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1 **Farmers Adoption of Integrated Crop Protection and Organic Farming:**
2 **Do Moral and Social Concerns Matter?¹**

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11
12 **Abstract:** We investigate empirically the role of moral and social concerns in farmers' decision to
13 adopt integrated crop protection (IP) and organic farming (OF). A survey questionnaire has been sent
14 to 1286 fruit-growers and vegetable producers located in the French areas of *Alpes de Haute*
15 *Provence, Hautes-Alpes* and *Vaucluse*. Analysis of individual responses (N=243) shows that,
16 although economic concerns play a strong role, a significant number of respondents give high
17 importance to moral and social ones. We also examine how these considerations matter according to
18 different crop protection strategies, that is, conventional farming, IP and OF. Using a multinomial
19 logistic regression, we find that (1) social concerns (*e.g.*, showing to others one's environmental
20 commitment) drive both IP and OF adoption, (2) moral concerns (*e.g.*, do not feel guilty about one's
21 choices) increase the probability of organic farming adoption only, and (3) farmers who give high
22 importance to economic concerns (*e.g.*, cutting production costs) are less likely to adopt OF.

23
24 **Key-words:** integrated protection, organic farming, social and moral concerns.

25
26 **JEL classification:** L15, L59, Q13.

27

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1 **Farmers Adoption of Integrated Crop Protection and Organic Farming:**
2 **Do Moral and Social Concerns Matter?**

3
4 **1. Introduction**

5 Agricultural policies in several countries are experiencing a strong trend to become more ecologically-
6 friendly. The mainstream model of production, based on intensive use of chemical inputs for crop
7 protection such as pesticides, is increasingly challenged because of its environmental damages (*e.g.*,
8 water pollution, harm to biodiversity, etc.) and the negative impacts on consumer and producer health
9 (for example, the carcinogenic effect of some agrofood components). In response to the increasing
10 demand for a more sustainable agriculture, several technical and institutional alternatives have been
11 developed, such as conservation practices, integrated crop protection, organic farming, environmental
12 management systems, retailers' specifications, and so on. These ecologically-friendly practices (or
13 measures) can be positioned on a continuum from slightly conventional practices or greenwashing
14 strategies to more stringent and highly sustainable ones. Without purporting to be exhaustive, they can
15 be characterized as being (1) privately or publicly promoted, (2) tied to private or public benefits, (3)
16 implemented at the farm level or along the supply chain, (4) voluntary or quasi-compulsory, and (5)
17 signaled or not to consumers and/or shareholders.

18
19 The economic literature has largely investigated the drivers behind farmers' adoption of ecologically-
20 friendly practices. It should be noticed that several studies are also devoted to the adoption of
21 innovations, broadly defined (*e.g.*, Feder *et al.*, 1985; D'Souza *et al.*, 1993; Feder and Umali, 1993;
22 Rogers, 1995 and references therein). Nevertheless, economists have mainly cited economic concerns
23 as the main driver of adoption (Sheeder and Lynne, 2009). For instance, Cary and Wilkinson (1997)
24 argue that the best way to increase the use of resource conservation practices, will be to ensure they
25 are economically profitable. Chouinard *et al.* (2008) achieved an interesting review of the literature
26 about conservation technology adoption and note that increasing profit or wealth is one of the most
27 important reasons for which producers may engage in conservation practices. In the same vein,
28 Musshoff and Hirschauer (2008, see also Padel, 2001) emphasize the prominence in general of
29 financial reasons with regard to conversion to organic production.

30
31 However, based mainly upon works in behavioral economics (Simon, 1987; Kahneman, 2003;
32 Camerer *et al.*, 2004), an increasing number of scholars recognize the role of non-economic concerns
33 in the adoption decision to farmers. Several contributions (*e.g.*, Rigby *et al.*, 2001; Carlsson *et al.*,
34 2007) show that farmers are not only driven by monetary considerations but also change their behavior
35 in reaction to moral and social ones. Moral concerns are those related to individuals' (intrinsic) ethics,
36 such as personal satisfaction. Social concerns are those which shape the individual's behavior in
37 relation to his/her reference group, for example, the other similar farmers in the same region. Among

1 social concerns, let us consider the desire for status which has been recognized as a driver of human
2 behavior. Several studies support the idea that farmers switched to intensive farming (Green
3 Revolution) not only as a profit maximizing decision, but also because of the status benefits tied to the
4 changes under consideration (*e.g.*, the French ‘*club des 100 quintaux*’ in the 1980s which was
5 including corn producers able to produce more than 100 quintal/ha). Lanneau (1967, see also Bessièrè,
6 2002) argues that the adoption of some innovations, such as the purchase of a tractor or huge
7 equipments in the 1960s, was not only explained by economic requirements, but also the desire to
8 progress in the social hierarchy.

9
10 The aim of this paper is to investigate empirically the role of moral and social concerns in farmers’
11 decision to adopt ecologically-friendly practices, namely integrated crop protection (IP) and organic
12 farming (OF). IP and OF are two voluntary practices implemented at the farm level and delivering a
13 mix of private and public benefits. IP –also referred to in the economic literature as integrated plant
14 protection (IPP) or integrated pest management (IPM) refers to crop protection techniques and
15 practices which satisfy economic, ecological and toxicological requirements, while encouraging the
16 use of natural pest control (Boller *et al.*, 1998). OF refers to the non-use of chemical inputs in the
17 farming process in order to provide consumers with foodstuffs respecting natural life-cycle systems
18 (European regulation EC 834/2007).² Beyond the use, or not, of chemical inputs, IP and OF differ at
19 least on two other crucial issues. First, there is no official standard for IP, despite some attempts
20 notably in the French fruit growing sector (Codron *et al.*, 2003 ; Bellon *et al.*, 2006). On the opposite,
21 organic farming is standardized and farmers have also the possibility to signal their efforts using the
22 French label and more recently the European label as defined by the regulation EC 834/2007. Second,
23 farmers receive public financial support to adopt OF and not for IP adoption *per se*. As far as we
24 know, only Swiss (big) farms receive direct subsidies to adopt IP.

