Explaining participation of private forest owners in economic incentives. Case studies in Europe

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Abstract

Taking part in the implementation of a voluntary policy instrument for land use management implies motivational requirements of the targeted landowner. Increasing knowledge on the potential economic, managerial and attitudinal factors helps design incentives in accordance and facilitates an effective performance. We analyzed surveys and interviews addressed to private forest owners, at country or regional level in five European countries. Participation rates for different schemes aimed at enhancing the provision of ecosystem services were contrasted with a range of landowners' socio-economic, forest management variables, as well as with the instrument design characteristics.

Results show larger participation trends in mechanisms that promote a forest ecosystem service while simultaneously augments benefits enjoyed by the landowner. Being involved in some type of forestry association increases the likelihood of engaging in the policy mechanism, especially for small and medium size landowners. Correlation patterns were found for variables representing active forest management and activity-enhancing instruments.

We argue that these factors explain an alignment of the landowner either with the instrument objectives or the land management measures they promote. It demonstrates that the design of mechanisms bolstering synergies between current landowners' practices and expectations to those demanded by externals have more likelihood of success than those implying drastic management changes. On the other hand, this pre-existing alignment may challenge the efficiency of the policy intervention if most of the expected added value would require targeting not aligned landowners.

Keywords: policy instrument, active forest management, cooperation, instrument design

Introduction

Most forest ecosystem services (ES) demanded by society tend to exhibit public good characteristics (difficulty to exclude, no rivalry) and they are not traded in a conventional market. As a consequence, private forest owners (FO) cannot reap the benefits and hence may have no incentives to provide them. Modern governance approaches promote voluntary schemes aimed at enhancing forest ecosystem service provision, whereby participating forest owners receive compensation for modifying their management behaviour accordingly. Examples of this sort are abundant all across Europe and beyond, e.g. METSO scheme in Finland (Mäntymaa et al., 2009), afforestation subsidies in Denmark (Broch and Vedel, 2010) or Mature forest reserves in Catalonia (Prokofieva and Gorriz, 2013).

Prior studies have highlighted the fact that private forest owners are not only profit-driven (Beach et al., 2005). Yet, many forest policy instruments, especially those which intend to provide economic incentives for behavioural change (e.g. public contractual mechanisms, private and market-based schemes) implicitly presume that FO would compare the costs and the benefits of participating in the instrument with those of not participating, therefore implicitly assuming profit maximization as the most important motivation for forest management. However, the actual participation rates are frequently lower than expected, sometimes even too low to achieve significant outcomes. This might indicate that FOs have other motivations behind their decision to get involved in the policy instruments apart from purely profit-oriented. Previous studies have focused on the following factors as potential determinants of FO decision to participate in policy schemes: (a) active forest management; (b) alignment between FO management motivations and instrument objectives, and (c) socio-demographic characteristics (e.g. forest property characteristics, forest owner knowledge on forestry and economic dependence on forest revenues). We discuss these briefly below.

Previous studies have highlighted the fact that private Forest Owners (FO) are not only profit-driven. However, many forest instruments (public policy interventions and/or market/private tools) have assumed profit expectations as the most important orientation for FO management, hence designing them as economic incentives that promote certain FO behaviour, in terms of changing forest management decisions. However, the actual participation shows lower rates than planned, sometimes too low to achieve significant outcomes. They may have other interests to get involved in the instruments.

Active forest management is seen as a factor potentially increasing FO participation in policy schemes. For example, Juutinen et al (2005) in Mäntymaa et al (2009) mention that in the Nature Trading Values program in Finland participating forest owners were very active in forestry. The differentiation between active forest managers and non-active forest managers is far from straightforward. In their study, Marey-Pérez and Rodríguez-Vicente (2011) discriminate between landowners involved in forestry (whom they call “active”) and those not involved in forestry. This definition however is rather vague, as it does not clearly state what is understood by “involved in forestry”. Bliss & Martin (1989), in turn, equate active management to following the current standards of the forestry profession. The factors affecting active forest management were explored by Domínguez and Shannon (2011), finding that four main factors affect their decisions: economic expectations, the model on how a forest should look like, their moral duty and the perception of risk.

