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Non-industrial private forest owner, Natura 2000 program, Motivation

JEL codes:

D64, H41, Q23, Q28, Z13

Why are Private Forest Owners not Adopting Natura 2000 ?

A Survey of Motivations

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Abstract

A survey of private forest owners on adoption of the Natura 2000 charter has been designed to allow respondents to state motives for non-adoption. These motives fall into five main categories: Economic, Compatibility with own practices, Control over one's property, Information and "no motive". Using a mixed logit model, we can show that owners of properties at least in part in N2000, significantly evoke the Control motive more often than the other owners; that is not the case of the other motives. Owners who are convinced their properties have a remarkable feature are significantly less likely to evoke the Control motive. We argue that these findings might be appropriated by environmental managers to induce adoption of the N2000 Charter.

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JEL Codes. D64 Altruism • Philanthropy, H41 Public Goods, Q23 Forestry, Q28 Government Forestry Policy, Z13 Economic Sociology

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1 Introduction

Natura 2000 is an EU-wide policy that applies to designated areas. It is arguably the centre-piece of the EU's nature conservation policy (Winkel et. al., 2015 [21]). Implementation differs somewhat in member states. In France, for forest properties that belong to such designated areas, management must be submitted to an impact assessment or the owner may choose to adopt a Natura 2000 charter, that is, commit to management practices that are compatible with the N2000 program. The purpose of this paper is to understand private forest owner's (PFO) motives for not adopting this charter. In a survey on adoption of forest practices on a sample of 627 non-industrial PFOs in the French regional Regional Natural Park (RNP) "Ballons des Vosges" <http://www.parc-ballons-vosges.fr/en/>, only 3 respondents stated that they adopted the charter.¹

Such a low adoption rate for such a flagship program is not unknown: Delacote et.al. (2014, [8]) and Winkel et. al. (2015, [21]) indicate that indeed PFO rarely sign an N2000 charter, at least in France. However, they own large parts of the N2000 designated areas. The European Commission (2015, [2]) indicates that almost 50% of the Natura 2000 network is composed of forests, of which 60% is in private hands, and indicates that "forest owners ... have a key role in the implementation of Natura 2000".

It is well known (e.g. Winkel et. al., 2015 [21]) that the implementation of N2000 has been characterized by conflicts and delays, not only from PFOs, but also from industries and municipalities. For PFOs, Europe-wide, Winkel et. al. (2015, [21]) indicate "Conflicts related to changing property/use rights". In our survey, the non-adopters evoke a variety of motives that will be presented in the sequel, some of which relate to conflicts, but some do not. Non-adopters are also spatially characterised to examine spatial patterns and correlate them with the evoked motives. Of particular interest is that the 29% of the respondents who actually have a forest property in or overlapping an N2000 area answer differently from the others.

Because N2000 is a policy based on voluntary adoption and actions, it is possible to examine PFOs' behaviors in the framework of a large literature in psychology and economics. Such behaviors are often termed prosocial in the sense that their social benefits exceed those of the supplier of the protection, or have a positive externality on society. Adoption of prosocial behaviors has been shown to sometimes depend more on social motives than on economic ones. For example, Freeman (1996, [9]) shows that having been asked by a person is a more powerful motive than the economic one. Oliver (2013, [14]) reviewed a number of applications of nudges

¹In the RNP, PFOs may further commit to a Natura 2000 contract in which they enroll in a biodiversity conservation program which provides financial support for the additional costs of conservation and restoration measures (provided there is any). PFOs may then also benefit from certain tax exemptions.

that illustrate the importance, for designing public policy, of understanding the motives of adoption of such programs. Bénabou and Tirole (2006, [1]) argue that economic motives may crowd-out social motives, so that introducing economic rewards or penalties may decrease prosocial behavior.

More generally, self-determination theory, developed by psychologists Ryan and Deci (e.g. [17]) argues that individuals have extrinsic and intrinsic motivations. Extrinsic ones lead to what is termed “controlled” actions, that is, actions motivated by a pressure that is perceived as external to the individual, and can be more or less accepted (“integrated”) by that individual. Such pressures are akin to penalties or rewards and encompass economic or financial incentives (penalties or rewards) to include threats, peer pressures and feelings of moral obligation. Intrinsic motivations, on the other hand, lead to actions that are called “autonomous”, in the sense that the individual carries them out for themselves, without any perceived external pressure. The satisfaction (or utility) of an action is deemed higher when it is motivated intrinsically than extrinsically.

Thus, for a PFO, adopting the N2000 may be motivated extrinsically (e.g. because of the financial incentives or because she thinks that it would be illegal not to adopt or because she is asked to adopt by a friend) or intrinsically because she identifies with the particular objectives of the N2000 program applicable in her property. The diversity of motives in silvicultural and harvesting behaviors is well documented for non-industrial PFOs, e.g. Karpinnen (1998, [11]) or Kendra (2005, [12]).