25
26 While a growing and relatively large literature is devoted to farmers’ adoption of IP (*e.g.*, Harper *et*
27 *al.*, 1990; Fernandez-Cornejo *et al.*, 1994; Fernandez-Cornejo and Ferraioli, 1999; Maumbe and
28 Swinton, 2003; Mauceri *et al.*, 2007) and OF (*e.g.*, De Cock, 2005; Genius *et al.*, 2006; Parra-Lopez *et*
29 *al.*, 2007; Cristoiu *et al.*, 2007; Musshoff and Hirschauer, 2008), this literature mainly focuses on the
30 characteristics of farmers. For instance, by analyzing the determinants of IPM adoption among rice
31 producers in the US (N=117), Harper *et al.* (1990) found that education has a significant effect on
32 adoption. Fernandez-Cornejo *et al.* (1994) surveyed vegetable producers in the US (N=528) finding
33 that labor availability, credit or debt ratio, farm size and farmer’s age are significant drivers of IPM
34 adoption. Similar findings have also been reported by Chaves and Riley (2001) who surveyed coffee
35 producers in Colombia (N=392). According to Mauceri *et al.* (2007), access to information and

² Available at : <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:189:0001:0023:EN:PDF>.

1 household size are the main drivers of IPM adoption by potato growers in Ecuador (N=109). In their
2 analysis of the determinants of adoption of organic horticultural techniques in the UK (N=237),
3 Burton *et al.* (1999) state that an individual's characteristics, mainly age and gender, and access to
4 information are of paramount importance. They also argue that farmers concerned about
5 environmental issues are more likely to adopt organic farming. Anderson *et al.* (2005) surveyed 175
6 farmers growing fresh-market produce in California and found similar results. This paper goes beyond
7 the above-mentioned considerations and investigates the role of economic, social and moral concerns
8 with regard to the adoption of integrated crop protection strategies and organic farming.

9
10 The remainder of the paper is organized as follows. Section 2 considers the theoretical arguments. It
11 discusses the adoption of ecologically-friendly practices from a behavioral economics framework.
12 Section 3 presents the data and methods. A multinomial logistic regression is specified to investigate
13 the drivers of IP and OF adoption by 243 French fruit-growers and vegetable producers. Section 4
14 discusses the results. Section 5 concludes and highlights policy implications.

16 **2. Behavioral economics and adoption of ecologically-friendly practices: literature and** 17 **hypotheses**

18 While neoclassical economic theory considers (extrinsic) economic motivations, behavioral economic
19 literature (*e.g.*, Rabin, 1993; Frey, 1994; Camerer *et al.*, 2004; Frey and Stutzer, 2008) assumes that
20 individuals have intrinsic and extrinsic motivations, including economic ones. Intrinsic motivations
21 are reasons for action that come from within the individual, such as pleasure or personal satisfaction.
22 An intrinsically motivated person performs an activity even when he or she receives no apparent
23 reward except that derived from the activity itself. Extrinsic motivations are imposed on individuals
24 from the outside. They can take several forms such as social recognition or monetary rewards to adopt
25 a given behaviour and threats of punishment for failing to comply with a prescribed behavior.
26 Behavioral economists identified several cognitive and behavioral anomalies that make individuals'
27 behavior deviant from what is predicted in a neoclassical framework (Venkatachalam, 2008; Gowdy,
28 2008). Meier (2007) argues that individuals are not only self-interested actors but also act pro-socially,
29 and, as such, their behavior maybe different from the standard model predictions. Manner and Gowdy
30 (2010) argue that "emotions such as altruism, love, and envy are an essential part of the human
31 experience." Fehr and Falk (2002) have also provided evidence that non-pecuniary concerns, such as
32 the desire for social approval, may shape human behavior. They state that, if these concerns are
33 ignored, economists may fail to understand the overall effect of economic instruments. Another part of
34 literature has considered guilt aversion to test the relevance of human non-selfish behavior (*e.g.*,
35 Battigalli and Dufwenberg, 2007 and references therein). According to Ellingsen *et al.* (2010), "people
36 may feel guilty if their behavior falls short of others' expectations".

1 In the environmental realm, an increasing number of papers have recently started to explore the
2 relevance of social and moral concerns when focusing on environmental sustainability and
3 environmental compliance (*e.g.*, Venkatachalam, 2008; Frey and Stutzer, 2008). Frey and Stutzer
4 (2008) argue that individuals might contribute to a public environmental good because of an “intrinsic
5 motivation to act according to one’s values”. They also state that environmental morale and
6 motivation are certainly more important than claimed in standard economics, and that environmental
7 policies solely using price incentives would disregard their useful contribution to overcome
8 environmental degradation. According to Torgler *et al.* (2008), past environmental policy may have
9 inappropriately put emphasis on financial values for the environment. They argue that “environmental
10 motivation, environmental morale or pro-environmental attitudes are highly relevant to an
11 understanding of why people have a higher willingness to be involved in environmental protection.”
12 Venkatachalam (2008) shows how some behavioral anomalies could influence the overall
13 environmental policies based on standard environmental economics and argues that “overlapping areas
14 between behavioral economics and environmental economics provide an intellectual platform for a
15 rich ‘intradisciplinary’ research and policy for sustainable development, which need to be pursued
16 rigorously in the future”. An increasing number of papers adds empirical content to the arguments
17 above.³ Brekke *et al.* (2003) used survey data on 1102 individuals in Norway to investigate, among
18 other questions, their motivation for recycling. They found that moral concerns are important. For
19 instance, 73% of their respondents stated they recycle because of a desire to regard themselves as
20 responsible, while 41% do it because they want other people to think of them as responsible. Gilg and
21 Barr (2006) list intrinsic concerns and satisfactions of doing environmental actions among the factors
22 that could influence individual’s behavior, notably related to water savings.

23
24 With regards to farmers’ adoption of ecologically-friendly practices, economists have generally
25 followed the same path and focused mainly on economic concerns. Nevertheless, this perspective is
26 increasingly challenged by works in behavioral (ecological) economics. For instance, Sheeder and
27 Lynne (2009) judges reasonable to hypothesize that egoistic-financial and social-moral concerns can
28 influence conservation decisions made by farmers, based upon arguments advanced by behavioral
29 economists and neuroscientists. Sheeder and Lynne (2009) report the results of several works showing
30 that non-financial considerations, such as, farmer values and attitudes, can play a role in the
31 conservation decision made by farmers. For example, Ervin and Ervin (1982) indicate that (moral)
32 personal concerns may have a substantial impact on the number of adopted conservation practices by
33 Missouri farmers. Maybery *et al.* (2005) show that conservation behavior is to some extent shaped by

³ Several empirical studies not directly focused on environmental issues provide evidence that moral and social incentives matter (*e.g.*, Easterlin, 1995; Mui, 1995; Solnick *et al.* 2007). Despite their interest, these results are out of the scope of this paper.

