NUDGES, SOCIAL NORMS AND PERMANENCE IN AGRI-ENVIRONMENTAL SCHEMES

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Abstract

Agri-environmental schemes (AES), implemented to address a wide range of environmental issues, suffer from what has been referred to as the "end of the contract problem", in the sense that many of the land management practices adopted under the scheme cannot be expected to persist in the absence of payments. A first objective of this paper is therefore to investigate farmers' actual land management intentions at the end of AES contracts. The second objective is to investigate the effect of social norms, and framing of these norms, on the likely permanence of land management practices adopted under AES. That is, we are interested in whether a "nudge" in the form of a social norm can help solve the end of contract problem. Our results are based on the stated intentions of 395 farmers participating in the French AES scheme MAEt. They show that almost half of the farmers of our sample are willing to maintain the practices adopted during the AES even in the absence of payments after the contract ends, and that information about what other farmers intend to do – the social norm - can greatly influence farmers' decisions. However, the framing of this information has no significant effect on stated intentions.

Keywords   Agri-environmental schemes; Permanence; Framing; Social norm
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Nudges, social norms and permanence in agri-environmental schemes

1. Introduction

Agri-environmental schemes (AES) have been used in the EU, USA and Australia to address a wide range of environmental issues, from conservation of biodiversity to water quality enhancement and landscape protection. These schemes are based on contracts in which farmers can voluntarily accept payments in return for adopting more environmentally-friendly land management practices.

Most AES contracts have an end point, with contracts lasting from 5 years in French "territorialised agri-environmental measures", to 10 years in the UK Higher Level Stewardship scheme, 15 years for some of the contracts of the US Conservation Reserve Program, and 20 years in the now-defunct Environmentally Sensitive Areas scheme in the UK. After the end of the contract, farmers are free of any contracted commitment concerning their land management choices, and can therefore revert to environmentally-damaging practices even if this destroys the accumulated natural capital resulting from participation (Hanley *et al.* 1999). This issue has already been referred to as the "end of the contract problem" (Whitby 2000), and is an important criticism to be made of Payments for Environmental Services (PES) schemes in general (Swart 2003).

A first objective of this work is therefore to investigate farmers' land management intentions at the end of AES contracts. Will farmers keep providing enhanced environmental services even in the absence of any payment; or does a short term contract necessarily lead to a short term provision of services? This paper will review existing studies on this question and will seek to identify reasons for a continuation of pro-environment actions after the end of the contract. In particular, it will focus on how farmers influence each other and what effect providing information on other farmers' decisions concerning the continuation of their own pro-environmental practices can have on each farmer's choice.

A growing literature demonstrates that information about one's own behaviour relative to that of others' behaviour (an indicator of a 'social norm') can influence individual behaviours (Croson and Treich 2014). Moreover, Thaler and Sunstein (2008) show that individual choices are influenced not only by information about what others in the same social group do, but also by the way the information is formulated and provided, the so-called "framing" of information. They introduce the concept of "nudge" as the use of a specific policy design, type of information and framing of information which influences people's decisions without changing the structure of economic incentives or restricting their available options.

Therefore the second objective of this paper is to investigate the effect of two nudges: *(i)* whether providing information about what other farmers do or intend to do, *i.e.* giving them an idea of what the prevailing "social norm" might be, could improve participants' willingness to maintain the land management practices they adopted under the AES after the contract ends, and *(ii)* whether the framing of this information matters to their stated intentions.

These nudges and the behavioural motives underlying the decision to maintain environmentally-friendly practices beyond the duration of the contract are tested through a French national survey conducted in 2013. In France, the national rural development program[1] for the 2007 to 2013 period has introduced a better targeting of existing agri-environmental measures on vulnerable areas along with a new localized scheme: the regional agri-environmental measures (*Mesures Agro-Environnementales territorialisées*, MAEt). This scheme is targeted at the most sensitive areas for biodiversity conservation and water quality issues. Concerning water quality, the scheme is open to farmers located in the most contaminated drinking water catchment areas and/or at priority watersheds, where the risk of failing to achieve Good Ecological Status for water bodies set by the European Water Framework Directive is the highest. Concerning biodiversity, the scheme is intended to attain the conservation objectives of the Natura 2000 network sites, defined by the Habitat and Birds European Directives. The MAEt scheme provides payments both for a change in farmers' practices or to maintain farming practices or activities that benefit the environment but are at risk of disappearing. In this scheme, farmers can adopt a wide range of land management options such as the reduction of input use (pesticides or fertilizers), the conversion of croplands to grasslands or the restoration of hedgerows.

