii), i.e. that there is a negative link, were older, had a lower operating surplus per hectare of UAA and received a lower SFP amount per hectare of UAA on average in 2010 than the conventional farmers who disagreed or strongly disagreed with statement (iii).

There is no statistically significant difference between the characteristics of the organic farmers who fully agreed or agreed with statement (i) on a neutral linkage between earnings and conversion decision, and the organic farmers who disagreed or strongly disagreed with this statement. Those who fully agreed or agreed with statement (ii), i.e. that there is a positive link between earnings and conversion decision, were younger on average and converted one year earlier on average than the organic farmers who disagreed or strongly disagreed with statement (ii). In addition, on average over the three years prior to their conversion, these farmers had a lower indebtedness ratio, higher total subsidies per hectare of UAA, higher agri-environmental payments per hectare of UAA, a higher operating surplus per hectare of UAA, a higher profit per hectare of UAA and a higher milk yield per dairy cow than the organic farmers who disagreed or strongly disagreed with statement (ii). Conversely, the organic farmers who fully agreed or agreed with statement (iii), i.e. that there is a negative link between earnings and conversion decision, had a higher indebtedness ratio, lower total subsidies per hectare of UAA, lower agri-environmental payments per hectare of UAA, a lower profit per hectare of UAA and a lower milk yield per dairy cow than the organic farmers who disagreed or strongly disagreed with statement (iii).

More conventional vegetable farmers who fully agreed or agreed with statement (i), i.e. that there is no link between earnings and conversion decision, farmed sole proprietorships in 2010 than the conventional farmers who disagreed or strongly disagreed with statement (i). There is no significant difference between the characteristics of the conventional farmers who fully agreed or agreed with statement (ii), i.e. that there is a positive link between earnings and conversion decision, and the conventional farmers who disagreed or strongly disagreed

with statement (ii). The conventional farmers who fully agreed or agreed with statement (iii), i.e. that there is a negative link between earnings and conversion decision, had a lower UAA, fewer total workers and lower pesticide costs per hectare of UAA on average in 2010 than the conventional farmers who disagreed or strongly disagreed with statement (iii).

There is no statistically significant difference between the characteristics of the organic farmers who fully agreed or agreed with statement (i) on a neutral linkage between earnings and conversion decision, and the organic farmers who disagreed or strongly disagreed with this statement. Those who fully agreed or agreed with statement (ii), i.e. that there is a positive link between earnings and conversion decision, had a higher operating surplus per hectare of UAA on average in 2010 than the organic farmers who disagreed or strongly disagreed with statement (ii). The organic farmers who fully agreed or agreed with statement (iii), i.e. that there is a negative link between earnings and conversion decision, had a smaller UAA, higher seed and seedling costs and higher pesticide costs per hectare of UAA, and higher agri-environmental payments per hectare of UAA than the organic farmers who disagreed or strongly disagreed with statement (iii).

6. Determinants of the organic conversion decision

6.1. Comparison of farm profiles based on their conversion decision

This section compares the profiles of the currently conventional farms with the profiles of the organic farms when they were conventional. This is done by calculating the average of a set of farm characteristics (size, stocking density, etc.) over a three-year period. This calculation of a three-year average captures an average trend for each of the characteristics (figures for a given year may differ from an average trend where exceptional events such as drought occur). The average for the currently organic farms is calculated for the three years before the conversion to organic farming. The conventional farm average is calculated across 2009, 2008 and 2007 to tie in with the economic and climate conditions of the future organic farms (most of which started conversion in 2010 or 2009).

Table 31 presents the three-year averages for the two groups of dairy farms. The last column shows whether there is a statistically significant difference between the averages for the two groups. Table 31 also compares certain information (commitment to AESs, availability of shared machinery cooperative or contract work services for organic production, organic farming extension services, and commercial organic farms in the municipality). This information is current for the conventional farms and refers to the period prior to conversion for the organic farms. The comments here concern solely those characteristics that present a statistically significant difference between averages.

A certain number of characteristics differentiate the conventional farms from the future organic farms (prior to conversion) in the dairy sector:

- The share of main forage area in UAA was higher on average on the farms that later converted to organic farming (75.7% as opposed to 66.7% on the farms that were conventional at the time of the survey),

- The share of grazing area in UAA was higher on average on the farms that later converted to organic farming (52.0% compared with 39.6%),

- The share of hired AWUs was higher on average on the farms that later converted to organic farming (8.6% versus 2.3%),

- The farms that later converted to organic farming had a lower total number of dairy cows and a lower number of dairy cows per hectare of UAA on average. They reported herds of 50.9 cows on average as opposed to 74.6 in the group of farmers who remained conventional.