Previous studies have identified that the compatibility of the policy instrument with the FO goals or objectives for their land, as well as the possibility to realise their own particular values regarding forest management might enhance participation (Kline et al., 2000). A related (extensive) strand of literature focuses on clustering forest owners according to their goals, objectives and motivations (e.g. Erickson et al., 2002; Fischer, 2012; Ingemarson et al., 2006).

Previous scholars have identified the compatibility of the policy instrument with existing farming system; this is, with the goals or objectives for the land, as a factor positively affecting landowner's engagement. In this line, Boon et al (2010) already notice the different nature of nature conservation (passive) versus active restoration or amelioration projects may influence the motivation of forest owners to participate in set-aside lands.

The literature also points out to other socio-demographic factors, as follows: household income (Amacher et al., 2003), income derived from the forest (Moon and Cocklin, 2011) or educational level and property size (Kline et al., 2000).

Objective

We aim at analysing the factors that influence private FO engagement in voluntary instruments. Specifically, our first research question asks whether active forest management can explain participation in economic instruments. Based on the previous literature, our hypothesis is that landowners engaged in active management of their forest are more likely to participate in economic incentives dealing with ES provision. The underlying proposition is that active forest owners are more likely informed about the programs and are more acquainted with the bureaucracy linked to them, and hence would participate more.

Our second research question addresses the influence of the instrument design characteristics – specifically the goal of the policy instrument, and the activities promoted by the instrument – on FO enrolment in policy schemes. Our hypothesis is that instruments promoting active forestry, and aiming at enhancing simultaneously various ES would present greater rates of participation than those which seek to limit the landowner's activities and focus on a single ES thereby creating trade-offs with other forest benefits.

The results of this study will provide insights into how to better target FO in view of facilitating and increasing their participation in policy instruments. The novelty of this study lies in the inclusion of the correlation between different dimensions of active forest management (not so explicitly analysed by previous scholars) and the extent of the study which involves a cross-country approach.

Methodology

With surveys across four case studies (Rukka-Kuusamo, Finland; Denmark; France; and Germany) we have explored the degree of FO participation in different schemes and we have analysed factors that could explain such participation using contingency tables. Additionally, qualitative interviews have been conducted in another case study (Catalonia, Spain), which shed light on the possible reasons behind FO participation and their constraints. The data collection was conducted between 2012 and 2013. The qualitative findings jointly with the preliminary results from contingency tables allowed developing hypotheses, which were statistically tested with SPSS, using binary logistic regressions checked for correlation indexes for the used variables.

Sample design and instruments under focus

We did not aim at a representative sample for each case study area, but to gather enough statistical data from different regions in order to discover trends in FO's participation in policy instruments. Table 1 depicts the sample and survey strategy.

Brief description of the survey of each CS

The Finnish case study focused on Rukka-Kuusamo, an area in Lapland with vast forests and an increasing tourism industry related to a ski resort; willingness to change forestry activities for improving recreation were in the focus, jointly with values related to forestry. The German case focused on the benefits private landowners extract from forest cooperatives and values related to forestry, hence only cooperative members were surveyed. The Danish and French case included forest owners from all over the country and included extended questions on participation in policy instruments, forestry activities and FO values. The Spanish case study was located in Catalonia, where forest owners were asked about their participation in policy instruments and their opinions on possible payments for environmental services, focusing on its design features and respondent values.

Limitations for the cross-country comparability

We acknowledge the presence of several challenging limitations stemming from the variety of data collection methods used for this study. First, we find dissimilar samples across countries and very different policy instruments under focus –both in terms of quantity (from one in France to twelve in Denmark), funding organisation (more private in France, all public in Germany and Rukka-Kuusamo, and of both types in Catalonia and Denmark), or ecosystem services in focus (examples here). Surveys were not aiming to capture the whole spectrum of policy instruments, and hence are not exhaustive. Moreover, the German survey did not identify specific policy instruments, but instead named larger subsidy programs with similar objectives and actions across states (*Länder*).

We expect to see larger participation rates in the German and Catalan samples, as respondents have already shown interest in forestry bodies in the first case, and respondents have some close contact with technicians in the second case. We also lack information on landowners' eligibility for specific programmes, and hence we cannot conclude on whether the lack of FO participation stems from their unwillingness or rather inability to participate.