Our results, based on the stated intentions of 395 French farmers, show that information about what other farmers intend to do can greatly influence a farmer's stated decision whether to maintain or not the practices adopted during the AES in the absence of payments after the contract ends. However, we find that the framing of this information has no significant effect on stated intentions.

The remainder of this article is organised as follows. We will provide first a literature review on the permanence of agri-environmental practices in section 2, and evidence of the role of social norms and framing in individual behaviours towards the environment in section 3. We then describe in a fourth section the method and data used. Finally we present and discuss the estimated effect of social norm information and its framing on farmers' stated intentions to continue with environmentally-friendly land management practices even in the absence of an agri-environmental contract.

2. Permanence of agri-environmental practices after the end of the agri-environmental contract

In PES schemes, farmers can provide ecosystem services in two ways: through land retirement or by modifying their resource use or technologies on farmed land, that is, by "land sparing" or "land sharing" (Lipper *et al.* 2009, Balmford, 2012). The French MAEt scheme proposes both types of options. Some of the options proposed, like wetland or grassland creation, require setting the farm plot aside from production. Therefore, it creates significant opportunity costs for participants in terms of the net value of production foregone. Other options, pertaining more to the "land sharing" approach, offer payments to farmers who accept to reduce the intensity of agricultural production, such as payments for reductions in stocking rates, which also come at a cost in terms of profits

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[1] Programme de Développement Rural Hexagonal (PDRH)

foregone (Armsworth *et al.*, 2012). A third category of options proposed in AESs are meant to support farmers during the transition towards new low input practices. It is argued that AESs could provide farmers with compensation for investment costs (new machinery for example to switch from chemical to mechanical weeding, but also learning investments to acquire new skills) and for the increased risks resulting from the adoption of new practices they have no experience in, assuming that these risks can be reduced with time and experience. This can be true if alternatives exist that can yield the same or higher benefits for farmers while conserving the environment, so that these new practices are privately profitable after a period of adaptation and after the fixed starting costs are overcome. Engel *et al.* (2008) argue that "there cannot be any expectation of permanence in the absence of payments" as the logic of PES turns public good supply into a marketable service. However, Roberts and Lubowski (2007) show that a large share (42%) of farmlands engaged in the CRP program would not have been returned to crops if the program had ended in 1997. Other studies (ECA 2011) also find that there is not a complete reversal to previous management practices at the end of contracts.

There are several explanations to this observation. The first one is that farmers enrolling into agri-environmental schemes would have changed their practices even without any incentives and that contracts provide windfall gains to farmers without environmental additionality (Chabé-Ferret and Subervie 2013). A more optimistic explanation is that land management changes have resulted in a new cost-benefit balance, or have triggered different motivations in farmers' choices, or have changed the relative pay-offs from less intensive management options.

Landowners base their choices on their beliefs about the relative pay-offs of alternative land management options they face. The payments provided by agri-environmental schemes represent an opportunity to learn more about such pay-offs and to change initial beliefs, to break away from existing production "habits" and form new habits, potentially motivating the supply of environmental services even in the absence of AES payments (Hiedanpää and Bromley 2014). The motivations to do so can be pecuniary (an increase in profits for example due to savings in pesticide costs), non-pecuniary but selfish (reputation effects for example) or purely altruistic (Glaeser 2014). As we will discuss in the next section, social norms can "super-charge" motivations and thus increase the likelihood that farmers maintain pro-environmental practices despite the end of the financial incentives.

3. *Social norms, framing and pro-environmental behaviour*

Farmers' decisions whether to maintain pro-environmental practices after the end of an AES contract can be considered as a public good supply problem. Farmers who decide to maintain pro-environmental practices will bear private costs whereas environmental improvements will benefit other members of the community. A large amount of research effort has been focused on understanding why people contribute to public goods, when the main game theoretic prediction would be not to contribute at all. One interpretation is that a large proportion of people are conditional co-operators: people tend to contribute more when other people contribute too. In a seminal article, Fischbacher *et al.* (2001) demonstrate, using modified public good games where players can choose their contribution depending on others' contribution, that about 50% of people

are conditional co-operators. In other experiments, people are even willing to pay to get information about others' contribution in a public good game in order to decide on their voluntary contribution (Kurzban and DeScioli, 2007).