The role of intrinsic motivations in the sustainable provision of environmental services has been acknowledged by numerous authors including Ostrom 1998 [15], and Dedeurwaerdere et. al. (2017, [7]). De Young (2000, [4]) argues that intrinsic motivations can be leveraged (e.g. by park managers) to promote environmentally responsible behavior and consequently, long-term effectiveness of environmental policies. DeCaro and Stokes (2013, [5]) argue that public participation to environmental institutions can be improved by increasing acceptance of such institutions through intrinsically motivated behaviors. For Dedeurwaerdere et al. (2016, [7]), two contextual conditions are essential for enhancing the expression of intrinsic motivation: a sense of autonomy and a feeling of competence (Ryan and Deci, 2000 [17]). Such conditions should be perceived, by environmental managers, as levers to induce intrinsic motivation in PFOs to achieve the applicable N2000 objectives.

The present paper is a contribution to the understanding of PFOs’ motivations for not-adopting the N2000 charter, with a view to help select efficient policy tools of pushing such objectives, based on observed PFOs’ behaviors. In the present RNP context, it will be seen that the main intrinsic motivation of PFOs who have part of their properties in an N2000 area, is to “retain Control of own practices”, which pushes towards non-adoption.

This is coherent with a context in which the N2000 network has been adopted with little or no concertation with PFOs (Winkel et. al., 2015 [21]), since governance research has shown that involving locals in policies helps legitimizing them and increase support and efficacy (Dedeurwaerdere et. al., 2016 [7]). As has been shown in Polome (2016, [16]) and Le Jeannic (2013, [13]), “Attachment” is another important intrinsic motivation for adopting biodiversity-related actions for PFOs. Actually, in the present sample, Attachment is evoked for action while Control is evoked for inaction: both reflect a strong link to the owned forest. This potentially opens the way for different kinds of incentives than material ones. For example, one could think of forms of institutional or peer recognition of special characteristics of the PFO’s property that are the source of the attachment. At heart, this is precisely what N2000 is about : designating areas of special biodiversity interest.

From an epistemic point of view, it may be necessary to justify the use of a cross-sectional survey to investigate motivations. Individual time-series data on incentive changes are certainly better suited but are difficult to create or find as they require a purposefully designed panel. Experimental data are sometimes considered an alternative, but the forestry context is difficult to recreate in the lab as it involves long-term decision (several decades from a newly planted tree to a fully grown one). PFOs also tend to be rather older than the average experimental subject and their decisions appear to be governed more by intrinsic issues (attachment) and the constitution of a heritage than by direct economic benefit, at least in France (Le Jeannic, 2013 [13]). On the other hand, it is possible to interpret a cross-section in a long-term sense. Individual characteristics in the sample allow for a (statistical) control; that is, each respondent is seen as a unit that has undergone a number of “treatments”. These are his/her individual characteristics and those of his/her property. Econometric estimation attempts to sort out the effects of those treatments so that each individual can be examined “other things equal”, that is, as if they were identical units.

The rest of the paper is organized as follows. Section 2 presents the cross-section sample of forest owners in the RNP and describes the motives for not adopting the N2000 charter. Section 3 details the econometric model used to analyze the answers to the survey. Section 4 presents the econometric results. Section 5 concludes and offers some recommendations.

2 Survey and Data Descriptions

2.1 The Regional Natural Park “Ballons des Vosges”

A semi-mountainous area covering 2 700 km² for 240 000 inhabitants, the RNP is organized around a territory project, “the Charter”, which aims at ensuring the sustainable protection and development of its territory. About 61% of the Park is covered in forest, including 280 peatlands over 13 km² (½%). It includes 4 National Nature Reserves and 5 Regional Nature Reserves. 22% of the territory is within the N2000 Network (33 sites of which 20 are managed by the RNP). 7% of it is built-up territory, including 30 cities of more than 2 000 inhabitants. There are 3 497 farms over nearly 580 km² (21%).

Figure 1 shows the spatial distribution of the three types of forest owners in the RNP. Forest ownership is private, for roughly one half the forested area, or public (communal or greater communities). Figure 1 shows the plots of the interviewed PFOs, who jointly own about 6.3 km² of forest in N2000 areas, roughly 1.1% of the total N2000 area of the RNP.