Besides, questions were different in their wording and in their presence. This means, not all the cases gathered information on FO values and attitudes, and when these information were available, they were not collected in a homogeneous manner. Also the importance of instrument design characteristics varied across the surveys. Finally, socio-economic factors have been surveyed in diverse ways, so that only forest size is congruent across case studies. Income and employment variables are very irregular, as per the job categories and the lack of absolute comparability of salaries across countries.

Joint database

In spite of previously mentioned limitations, we built a joint database with the data from the surveys, which gathers up to 8,579 observations. 210 were considered as not valid representing incomplete surveys. For building the database several assumptions were made for the sake of homogenization. Homogeneous concepts served as the basis for defining the variables.

Table 1. Sample description in the case study areas

Case study	Approach	Respondents (% of respondents)	ES focus in instrument	Funding source (nr instruments)
Ruka-Kuusamo (Finland)	Mail survey	471 from Kuusamo municipality	Biodiversity	Conservation of habitats of special importance for biodiversity, preserved by Forest Act / Environmental subsidy for preservation of special habitats / Voluntary conservation contracts under the Metso programme / Nature management projects / Consulting or planning aid for nature management
Germany	Mail survey	209 members of forest cooperatives	Timber, Biodiversity, Recreation	Afforestation aids / Subsidies for forest tending / Subsidies for soil liming / Forest conversion aids / Forest protection aids / Aids for maintenance of forest edge / Conservation by contract / Compensation payments for conservation / Subsidies for building recreation facilities / Forest road construction
France	Mail survey	590 responses of forest owners (15,000 questionnaires sent)	Timber, Other ES	SFM certification
Denmark	Web-based survey	308 responses of forest owners	Timber, Biodiversity, Recreation, Water, Timber + other ES	Subsidy for special management initiatives / Subsidy for replanting after windthrow / Afforestation subsidies / Subsidy for production and sales of Christmas greenery / Practical forest management experiments / Aids for recreation and outdoor facilities / Counselling visit for sustainable management / Subsidies for oak woodlands and coppice / Subsidy for setting aside areas as untouched forest / Single tree contracts for aging and natural decay / Subsidies for sustainable management / Contracts related to groundwater or wetlands
Catalonia (Spain)	Face-to-face qualitative interviews	26 forest owners (100% of respondents)	Biodiversity, Recreation, Timber + Other ES	SFM subsidies / Postfire regeneration subsidies / Forest Defence Groups / SFM certification / Land stewardship / Mature Forest Reserves

We explored at country level the meaning of "active forest management", which resulted in a very multi-dimensional concept, which includes having conducted forestry works in the property in the past years (showing a usual activity), or the intention to conduct them in the near future, having and/or implementing a forest management plan, being member of an association of forest owners (FOA), or the direct decision-making on the forest (in contrast with delegated management). See table 2 for further details. We built several dummy variables in this respect, as follows: membership in a FOA; presence of a forest management plan; and past active forestry work.

Table 2. Active forest management in the different case studies

Case study	Variables in the survey and best suited indicator (in bold)	Justification
Ruka-Kuusamo (Finland)	**Up-to-date forest management plan** Last time sold timber in last 5 years **Forest operations in last 5 years**	Being a member of FOA is mandatory; hence it does not give any additional information. Having a management plan is optional.
France	Having a forest **management plan** and/or being **member of a FOA** Having done forestry works in the last 5 years	Management plan is costly; hence it shows interest to implement it. Membership has a cost; and FOA provides information to their members on schemes and may assist them in the application/engagement.
Denmark	Having a **forest management plan** and/or being **member of a FOA** **Having done forestry works in the last 5 years** Person making forestry decisions. Person carrying out forestry works	Management plan is costly; hence it shows interest to implement it. Membership has a cost; and the FOA provides information & assistance on schemes
Catalonia (Spain)	**Having conducted forestry works in the last 5-10 years** Being **member of a FOA**.	Management plan facilitates forestry works permissions and is a pre-requisite for several programs. However, it is fully subsidized and is mandatory for being granted an inheritance tax exemption Membership has a cost (investment); and FOA provides information to their members on schemes (awareness) and may assist them in the application/engagement.
Germany	**Actor conducting forestry works in the past** Person conducting work related to subsidies.	All respondents are cooperative members. We assume that respondents do not have management plan, as it is not mandatory in Germany, nor facilitates subsidies or harvest permits. We assume that respondents are active if s/he reports having done forestry works (either itself, through the cooperative or through a forest contractor) in the past.