These experimental results have been confirmed in the field. Frey and Meier (2004) carried out an experiment at the University of Zurich where students were all asked to contribute to a charity fund but were given different information on other students' contribution rates. This information had a significant effect: more students contributed when they had the information that 64 percent of the other students contributed than when they had the information that only 46 percent contributed. The choice to contribute or not was also significantly correlated with students' expectations of others' behaviour. This approach has also been used to analyse the phenomenon of tax evasion. Paying taxes can be considered irrational if the probability of control and the sanction are analysed. Tax evasion should therefore normally be much higher than what it is in most countries. Tax payers seem to be largely influenced in their tax morale by the perception that they have of the behaviour of others and can therefore also be considered as conditional co-operators (Frey and Torgler, 2007). There are a number of interpretations to explain conditional cooperation: people may value conforming to a social norm, have some preference for fairness such as reciprocity, or could consider that contributions of others are an indicator of the quality/importance of the public good (Frey and Meier, 2004). However, Bohnet and Zeckhauser (2004) show in an economic experiment that the main engine of conditional coordination may rather be a social norm.

Social norms are traditionally considered to be divided into two categories: descriptive norms and injunctive norms (Cialdini *et al.*, 1990). A descriptive norm *describes* behaviour which is in some sense "typical" within a group. People tend to comply with descriptive norms because they reveal useful information about the appropriate behaviour in particular situations: "if others do that it must be a good thing to do". An injunctive norm refers to what constitutes morally approved and dis-approved conduct, that is to say what ought to be done. Adherence to injunctive norms is linked to other people's ability to administer social punishment or rewards (Thøgersen, 2006). Bicchieri (2006) considers that people are influenced by their subjective beliefs about what the others do and think, rather than by the actual behaviour and opinions of others. These beliefs may change when new information is received. Providing social information about others' behaviour may therefore strongly modify subjective estimation of norms and thus have a positive impact on the adoption of pro-social behaviour.

In the context of a PES scheme subsidising farmers for reforestation in China, Chen *et al.* (2009) show, through a choice experiment survey, that individual intentions to re-enrol can be positively influenced by the information that neighbours also intend to re-enrol. Farmers also stated that they would require lower subsidies to carry out environment protection activities if a large proportion of farmers re-enrol than if few farmers would do so (Chen *et al.*, 2009). In a rather different context, Czajkowski et al (2014) find that adherence to a social norm co-determines the desire to engage in higher levels of home recycling for a large group of their sample of Polish households. The positive effect of social information on pro-social behaviour has also been demonstrated in other contexts mainly in the social psychology literature: dictator games in the laboratory (Bicchieri and Xiao, 2009), charity giving (Croson *et al.*, 2009), littering (Cialdini *et al.*, 1990), energy consumption (Schultz *et al.*, 2007) and student alcohol consumption (Neighbors *et al.*, 2004).

However, many examples from the literature also show that information framing can significantly influence individual choices. Framing effects have been studied in psychology, in medical and clinical decision making, consumers' choices and bargaining behaviours (Levin *et al.* 1998). Framing can be defined as "*presenting individuals with logically equivalent options in semantically different ways*" (Krichnamurthy *et al.* 2001, p.383). One particular type of framing is of interest when a social norm is being presented to respondents: attribute framing (Levin *et al.* 1998). Attribute framing is a case of valence framing where one of the attributes of the choice is presented either positively or negatively. It differs from risk framing where a risky choice can be presented in terms gains or losses (avoided) and from goal framing where the goal of the action is subject to different framings, highlighting the potential positive or negative outcomes of the action (Levin *et al.* 1998). It is important to differentiate these types of framing as their expected impact on choices varies. It is usually found that a positive attribute framing triggers a positive reaction. For example, experiments (Levin *et al.* 1988) show that respondents are more likely to wish for surgery if they are told that the technique used has a 50 percent success rate than if they are told that it has a 50 percent failure rate. The authors explain this effect by the way information is processed: positive framing creates positive associations in memory which leads to a more favourable judgment of the event/object. In order to test this framing effect on farmers' intention, but also to avoid weakening the social norm effect of information provided, we provided respondents with either negative or positive framings of the intentions of other farmers.