1 farmers' values and attitudes. Sheeder and Lynne (2009) also argue that, "even when facing
2 difficulties, many agricultural producers have maintained an attitude and ethic that treats farming and
3 ranching as "a way of life," and not a venture to maximize profits". Torgler *et al.*'s (2009) manuscript
4 about littering practices in 30 European countries added empirical content to the argument that
5 environmental behavior of individuals is influenced by the perception of others' behavior.

6
7 In sum, as shown by Chouinard *et al.* (2008), while a huge part of the economic literature has focused
8 exclusively on financial concerns, assuming that only profits and/or costs matter, another part tried to
9 add social and moral concerns in an ad hoc way. Nevertheless, recent literature has started to explore
10 adoption of ecologically-friendly practices by integrating more substantively the both approaches. In
11 the same line, this paper explores two hypotheses:

- 12
- 13 ✓ H1: Moral and social concerns matter in farmers' decisions about ecologically-friendly
14 practices.
 - 15 ✓ H2: Moral and social concerns matter differently according to the protection methods used by
16 farmers, that is, conventional farming, integrated crop protection or organic farming. Without
17 speculating on which kind of farmer is characterized by a given concern, it seems intuitive that
18 when economic concerns are not very important, moral and social ones would be. In other
19 words, offsetting a relative economic advantage suggests that moral and social ones are more
20 intense, *ceteris paribus*.

21 22 **3. Data and methods**

23 Between December 2008 and March 2009, we conducted a mail survey of 1286 fruit-growers and
24 vegetable producers located in the French areas of *Alpes de Haute Provence*, *Hautes-Alpes* and
25 *Vaucluse* (the whole population in these areas). These locations belong to the French *Region PACA*
26 (*Provence-Alpes-Côte d'Azur*) which is the leading area in terms of organic production and the main
27 hosting of biodiversity in France. These locations are also characterized by a weak presence of
28 agriculture, compared to other areas in the country, which makes environmental issues, notably the
29 production of agricultural amenities, particularly important. Moreover, fruit-growing and vegetable
30 production in this area are substantial users of pesticides. For instance, while only 1% of the global
31 French agricultural area is devoted to fruit growing, this type of production uses 21% of the whole
32 volume of pesticides used in France.

33
34 All respondents were asked to indicate the crop protection method they use the most, *i.e.*,
35 conventional, integrated protection or organic farming, and then to answer a question formulated as
36 follows: 'How important is this factor to you in the choice of your crop protection method?' Ten
37 factors have been proposed encompassing economic, moral and social concerns. To measure the

1 importance of these concerns, one needs to define some proxies. Choosing proxies for economic
2 concerns is relatively simple, since the literature is very large concerning this issue. In line with
3 several preceding papers, we use the following proxies: cutting production costs, meeting customers'
4 requirements, diminishing the risk of output loss, getting a competitive advantage and benefiting from
5 public financial support. Nevertheless, when looking to moral and social concerns things are a bit
6 more complicated. The economic literature devoted to this issue is very heterogeneous. Taking into
7 account moral and social concerns differs largely from one study to another. For instance, while some
8 authors (*e.g.*, Frank, 1985; Easterlin, 1995) focus mainly on status seeking and relative standings when
9 looking to moral and social concerns, others (*e.g.*, Mui, 1995; Fehr *et al.*, 2008) have focused on envy.
10 Several authors have also focused on behavioral anomalies or biases originally investigated by
11 sociologists and psychologists (attribution bias, optimism bias, loss aversion and so on). With regards
12 to agriculture, previous studies have mainly considered moral and social concerns in terms of the
13 desire for distinction, social values and conformism behaviors. In line with these studies, we use in
14 this paper doing the right thing and do not feel guilty about own choices to measure moral concerns.
15 Satisfying other landscape users' demands, being perceived the top one by the other farmers, and
16 showing to others one's environmental commitment are used to measure social concerns.

17
18 Moreover, the methods used are also heterogeneous, since the economic literature related to this issue
19 is rather recent and there is not yet a 'common' method to measure such aspects. Some scholars use
20 survey data based upon hypothetical questions, whereas others use field experiments. In this paper, a
21 5-point Likert scale has been used to measure the importance of economic, moral and social concerns,
22 where 5 indicates that the concern is very important and 1 the lowest importance. One may wonder
23 whether the use of Likert scales might lead to problems in the sense that some farmers find everything
24 important while others tend to use the lower part of the scales. Nevertheless, only 4 farmers in the
25 sample gave the same answer for all the proxies considered.

26
27 We received 243 fully filled responses (19%) covering 134 conventional farmers, 71 farmers using IP
28 and 38 organic farmers. Such a response rate may appear as not very high. Nevertheless, it is generally
29 difficult in France to have much more responses. For instance, Grolleau *et al.* (2007) investigated the
30 determinants of environmental management systems adoption by French agrofood firms. Out of the
31 1,000 firms surveyed, 215 responded. This difficulty of surveying French firms is also reported in
32 Henriques *et al.* (2004) who investigated environmental practices in several OECD countries. They
33 say response rates range from 9.3% in France to 34.7% in Norway for an average response rate of
34 24.7%. Finally, Harzing (2000) investigated the differences between response rates in a cross-national
35 industrial mail survey in 22 countries. She found that while for some countries such as Norway the
36 response rate was about 40%, for other countries, such as France it was only about 13%. Moreover,
37 such a response rate might induce selection bias. While we do not account for such possible bias, it

1 should be noticed that the characteristics of the farms in our sample are not largely deviant from those
2 of the whole population. For instance, up to December 2009, the percentage of organic fruit-growers
3 in the *Provence* region was about 7%.⁴ It should be noticed that the questionnaire was elaborated after
4 direct interviews of about two hours each with experts in the agricultural field and 7 farmers which
5 allowed us to better identify the concerns they take into account when choosing their crop protection
6 method. In order to improve its readability, the questionnaire was pre-tested on 15 farmers from
7 another area.