As representative **socio-economic factor** we included forest size, which has been categorized into 5 classes as follows: micro-owners (0 to 5 ha), small owners (from 5 to 25 ha), medium-size owners (from 25 to 100 ha), big owners (from 100 to 500 ha) and very big owners (larger than 500 ha). Table 3 shows the absolute number for each category per case study. We observe that very small forest owners constitute the largest part of the German and Danish respondents, while for medium-size landowners mean the largest groups for the Rukka-Kuusamo and French case, while big landowners are the most represented group for the Catalan case. This clearly shows that the sampled population does not represent the total population; German associated

landowners tend to be those with smaller areas, and Catalan respondents largely exceed the average property size of 1 ha.

Table 3. Forest size categories in each case study

	Forest size (ha)				
	0 - <5	5 - <25	25 - <100	100 - <500	>500
Rukka-Kuusamo (FI)	63	60	262	85	1
Denmark	104	83	68	30	23
France	132	113	215	101	29
Germany	75	33	46	22	12
Catalonia (ES)	0	0	4	18	4

Finally, the **country** variable has been categorized, being the reference Denmark. Table 4 gather the descriptive characteristics of the sampled forest owners for each case study.

Table 4. Characteristics of forest owner respondents

	Participation in at least 1 instrument	FO Association	Management plan	Past active forestry
Rukka-Kuusamo (FI)	213 (45%)	471 (100%)	227 (48%)	337 (72%)
Denmark	115 (37%)	135 (44%)	63 (20%)	141 (46%)
France	166 (28%)	212 (36%)	264 (45%)	274 (46%)
Germany	173 (83%)	209 (100%)	0 (0%)	194 (93%)
Catalonia (ES)	25 (96%)	19 (73%)	24 (92%)	11 (42%)

Policy instruments were classified according to two characteristics: the type of activity they entail and the presence of synergies between the ES promoted and timber production. This is our proxy for measuring alignment between FO values and instrument design. An instrument is activity-enhancing if it promotes forestry interventions (ex. SFM certification, or SFM subsidies), while activity-capping limits forestry works (ex: Contracts for setting aside forest lands, Subsidies for recreational and outdoor facilitation). Some policy instruments require activities that promoting a single Ecosystem Service (ex. payments for biodiversity conservation, contracts for water improvement), while others foster activities that allow a combination of traditional timber production and an ES (ex. subsidies for oak woodlands and coppice, aids for forest conversion).

Models for participation in policy instruments

In line with the proposed research questions, we have run four different models. First, we analyse the likelihood of participation of a forest owner explained by its active forest management profile, and its socio-economic factor (Equation 1). Next, we test whether there are significant differences among CS, by including a country variable. Our hypothesis is that owners showing more dimensions of active forest management would have larger likelihood of enrolment, as well as larger forest properties.

$$(Eq.1)\ Odds(Particip) = e^{a} + e^{b*(mgmt\ plan)} + e^{c*(FOA)} + e^{d*(past\ active\ mgmt)} + e^{e*(size)}\ (+ e^{f*(CS)}) + \mathcal{E}$$

Then, we test whether the probability of participation increases if the policy instrument design characteristics are specified, this is, the previous model includes the variables of activity-enhancing and the ES promoted (Equation 2). Finally, a last model includes a country variable.

Our hypothesis is that instruments addressing more than a single ES and those promoting activities in the forest would lead to increased odds of engagement.

$$\textit{(Eq.2) Odds(Particip)} = e^{a} + e^{b*(\textit{mgmt plan})} + e^{c*(FOA)} + e^{d*(\textit{past active mgmt})} + e^{e*(size)} + e^{f*(\text{activity-enh})} + e^{g*(\textit{multi-ES})} (+ e^{h*(CS)}) + \mathcal{E}$$

Results and discussion

Table 5 shows the results of the regressions, which indeed prove the hypotheses of participation in policy instruments promoting ES as being explained by the active forestry, and larger forest stands (model 1 and 2). Furthermore, policy instruments that are less restrictive with the previous forestry works, and allowing compatible ES with traditional forestry production show larger odds to engage. The regressions show that when adding instrument design variables (model 3 and 4) the goodness of fit improves, increasing the pseudo-R^2. All variables appear as being significant. The CS origin of the forest owners appears to have significant differences. Denmark seems to have less participation than Finnish and Catalan respondents; while being a French respondent has lower probability to participate. Interestingly, when including the policy mechanism variable, German respondent move from less probability than the reference case to having a greater likelihood. Still, the large negative constant shows that the majority of landowners have a very little likelihood of participating in policy instruments.