4. Method and Data

4.1. Survey and treatments

We used an online survey[2] to question farmers participating in the MAEt scheme about their land management intentions after the end of their contract. This survey was initially set up to conduct an evaluation of the MAEt scheme over the 2007-2013 CAP programming period. One section of the questionnaire focusses on land use and land management changes that farmers made when joining the MAEt scheme and on their intention to maintain these changes after their contract ends, in the event that it is not renewed. In order to test the effect of the two nudges "social norm" and "framing", we constructed 3 treatment groups to which the question on whether they intended to maintain their land management practices was put differently (Table 1):

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[2] Using the software Limesurvey®.

	Treatment	Framing of the question	Number of respondents
Control group	T_0: no information	After your period of agreement ends, do you plan to maintain these changes without renewal of the contract?	128
Group 1	T_1: positively framed information	In a previous survey, **80%** of the respondents stated that they would maintain the new practices they had adopted, even without renewal of their contract. After your period of agreement ends, do you plan to maintain these changes without renewal of the contract?	126
Group 2	T_2: negatively framed information	In a previous survey, **20%** of the respondents stated they would **not** maintain the new practices they had adopted without renewal of their contract. After your period of agreement ends, do you plan to maintain these changes without renewal of the contract?	141

The software randomly selected respondents into one of the three treatments. Respondents from groups 1 and 2 were both given the same information, which states the results obtained in the pilot survey[3] that was implemented in the Languedoc-Roussillon region before the implementation of the national survey. However the framing of the information differed: it was positively framed for respondents from group 1 and negatively framed for respondents from group 2.

Considering the literature on conditional cooperation and on social norms, we expect that the information on high rates of continuation of pro-environmental practices provided to group 1 and 2 will have a positive impact on farmers' intentions to also continue with their newly adopted practices after their contract ends. However, we expect that the negative framing presented to group 2 might reduce the impact of this positive social information.

4.2. Econometric specification

As the respondents were randomly assigned to the 3 groups, the treatment effects of information and framing are causal, and can directly be identified. In order to distinguish the two effects, we proceed in two steps. First, we introduce the dummy variable *T*, which takes the value 1 if the respondent received information (group 1 and 2), and 0 otherwise (control group). The effect of information on the probability that farmers decide to continue pro-environmental land management after the end of the contract (*y = 1*) is obtained through a maximum likelihood estimation of the α parameter in:

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[3] Based on the responses of 91 farmers participating to the MAEt scheme.

$$P(y = 1) = F(\alpha T) \tag{1}$$

where *F(.)* is the cumulative distribution function of the logistic distribution.

Then, we distinguish two treatment variables: T_1 and T_2. T_1 is a dummy variable that takes the value 1 if the respondent received positively framed information on others' behaviour (group 1), and 0 otherwise (control group or group 2). T_2 is a second dummy variable that takes the value 1 if the respondent received negatively framed information (group 2), and 0 otherwise (control group or group 1). We run the following econometric specification in order to identify the effect of framing:

$$P(y = 1) = F(\beta_1 T_1 + \beta_2 T_2) \tag{2}$$

where *F(.)* is again the cumulative distribution function of the logistic distribution.

Finally, so as to control for the effects of individual characteristics *X* on farmers' decisions to maintain their newly adopted practices, we also introduce these characteristics as covariates in the regression:

$$P(y = 1) = F(T\alpha + X'\gamma) \tag{3}$$

Vector *X* includes variables describing general farm characteristics: utilisable agricultural area (UAA) in hectares, the type of AES subscribed to, and farming activities. It also includes variables aimed at signalling potential low additionality of farmer's participation, *i.e.* whether the respondent states that he already complied with the scheme's requirement before joining, and to what extent he had to change his farming practices to comply with these requirements (low changes, medium changes or major changes). Finally, we introduce proxy variables to capture different types of motivations for continuing MAEt practices after the end of the contract (Glaeser 2014): pecuniary, non-pecuniary selfish or non-pecuniary altruistic motivations. Farmers who could earn a higher gross margin, who could sell their products at a higher price and faced no technical difficulties with the AES requirements, might have pecuniary motives to maintain the adopted practices. Farmers who, during the AES, experienced a better life quality and/or an acknowledgment that their farming activity contributes to the protection of the environment and to land management might have non-pecuniary selfish motives to do so. Finally, farmers who state that protecting the environment through their participation in the AES is a source of satisfaction by itself are likely to have purely altruistic motivations.