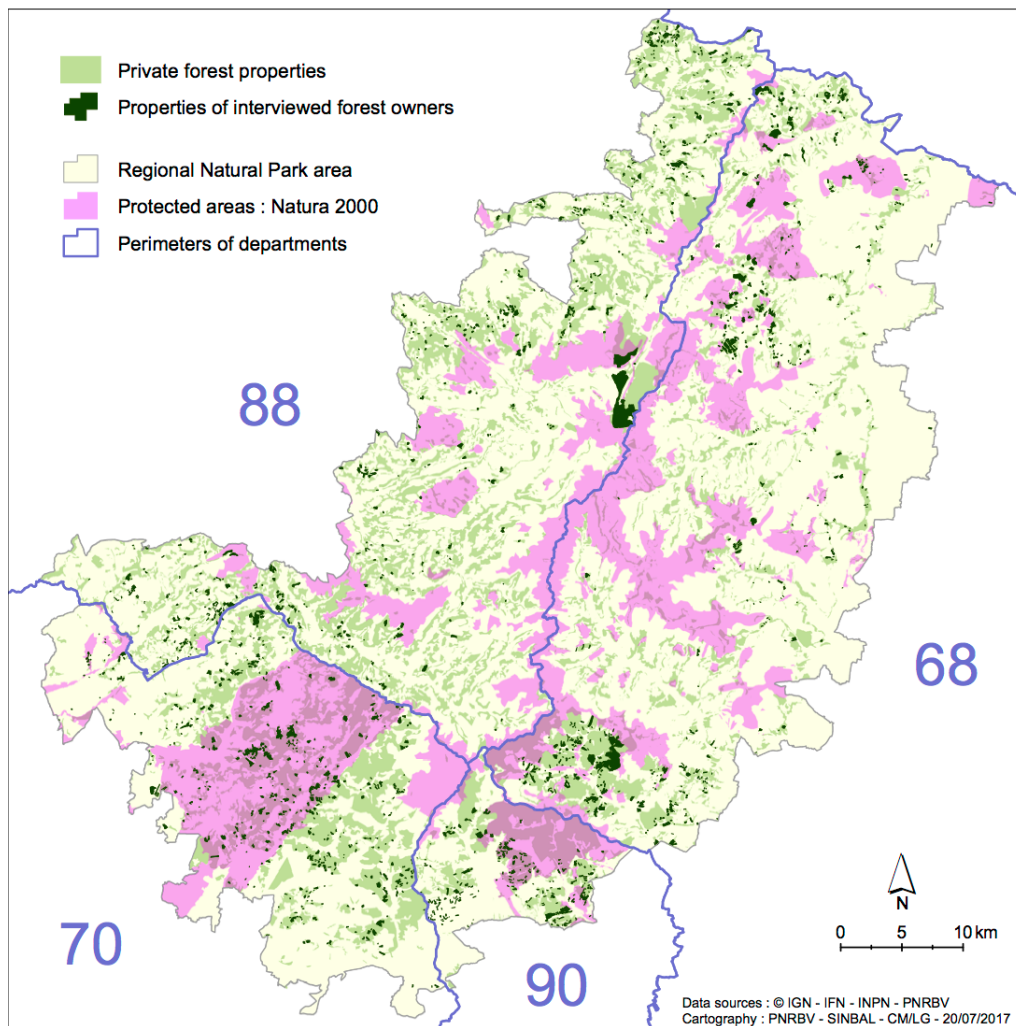
2.2 Sample

The survey was administered during the first quarter of 2015 on the nearly 50 000 non-industrial PFOs of the RNP using the quotas method, by telephone following a prior letter. The survey elicited motives for a number of voluntary, public and private, programs of forest management, including N2000, see Polome 2016 [16]. The letter summarized the programs of interest; those are not detailed here, but they concern primarily various forms of forest management tools, such as e.g. good practices, certifications, cooperatives or other associations; see e.g. Weiss 2003 [20] for a survey.

The survey data were subsequently spatially linked to properties in the RNP. Some information was lost for some records, so that the link could only be established for 541 records out of the original 627 (86%); the loss was random, so that no selection bias was generated. Further, an additional 9 records were discarded. Three because they adopted the N2000 charter and the remaining 6 for various incoherences in the answers. The final sample size is 532 owners.

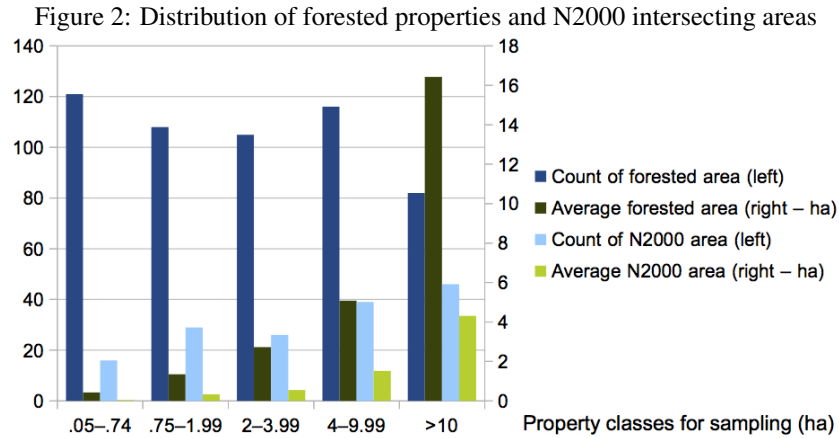
Considering surfaces distributions from the classes that have served to design the sample, Figure 2 shows that the sampling was relatively evenly distributed, among five size classes, with a smaller class of larger-than-10-ha

Figure 1: Spatial distribution of private forest properties in RNP “Ballons des Vosges”



properties because of their relative scarcity in the RNP. Such a sampling is a compromise between representativity in terms of owners (many more owners in the smaller classes) and in terms of forested areas (much larger part of the RNP in the larger classes). Figure 2 also shows that the larger the property, the more likely it intersects an N2000 designated area. The distribution of forested property sizes is very uneven in the RNP, since the average property size for a small owner represents 2.5% of the average property size for the largest class of properties in the sample; for the part of the property that intersects an N2000 area, that figure drops to 1%.