- Average nitrate pressure on the farm was lower in the group of future organic farmers (109.3 kg of nitrogen per hectare compared with 135.1 kg for the group of farmers who remained conventional).

- There were a certain number of cost differences (costs measured per hectare of UAA). The farmers who later converted to organic farming had lower total costs per hectare of UAA on average than the farmers who remained conventional (€1,970.4 and €2,295.8 per hectare respectively). This is due mainly to lower machinery costs (€305.4 versus €440.5 per hectare), fertiliser costs (€57 compared with €105 per hectare), seed and seedling costs (€47.0 as opposed to €63.1 per hectare) and pesticide costs (€28.8 compared with €51.7 per hectare). However, the future organic farmers had higher shared machinery cooperative and contract work company costs on average than the other farmers (€123.8 and €54.0 per hectare respectively) and higher insurance costs (€42.6 and €38.3 per hectare respectively).

- Farm profits were three times higher on average on the farms that later converted to organic farming than on the farms that remained conventional (€294.3 compared with €98.8 per hectare for the farmers who remained conventional).

- The future organic farmers received more agri-environment payments (€31.5 versus €5.3 per hectare in the group of farmers who remained conventional). It is important to note that these agri-environment payments do not include payments for conversion to organic farming, since this section focuses on the years before the organic farmers converted.

- Milk yields were lower on average on the farms that later converted to organic farming: 5,903 litres per dairy cow as opposed to 6,728 litres for the group of farmers who remained conventional.

- At the time of the survey, 20.5% of the conventional farmers had contracted one or more AESs. This figure doubled to 44.6% (excluding organic conversion scheme) for the group of organic farmers in the period before their conversion.

- At the time of the survey, 67.1% of the conventional farmers said there was no availability of shared machinery cooperative or contract work services for organic production. This compares with just 28.8% of the organic farmers for the period before their conversion.

- Proportionally more farmers who remained conventional said they had, at the time of the survey, a supply of organic farming extension services available from accounting companies, production cooperatives, chambers of agriculture, organic farmer's unions and freelance technical advisors. This compares with the proportion of future organic farmers who said they had access to such extension services prior to their conversion to organic farming. Note, however, that this question concerns the survey year (end-2011 to January 2012) for the conventional farmers and the period before conversion for the organic farmers (i.e. pre-2009 in most cases). The supply of extension services may well have developed over the last few years, which could explain these counterintuitive findings.

Table 32 presents the three-year averages for the two groups of vegetable farms. The last column shows whether there is a statistically significant difference between the averages for the two groups. The two groups of farmers (those who remained conventional farmers and those who became organic farmers) differ significantly in terms of just a few characteristics.

- Average nitrate pressure on the farm was lower for the group of future organic farmers (97.1 kg of nitrogen per hectare compared with 127.9 kg for the group of farmers who remained conventional).

- Seed and seedling costs per hectare of UAA were higher for the farmers who later converted to organic farming (€867 as opposed to €478 for the group of farmers who remained conventional).

- Unlike the sample of dairy farmers, at the time of the survey, a higher proportion of conventional farmers said they had a good supply of shared machinery cooperative or contract work company services for organic production compared with the share of organic farmers for the period before their conversion (45.5% as opposed to 9.7% for the future organic farmers).

- As with the sample of dairy farmers, proportionally more farmers who remained conventional in the vegetable producing sample said they had, at the time of the survey, a supply of organic farming extension services available from accounting companies and organic farmer's unions. This compares with the proportion of future organic farmers who said they had access to such extension services prior to their conversion to organic farming.

Table 31: Comparison of conventional farm profiles and organic farm profiles prior to conversion in the dairy sector

		Conventional farmers	Organic farmers before conversion	Significant difference
Three-year averages				
Total UAA	Average for the sample (hectare)	80.6	73.9	no
Share of main forage area in UAA	Average for the sample (%)	66.7	75.7	**yes**
Share of grazing area in UAA	Average for the sample (%)	39.6	52.0	**yes**
Total number of AWUs	Average for the sample	1.8	1.7	no
Share of hired AWUs	Average for the sample (%)	2.3	8.6	**yes**
Number of dairy cows	Average for the sample	74.6	50.9	**yes**
Number of dairy cows per hectare of UAA	Average for the sample (number/hectare)	1.0	0.8	**yes**
Number of dairy cows per hectare of main forage area	Average for the sample (number/hectare)	2.3	1.0	no
Number of dairy cows per hectare of grazing area	Average for the sample (number/hectare)	3.6	2.8	no
Average nitrate pressure on the farm	Average for the sample (kg nitrogen/ hectare)	135.1	109.3	**yes**
Total costs per hectare of UAA	Average for the sample (€/hectare)	2,295.8	1,970.4	**yes**