4.3. Sample

525 farmers participating in the MAEt scheme answered the national online survey, from which 83 stated that their joining the MAEt scheme had not changed their practices and 442 who, on the contrary, have adopted new practices. These 442 farmers were asked whether they intend to continue with these newly adopted practices when the payments cease, and 395 answered the question. Hence, the answer rate for the question concerning the permanence of changes is almost 90% with only 47 farmers who chose not to address this question.[4] The sample used for analysis is therefore constituted of the 395 farmers who did answer that particular question, randomly

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[4] There are no significant differences in the answer rates of the 3 groups.

distributed among the 3 groups, with 128 respondents in the control group, 126 in group 1 and 141 in group 2.

As described in Table 2, the sample includes farmers engaged in AES options aiming at a reduction in fertilizers use (variable name *AES Fertilizers*), at a reduction in phytosanitary products use (*AES Phytosanitary*), at management of land cover, pastures and moors (*AES land cover*, introducing for example constraints on pasture or mowing periods to favour biodiversity conservation), at the creation or upkeep of grassland (*AES grassland*), at the management of specific structural landscape features, like hedgerows or ditches (*AES linear*) or finally AES options for conversion to organic farming (*AES organic*). Other minor options, concerning the management of specific environments (for example reed beds or salt marshes) or landscape opening up are also represented in the sample, and have been grouped together under the "*AES other*" variable. The most common farming activity in the sample is field crops (41.3% of the sampled farmers), followed by mixed farming and breeding (31.7%), and livestock farming (20.3%).

There was a mixed feedback from respondents on their experience with the MAEt scheme. On the one hand, only 20% of the farmers questioned have been able to get a better value for their products under the AES contract, and 41.7% have increased their total gross margin. Almost half of them have experienced difficulties in relation with the technical constraints imposed by the AES contract. On the other hand, a wide majority of respondents (88.8%) state that their participation in the scheme provided them with greater social acknowledgement on their contribution to the protection of natural resources and to local land management, and they almost unanimously (96.1%) state that their participation provided them with the individual satisfaction of participating in the protection of the environment. Almost half of the sampled participants have experienced a better life quality during their participation.

Surprisingly, 67.8% of the farmers of our sample acknowledged that they entered the AES partly because their practices were already in line with AES requirements. Nevertheless all of them stated that they have adapted their practices further to their enrolment in the AES. 46.1 % of the interviewed farmers stated that they had to implement "low levels" of change in their practices to conform to the AES requirements, 38.5% have implemented "medium" changes and only 15.4% have implemented "major" changes. Remember that the 83 respondents who chose the fourth option (no changes) are excluded from our sample.

[Table 2]

Table 3 shows that, overall, random assignment between treatment groups has created 3 groups with similar characteristics for most of the variables we control for. However, we observe a few differences that we have to account for during the analysis. Farmers who adopted options for structural landscape features management (*AES linear*) are over-represented in the group who received information (T=1), and especially in the group who received positively framed information ($T_1=1$), while those who adopted organic options are under-represented in the group with information. Farming activities as well as farmers under phytosanitary constraints (*AES phytosanitary*) are also unevenly distributed between the two framing groups ($T_1=1$ and $T_2=1$). Finally, fewer farmers have altruistic motivations in the group that received negatively framed information.

[Table 3]

5. Results

To the question asking whether they would continue their newly adopted practices after their contract ends (see Table 1), farmers could choose one of the four responses: "absolutely", "probably yes", "probably no" or "not at all". Figure 1 shows the percentage of answers in the three informational treatments. We see that there is a shift of the percentage of answers from "not at all" toward "absolutely" when switching from the control group (no information), to group 2 (negatively framed information) and finally to group 1 (positively framed information). Indeed, as expected, answers are significantly different across the treatments (Pearson chi^2 (6) = 31.0256 with Pr = 0.000). In the following analysis, we pooled responses to work with a binary variable: y=1 if the answer is "absolutely" and "rather yes", y=0 if the answer is "not at all" and "rather no".