8

9 To investigate empirically the drivers of farmers' adoption of IP/OF, we use a multinomial logit
10 (MNL) regression. MNL models assume that the error terms are independently and identically
11 distributed (Greene, 2003). They are used to model relationships between a polytomous response
12 variable and a set of regressor variables. These polytomous response models can be classified into two
13 distinct types, depending on whether the response variable has an ordered or unordered structure. In
14 this case, each farmer chooses one of the mutually exclusive alternatives characterized by the
15 categorical variable. This variable includes three distinct unordered alternatives: conventional
16 methods, integrated protection and organic farming. Hence, we specify an unordered MNL model
17 (discrete choice method) as follows (Greene, 2003):

18
$$\text{Prob}(Y_i = j) = \frac{e^{X_i \beta_j}}{\sum_{k=1}^3 e^{X_i \beta_k}} \text{ with } j = 1, 2, 3.$$

19 where Y_i , the dependent variable, represents the protection method used by the farmer and takes the
20 values of 1, 2 or 3 if the farmer uses conventional methods, integrated protection or organic farming,
21 respectively. Here conventional farming is used as the reference category. X_i represents a vector of
22 explanatory variables and encompasses the above-mentioned economic, moral and social concerns
23 (cutting production costs, meeting customers' requirements, diminishing the risk of output loss,
24 getting a competitive advantage, benefiting from public financial support, doing the right thing, do not
25 feel guilty about own choices, satisfying other landscape users' demands, being perceived the top one
26 by the other farmers, showing to others one's environmental commitment), and, a set of control
27 variables (age, gender, education, and main activity). Indeed, it is widely acknowledged that adoption
28 of an innovation is related to socio-demographic characteristics (Parra-Lopez *et al.*, 2007). As stressed
29 by several previous studies (Fernandez-Cornejo *et al.*, 1994; Torgler and García-Valiña, 2007),
30 younger people, women and more educated farmers are more likely to exhibit eco-friendly behaviors.
31 Given the larger variety of vegetable productions compared to fruit-growing, it is also expected that
32 adoption differs according to the main activity of the farmer. β_i represent slope coefficients to be

⁴ <http://www.agencebio.org/>. Unfortunately, we do not have data about the proportion of IP among the whole population.

1 estimated. The results of the MNL model are interpreted in terms of the odds ratios, that is, the ratios
2 of the probability of choosing one outcome category over the probability of choosing the reference
3 category. These ratios are defined as:

$$\ln \left[\frac{P_{ij}}{P_{ik}} \right] = X_i (\beta_j - \beta_k) = X_i \beta_j \text{ if } k = 1.$$

5 Therefore, a positive parameter means that the relative probability of choosing IP/OF increases
6 relative to the probability of choosing conventional farming. To better interpret the sensitivity of the
7 probability of IP/OF adoption with respect to explanatory variables, we compute marginal effects. The
8 higher the marginal effect is, the higher the impact of the explanatory variable on dependent one is. As
9 it is common for discrete variables, the marginal effect is calculated as the difference between the
10 probabilities estimated at the sample means when the dummy variable takes the values of 1 and 0,
11 respectively. We also perform a Wald test for joint significance of moral and social concerns to
12 investigate their relevance as a group, that is, instead of estimating several coefficients for each
13 concern, we estimate a coefficient for more than one concern, here moral and social ones.

15 **4. Results and discussion**

16 The variables used in estimation and sample statistics are indicated in Table 1. In order to focus on the
17 case where the studied concerns are important, explanatory variables are dichotomous. For each
18 economic, moral and social concern, we considered it important if the farmer checked 4 or 5 on the
19 Likert scale. No problem of multicollinearity has been detected (see Appendix 1).

20 [Insert Table 1 around here]

21 Several results can be drawn from the simple statistics in Table 1 which confirm our hypotheses. First,
22 moral and social concerns matter among the surveyed fruit-growers and vegetable producers along
23 with economic ones. More than 76% of the respondents indicated that doing the right thing is
24 important when choosing the crop protection method, less than meeting customers' requirements
25 (80%), but more than reducing risks (73%) and cutting production costs (57%). Do not feel guilty
26 about own choices, showing to others one's environmental commitment and satisfying landscape
27 users' demands are also important, since 55%, 48% and 39% of respondents, respectively, stated they
28 are important concerns. An unexpected result relates to being perceived the top one by other farmers,
29 with only 16% of respondents considering it important.

31 Second, moral, social and economic concerns matter differently according to the protection method
32 used by the farmer. The Wilcoxon test shows that except showing to others one's environmental
33 commitment (*SHOW*), there is no significant difference between conventional farmers and those using
34 integrated crop protection, while the responses of organic farmers are significantly different from both.
35 For instance, organic farmers give significantly more attention to doing the right thing and guilty
36 feelings (moral concerns), but give significantly less importance to reducing production costs and risks

1 (economic concerns) compared to the rest of the population. This result can be partly explained by the
2 fact that organic farming is a standardized model and thus there are less problems of comprehension in
3 relation to its principles among farmers. However, IP still lacks a rigorous definition and farmers may
4 confuse it with other methods. So, some farmers may have mentioned they use IP while their practices
5 correspond more to conventional ones, as reported by several studies (*e.g.*, Bellon *et al.*, 2006; Bonny,
6 1997). Unfortunately, the data do not allow us to deal with such a problem. However, as stated by
7 Hayek (1952), “as far as human actions are concerned, things are what people think they are.”
8 Nevertheless, when things are not what farmers perceive them, this may constitute an obstacle to the
9 adoption of ecologically-friendly practices, because farmers think that what is required by society is
10 what they are doing yet.

11
12 Nevertheless, it can be argued that farmers may have indicated socially desirable answers, since
13 becoming an organic farmer because of moral reasons may be higher valued than becoming an organic
14 farmer because of economic ones.⁵ A possible way to solve this issue, at least partially, is to use
15 farmers’ income as a control variable. Unfortunately, this variable was not well reported and we have
16 decided to drop it in order to not decrease drastically the number of observations. In addition, the few
17 papers that focus on the economic performance of organic farming do not give clear-cut conclusions.
18 While some authors (*e.g.*, Nieberg and Offermann, 2003) argue that organic production allows
19 relatively high price premiums, others argue that OF is not more profitable than conventional farming
20 (Klonsky and Greene, 2005). Thanks to a review of the literature on profitability of organic farming,
21 Greer *et al.* (2008) report that the profitability of organic and conventional farms in the EU and the US
22 has generally been found to be similar. Interestingly, Acs, Berentsen and Huirne (2007, see Acs *et al.*,
23 2007) report higher income for organic farming. However, after taking into account some factors
24 likely to influence conversion, namely, extra depreciation costs, hired labor availability, organic
25 market price uncertainty and minimum labor income requirement, OF may become less profitable than
26 staying conventional. Acs *et al.* (2009) argue also that if farmers are risk-averse, “it is only optimal to
27 fully convert if policy incentives are applied such as taxes on pesticides or subsidies on conversion, or
28 if the market for the organic products becomes more stable”. In sum, results are mixed and this point
29 deserves further academic attention.