Machinery costs per hectare of UAA	Average for the sample (€/hectare)	440.5	305.4	**yes**
Shared machinery cooperative and contract work company costs per hectare of UAA	Average for the sample (€/hectare)	54.0	123.8	**yes**
Fertiliser costs per hectare of UAA	Average for the sample (€/hectare)	105.0	57.2	**yes**
Seed and seedling costs per hectare of UAA	Average for the sample (€/hectare)	63.1	47.0	**yes**
Pesticide costs per hectare of UAA	Average for the sample (€/hectare)	51.7	28.8	**yes**
Irrigation costs per hectare of UAA	Average for the sample (€/hectare)	1.8	1.0	no
Animal feed costs per hectare of UAA	Average for the sample (€/hectare)	301.1	262.9	no
Veterinary costs and fees per hectare of UAA	Average for the sample (€/hectare)	51.4	49.2	**yes**
Cost of insurance per hectare of UAA	Average for the sample (€/hectare)	38.3	42.6	**yes**
Indebtedness ratio	Average for the sample (%)	51.4	54.44	no
Operating surplus per hectare of UAA	Average for the sample (€/hectare)	837.1	833.1	no
Farm profit per hectare of UAA	Average for the sample (€/hectare)	98.8	294.3	**yes**
Total subsidies (excluding investment subsidies) per hectare of UAA	Average for the sample (€/hectare)	349.1	305.9	no

Agri-environment payments per hectare of UAA	Average for the sample (€/hectare)	5.3	31.5	**yes**
Milk yield	Average for the sample (litres/dairy cow)	6,728.0	5,903.1	**yes**
Current information for the conventional farmers/Information prior to conversion for the organic farmers				
AESs	Share (%) of farms in the sample currently applying (conventional)/applying prior to conversion (organic) one or more AESs excluding organic farming conversion scheme	20.5	44.6	**yes**
Availability of shared machinery cooperative or contract work company services for organic production	Share (%) of farms in the sample reporting that this supply is currently (conventional)/was pre-conversion (organic) - Non-existent - Small - Good	 67.1 22.3 10.7	 28.8 31.5 39.7	**yes**
Availability of extension services on organic farming	Share of farms reporting that they have (conventional)/had prior to conversion (organic) a supply of extension services on organic farming available from: - Dairy extension services - Accounting companies - Production cooperatives - Chambers of agriculture - Organic farmer's unions - Other farmers - Freelance technical advisors	 37.3 58.4 20.2 59.7 74.7 56.6 34.3	 31.1 13.5 9.5 39.2 62.2 58.1 23.0	 no **yes** **yes** **yes** **yes** no **yes**

	- Agricultural development associations	35.2	44.6	no
Share of commercial farms producing organically (certified or in transition) in the municipality	Average for the sample (%)	6.7	7.1	no

Table 32: Comparison of conventional farm profiles and organic farm profiles prior to conversion in the vegetable sector

		Conventional farmers	**Organic farmers before conversion**	**Significant difference**
Three-year averages				
Total UAA	Average for the sample (hectare)	40.7	38.9	no
Total number of AWUs	Average for the sample	2.6	3.3	no
Share of hired AWUs	Average for the sample (%)	16.0	29.1	no
Average nitrate pressure on the farm	Average for the sample (kg nitrogen/ hectare)	127.9	97.1	**yes**
Total costs per hectare of UAA	Average for the sample (€/hectare)	4,975	5,851	no
Machinery costs per hectare of UAA	Average for the sample (€/hectare)	1,108	1,321	no
Shared machinery cooperative and contract work company costs per hectare of UAA	Average for the sample (€/hectare)	81	132	no

Fertiliser costs per hectare of UAA	Average for the sample (€/hectare)	263	220	no
Seed and seedling costs per hectare of UAA	Average for the sample (€/hectare)	478	867	**yes**
Pesticide costs per hectare of UAA	Average for the sample (€/hectare)	246	170	no
Irrigation costs per hectare of UAA	Average for the sample (€/hectare)	1.4	0	no
Cost of insurance per hectare of UAA	Average for the sample (€/hectare)	68.2	100.2	no
Indebtedness ratio	Average for the sample (%)	52.9	45.8	no
Operating surplus per hectare of UAA	Average for the sample (€/hectare)	2,236	2,017	no
Farm profit per hectare of UAA	Average for the sample (€/hectare)	725	1050	no
Total subsidies (excluding investment subsidies) per hectare of UAA	Average for the sample (€/hectare)	114	85	no
Agri-environment payments per hectare of UAA	Average for the sample (€/hectare)	1.9	5.4	no
Current information for the conventional farmers/Information prior to conversion for the organic farmers				
AESs	Share (%) of farms in the sample currently applying (conventional)/applying prior to conversion (organic) one or more AESs excluding organic farming conversion scheme	6.9	9.1	no