Table 1 below shows that beliefs about one’s property legal status regarding protection are quite detached from reality. In the RNP, environmental protection is mostly N2000; 32% of the owners have at least a part of their



property under protection (29% for N2000 only). Of those, most (24% out of 32%) believe that their property is not protected. Over the whole sample, 94% do not think their property has some form of protection; of the 6% who believe it has, half (3%) is wrong. Owners are thus quite unaware of the legal situation of their properties regarding protection. Owners of larger properties appear to be only slightly closer to the truth than owners of smaller properties.

Table 1: Beliefs vs reality: property environmental protection

Beliefs	Property at least in part in protected area	
	No	Yes
Unprotected	58%	24%
At least partly protected	3%	3%
DK/DA	8%	4%
Total	68%	32%

In spite of believing that their property is unprotected, many owners consider that their property has some remarkable feature: natural or built environment, or some form of more personal attachment. From one quarter of the small owners, that proportion rises to 60% for the largest owners.

2.3 Description of Behaviors

All the respondents were queried on their motives for not adopting the N2000 charter, even though about two third of them could not have adopted it since their property did not intersect an N2000 area.² They were presented with a list of motives previously established with the RNP's stakeholders (including representatives

²This feature of the data helps distinguish between general attitudes towards N2000 and actual owners' behaviors.

of private owners); they could also state that they did not know or refuse to answer, although these two options were not made explicit. The complete list of motives is listed in Table 2.

Table 2: Motives Evoked for Not Adopting N2000

Motives	Grouping
No social recognition	Minor
No previous consultation of forest owners	
Other owners do not show commitment	
Commitment is too long, too uncertain in its outcome	
Not legally entitled	
The charter (or contract) is incompatible with own action for the environment, or with own management of forest	Compatibility
Lack of information	Information
Retaining mastery of practices	Control
Lack of financial incentives	Economic
Too time-consuming	
Too complicated	
Don't know / don't answer	Don't know

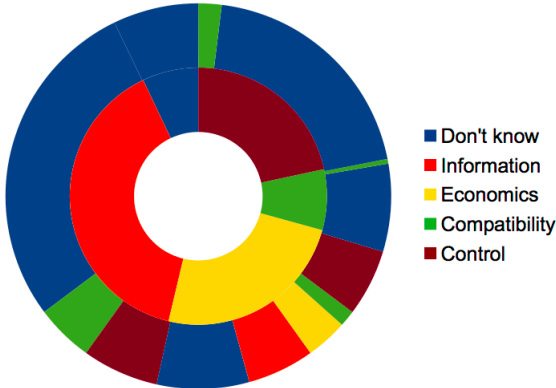
The motives grouped under “minor” elicited very few responses (0-4). Such “minor” motives are excluded from further analysis, to focus on motives with a sufficiently large sample. Among these minor motives, the “Not legally entitled” reveals that PFO are poorly informed regarding the N2000 status of their property and/or how the charter itself works.

After grouping, there are then five main motives: Economic, Compatibility, Control, Information and “Don't know”. Respondents could quote any number of motives. All but 37 out of the 532 respondents in the present sample cited at least one motive, 169 indicated two motives, 37 three and 3 four. Only the two main motives have been retained for statistical analysis. Respondents are aware of all the possible motives before answering, so that it seems reasonable to assume that there is no chronological sequence in the answers (that is, they are not like a panel), but that the respondent states each motive being aware of the other stated motive (if any). We call the first recorded motive “primary” and the other “secondary” to de-emphasize the temporal interpretation present in “first” and “second”, and to emphasize the mutual link between the two, but there is no interpretation that respondents answer by importance of the motive for them. The survey questionnaire did not enable to record such importance. Because most respondents have only one motive, the secondary motive is dominated by no answer.

The pairs of motives are depicted in Figure 3; minor motives have been removed. The inner ring reflects, by color, the primary motive. The outer ring uses the same color codes and indicates, for each one of the primary motives, what were the secondary motives. For example, of all the respondents who cited information

(orange) as a primary motive, most do not have a secondary motive, and the remaining ones are divided between compatibility (green) and control (dark red) secondary motives. Necessarily, all the respondents who had no motive (blue) for their primary motive, also have no motive for their secondary. When the primary motive is Economic (yellow), there is often a secondary motive and it is varied. For all other primary motives, for most respondents, there is no secondary motive. This reflects a more complicated story with the Economic motive than with the other motives, as if an Economic motive needed some additional reason. Economic as a secondary motive is only mentioned when it was mentioned as a primary motive.