Figure 1: Percentage of the answers according to the three treatments.
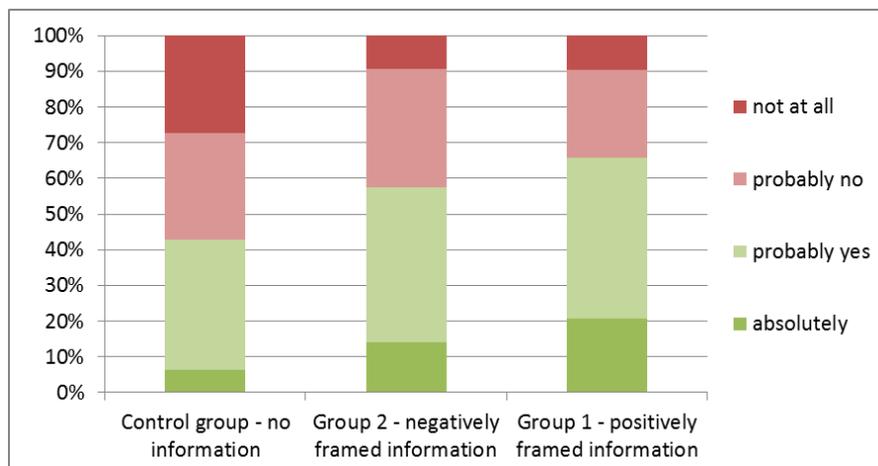
5.1. Permanence

On average, 55% of farmers (219 of the 395 who answered this question), and 43% in the control group, were willing to maintain the practices adopted during the AES after the end of the contract. One explanation to this is that in most cases, the new practices have revealed to be at least as profitable as the counter-factual practices. The AES might indeed have changed farmers' perceptions of alternative practices and created new habits and skills as suggested by Hiedanpää and Bromley (2014). Another explanation is that farmers who have signed AES contracts are those who would have adopted these practices in the absence of the scheme, revealing a low additionality of the scheme.

Table 4 presents the results of the logit models. Since the marginal effects of each variable cannot be directly observed from the coefficients of the logit models, the two last columns give the odds ratios with their standards errors. The odds ratio indicates the effect of an increase of one unit of the considered independent variable on the odds that farmers intend to continue the AES land management practices rather than abandon them. Logit 1 and logit 2 present the results on the

effects of the information on the social norm and on the framing of this information. Results will be discussed in the next subsection. To analyse how farmers' characteristics (*X*) impact their intention to continue the AES land management practices, let's consider now the Logit 3 model in Table 4.

[Table 4]

As expected, the likelihood of permanence of AE practices decreases if farmers have experienced technical difficulties during their implementation. The odds of continuing the new practices are divided by more than two in that case. Conversely, if the new AE practices have generated a better sale value for the production, the odds of continuing them are more than doubled (but this effect is significant at only 10%).

Farmers who experienced acknowledgment for their contribution to the protection of the environment or a better life quality are more likely to maintain the adopted practices even in the absence of payment, which indicates that they might have non-pecuniary selfish motivations to do so. Farmers who experienced acknowledgment may value external positive judgments and might fear social disapproval if they go back to their less environmentally-friendly practices. On the opposite, farmers who did not experience acknowledgment may feel fewer qualms to revert to their old practices.

No significant effect of altruistic motivation is detected, but this can be explained by the low variability of this variable, as almost all respondents answered that one on the satisfactions of their participation in the AES is to contribute to environmental quality (Table 2).

Farmers are more likely to continue AE practices if they implemented small rather than major changes to conform to the AES requirements or if they already conformed before joining the AES (Table 4, Logit 3). This result confirms the intuition that a long term upkeep of the practices is linked to a low additionality of the scheme.

Finally, and surprisingly, farmers who participate in an AES phytosanitary option (aiming at a lower use of pesticides) display a greater propensity to maintain the adopted practices while options of grassland management or reduction of fertilizers use decreases it. This is rather counter-intuitive since the reduced use of pesticide may result in greater yield variability. However, it can be explained by the fact that farmers have to invest in greater knowledge of pest and weed management techniques in order to comply with the AES requirements. Once such investment has been made, it might be less profitable to revert to previously-used techniques.

5.2. Effect of social norm and framing

The results also show that being provided with the information that a majority of farmers would not revert to their old (detrimental) practices is sufficient to trigger a higher proportion of positive responses concerning future commitment to the new within-contract practices. Indeed, *α* is positive and significant (Table 4, Logit 1 and 3) and the odds ratios show that the odds that farmers maintain the adopted practices is more than twice higher (2.1 in Logit 1 and 2.8 in Logit 3) when information about the social norm (*T=1*) is given than without information. Indeed, 61% of farmers who received information state that they would maintain the AES practices after the contract ends, compared with only 43% in the control group.