30
31 Third, the proportion of women is significantly higher in OF, compared to conventional agriculture.
32 Moreover, relatively more fruit growers use IP, probably because there are less technical possibilities
33 for integrated crop protection in the vegetable production.
34

⁵ This point has been appropriately stressed by one of the reviewers.

1 To analyze the factors of IP/OF adoption with more control, we present the results of the multinomial
2 logistic regression (Table 2) together with goodness-of-fit measures (Maximum Likelihood
3 estimation).⁶ The R2 of 0.17 indicates that unobserved individual heterogeneity is still relatively
4 important in the data.⁷ For ease of exposition, the marginal effects are only discussed when it is the
5 most appropriate.

6 [Insert Table 2 around here]

7 These findings partially confirm our hypothesis 1 that moral and social concerns matter. Farmers
8 thinking that showing to others one's environmental commitment (*SHOW*) is important are more
9 likely to adopt IP and OF (compared to the reference category), since for one unit change in the
10 variable *SHOW*, the log of the ratio of the probability of choosing IP (respectively, OF) over the
11 probability of choosing the reference category, that is, conventional protection, will be increased by
12 0.663 (respectively, 1.182). Noteworthy, when considering OF adoption, the variable *SHOW* is
13 significant at the 5% level with a marginal effect of 0.08. However, when considering IP adoption, it is
14 only significant at the 10% level with a marginal effect of 0.13, which may indicate, to some extent,
15 that this factor is relatively more important when choosing OF. Do not feeling guilty about one's
16 choices (*GUILTY*) only influences adoption of organic farming. This result might be explained by the
17 fact that, contrarily to OF, IP combines natural and chemical inputs. Nonetheless, it should be noticed
18 that *GUILTY* is only significant at the 10% level (the weakest statistical power compared to the other
19 variables) and has one of the lowest marginal effects (0.085). Moreover, while the variables *USERS*
20 (satisfying landscape users' demands) and *PERCEPTION* (being perceived the top one by other
21 farmers) are non-significant, the Wald-test for joint significance of moral and social concerns indicates
22 their relevance as a group in understanding farmer's attitudes.

23

⁶ For readers not familiar with statistical measures, let us explain that the Log likelihood (LL) is mentioned to indicate that the model fits. Maximum likelihood estimation is an iterative procedure. When the difference between successive iterations is very small, the model is said to have converged and the results are displayed. The LL is also used to compute the Likelihood Ratio Chi-Square, LR Chi2, which indicates that for both regressions at least one of the coefficients is not equal to zero (for more details see: http://www.ats.ucla.edu/stat/stata/output/stata_mlogit_output.htm).

⁷ One may question the power of expression of the model used given the low level of Pseudo R2. Nevertheless, it is generally difficult with MNL models to have a high Pseudo R2, especially when the number of observations is relatively low, since the regression divides the sample into several categories. Regardless of its level, the R2 is mainly used here to compare different models. As stressed by Hosmer and Lemeshow (2000) "low R2 values in logistic regression are the norm and this presents a problem when reporting their values to an audience accustomed to seeing linear regression values (...) However, they [R2 values] may be helpful in the model building state as a statistic to evaluate competing models".

1 Table 2 also shows that economic concerns negatively influence OF adoption, which supports to some
2 extent hypothesis 2. Farmers who think that cutting production costs (*COST*) and reducing the risk of
3 output loss (*RISKS*) are important are less likely to adopt OF. For one unit change in the variable
4 *COST* (respectively, *RISKS*), the log of the ratio of the probability of choosing OF over the probability
5 of choosing the reference category, will be decreased by 1.54 (respectively, 1.664). These variables
6 have also the highest marginal effects (0.18 and 0.25, respectively). Interestingly, when considering
7 OF adoption, these variables are the only ones which are significant at the 1% level, which may
8 suggest that not only economic considerations play a strong role in farmers' decisions, but also that the
9 latter may 'still' perceive organic farming as relatively costly and risky. However, *COST* and *RISKS*
10 are non-significant with regards to IP adoption. This result can be explained by the fact that
11 conversion costs and risks are generally higher for OF than for IP. Moreover, farmers who wish to get
12 a competitive advantage (*COMPETITION*) are less likely to adopt IP. The marginal effect of 0.205
13 and the significance of this variable at the 1% level indicate that this variable is among the most
14 important concerns when choosing conventional methods over IP. The negative sign may be explained
15 by the fact that competition may depend on dimensions other than environmental considerations, for
16 example, the level of production or equipment. Interestingly, while organic farmers receive subsidies
17 for their conversion and production, the variable *SUPPORT* (getting support from public authorities) is
18 only significant with regards to IP adoption. Two facts can explain this result. First, since farmers can
19 receive public funds for several environmental investments, such as the adoption of good agricultural
20 practices, IP can constitute a leverage to this financial support. This point was raised by a fruit-grower
21 interviewed before the survey. The grower stated that he was willing to introduce an integrated crop
22 protection technique, namely mating disruption, in 2009, in order to benefit from funds from the 'plant
23 plan for the environment' (*plan végétal pour l'environnement*).⁸ Second, subsidies for organic farming
24 remain relatively low and the profitability relates mainly to the price premium paid by consumers to
25 purchase organic products. Moreover, the variable *CUSTOMERS* (meeting customers' requirements)
26 is not significant either for IP or OF adoption. As indicated in Table 1, farmers rank this aspect as
27 highly important, whatever the crop protection strategy.

28
29 As for control variables, results show that *AGE* is not significant, *GENDER* is significant only for
30 farmers using integrated protection, education (*EDUCATION*) has only a significant impact on organic
31 farming adoption, and fruit-growers (*ACTIVITY*) are more likely to adopt IP than vegetable producers.

32
33 Furthermore, several versions of the model are estimated, to investigate the robustness of results to
34 variable omission (Table 3). In Model 1 we have focused only on the 'traditional' concerns. In Model

⁸ The plant plan for the environment is a part of the French rural development plan (2007-2013) aiming at to helping farmers in their environmental investments.

1 2 the variable *GUILTY*, measuring moral concerns, is excluded, whereas in Model 3, social concerns
2 are excluded.