Availability of shared machinery cooperative or contract work services for organic production	Share (%) of farms in the sample reporting that this supply is currently (conventional)/was pre-conversion (organic) - Non-existent - Small - Good	 45.4 9.1 45.5	 50.0 40.3 9.7	 **yes** **yes** **yes**
Availability of extension services on organic farming	Share of farms reporting that they have (conventional)/had prior to conversion (organic) a supply of extension services on organic farming available from: - Accounting companies - Production cooperatives - Chambers of agriculture - Organic farmer's unions - Other farmers - Freelance technical advisors - Agricultural development associations	 66.7 43.1 70.8 72.2 63.9 29.2 12.5	 27.7 27.7 81.8 27.3 72.7 9.1 0	 **yes** no no **yes** no no no
Share of commercial farms producing organically (certified or in transition) in the municipality	Average for the sample (%)	8.9	2.2	**yes**

6.2. Econometric analysis for the sample of dairy farms

This section uses statistical and econometric methods to identify the significant determinants for conversion to organic farming. The survey used is unique in that it comprises economic data (detailed bookkeeping data), structural information (farm situation and availability of services) and information on the farm head (education and opinions). The survey's other innovative feature is that it covers this set of data for the period prior to conversion for the farmers who were farming organically at the time of the survey.

This section concerns the dairy farms only. An econometric analysis of the vegetable farms is impossible due to the poor quality of the data collected.

6.2.1. Description of the data used

The following focuses solely on the farmers who converted to organic farming as of 2008. A total of 65 farmers were in this case, ten of whom converted in 2008, 25 in 2009, 25 in 2010 and five in 2011. The section seeks to identify the conversion determinants and considers conditions prior to the conversion year. We look at the conventional farmers' characteristics in 2009 to ensure more consistency in economic conditions between future organic farmers and conventional farmers. We test the conditions for organic farmers the year before the conversion date and their average conditions over the three years prior to conversion. For the conventional farmers, we test whether the conversion decision is influenced more by the conditions in 2009 or the average conditions from 2007 to 2009. Table 33 sums up the years covered for each type of farmer.

Table 33: Accounting years used for the econometric analysis

	Number of farmers	**Conversion or non-conversion decision (year)**	**Variables that potentially influenced the decision (year or period)**
Conventional farmers remained conventional	231	2010	2009 2007-2009
Conventional farmers converted to organic farming in 2008	10	2008	2007 2005-2007
Conventional farmers converted to organic farming in 2009	25	2009	2008 2006-2008
Conventional farmers converted to organic farming in 2010	25	2010	2009 2007-2009
Conventional farmers converted to organic farming in 2011	5	2011	2010 2008-2010

6.2.2. Underlying theoretical model

The assumption made here is that the farmer is rational and will decide to convert to organic farming if expected utility after conversion is greater than expected utility without conversion. Let $U_1(\mathbf{x})$ denote expected utility under the assumption of conversion to organic farming. The assumption is made that this level of expected utility is written as follows:

$$U_1(\mathbf{x}) = \mathbf{x}'\boldsymbol{\beta}_1 + v_1$$

where $\mathbf{x}$ is the vector of utility determinants (farmer and farm characteristics, economic conditions, etc.) and $\boldsymbol{\beta}_1$ is the vector of associated parameters (that will be estimated by suitable methods). If, however, the farmer decides to remain conventional, expected utility $U_0(\mathbf{x})$ is assumed to be described by the following equation:

$$U_0(\mathbf{x}) = \mathbf{x}'\boldsymbol{\beta}_0 + v_0 .$$

v_1 and v_0 represent error terms assumed to have a mean of zero.

The assumption is that the farmer chooses to convert the farm to organic farming if:

$$U^*(\mathbf{x}) = U_1(\mathbf{x}) - U_0(\mathbf{x}) = \mathbf{x}'(\boldsymbol{\beta}_1 - \boldsymbol{\beta}_0) + v_1 - v_0 = \mathbf{x}'\boldsymbol{\gamma} + \varepsilon > 0 .$$

$U^*(\mathbf{x})$ is not observed. We observe solely whether the farmer decided to convert the farm to organic farming or not. We therefore create a dichotomous variable *Y*, which is equal to 1 if $U^*(\mathbf{x}) > 0$ and to 0 otherwise. Under the assumption that ε has a standard normal variance equal to 1, the following probit probability model is obtained:

$$\text{Prob}(Y = 1|\mathbf{x}) = \Phi(\mathbf{x}'\boldsymbol{\gamma})$$

where $\Phi(.)$ represents the distribution function for the standard normal distribution. Under the assumption of residuals' normality (mean of 0 and variance of 1), the maximum likelihood method produces convergent, efficient estimators (Greene, 2003).