However, a test of equality of parameters in equation 2 reveals that there is no significant difference between β_1 and β_2, which means that the way information is framed, positively or negatively, has no effect here. This is contradictory with the literature where attribute framing effect is considered ''a reliable phenomenon'' (Levin, Gaeth, Schreiber, & Lauriola, 2002, p. 413). Note that in our survey the information about the social norm is quite strong since the rate of farmers stating that they would maintain their AE practices at the end of the contract was 80% in our pilot survey. This may lessen the impact of the negatively framed information (only 20% do not continue with the newly-adopted practices). A 50% rate might have captured a much stronger framing impact.

In an attempt to identify if some of the characteristics included in *X* might favour or disfavour the sensibility of farmers to social norms, for example if farmers with non-pecuniary selfish motivations are more sensitive to social norms than other farmers, interaction variables *T*X* have been included in other versions of regression 3. However, we could detect no significant effect of these interaction variables.

6. Conclusion

The first result of this paper is that the "end of the contract" issue in AES might not be as dramatic as could be anticipated. Indeed, 43% of the surveyed farmers intend to maintain the practices they have adopted under the AES requirements, even in the absence of financial incentives or knowledge of others' intentions. This result comforts those obtained by Roberts and Lubowski (2007) and in the study by ECA (2011). We also show that pecuniary and non-pecuniary selfish motivations, like social acknowledgement or a better life quality, can partly explain this intention. However, we also show that low levels of change are more likely to be permanent than major changes. Therefore, the change towards more environmentally-friendly practices in agriculture, even subsidized by AESs, can be expected to be slow. This means the decision to renew contracts should be partly based on the environmental additionality of schemes: schemes which produce bigger changes in farm practices are more likely to suffer a reversion to pre-contract management than those which produced smaller changes.

More interestingly, we find that farmers participating in the French MAEt scheme are conditional co-operators, so that information on what others intend to do, as an indicator of social norm, can be a powerful nudge to increase the permanence of pro-environment practices. As such, this paper adds to a series of results which are increasingly inspiring public economists for more ambitious policies targeted at farmers (DEFRA 2008). Indeed, much attention has been granted to the design of incentive policies such as taxes or subsidies to reduce polluting activities. The economic crisis, which makes green taxes more politically sensitive and reduces the margin of manoeuvers for public spending, has given momentum to a new kind of policies relying more on suasion and psychology than on monetary incentives. This paper contributes to the literature showing that farmers value conforming to social norms, which should be kept in mind when designing AESs. The recent trend towards collective AESs should then favour participation, as it guarantees farmers with the participation of others –although the interaction of changes in the strategic environment with social norms is not something that has been well-studied.

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Tables

Table 2: Descriptive statistics of the sample

Variables	Obs.	% of Obs. / Mean (*Std. Dev.*)
Pecuniary motivations		
Increased gross margin	360	41.7%
Higher value	343	20.1%
Technical difficulties	384	48.2%
Non-pecuniary selfish motivations		
Social acknowledgment	376	88.8%
Better life quality	348	49.4%
Non-pecuniary altruistic motivations		
Contribute to environment	384	96.1%
Additionality		
Already conform	357	67.8%
Low changes	395	46.1%
Medium changes	395	38.5%
Major changes	395	15.4%
Farm characteristics		
UAA (ha)	382	153.30 (*97.76*)
AES fertilizers	395	50.6%
AES phytosanitary	395	44.8%
AES land cover	395	30.9%
AES grassland	395	23.0%
AES linear	395	16.5%
AES organic	395	4.1%
AES other	395	12.2%
Vine or arboriculture	385	4.2%
Livestock farming	385	20.3%
Field crops	385	41.3%
Mixed farming and breeding	385	31.7%
Other agricultural production	385	2.6%