3 [Insert Table 3 around here]

4 In all estimations, the Pseudo R2 (between 0.13 and 0.15) is lower than 0.17 which indicates that
5 adding the moral and social concerns into specification is more appropriate. In addition, the main
6 results presented above (Table 2) are robust to variable omissions. For instance, Model 2 indicates that
7 even when omitting the variable *GUILTY*, farmers thinking that showing to others one's
8 environmental commitment is important are more likely to adopt IP and OF. The coefficients
9 associated to the variable *SHOW* (0.584 and 1.142) are also very close to those reported in Table 2.
10 The variable *GUILTY* remains significant with regards to OF adoption, even when social concerns are
11 excluded (Model 3). Moreover, similarly to Table 2, all estimations in Table 3 show that the variables
12 *USERS* and *PERCEPTION* are non-significant. It is also interesting to note that the variables *COST*
13 and *RISKS* are negatively significant at the 1% level in all estimations. As for control variables, the
14 results do not largely differ from those reported in Table 2, except for the variable *GENDER*, which is
15 non-significant in all estimations, while in Table 2 it was a significant driver at the 10% level of IP
16 adoption.

17
18 Finally, we re-run the analysis by using composite variables (*i.e.*, moral, economic and social) instead
19 of using the individual ones (*e.g.*, do not feel guilty, showing to others, cutting costs, etc.). These
20 composite variables are computed as the sum of the individual binary ones. Thus, *MORAL*
21 (respectively *SOCIAL*) can take values between 0 when *RIGHT* and *GUILTY* (respectively *USERS*,
22 *PERCEPTION* and *SHOW*) are equal to 0 and 2 (respectively 3) when they are equal to 1. Similarly,
23 the variable *ECONOMIC* can take values between 0 when all individual economic concerns (that is,
24 *COST*, *CUSTOMERS*, *RISKS*, *COMPETITION* and *SUPPORT*) are equal to 0, and 5 when they are
25 equal to 1.

26 [Insert Table 4 around here]

27 The results in Table 4 are similar to those reported in Tables 1 and 2, confirming our hypothesis 1 that
28 moral and social concerns matter. They show that moral concerns positively influence organic farming
29 adoption, since the variable *MORAL* is significant at the 1% level. This variable has also the highest
30 marginal effect (0.15). Table 4 also shows that social considerations drive both IP and OF adoption.
31 Nevertheless, while *SOCIAL* is significant at the 5% level when considering OF, it is only significant
32 at the 10% level when considering IP. The marginal effect is also only significant for the former. Last
33 but not least, results in Table 4 suggest that farmers who give high importance to economic
34 considerations are less likely to adopt OF, which is consistent with the results of the basic model
35 reported in Table 2.

36 37 **5. Concluding remarks**

1 This paper provides a better understanding of farmers' decision to adopt ecologically-friendly
2 practices. We have shown that beyond the role played by economic concerns, moral and social ones
3 matter amongst French fruit-growers and vegetable producers and are significant drivers of integrated
4 crop protection and organic farming adoption. These results suggest that only focusing on economic
5 incentives may be useful but partial. Ignoring these aspects can lead to flawed considerations. For
6 instance, farmers are likely to adopt ecologically-friendly practices to show their commitment to
7 others. Regulators may take into account such aspects by making farmers' efforts more visible, for
8 example, through awards to those who protect the environment the most.⁹ Recent behavioral
9 economics work (e.g., Frey and Neckermann, 2009) stresses that awards can constitute a more
10 effective policy tool than monetary compensations. Even innovations that are both profitable and
11 ecologically-friendly may suffer from a low diffusion rate because their capacity to confer moral and
12 social benefits has been ignored. More precisely, increasing the non-economic benefits of socially
13 desirable innovations, such as IP and OF, may be a complementary and more efficient way of
14 promoting them among potential adopters. Moreover, our results show that guilty feelings are
15 important for farmers. Consequently, creating a state of cognitive dissonance among farmers, *i.e.*,
16 incoherence between their intrinsic values and their actions can push them to adopt ecologically-
17 friendly farming to be relieved. Furthermore, while several scholars argue that less chemical inputs are
18 likely to reduce the costs incurred by farmers, and although public authorities often use these input
19 gains to encourage farmers to reduce the use of chemicals, we have shown that farmers who wish to
20 reduce production costs are less likely to adopt ecologically-friendly practices, maybe because they do
21 not perceive this predicted cost reduction. As such, this finding suggests that those public policies may
22 be less effective than expected.

23
24 Furthermore, economic, moral and social concerns matter differently according to the protection
25 method used by farmers. This result suggests that public authorities should take into account not only
26 the multiplicity of motivations but also the way these motivations can be combined. This issue recalls
27 the debate concerning the crowding in/crowding out situation (Fehr and Falk, 2002; Frey and Stutzer,
28 2008). Economic motivations, such as paying people, may crowd out (crowd in) moral motivations,
29 such as doing the right thing, because they undermine (reinforce) self-determination and self-esteem.
30 In the crowding out situation, the individual feels pressured by an external force, and therefore feels
31 over justified in maintaining his moral motivation rather than complying with the will of the source of
32 the economic reward. Moreover, economic motivations cause an individual to feel that his/her internal
33 motivation is rejected, not valued, leading him/her to reduce his/her self-esteem and thus to reduce
34 effort (Frey and Oberholzer-Gee, 1997 ; Gneezy and Rustichini, 2001). Although difficult to capture,

⁹ One may argue that as the number of farmers who wish to show their environmental commitment increases, this concern may become less important for them. This issue deserves more attention in future research.

1 taking into account these issues is a crucial step toward more efficient and effective policies, and an
2 important topic for future research. This is particularly interesting when considering environmental
3 policy which is characterized by several kinds of external interventions, notably through command-
4 and-control and market-based instruments (Frey and Stutzer, 2008).

5
6 Nevertheless, our study has some limitations that should be taken into account in future research. First,
7 the number of observations remains relatively low to gather rigorous information regarding moral and
8 social concerns. Increasing the sample of surveyed farmers may allow having more clear-cut
9 conclusions. Moreover, due to the relatively low rate of responses, we were not able to test for
10 differences among the three different regions. Second, we have ignored in our estimation a set of
11 exogenous concerns that are likely to generate adoption, such as regulation, the distance between a
12 farmer's house and farm, etc. For instance, it seems intuitive that an individual who lives on his/her
13 farm maybe more sensitive to chemical inputs reduction, notably in presence of children.¹⁰ Asking
14 questions in regards to farmers' perceptions on how other farmers behave would also have been
15 interesting. Taking into account these considerations is a challenging topic for future research. It
16 would be also interesting to consider the date of adoption and the conversion process followed by
17 farmers, that is, whether they moved directly from conventional to organic farming or took a step by
18 step approach starting by adoption of IP. Third, our study focuses on fruit-growers and vegetable
19 producers in three French areas. Covering more activities and areas is likely to generate fruitful
20 results. A cross-country comparison also would constitute an interesting extension of our work.