6.2.3. Specification of the econometric model

Subscript t is introduced here to represent the period (year). Variable Y_t represents the organic farming conversion decision and takes the value 1 if the farmer converted in year t and 0 otherwise. As explained above, we set out to identify the conversion determinants and test whether the conversion decision was influenced more by the conditions in the year preceding the conversion (t-1) or the average conditions over the previous three years (t-3 to t-1). A number of factors are measured on the date of the survey, but are assumed to have remained constant since the conversion. The following will specify when the potential determinants are evaluated before conversion for the organic farmers. Several categories of variables are chosen based on the review of the literature on conversion determinants conducted for this project (Géniaux *et al.* 2010).

The farmer's characteristics and opinions:

- Gender (male or female),
- Age,
- Level of education,
- Agricultural qualifications or not,
- Member of a farmers' union or not (before conversion),
- Member of a nature conservation association or not (before conversion),
- Time spent reading the agricultural press,
- Opinion on the link between farming and the environment,
- Concern about different society issues,
- Opinion of the health risk associated with exposure to pesticides.

The farm's (structural) characteristics, including:

- The share of UAA on wetlands,

- The different soil types on the farm,
- Average rainfall,
- The presence of a successor (before conversion).

The farm's characteristics before conversion (the practices), including:

- Total UAA, main forage area, permanent grassland area and grazing area,
- Stocking density,
- Nitrate pressure,
- AESs,
- Direct selling,
- Quality label production,
- Contract farming,
- Indebtedness level.

Factors external to the farm before conversion, including:

- Extension services for organic farming,
- Availability of shared machinery cooperative or contract work company services for organic production,
- The number of organic farms in the municipality.

Farm earnings and performance before conversion, including:

- Milk production per cow,
- Farm profit (per hectare of UAA, per dairy cow or per AWU),
- Operating surplus (per hectare of UAA, per dairy cow or per AWU).

Lastly, we control for a certain number of soil and weather characteristics measured at the level of the municipality (for the weather data) and district (for the soil data) in which each farm's head office is established. We consider the following variables:

- Average temperature,
- Atmospheric radiation,
- Soil pH, and
- The soil's cation-exchange capacity.

The Météo France national weather forecast service provided the annual weather data for the 2000-2008 period. GIS Sol provided the soil data for the 2005-2009 period. Five-year averages are calculated for the temperature and atmospheric radiation data, with the start of the five-year period depending on the conversion date (for the organic farmers). For the farms that converted in 2008 (respectively 2009, 2010 and 2011), the average covers 2001 to 2005 (respectively 2002 to 2006, 2003 to 2007, and 2004 to 2008). The average for the conventional farms is calculated for the period from 2003 to 2007.

The decision model's explanatory variables (vector **x**) have to satisfy a certain number of conditions:

(i) They have to be exogenous, i.e. their level must not have been influenced by the conversion decision. The use of variables measured on a date before the conversion date guarantees the exogeneity condition;

(ii) The selected variables must not be too closely intercorrelated to prevent creating overly large standard errors for the estimated coefficients;

(iii) The chosen variables must display enough variation within the population studied to be able to statistically identify their impact on the conversion decision.

A certain number of criteria are used to judge the model's overall validity, namely pseudo-R2, the likelihood ratio test, the Akaike information criterion (AIC), and the percentage of correct predictions.

6.2.4. Estimation results

We present the results of 12 models used to test different performance indicators and the relevant period to be considered before conversion (one year before conversion or the average for the last three years), as explained in Table 34.

Table 35 presents the list of explanatory variables ultimately considered in the models describing the conversion decision.

Table 36 presents the estimation results for the 12 models.

Table 34: The different models tested

	Period before conversion	**Performance indicator**
Model 1	1 year	Farm profit per hectare of UAA
Model 2	1 year	Farm profit per dairy cow
Model 3	1 year	Farm profit per AWU
Model 4	1 year	Operating surplus per hectare of UAA
Model 5	1 year	Operating surplus per dairy cow
Model 6	1 year	Operating surplus per AWU
Model 7	3 years	Farm profit per hectare of UAA
Model 8	3 years	Farm profit per dairy cow
Model 9	3 years	Farm profit per AWU
Model 10	3 years	Operating surplus per hectare of UAA
Model 11	3 years	Operating surplus per dairy cow
Model 12	3 years	Operating surplus per AWU

