



Contracts for afforestation and the role of monitoring for landowners' willingness to accept



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ABSTRACT

The proper balance between costly monitoring and non-compliance have often been studied, however, the costs of monitoring from landowners' perspective have only received little attention. We designed a Choice Experiment where landowners expressed their willingness to accept afforestation contracts with varying attributes, one of them being the likelihood of being monitored. Based on agency and social preference theory, respectively, we formulated a model allowing us to test alternative hypotheses regarding landowners' behaviour. The first hypothesis was that landowners may plan not to comply if optimal, which makes monitoring increasingly unwelcome as the contract sum increases. The second hypothesis was that landowners plan to comply and consider monitoring increasingly fair as the contract sum increases. The hypotheses were tested using a discrete mixture RPL model, where three parameters were estimated for an interaction effect between monitoring probability and contract sum (one fixed to zero and two varied freely). Both free parameters were positive and significant, indicating that landowners tend to find monitoring less of a negative feature, the higher the contract sum – suggesting that a group of landowners show social preferences. A latent class model further corroborated that conclusion.

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1. Introduction

Public procurement of environmental goods through the offering of contracts to private landowners is a standard policy measure and also widely implemented in forest policies across around the world. Typically, such contracts specify a set of actions to be undertaken by the landowner, a target environmental change to be obtained, a payment to be made to the landowner, and various other terms including length, procedures for settlement of disputes, and consequences in case of non-compliance. From the view point of the 'buyer', e.g. a government, this involves standard agency issues of asymmetric information and moral hazard (Bolton and Dewatripont, 2005), along with concerns about transaction costs, budget constraints and cost effectiveness (Anthon et al., 2007a,b).

A common measure to counteract the problem of non-compliance and moral hazard is the use of monitoring and control, e.g. in the form of monitoring random samples of landowners for compliance with the terms of their contract, combined with reclaim procedures and possible sanctions if non-compliance is discovered. Such monitoring is of course costly in itself, but while the issue of achieving the proper balance between monitoring and non-compliance costs has often been studied (e.g. Ozanne and White, 2008), we focus on this from the perspective

of the agent and investigate how monitoring programmes may affect the landowner's willingness to accept a contract, depending on his ex-ante view upon compliance.

We investigated landowners' willingness to accept afforestation contracts where different monitoring levels was an attribute of the contract. The Danish landscape is heavily dominated by agriculture and the forest area highly fragmented, yet it has the potential to deliver several ecosystem services in high demand (Termansen et al., 2013; Campbell et al., 2014). Thus, during the preparation for the 1990 Forest Act revision, the Parliament declared it a political goal to double the country's forest cover. Since then, subsidy schemes for afforestation have been offered, and the forest area has increased though at a modest rate. The subsidy schemes rely on the EU rural development funds and monitoring is an integral part of most EU agri-environmental schemes. For subsidy schemes funded – even in part by the EU, a minimum of 5% of landowners must be randomly selected for monitoring.

Past empirical evidence from the Danish authorities' monitoring of afforestation contracts have shown that approximately 14% of landowners who entered an afforestation contract did not comply (Christiansen, 2001; Andersen and Vestergaard-Nielsen, 2004). This level of non-compliance covers cases where landowners receive a subsidy and makes no effort to afforest their land, but also cases where compliance is partial, e.g. the afforested area is too small or the number of surviving trees per hectare is too low (Christiansen, 2001; Andersen and Vestergaard-Nielsen, 2004). These findings stress the need to investigate how monitoring and compliance is perceived by landowners and

Abbreviations: CE, choice experiment; WTA, willingness to accept; WTP, willingness to pay; RPL, random parameter logit; MNL, multinomial logit

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how it affects their willingness to accept contracts. This may enable us to improve future contract design for forest ecosystem services.

Landowners may experience costs in more than one way in relation to monitoring, even when in compliance. They face direct costs when monitored in the form of time spent on visits made by authorities, preparing documents and implementing resulting additional actions. Another cost component could be related to the disutility the landowner may experience in relation to monitoring, e.g. a feeling of invasion of private property, seeing monitoring as an expression of mistrust, or fear of the power of bureaucracy. These latter issues relate to the demotivation that monitoring may create. For any landowner to accept a given contract, any disutility caused by potential monitoring has to be compensated and thus raises the willingness to accept (WTA).

We argue that in addition to the above effects, the element of monitoring (in contracts) could have a positive or negative effect on landowners' utility depending on their personal attitude towards compliance and monitoring. We relate this to agency and social preference theory (Bolton and Dewatripont, 2005; Nyborg, 2000), formulate two alternative hypotheses and specify them in a form allowing us to test them with available data from a choice experiment (CE). The first hypothesis is, that landowners exist who – in spite of costly sanctions if discovered – plan not to comply or not to self-report compliance problems if they occur. If this behaviour is factored in when assessing whether to enter a contract, monitoring should be increasingly unwelcome, the higher the contract sum. The second hypothesis is that landowners exist that find monitoring increasingly fair, the larger contract sums are rewarded, e.g. due to social preferences for fairness and control of public funds. Using data from a CE of landowners' contract preferences (some of which already have forest on their property and others do not), we test for the presence of these groups in models allowing for the estimation of two or more parameters for the interaction term between the monitoring probability and afforestation subsidy.