Figure 3: Primary Motives (inner ring) and Secondary Motives by Primary Motive



In the theory of self-determination, Deci and Ryan (1985, [6]) suggests that individuals have either or both intrinsic and extrinsic motives for their actions. Intrinsic motives are their own rewards, while extrinsic motives correspond to perceived pressures that may come from people (peers or rivals), or the context (laws and rules, incentives). Such pressure is the reward: economic incentives (benefits, payments, fees, taxes, penalties...), social appraisal or shame, ... In the present context, the Economic and Compatibility motives are extrinsic (for a total of about one third of all the primary motives), while Control is intrinsic (a little over 20%). Compared to Freeman's (1996, [9]) context, Social motives appear close to inexistent, thus mooting the potential crowding-out of economic on social incentives as suggested by Benabou and Tirole (2006, [1]). This has been verified for other programs than N2000, see Polomé (2016, [16]) : social motives are relatively unimportant in the present sample (numerically, when compared to the economic and intrinsic motives).

The Information motive is not so easily categorized. It may appear outside of the Ryan and Deci framework as it reflects ignorance: the person simply did not know what she could do. Inasmuch as Information appears its own reward, it would fall under Intrinsic. One might argue that evoking the Information motive might be used to mask other motives that are deemed less socially acceptable, although in the anonymous context of the

survey and given that N2000 does not enjoy a high social recognition in the RNP area, it is difficult to imagine what such “less socially acceptable” motives could be. Certainly, Ignorance is also behind the DK/DA answers, for a total of 46% of the primary motives. But willful ignorance might also be considered a behavior that is its own reward as it avoids having to make further choices – a justification of a (well-documented) preference for status-quo. The present survey cannot distinguish between a (more-or-less) willful lack of information and an unintentional one.

3 Econometric Model

The purpose of the present section is assess, in a statistical sense, the influence of factors that make it more or less likely that a particular motive j is cited by a respondent i for not-adopting N2000. Since it has been argued that motives are not sequential, the statistical model should treat the primary and secondary motives jointly, as a two-dimensional simultaneous decision. When a respondent does not have a secondary motive, it is assumed that it is equivalent to a “don’t know” answer, a category that is also observed for the primary motive. Since there are several motives, the model is about the multinomial probability of evoking one of the above five motives, conditionally on owners’ and properties’ characteristics as observed in the survey. Such conditional analysis helps disentangle the effects of various factors (called regressors in the present context) on the probability of evoking a particular motive.

3.1 Mixed Logit

As is classical, consider that to each motive can be associated a (unobserved) score for each individual. Assume this score takes a linear form

$$S_{ij} = y_{ij}\beta_i + x_{ij}\delta_i + \varepsilon_{ij}$$

where y and x denote regressors that may (or not) take different values according to motive j and individual i ; individual characteristics, for example, are individual-specific but not motive-specific. A motive-specific regressor will be constructed later on. The y regressors are said endogenous, that is, correlated with the ε term; the x regressors are exogenous. The coefficients β and δ have an index i to reflect that they may take different values for different individuals, a property that is modeled as random coefficients following Train (2003, [18]).

The ϵ_{ij} is an error term that models the unobserved heterogeneity amongst individuals, such as e.g. an individual predisposition for a certain motive.

Abstracting for the moment from the fact that the parameters β and δ of the S score are random, the classical multinomial model derives from the idea that individual i states motive j over any other motive k with probability

$$\begin{aligned} P_{ij} &= \Pr \{ S_{ij} > S_{ik} \} \\ &= \Pr \{ y_{ij}\beta_i + x_{ij}\delta_i + \epsilon_{ij} > y_{ik}\beta_i + x_{ik}\delta_i + \epsilon_{ik} \} \\ &= \Pr \{ \epsilon_{ik} - \epsilon_{ij} < (y_{ij} - y_{ik})\beta_i + (x_{ij} - x_{ik})\delta_i \} \end{aligned}$$

A specific choice of distribution of the $\epsilon_{ik} - \epsilon_{ij}$ term leads to the classical multinomial logit probability (evaluated at the coefficients β_i and δ_i)

$$P_{ij} | (\beta_i, \delta_i) = \frac{\exp(y_{ij}\beta_i + x_{ij}\delta_i)}{\sum_k \exp(y_{ik}\beta_i + x_{ik}\delta_i)}$$

This probability depends on the random coefficients β_i and δ_i ; to evaluate it unconditionally, these coefficients must be integrated out, that is the mixed logit probability of answering motive j among k motives (Train, 2009 [19] equation 6.1), leading to the following expression:

$$P_{ij} = \int_{\beta, \delta} \frac{\exp(y_{ij}\beta_i + x_{ij}\delta_i)}{\sum_k \exp(y_{ik}\beta_i + x_{ik}\delta_i)}$$

An important complication arises when one or more regressors are endogenous, i.e. when there are y regressors. In this case, if the issue is not properly addressed, the coefficient estimates of all regressors (endogenous and exogenous alike) may be inconsistent. To address this issue, we follow the control function approach as summarized by Train (2009, [19]), chapter 13, for the case of the multinomial model of interest here. The control function approach has been selected for its relative simplicity of application and intuitive appeal. Assume that the y regressors can be expressed as a function W

$$y_{ij} = W(z_{ij}, \gamma) + \mu_{ij}$$

where z may include elements of x and other regressors that are specific to the y_{ij} equation. There is one such equation for each motive; nothing compels the set of regressors z to be the same across motives. The random

terms μ_{ij} and ε_{ij} are both independent of z_{ij} , but are correlated with each other.³ Such correlation implies that y_{ij} is correlated with ε_{ij} , that is the source of the endogeneity of the y regressors.