Table 35: Variables used in the estimated probit model

Variable	Definition
i_ag_qualif	Takes the value 1 if the farm head has an agricultural qualification and 0 otherwise
union_memb	Takes the value 1 if the farm head is a member of a farmers' union and 0 otherwise
agree_ag_env	Takes the value 1 if the farm head fully agrees or agrees with the statement that, "Some of today's agricultural production methods are environmentally damaging," and 0 otherwise
high_healthrisk	Takes the value 1 if the farm head considers there is a high health risk associated with exposure to plant protection products and 0 otherwise
i_wetlands	Takes the value 1 if part of the farm is on wetlands and 0 otherwise
i_succ	Takes the value 1 if there is an identified successor on the farm and 0 otherwise
forage_area	Main forage area
cow_grazing	Stocking density (number of dairy cows per hectare of grazing UAA)
N	Nitrate pressure
AES	Takes the value 1 if the farm head has contracted one or more AESs (excluding organic farming conversion scheme) and 0 otherwise
indebt	Indebtedness ratio (%)
i_mach_supply	Takes the value 1 if there is a supply of shared machinery cooperative or contract work services for organic production and 0 otherwise
milkprod_cow	Milk production per dairy cow
profit_uaa	Farm profit per hectare of UAA
profit_cow	Farm profit per dairy cow
profit_awu	Farm profit per AWU
surplus_uaa	Operating surplus per hectare of UAA
surplus_cow	Operating surplus per dairy cow
surplus_awu	Operating surplus per AWU
temp	Average temperature over five years (degrees Celsius)
atm_rad	Average atmospheric radiation over five years (J/cm^2)
pH	Median soil pH for the district (pH unit)
cation_exch	Median cation-exchange capacity (cmol+/kg)

Table 36: Estimation results for the 12 probit models (M1 to M12) (estimated coefficients and significance[a])

Variables	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8	M 9	M 10	M 11	M 12
Farmer's characteristics and opinions												
i_ag_qualif	2.035*	1.946	1.828*	1.576	1.817	1.234	1.367	1.317	1.292	1.257	1.362	1.285
union_memb	1.063***	1.132***	1.141***	0.797**	1.088***	0.802**	0.815**	0.874***	0.854***	0.665**	0.985***	0.628**
agree_ag_env	1.439***	1.466***	1.489***	1.622***	2.006***	1.518***	1.431***	1.456***	1.409***	1.527***	1.717***	1.545***
high_healthrisk	0.882**	0.931**	0.895**	0.853**	1.056**	0.939**	0.934**	0.958**	0.934**	1.005***	0.941**	1.062***
Farm's structural characteristics												
i_wetlands	-0.367	-0.208	-0.328	-0.148	0.012	-0.216	-0.379	-0.309	-0.367	-0.331	0.084	-0.382
i_succ	0.890*	0.676	0.854*	0.813*	0.453	0.638	0.664	0.616	0.649	0.522	0.425	0.455
Practices before conversion												
forage_area	0.789	0.369	0.679	0.508	0.358	-0.094	0.374	0.075	0.264	0.236	-0.056	0.273
cow_grazing	-0.006	-0.007	-0.007	-0.009	-0.001	-0.008	-0.011	-0.011	-0.010	-0.012	-0.009	-0.009
N	-0.008*	-0.009**	-0.007	-0.011***	-0.010**	-0.009**	-0.009**	-0.010**	-0.008**	-0.010***	-0.010**	-0.010***
AES	1.057***	1.029***	1.029***	1.017***	0.974**	1.036***	0.902***	0.884***	0.900***	1.003***	0.692**	1.049***
indebt	0.007	0.009	0.007	-0.002	-0.001	-0.001	0.003	0.005	0.003	-0.001	0.000	0.000
External factors												
i_mach_supplu	1.515***	1.539***	1.475***	1.494***	1.540***	1.396***	1.429***	1.465***	1.439***	1.384***	1.276***	1.390***
Performance indicators												
milprod_cow	-0.278**	-0.376***	-0.272**	-0.303**	-0.419***	-0.241**	-0.260**	-0.318**	-0.253**	-0.215*	-0.506***	-0.173
profit_uaa	2.219***						1.047*					
profit_cow		1.758***						0.746**				
profit_awu			0.055***						0.026*			
surplus_uaa				1.571***						0.259		
surplus_cow					1.519***						1.778***	
surplus_awu						0.017						-0.005