¹⁰ Noteworthy, the farm was the farmer's house for several decades in France. Nevertheless, this situation is increasingly changing mainly among young farmers, notably due to some institutional constraints, which prevent individuals from building their houses on the farm, in order to preserve land agricultural use.

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Table 1: Variables description and sample statistics

Variable	Definition	All farmers (N=243)		Conventional (N=134)		Integrated (N=71)		Organic (N=38)		Wilcoxon test		
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	C/IP	C/OF	IP/OF
PROTECTION (<i>Dependent variable</i>)	Categorical variable (=1, 2 or 3 if the farmer chooses a conventional protection method, IP or OF, respectively)	1.604	0.744	1	0	2	0	3	0	-	-	-
<i>Moral concerns</i>												
RIGHT	Dummy variable (=1 if the farmer thinks that doing the right thing is important)	0.761	0.427	0.708	0.455	0.732	0.445	1	0	ns	***	***
GUILTY	Dummy variable (=1 if the farmer thinks that do not feel guilty about his own choices is important)	0.559	0.497	0.537	0.500	0.521	0.503	0.710	0.459	ns	**	*
<i>Social concerns</i>												
USERS	Dummy variable (=1 if the farmer thinks that satisfying landscape users is important)	0.390	0.488	0.350	0.478	0.394	0.492	0.526	0.506	ns	*	ns
PERCEPTION	Dummy variable (=1 if the farmer thinks that being perceived the top one by the other farmers is important)	0.168	0.375	0.171	0.378	0.197	0.400	0.105	0.311	ns	ns	ns
SHOW	Dummy variable (=1 if the farmer thinks that showing one's environmental commitment to others is important)	0.485	0.500	0.410	0.493	0.549	0.501	0.631	0.488	*	**	ns
<i>Economic concerns</i>												
COST	Dummy variable (=1 if the farmer thinks that cutting production costs is important)	0.576	0.495	0.619	0.487	0.647	0.481	0.289	0.459	ns	***	***
CUSTOMERS	Dummy variable (=1 if the farmer thinks that meeting customers' requirements is important)	0.806	0.395	0.791	0.408	0.845	0.364	0.789	0.413	ns	ns	ns
RISKS	Dummy variable (=1 if the farmer thinks that reducing risks is important)	0.732	0.443	0.798	0.402	0.802	0.400	0.368	0.488	ns	***	***
COMPETITION	Dummy variable (=1 if the farmer thinks that getting a competitive advantage is important)	0.246	0.432	0.261	0.440	0.169	0.377	0.342	0.480	ns	ns	**
SUPPORT	Dummy variable (=1 if the farmer thinks that public support is important)	0.292	0.455	0.268	0.444	0.366	0.485	0.236	0.430	ns	ns	ns
<i>Farmers' characteristics</i>												
AGE	Dummy variable (=1 if farmer's age is under 40)	0.205	0.405	0.231	0.423	0.183	0.389	0.157	0.369	ns	ns	ns
GENDER	Dummy variable (=1 if the farmer is female)	0.172	0.378	0.126	0.334	0.197	0.400	0.289	0.459	ns	***	ns
EDUCATION	Dummy variable (=1 if the farmer's level of education is high school)	0.456	0.499	0.417	0.495	0.492	0.503	0.526	0.506	ns	ns	ns
ACTIVITY	Dummy variable (=1 if the main activity of the farmer is fruit-growing)	0.580	0.494	0.544	0.499	0.732	0.445	0.421	0.500	***	ns	***

The Wilcoxon test compares conventional farmers (C), farmers using integrated protection (IP) and organic farmers (OF). (*), (**) and (***) stand for parameter significance at the 10, 5 and 1 percent level, respectively.

Table 2: Multinomial logistic estimates of IP/OF adoption

Variables	Integrated protection			Organic farming		
	Estimate	z-value	Marginal effect	Estimate	z-value	Marginal effect
INTERCEPT	-1.846***	-3.19	-	-1.127*	-1.77	-
<i>Moral concerns</i>						
GUILTY	-0.509	-1.45	-0.129	0.918*	1.87	0.085**
<i>Social concerns</i>						
USERS	0.347	0.95	0.066	0.224	0.45	0.009
PERCEPTION	0.268	0.59	0.078	-0.956	-1.37	-0.065
SHOW	0.663*	1.86	0.104	1.182**	2.44	0.080**
<i>Economic concerns</i>						
COST	-0.188	-0.53	0.008	-1.540**	-3.12	-0.137***
CUSTOMERS	0.097	0.22	0.028	-0.317	-0.56	-0.031
RISKS	0.121	0.29	0.084	-1.664***	-3.63	-0.196***
COMPETITION	-1.091**	-2.38	-0.212***	0.671	1.28	0.095
SUPPORT	0.649*	1.75	0.146*	-0.216	-0.40	-0.033
<i>Farmers' characteristics</i>						
AGE	-0.300	-0.71	-0.043	-0.812	-1.26	-0.049
GENDER	0.749*	1.65	0.148	0.553	1.04	0.023
EDUCATION	0.562	1.60	0.091	0.908*	1.83	0.060
ACTIVITY	0.999**	2.77	0.194***	0.167	0.36	-0.011
Pseudo R2			0.1734			
Log likelihood			-196.41559			
LR Chi2(26)			82.42			
Wald test: joint for moral and social concerns			18.04**			
(GUILTY=USERS=PERCEPTION=SHOW=0)						
Number of observations			243			

(*), (**) and (***) stand for significance at the 10, 5 and 1 percent level, respectively. The z value is computed as the estimated coefficient divided by its robust-estimated standard error. The variable *RIGHT* (doing the right thing) has not been used in estimation since all organic farmers stated it was important.