Decompose ε_{ij} into its expectation E conditional on μ_{ij} and deviations $\tilde{\varepsilon}_{ij}$ around this mean: $\varepsilon_{ij} = E(\varepsilon_{ij}|\mu_{ij}) + \tilde{\varepsilon}_{ij}$. By construction, the deviations $\tilde{\varepsilon}_{ij}$ are not correlated with μ_{ij} and therefore not correlated with y_{ij} . The conditional expectation $E(\varepsilon_{ij}|\mu_{ij})$ is called the control function $CF(\mu_{ij}, \lambda)$, where λ are the parameters of this function. Once a consistent estimate of these parameters is available, the ε_{ij} term in the score S is replaced by $CF(\mu_{ij}, \hat{\lambda}) + \tilde{\varepsilon}_{ij}$, and the derivation of the multinomial logit model proceeds as before, with the difference that the y_{ij} regressors are now uncorrelated to the error $\tilde{\varepsilon}_{ij}$, effectively removing the endogeneity.

In effect, the control function approach amounts to adding an extra regressor, the estimated control function, to the multinomial model. The argument works because the score S is linear, but the control function itself does not need to be linear. A central issue with this approach is the specification of the control function and the conditional distribution of $\tilde{\varepsilon}_{ij}$. Train (2009, [19]) presents a mixed logit specification that suits the present case well. Estimation uses the MLOGIT package (Croissant, 2012 [3]) and the MAXLIK package (Henningsen and Toomet, 2011 [10]) for the R programming language.

3.2 Regressors

The present survey has been devised to elicit the set of regressors y and x that are potentially relevant to explain owners' motivations. These regressors are presented below as a typology to underline their different natures. Since the focus of the model is to supply levers to environmental managers to encourage uptake of the Natura 2000 charter, some regressors are of limited interest.

- **Socio-economic characteristics** of the owner or of her property are exogenous, but not all are of interest to the issues at hand. Of particular interest is whether respondents whose property is at least in part in an N2000 area answer differently from the other respondents. An interest lies also in the effect of size of the forested property, although those two characteristics are correlated. Classical socio-demographics such as age, gender, education or administrative residence are of limited interest as they could potentially obfuscate the impact of regressors with a more direct relevance to management of the RNP. In Table 3 below, the cell "Mostly inherited" indicated whether the main mode of acquisition of the properties was an inheritance; this seemed of interest as a potential proxy for an attachment to the property.

³Between motives they are independent so that μ_{ij} and ε_{ik} are independent for $j \neq k$.

- **Individual behaviors** are of interest to Park management since it can potentially influence them :
 - participation to forest management tools, we consider two broad cases:
 - * participation to “Pro Silva” management,⁴
 - * participation to any other management tools (e.g. certifications, cooperatives, good practices plans...),
 - whether the owner considers that his/her property has some sort of remarkable feature,
 - whether the owner intends to leave the property to his/her heirs,
 - knowledge of ones neighbor and/or neighboring woods,
 - frequency of visits to the property,
 - whether the harvested wood is sold.

It is interesting to discuss correlation between behaviors as the impacts of highly correlated behaviors, on the probability to state a motive, may be difficult to disentangle. Firewood collection and hunting are both correlated to the knowledge of one’s neighbors and to the frequency of visit to the property. Certainly, the former two are particular cases of the later two, e.g. firewood collection makes one visit one’s properties more often. Consequently, only the later two are kept in the model.

These behaviors are not as clearly exogenous as socio-economic characteristics. One could think of modeling each one of these behaviors and certainly similar motives as for N2000 could be considered as regressors. For example, adhering to a cooperative could be motivated by economic concerns. Therefore, such behaviors might be correlated to the error term ϵ_{ij} of the score function S . While this cannot be easily ruled out, introducing any one such behavior as a regressor into the model does not appear to alter much the estimated coefficients of the other regressors. Therefore, they will be treated as if they were exogenous.

- **The other motive** evoked for not-adopting N2000 (if any) is likely endogenous, i.e. any stated motive is related to the choice to state another motive. Evoking a particular motive for any decision certainly has a strong individual component that is not fully observed, i.e. the predisposition ϵ . The endogeneity of the secondary (resp. primary) motive as a regressor for the primary (resp. secondary) motive is strongly apparent when introducing it into a model containing only the exogenous regressors: The estimated

⁴ Association of forest owners promoting a continuous and irregular form of management, closer to a natural cover. It is quite popular in the RNP.

coefficients (and their significance) change considerably.

Consequently, the control function approach will be applied. By construction, such a regressor is motive-specific since it indicates, for each motive, whether that motive has been selected for the other motive.