Table 3: Balancing tests

Group →	Control	T=1		T_1=1		T_2=1	
	N=128	N= 267		N=126		N=141	
	Mean	Mean	p-value[1]	Mean	p-value[2]	Mean	p-value[3]
Pecuniary motivations							
Increased gross margin	0.482	0.386*	0.085	0.412	0.909	0.364	0.120
Higher value	0.171	0.216	0.338	0.252	0.103	0.182	0.509
Technical difficulties	0.508	0.469	0.476	0.468	0.704	0.471	0.745
Non-pecuniary selfish motivations							
Acknowledgment	0.911	0.877	0.339	0.849*	0.098	0.903	0.501
Better life quality	0.487	0.498	0.846	0.536	0.287	0.463	0.395
Non-pecuniary altruistic motivations							
Contribute to environment	0.976	0.954	0.308	0.984	0.109	0.927**	0.011
Additionality							
Already conform	0.713	0.661	0.327	0.655	0.524	0.667	0.738
Medium changes	0.359	0.397	0.472	0.397	0.737	0.397	0.707
Major changes	0.156	0.154	0.945	0.159	0.871	0.149	0.822
Farm characteristics							
UAA (ha)	157.623	151.169	0.545	160.308	0.344	143.105	0.130
AES fertilizers	0.531	0.494	0.493	0.500	0.863	0.489	0.615
AES phytosanitary	0.430	0.457	0.610	0.381*	0.066	0.525**	0.022
AES land cover	0.305	0.311	0.901	0.333	0.471	0.291	0.562
AES grassland	0.219	0.236	0.704	0.214	0.603	0.255	0.380
AES linear	0.086	0.202***	0.004	0.278***	<0.001	0.135	0.234
AES organic	0.078	0.022***	0.009	0.024	0.249	0.021	0.149
AES other	0.133	0.116	0.634	0.143	0.374	0.092	0.184
Vine or arboriculture	0.032	0.046	0.501	0.049	0.610	0.044	0.870
Livestock farming	0.230	0.189	0.348	0.238	0.243	0.146**	0.040
Field crops	0.444	0.398	0.382	0.320**	0.011	0.467	0.109
Mixed farming and breeding	0.262	0.344	0.106	0.377*	0.084	0.314	0.925
Other agricultural production	0.032	0.023	0.619	0.016	0.421	0.029	0.768

Note

1: reports the p-value of the test that the mean values for both groups T=1 and control are equal

2: reports the p-value of the test that the mean values for both groups T_1=1 and T_1=0 are equal

3: reports the p-value of the test that the mean values for both groups T_2=1 and T_2=0 are equal

*p<0.01; **p<0.05; ***p<0.01

Logit 1

Y	Coef.	S.E.	Odds ratio	S.E.
T	0.748***	0.218	2.113***	0.461
_cons	-0.283	0.179	0.753	0.135
N	395			
Log likelihood	-265.49			
Pseudo R2	0.0219			

Logit 2

Y	Coef.	S.E.	Odds ratio	S.E.
T_1 (ref: T_0)	0.941***	0.259	2.562***	0.664
T_2 (ref: T_0)	0.583**	0.247	1.792**	0.018
_cons	-0.283	0.179	0.753	0.135
N	395			
Log likelihood	-264.49			
Pseudo R2	0.0256			

Logit 3

Y	Coef.	S.E.	Odds ratio	S.E.
T	1.030***	0.321	2.801***	0.900
Pecuniary motivations				
Increased gross margin	0.434	0.329	1.543	0.507
Higher value	0.778*	0.440	2.177*	0.957
Technical difficulties	-0.757**	0.323	0.469**	0.151
Non-pecuniary selfish motivations				
Acknowledgment	0.931*	0.480	2.537*	1.218
Better life quality	0.705**	0.335	2.023**	0.679
Non-pecuniary altruistic motivations				
Contribute to environment	0.506	0.902	1.659	1.496
Additionality				
Already conform	0.722**	0.329	2.059**	0.677
Medium changes (ref: low changes)	-0.460	0.341	0.631	0.215
Major changes (ref: low changes)	-1.030**	0.503	0.357**	0.180
Farm characteristics				
UAA (ha)	-0.002	0.002	0.998	0.002
AES land cover	0.482	0.356	1.620	0.576
AES phytosanitary	1.027***	0.364	2.792***	1.016
AES fertilizers	-0.654**	0.304	0.520**	0.158
AES organic	0.499	0.850	1.648	1.401
AES linear	0.808*	0.441	2.244*	0.990
AES grassland	-0.866**	0.354	0.421**	0.149
Vine or arboriculture (ref: other agric. prod.)	0.082	1.513	1.085	1.642
Livestock farming (ref: other agric. prod.)	-0.296	1.373	0.743	1.021
Field crops (ref: other agric. prod.)	-0.462	1.333	0.630	0.840
Mixed farming and breeding (ref: other agric. prod.)	-0.453	1.341	0.636	0.853
_cons	-1.711	1.668	0.181	0.301
N	287 (due to missing observations for X)			
Log likelihood	-145.09			
Pseudo R2	0.2673			

*p<0.1; **p<0.05; ***p<0.01
S.E.: Standard Error