Our hypotheses, then, seem to hold for the data collected across European countries. These variables only partly explain the enrolment of forest owners, as shown by the pseudo-R^2. These results confirm the previous literature.

Conclusions

In this exercise we have provided empirical evidence of some factors that affect the odds of private forest owners to engage in voluntary policy instruments. We found that active forestry, socio-economic, and cooperation factors partly explain landowner participation. Likewise, it shows that the alignment of the landowner either with the instrument objectives or its promoted land management measures facilitates the participation. Hence, these results suggest that the design of mechanisms encouraging synergies between current landowners' practices and external ES demands are more likely to attract forest owners than those implying severe management changes for the landowner. On the other hand, this pre-existing alignment may challenge the efficiency of the policy intervention if most of the expected added value would require targeting not aligned landowners; this is, according to our result, those owners who at present are not active in forest management, they own small pieces of forests, or are not member of associations.

Table 5 – Results from the binary logistic regressions

	Model 1			Model 2			Model 3			Model 4		
Variable	**B**	**E.T.**	**Exp(B)**	**B**	**E.T.**	**Exp(B)**	**B**	**E.T.**	**Exp(B)**	**B**	**E.T.**	**Exp(B)**
Constant	-2,436 ***	,153	0,088	-1,962 ***	,250	0,141	-3,650 ***	,177	0,026	-3,009 ***	,268	0,049
management plan	0,339 ***	,069	1,404	0,968 ***	,091	2,632	0,391 ***	,071	1,478	0,971 ***	,092	2,641
FO Association	0,925 ***	,105	2,522	0,538 ***	,135	1,713	1,235 ***	,108	3,439	0,535 ***	,135	1,707
Past active forestry	0,909 ***	,086	2,482	0,551 ***	,096	1,735	0,933 ***	,087	2,542	0,560 ***	,096	1,750
Size: >500 ha												
Size: 0 to <5 ha	-1,014 ***	,130	0,363	-1,401 ***	,141	0,246	-0,856 ***	,135	0,425	-1,502 ***	,147	0,223
Size: 5 to <25 ha	-0,766 ***	,132	0,465	-0,846 ***	,143	0,429	-0,617 ***	,137	0,539	-0,909 ***	,148	0,403
Size: 25 to <100 ha	-0,854 ***	,116	0,426	-0,892 ***	,131	0,410	-0,626 ***	,123	0,535	-0,955 ***	,135	0,385
Size: 100 to <500 ha	-0,419 ***	,124	0,658	-0,536 ***	,135	0,585	-0,258 **	,129	0,772	-0,584 ***	,139	0,558
Activity enhancing							0,669 ***	,078	1,953	1,150 ***	,126	3,158
Timber + other ES							0,579 ***	,085	1,784	0,334 ***	,098	1,397
Denmark												
France				-0,988 ***	,205	0,372				-1,083 ***	,212	0,339
Ruka-Kuusamo (FI)				0,840 ***	,217	2,315				0,457 **	,223	1,579
Germany				-0,395 *	,203	0,674				0,500 ***	,230	1,648
Catalonia (ES)				1,063 ***	,221	2,896				1,307 ***	,229	3,696
*p<0,1; **p<0,05; ***p<0,01	-2 log likelihood	R^2 Cox & Snell	R^2 Nagelkerke	-2 log likelihood	R^2 Cox & Snell	R^2 Nagelkerke	-2 log likelihood	R^2 Cox & Snell	R^2 Nagelkerke	-2 log likelihood	R^2 Cox & Snell	R^2 Nagelkerke
	6838,973	,071	0,120	6291,694	0,129	,219	6572,978	,100	0,169	6043,264	,155	0,263

Acknowledgements

This work has been conducted within the FP7 NEWFOREX project. The UMR Economie Forestière is supported by a grant overseen by the French National Research Agency (ANR) as part of the "Investissements d'Avenir" program (ANR-11-LABX-0002-01, Lab of Excellence ARBRE). We also thank Elsa Varela and Nicolas Robert.

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