Following the score function S notation, there is then one motive-specific and individual-specific endogenous regressor y_{ij} which is the other stated motive (e.g. the secondary motive when analyzing the primary motive). There are several socio-economic and behavioral exogenous regressors that are individual-specific but not motive-specific, that are written as x_i . For these regressors, to estimate the mixed logit model, it is necessary that their coefficients be motive-specific, otherwise they would simply drop out of the multinomial probability P_{ij} . On the other hand, these coefficients need not be individual-specific, that is δ_j instead of δ_i in the multinomial probability P_{ij} .

When applying the above model to the present sample, it is assumed that, because both motives are actually simultaneous (not sequential), the regressors have the same coefficients. That is, each individual i is considered as observed two times, once for the primary motive, once for the secondary. These observations are treated as independent once they are conditioned on the other motive, so that the “pairwise” aspect of the stated motives is fully captured by the other motive.

4 Results

Since some regressors have missing data due to non-responses, the corresponding observations must be dropped for the sample used for estimation, for a total of 497 individuals, each associated with two observations (primary and secondary motives). This sample is summarized in Table 3.

Table 3: Sample Descriptive Statistics

Regressors	Mean	Regressors	Mean
Forest area	5.2 ha	Remarkable ? (yes/no)	35 %
Some part in N2000 ? (yes/no)	28 %	Heir ? (yes/no)	78 %
Mostly inherited ? (yes/no)	75 %	Know the neighborhood ? (yes/no)	73 %
Pro-Silva ? (yes/no)	13 %	Visits often or regularly ? (yes/no)	32 %
Other management tools ? (yes/no)	10 %	No wood is sold ? (yes/no)	76 %

Event though the model is quantitative, and it is possible to predict what would be the marginal change in the probability P_{ij} corresponding to a change in any regressor, in practice, this change depends on the actual value

of the individual-specific regressors, so that communicating the results is cumbersome. Instead, a qualitative presentation is adopted in Table 4, in which regressors that do not have a significant effect are associated with a “0” symbol, those who have a significant positive effect by a “+” sign together with a ° sign if the significance is weak (p-value between 5 and 10%), a * for the usual 1-5% p-value, ** at better significance; similarly, a “-” sign is associated with a negative impact on P_{ij} . The “Don’t know / don’t answer” motive is the default category; the 0, + or - signs indicate whether the corresponding regressor induces a significant departure for the motive in the corresponding column with respect to the default category.

As indicated earlier, introducing the other motive in a model that includes only exogenous regressors, changes strongly the estimated coefficients and their significance. As this is indicative of endogeneity, the control function approach is used. Because both the previous motive and the control function are motive-specific, their associated coefficients are individual-specific, the effects given in Table 4 below refer to the expected values of these coefficients.

Table 4: Mixed Logit Estimation Results

Regressors		Info.	Econ.	Compat.	Control
Property	Part in N2000	0	0	0	+ *
	Surface	0	0	0	0
	Inherited	0	0	0	0
Behaviors	Pro-Silva	0	- **	0	- **
	Other management tools	0	- *	+ *	- *
	Remarkable	0	0	0	- *
	Heir	0	0	0	+ *
	Neighborhood	0	0	0	0
	Visits	0	0	+ °	+ °
	No wood sold	- °	- °	- **	0
The other motive		- **			
Control function		+ **			
Interviewer’s effect is not significant.					

Reading the results by columns, it appears that the “Information” motive differentiates itself very little from the default “Don’t know / don’t answer” motive while the “Control” motive differentiates the most.

The behavioral regressors are easier to interpret. When owners are involved in management tools (Pro-Silva or others), they become less likely to evoke the Control motive, possibly because they have either experienced that involvement does not induce a loss of control or they are more prone to accept it. Interestingly, they are then also less likely to evoke an Economic motive; therefore, for those owners more involved in the actual management of their property, N2000 is not associated with insufficient retribution. As could be expected, owners more involved in other management tools are more likely to evoke a Compatibility issue.

Owners who are convinced their properties have a remarkable feature are less likely to evoke a Control motive; this can also be expected since N2000 is a protection feature, thus desirable when the property is remarkable. When owners intend to leave the property as heritage, they become more likely to evoke the Control motive; that is compatible with qualitative findings that parents do not want to engage or otherwise limit the freedom of actions of their heirs. Perhaps intriguingly, knowledge of the neighborhood (the people, the forest or both) has no impact on the motives, possibly reflecting a variety of opinion in the population, but it may also be a specificity of the present sample for whom it has been shown (Polomé 2016, [16]) that social motives were relatively uncommon.

Frequent visits to the property are associated with higher likelihood to evoke the Compatibility or Control motives; since frequent visits are likely associated with specific activities (hunting, firewood collection or other), this may denote a fear that these activities might be limited by N2000. When no wood from the property is sold, the Compatibility and Economic motives are less likely to be evoked, which makes sense since the stakes are smaller (other things equal) than if wood was sold.