Table 3: Check of the robustness of the overall results to the omission of some variables

Variables	Model 1 (omitting moral and social concerns)						Model 2 (omitting moral concerns)						Model 3 (omitting social concerns)					
	Integrated protection			Organic farming			Integrated protection			Organic farming			Integrated protection			Organic farming		
	Estimate	z-value	Marginal effect	Estimate	z-value	Marginal effect	Estimate	z-value	Marginal effect	Estimate	z-value	Marginal effect	Estimate	z-value	Marginal effect	Estimate	z-value	Marginal effect
INTERCEPT	-1.650***	-2.99	-	-0.302	-0.55	-	-1.928***	-3.33	-	-0.875	-1.44	-	-1.565***	-2.83	-	-0.644	-1.09	-
<i>Moral concerns</i>																		
GUILTY	-	-	-	-	-	-	-	-	-	-	-	-	-0.247	-0.76	-0.079	0.994**	2.17	0.094**
<i>Social concerns</i>																		
USERS	-	-	-	-	-	-	0.224	0.63	0.032	0.493	1.05	0.037	-	-	-	-	-	-
PERCEPTION	-	-	-	-	-	-	0.188	0.42	0.059	-0.793	-1.14	-0.058	-	-	-	-	-	-
SHOW	-	-	-	-	-	-	0.584*	1.67	0.088	1.142**	2.43	0.082**	-	-	-	-	-	-
<i>Economic concerns</i>																		
COST	-0.176	-0.51	0.007	-1.265***	-2.76	-0.124**	-0.270	-0.77	-0.008	-1.482***	-3.06	-0.132***	-0.134	-0.39	0.016	-1.340***	-2.88	-0.130***
CUSTOMERS	0.253	0.62	0.049	0.030	0.06	-0.004	0.140	0.32	0.035	-0.247	-0.44	-0.026	0.247	0.60	0.053	-0.128	-0.24	-0.019
RISKS	0.004	0.01	0.076	-1.758***	-4.04	-0.230***	0.102	0.25	0.083	-1.645***	-3.66	-0.199***	-0.015	-0.04	0.068	-1.731***	-3.89	-0.217***
COMPETITION	-0.697*	-1.71	-0.155**	0.749	1.55	0.108	-0.988**	-2.21	-0.201***	0.717	1.37	0.103	-0.722*	-1.76	-0.155**	0.643	1.31	0.091
SUPPORT	0.606*	1.74	0.130*	0.027	0.05	-0.017	0.564	1.55	0.125	-0.087	-0.16	-0.023	0.649*	1.84	0.142*	-0.033	-0.06	-0.022
<i>Farmers' characteristics</i>																		
AGE	-0.343	-0.83	-0.045	-0.957	-1.58	-0.066	-0.305	-0.72	-0.041	-0.917	-1.47	-0.057	-0.331	-0.80	-0.045	-0.881	-1.42	-0.059
GENDER	0.597	1.38	0.109	0.561	1.12	0.034	0.682	1.53	0.127	0.680	1.32	0.039	0.615	1.41	0.118	0.471	0.91	0.023
EDUCATION	0.550	1.61	0.086	0.874*	1.87	0.066	0.578*	1.66	0.093	0.933*	1.94	0.064	0.543	1.58	0.085	0.875*	1.82	0.064
ACTIVITY	0.933***	2.68	0.183***	0.097	0.22	-0.018	0.930***	2.62	0.180***	0.246	0.53	-0.003	0.978***	2.77	0.195***	-0.027	-0.06	-0.030
Pseudo R2	0.1315						0.1576						0.1458					
Log likelihood	-206.36559						-200.17828						-202.98183					
LR Chi2	62.52						74.89						69.29					
Number of observations	243						243						243					

(*), (**) and (***) stand for significance at the 10, 5 and 1 percent level, respectively. The z value is computed as the estimated coefficient divided by its robust-estimated standard error. The variable *RIGHT* (doing the right thing) has not been used in estimation since all organic farmers stated it was an important factor.

Table 4: Multinomial logistic estimates of IP/OF adoption (using composite factors)

Variables	Integrated protection			Organic farming		
	Estimate	z-value	Marginal effect	Estimate	z-value	Marginal effect
INTERCEPT	-1.472***	-2.95	-	-2.016***	-2.86	-
MORAL	-0.183	-0.85	-0.074	1.180***	3.21	0.112***
SOCIAL	0.301*	1.71	0.048	0.504**	2.11	0.036*
ECONOMIC	-0.034	-0.24	0.015	-0.757***	-3.66	-0.067***
AGE	-0.503	-1.23	-0.089	-0.392	-0.71	-0.020
GENDER	0.618	1.46	0.109	0.711	1.43	0.048
EDUCATION	0.535	1.59	0.096	0.538	1.24	0.032
ACTIVITY	0.955***	2.77	0.199***	-0.227	-0.53	-0.049
Pseudo R2			0.1180			
Log likelihood			-209.58324			
LR Chi2(14)			56.08			
Wald test: joint for MORAL and SOCIAL			20.41***			
Number of observations			243			

(*), (**) and (***) stand for significance at the 10, 5 and 1 percent level, respectively. The z value is computed as the estimated coefficient divided by its robust-estimated standard error.

Appendix 1: Pearson correlation coefficients

	PROTECTION	AGE	GENDER	EDUCATION	ACTIVITY	COST	CUSTOMERS	RISKS	COMPETITION	SUPPORT	GUILTY	USERS	PERCEPTION	SHOW
PROTECTION	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-
AGE	-0.07	1.00	-	-	-	-	-	-	-	-	-	-	-	-
GENDER	0.15	0.03	1.00	-	-	-	-	-	-	-	-	-	-	-
EDUCATION	0.08	0.33	0.19	1.00	-	-	-	-	-	-	-	-	-	-
ACTIVITY	-0.01	-0.04	-0.11	-0.14	1.00	-	-	-	-	-	-	-	-	-
COST	-0.18	0.00	-0.04	-0.06	0.31	1.00	-	-	-	-	-	-	-	-
CUSTOMERS	0.02	0.06	0.05	-0.03	0.13	0.10	1.00	-	-	-	-	-	-	-
RISKS	-0.28	0.07	-0.21	0.06	0.14	0.19	0.01	1.00	-	-	-	-	-	-
COMPETITION	0.02	0.20	0.04	-0.02	0.04	0.08	0.11	-0.02	1.00	-	-	-	-	-
SUPPORT	0.01	-0.01	-0.03	-0.17	0.12	0.22	0.10	0.02	0.19	1.00	-	-	-	-
GUILTY	0.09	-0.02	0.05	-0.08	0.15	0.19	0.09	-0.03	0.10	0.15	1.00	-	-	-
USERS	0.11	0.00	-0.03	-0.00	-0.01	0.03	0.28	-0.12	0.16	-0.05	0.25	1.00	-	-
PERCEPTION	-0.04	0.06	-0.06	-0.08	0.16	0.14	0.08	0.04	0.32	0.09	0.17	0.11	1.00	-
SHOW	0.17	-0.04	-0.00	-0.09	0.07	0.13	0.10	-0.08	0.24	0.22	0.24	0.26	0.28	1.00