Soil and weather data												
temp	0.064	0.128	0.100	0.274	0.429	0.166	0.236	0.321	0.250	0.199	0.585	0.154
atm_rad	-0.039	-0.040	-0.042	-0.036	-0.036	-0.033	-0.032	-0.035	-0.037	-0.030	-0.036	-0.029
pH	-0.998*	-1.045*	-0.914*	-1.120*	-1.309**	-0.925	-0.912*	-0.978*	-0.858	-0.950*	-0.998*	-0.988*
cation_exch	-0.063	-0.035	-0.051	-0.004	0.088	0.033	0.018	0.039	0.025	0.054	0.069	0.073
constant	40.557	41.756	42.605	35.968	34.168	32.896	31.946	34.246	36.229	29.573	31.126	29.460
Overall quality indicators for the model												
Number of observations	219	219	218	221	221	220	220	220	219	222	222	221
Pseudo R2	0.62	0.62	0.62	0.56	0.63	0.53	0.54	0.55	0.54	0.52	0.59	0.52
LR-test chi2	127.458	127.343	125.958	118.824	133.512	111.526	112.996	114.127	112.637	111.341	126.309	110.931
LR-test p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AIC	115.733	115.848	116.840	131.186	116.499	138.073	133.626	132.495	133.582	142.019	127.051	142.009
% of correct predictions	92.69%	91.78%	92.66%	92.76%	93.21%	91.82%	92.73%	92.27%	93.15%	91.44%	91.44%	91.40%

[a*] p<0.1;** p<0.05;*** p<0.01

Note: The dependent variable takes the value 0 if the farm has remained conventional and 1 if it has converted to organic farming.

Overall quality of the models – choice of the best model

The results of the 12 models are fairly similar on the whole. The pseudo-R2 is very satisfactory, ranging from 0.52 (M12) to 0.63 (M5). The pseudo-R2 for models 1 to 6 is higher than for models 7 to 12, suggesting that the performance indicators for the year prior to conversion are more important determinants than the average indicators for the three years before conversion. The pseudo-R2 for the models using farm profit as the performance indicator (M1 to M3 and M7 to M9) is virtually the same from one model to the next. Expressing this indicator per hectare of UAA, per dairy cow and per AWU does nothing to change the explanatory power of the decision model. However, when the chosen indicator is operating surplus, reporting it per dairy cow (M5 and M11) considerably increases the model's explanatory power.

The percentage of correct predictions in terms of organic conversion is high, at just over 90% in all the models. Turning to the AIC, the minimum AIC value (indicating the best fit) is obtained for Model 1 in which the performance indicator is farm profit per hectare of UAA. The following discusses the signs and magnitudes of Model M1's coefficients.

Discussion of Model M1 results

The estimation results show the importance of the farmer's characteristics and opinions in the conversion decision: having an agricultural qualification, membership of a farmers' union, the opinion that some of today's agricultural production methods are environmentally damaging and considering that there is a high health risk associated with exposure to pesticides increase the farmer's propensity to convert to organic farming. The corresponding marginal effects (see Table 36) range from 2% to 5% (in other words, these effects raise the conversion probability, varying from 0 to 1, by 0.02 to 0.05 points). The effect of the farm head's age and level of education on the probability of conversion is also tested, but these variables are never found to be significant.

Our results also show that the presence of an identified successor on the farm increases the farmer's propensity to convert (marginal effect estimated at 7%). However, having a farm on wetlands has no statistically significant effect on the probability of conversion.

Some of the farmer's practices prior to conversion also appear to play a decisive role in the likelihood of converting to organic farming. Our findings show, in particular, that the farms with less nitrate pressure and the farms that contracted AESs are more liable to convert to organic farming. The marginal effect of contracting AESs is approximately 8%. Stocking density per hectare of grazing area has a negative sign, but does not appear to be significant. We also tested the effect of direct selling, contract farming and quality label production on conversion probability. These variables never turn up any significant results.

Among the external factors studied, we show that the availability of a supply of shared machinery cooperative or contract work services for organic production significantly increases the chances of conversion. The corresponding marginal effect is strong at around 10%. We do not find the number of organic farms in the municipality in which the farm's

head office is established to have any significant effect. We also excluded the variables measuring the availability of organic farming extension services, since the problem here is that the number of extension services has risen over time. Current conventional farmers therefore have a larger supply of services at their disposal than the farmers who converted to organic farming in the past. This implies a negative correlation between the supply of extension services and the conversion decision, due largely to the passage of time rather than to any causal relation.

The performance indicators show that the “intensive” farms, i.e. those with higher milk yields per dairy cow, are less likely to convert to organic farming. However, higher earnings (especially a better farm profit) raise the probability of converting. This last finding is consistent on the whole with the respondent farmers’ opinions on the linkage between earnings and conversion decision. More respondent organic farmers felt that, “Good earnings made from conventional farming made it possible to take the risk to convert the farm” (see Table 20).