The characteristics of the property are perhaps more surprising. First is the insignificant role played by the size of the property, but it is important to remember that this is a “pure” size effect since whether this property has a part that is N2000 is captured by the “property intersects an N2000 area” regressor. When owners actually have a part of their property in an N2000 area, Control is evoked more often. The interpretation of that effect is more difficult when one realizes that PFOs do not, in fact, know whether their properties intersect an N2000 area, as seen in Table 1. Of course it could be “professed ignorance”, to avoid a subject that did not emerge without opposition in France (Winkel, 2015 [21]), but, that is clearly an important result for the RNP management. Whether the property was inherited or not does not change the likelihood to evoke any motive, possibly because the attachment to the property is already captured by the “remarkable” regressor.

Finally, the “other motive” regressor has a negative impact on the stated motive, essentially meaning that it is unlikely that respondents repeat the same motive. The motives, used in the regression, are broad categories made of several more detailed motives; it would be easy to state two different motives that would end up in the same category.

5 Conclusions and Recommendations

In the RNP “Ballons des Vosges”, virtually no private forest owners have adopted the N2000 charter. It is therefore not possible to find out what makes owners adopt N2000, since there is no example of adoption. Owners have been surveyed on their motives not to adopt the N2000 Charter. Five main motives have emerged: Information, Economic (financial incentives, time-saving...), Compatibility (with own practices), retaining Control over one’s property and “no motive”. Contrarily to a body of literature in economics, social motives are virtually absent from those evoked. Consequently, there is also no possible crowding-out between the economic and the social motives, as detailed in e.g. Bénabou and Tirole (2006, [1]).

A Mixed Logit regression has been used to estimate the effects of the characteristics of the property and the owner’s behavior on the probability of evoking any of the five main motives. The main motive that emerges is Information, indicating that a large proportion of owners think they do not have sufficient information. This view is comforted by the disparity between owners’ beliefs and reality regarding the inclusion of their properties in an N2000 area (or other figure of protection). It is however not possible to assess whether this claim is really a demand for more information or a way to avoid having to state one’s distaste or disagreement with the N2000 policy. The results of the Mixed Logit regression shows that the Information motive is not associated with any particular behavior (weakly with the sale of wood).

But other motives present clear associations; in particular, the (few) owners who are involved in other management practices tend to evoke less frequently the Control or Economic motives. Possibly, that reveals that N2000 is not perceived as incompatible with active forest management, and thus that those owners might be more receptive to the N2000 charter than others.

The Mixed Logit regression results also show that owners whose properties actually has a part in an N2000 area are significantly more likely to evoke the Control motive than other owners. This is interpreted as a fear of a loss of control over their practices. Whether they are right or not is beyond the present study, but it might offer insight to the RNP managers. Once other factors are accounted for, owners who believe their property is in some way remarkable, fear less this loss of control, possibly because they might see the advantage of a protection figure. Therefore, inducing a feeling that an owner’s property is remarkable might “lower the defenses” against the N2000 charter.

Consequently, although the present survey has not allowed the respondents to detail the “retain Control of own practices” motive, there seems to be two paths that the RNP management could exploit in seeking to expand the

N2000 chartered area: Reduce the fear of a loss of control and Induce a feeling that the property is remarkable. Self-determination theory advances that any motivation for any particular action can be gradually internalized (“appropriated”), that is, the motivation can become more intrinsic as the individual identifies more with it. Following Ryan and Deci (2000, [17]), extrinsic motivations can be internalized either because of their social component or because of self-endorsement (possibly in association with the person’s other goals). The first way, internalizing because of the social component, does not seem relevant in the present context in which social image is relatively unimportant. Self-endorsement of the goals of the policy might be a more promising avenue to the extent that inducing the feeling that one’s property is remarkable, is precisely in line with the reasons why an area is designated N2000, that is, because it has a remarkable biodiversity.

Another conclusion of the present survey, in the context of ecosystem services, relates to the suggestion that private forest owners be paid (compensated) for such services. This could translate into higher (or more explicit) compensations for N2000 owners in exchange for adopting the N2000 charter. The present results show however that payment (Economic motive) is not the prime driver for not adopting the N2000 charter or contract; instead the sense of control over one’s property is the only motive that can be significantly associated with actual ownership of N2000. Indeed, for PFOs, Europe-wide, Winkel et. al. (2015, [21]) signal that one issue is “Conflicts related to changing property/use rights”. Certainly, such conflicts relate to the “retain Control” motive evoked by the PFOs in the survey.

Another avenue for research, in the context of N2000, is the conundrum of having significantly different behaviors for PFOs of properties within and without N2000 areas while these PFOs are generally not aware that their properties intersect with an N2000 area. One could think this is professed ignorance, but there is no factual element, in the present research, to establish such cause. The hypothesis that these PFOs have detected the same remarkable character as in the N2000 network, can be rejected because there is nearly zero correlation between intersecting with N2000 and the perception of remarquableness that the PFOs have of their property. Practitioners have suggested that such fear of losing control might be a memory of the N2000 historical process, which was massively rejected at its establishment in France.

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