In section two, we outline the theories of agency and social preferences and relate them to literature on environmental contracts and afforestation instruments in particular. Based on these theories we develop and present two theoretical models for landowners' assessment of contracts with a monitoring element, aligned with our hypotheses. Section three specifies the econometric model and how the hypotheses are tested. Section four describes the CE case study in more detail. Results are briefly reported in section five, and the discussion in section six relates our findings to the two strands of literature, with the final conclusions and policy perspectives in section seven.

2. Theory

2.1. Agency theory and moral hazard studies in environmental procurement

Within the agency literature, negative incentives in the form of monitoring and sanctions are believed to reduce moral hazard and incentives to shirk when they undertake requested costly efforts. These dynamics are likely to carry over to public procurement of environmental services.

The field of agency theory and contracting (e.g. Bolton and Dewatripont, 2005) deals with issues widespread in any economic transaction involving the interaction between principals and agents. The role of asymmetric information (Akerlof, 1970) for the optimal design of public procurement has been investigated in many studies in forest, agricultural and environmental economics, treating issues like heterogeneity of agents (Hart and Latacz-Lohmann, 2005; Latacz-Lohmann and Van der Hamsvoort, 1997; Levy and Vukina, 2002; Wu and Babcock, 1996) and inter-temporal moral hazard problems (Fraser, 2012). Another strand of literature has focused on moral hazard, ranging from its role in reaching international environmental agreements (e.g. Petrakis and Xepapadeas, 1996) to micro level effects in public procurement cases (Cox et al., 1996) and its role in exacerbating the implications of environmental risks (Laffont, 1995). Moral hazard remains an issue in public procurement of environmental services and payments for ecosystems

services from forests too (Wunder, 2007; Wunder et al., 2008), potentially combined with asymmetric information (Anthon et al., 2010).

Numerous theoretical issues around moral hazard have been investigated; whereas empirical evidence of moral hazard issues in public procurement is less voluminous. Experimental economics offers evidence of moral hazard in procurement games (Cox et al., 1996), and in a lab study of *ex ante/ex post* moral hazard regarding income losses Di Mauro (2002) found that people exerted effort *ex ante* even though it was not optimal to do so, but also that moral hazards prevailed. Some studies based on revealed behaviour in actual settings do exist and show evidence of moral hazard induced behaviour (Mishra et al., 2005) and have provided approaches to measuring the welfare economic impact (Vera-Hernandez, 2003). To our knowledge there are no studies that have investigated possible moral hazard motivated decision behaviour *ex ante* using stated preference methods.

While stated preference studies have not been used to investigate issues of moral hazard in public procurement schemes, they have been used to research other issues of relevance to this study. In particular, the CE method has been used to investigate farmers and forest owners preferences for providing various environmental services through contracts (Espinosa-Goded et al., 2010; Horne, 2006; Hudson and Lusk, 2004; Jaeck, 2009; Ruto and Garrod, 2009). Out of these, only Horne (2006) focus on attributes related to the contract set-up such as who initiated the contract, contract length etc. Other findings stress the importance of maintaining flexibility for the owner (e.g. which area, size, duration of contract and cancellation policy). However, monitoring has not been in focus in any of these studies and no attempts have been made to uncover preference variation with respect to monitoring.

2.2. Social preferences and acceptance of monitoring

The literature on motivation argues that people may have different attitudes towards monitoring (e.g. Gagné and Deci, 2005; Frey and Jegen, 2005). People may express acceptance of monitoring based on their moral motivations and personal beliefs. This tendency can be related to different concepts, including social preferences (Nyborg, 2000), self-image (Brekke et al., 2003), and civic cooperation (Owen and Videras, 2006).

According to the crowding theory by Frey (1997), monetary rewards may reduce moral motivation, when perceived as controlling rather than acknowledging, whereas Frey and Jegen (2005) argue that monitoring may have a positive effect on people's willingness to exert effort if perceived as supportive or seen as a form of implicit recognition of the effort's importance. Here we deal with landowners' *ex ante* preferences for monitoring, but may expect a similar tendency, i.e. that people who perceive monitoring as supportive and as recognition of the importance express greater acceptance of monitoring than people who regard it as controlling.

Experimental work has indicated that invoking moral responsibility increases individuals' WTP (Ajzen et al., 1996; Boyce et al., 1992; Nyborg, 2000; Peterson et al., 1995), suggesting that a lower WTA for monitoring could also have a root in a sense of moral responsibilities. Acceptance of monitoring can also be due to a high sense of social responsibility, where people find it important to make sure there are no free-riders and that governmental subsidies are spent according to the specified goals. For example, individuals are more likely to report perceived non-compliance the more they disapprove of free-riders (Owen and Videras, 2006; Pretty and Ward, 2001). This could be explained as a kind of 'police-man effect', where people who comply gain utility from knowing that non-compliers risk sanctions. In a study based on farmers' self-reported compliance behaviour with environmental regulations in general, Winter and May (2001) found that social motivations are as important a driver for compliance as are calculated motivations, and they argue that farmers often are important citizens in the local community and have an interest in being perceived as good citizens. Similarly, we know from research on forest owners'

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