Lastly, among the soil and weather variables at municipal level (for the weather data) and at district level (for the soil data), only the soil pH appears to have any significant (and negative) effect in Model M1.

Table 36: Marginal effects on conversion probability (Model M1)

Variable[a]	Marginal effect	Standard error
Farmer's characteristics and opinions		
i_ag_qualif*	0.023	0.017
union_memb*	0.051	0.032
agree_ag_env*	0.050	0.031
high_healthrisk*	0.031	0.024
Farm's structural characteristics		
i_wetlands*	-0.016	0.020
i_succ*	0.067	0.062
Practices before conversion		
forage_area (100 hectares)	0.029	0.031
cow_grazing	0.000	0.001
N (kg per hectare)	0.000	0.000
AES*	0.076	0.052
indebt	0.000	0.000
External factors		
i_mach_supply*	0.104	0.057
Performance indicators		
milkprod_cow (1000 litres)	-0.010	0.009
profit_uaa (1000 €)	0.083	0.056
Soil and weather data		
temp	0.002	0.021
atm_rad	-0.001	0.003
pH	-0.037	0.030
cation_exch	-0.002	0.005

[a] * indicates a dummy variable.

7. Discussions and conclusion

This survey's descriptive and econometric analyses find that farmers consider the farm's earnings when deciding whether or not to convert to organic farming, and that this holds true for both the dairy farmers in Brittany and Pays de la Loire and the vegetable farmers in Brittany.

Our analyses find that high earnings encourage dairy farmers to convert. Conversion to organic farming would therefore appear to be seen more as a "risky" financial decision. Good earnings before conversion can hence play a risk coverage role in the event of a decision to convert. This finding indirectly highlights the important role played by subsidies to convert to organic farming and keep the farm organic. The guarantee of a certain amount of income (in the form of subsidies) partially absorbs the financial risk associated with conversion. An

increase in the level of conversion subsidies and subsidies to keep the farm organic should therefore encourage more farmers to convert.

The economic theory of choice under uncertainty shows that it is often in rational agents' interests to hold off on a decision in order to gather information on the (uncertain) costs and benefits associated with the decision. Farmers who see conversion to organic farming as a "risky" operation will always benefit from more information provided by dedicated organic training courses and extension services, which we consequently recommend developing.

Our results also find that a large part of the conversion decision is connected with how concerned farmers are about environmental and health issues. Environmental issues and questions regarding the health risks of using chemical products in agriculture will probably grow in importance in our society. At the same time, we observe a growing demand from consumers for environmentally friendly practices and quality products. Growing awareness among farmers and a growing demand from consumers for more environmentally friendly farming should encourage more farmers to convert. Training and information actions on environmental issues and how to protect against the risks associated with using chemicals in agriculture should encourage conversions to organic farming.

Among the external factors studied, we find that the availability of a supply of shared machinery cooperative or contract work services for organic production significantly raises the probability of conversion. This finding highlights the importance of giving farmers the means to successfully convert to organic farming. However, growth in the number of organic farms should drive up the supply of these services and consequently encourage more farmers to convert. Sector organisational problems (upstream supplies and downstream collection) will put the brakes on conversion.

Lastly, our findings show that some farming practices prior to conversion play a decisive role in the propensity to convert to organic farming. In particular, the farms with less nitrate pressure and the farms that have contracted AESs are found to be more likely to convert to organic farming. In other words, the conventional farms with fairly similar practices to the organic farms have a greater probability of converting. The opportunity cost of changing practices is lower for conventional farms that already apply sustainable farming or more environmentally friendly farming practices. Other things being equal, any policy that encourages the use of more environmentally friendly practices (e.g. nitrate directives) along with the implementation of incentive agri-environment measures and environmental zoning, should therefore indirectly further the development of organic farming.

Acknowledgements

We are extremely grateful to all the farmers who agreed to answer this long, complicated survey. Our acknowledgements also go to all our partners who assisted us with this research project: Inter Bio Bretagne, Cogedis-Fideor, FRAB, CAB, and the teachers and students at LEGTA in Le Rheu, IREO Lesneven and ESA in Angers.

References

Géniaux, G., Latruffe, L., Lepoutre, J., Mzoughi, N., Napoléone, C., Nauges, C., Sainte-Beuve, J., Sautereau, N. 2010. *Les Déterminants de la Conversion à l'AB : une Revue de la Littérature Economique*. Project INRA-AgriBio3 'PEPP' ("Role of Farm and Sector Economic Performance and Public Policies in the Development of Organic Farming in France"), Deliverable 1. 23 November.

Greene, W. 2003. *Econometric Analysis*. Seventh edition. Prentice Hall.