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Analysis

Public transaction costs of agri-environmental schemes and their determinants—Analysing stakeholders' involvement and perceptions

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ABSTRACT

Despite an overall budget increase for rural development in the new programming period (2007–2013), most older Member States in the now expanded European Union are facing a substantial reduction in their budget for rural development and thus for agri-environmental schemes (AESs). It can be assumed that, in most countries, none or at best only part of this loss can be offset by national funds. Therefore the design of more efficient national governance structures for AESs, which decrease public transaction costs (TCs), would be an appropriate solution to this problem. The objective of this paper is to define the factors that influence these public TCs, so that appropriate action can then be taken to reduce them. A statistical analysis, with a proxy for public TCs, is combined with an analysis of stakeholder perceptions (excluding farmers) concerning public TC influencing factors. The research showed that it is mainly scheme related factors that are perceived to be important, although the governance structure, institutional environment and level of trust also play a role. Finally, the analysis of perceptions concerning TCs also showed that AES related actors have a limited knowledge of TCs.

1. Introduction

Since the Second World War, European agriculture has been characterized by increasing specialisation and intensification, which has led to negative environmental externalities. The European Union reacted to this situation by introducing agri-environmental schemes (AESs) in Council Regulation (Reg.) (EC) 2078/92. From that point, member states could compensate farmers financially for providing environmental goods and services. With the implementation of Reg. (EC) 1257/1999, AESs became a core element of the second pillar of the European Common Agricultural Policy, but they also became increasingly entangled in critical debates questioning their environmental effectiveness (see e.g. Berger et al., 2006; Kleijn et al., 2004, 2006; Kleijn and Sutherland, 2003; Matzdorf et al., 2008; Melman et al., 2008; Ohl et al., 2008). However, in addition to their environmental effectiveness, the economic efficiency of the schemes also deserves attention. In the light of recent changes in the European budget for rural development, which provides up to 55% of the funding for the schemes,[2] this last concern is particularly justified. Despite an overall budget increase for rural development in the new programming period (2007–2013) compared to the previous one (2000–2006) (European Commission, 2006, 2007), most 'old' countries[3] in the now expanded European Union are facing a substantial reduction to their budget for rural development. This is largely the result of increases to the number of Member States (27 compared to 15, in 2000–2004, and 25, in 2004–2006). In addition to this, new responsibilities were added to the rural development policy, such as support linked to Natura 2000 areas. Taking into account these changes, the Commission asked for a higher budget than the one that was finally agreed by the Council. Even if the funding had remained the same, it is debatable as to whether this would be sufficient in the new programming period. The second programming period builds on the achievements of the preceding period, so some funding will be committed to contracts that have already been agreed upon under existing schemes. It can be assumed that in most countries none, or at best only part of this loss, could be offset by national funds. Additionally, most countries are

Abbreviations: TCs, transaction costs; AESs, agri-environmental schemes.

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[2] 80% in Convergence regions.
[3] These countries are Germany, Greece, Spain, France, Ireland, Luxemburg, the Netherlands, Austria and Finland.

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facing greater budgetary constraints within their own administrations. Designing more efficient national governance structures for AESs, which decrease public transaction costs (TCs), would be an appropriate solution to this problem. Therefore, the objective of this paper is to define the factors influencing these public TCs, so that appropriate action can then be taken to reduce them. When judging TCs relating to AESs, however, the costs associated with failure to meet the targets or the environmental utility losses should always be taken into account, since it is the sum of TCs and the costs resulting from the failure to meet targets that should be minimised in designing measures with optimal precision (Eggers, 2006).

Firstly an overview will be given of the relevant literature concerning the factors that influence public transaction costs associated with agri-environmental policies. This is followed by a description of the methodology used to assess these factors. Results are presented in the fourth section and critically discussed in the final part, including some policy recommendations for decreasing public TCs regarding AESs.

2. Definition and Background

TCs, which can be defined as the costs arising, not from the production of goods, but from their transfer from one agent to another (Niehans, 1971), have gained considerable importance in socio-economic research on agri-environmental policies (Beckmann et al., 2009; Ducos et al., 2009; Falconer and Saunders, 2002; McCann et al., 2005; McCann and Easter, 2004; Mettepenningen et al., 2009; OECD, 2001; Peerlings and Polman, 2008; Smits et al., 2008). From a transaction cost economics point of view, an AES can indeed be seen as a contractual mechanism for the transaction of environmental goods and services between the farmer, as seller, and society, represented by the public authorities, as buyer. The costs directly resulting from this transaction are called private TCs when borne by the farmer, and public TCs when borne by the government. A direct transaction between citizens and farmers suffers from the absence of fully articulated property rights, which leads to market failure and hence governmental organisation of AESs (Falconer et al., 2001; Whitby, 2000). According to Transaction Cost Economics (TCE), and its principle of discriminating alignment, the chosen mode of governance has to match the characteristics of the transaction in such a way that the costs incurred are minimised (Leiblein, 2003; Williamson, 1998).

Following this principle, the current form of governance could indeed minimise the costs. However, there are other factors which might influence public TCs regarding AESs. The analysis of public TC influencing factors in this paper is not only done on the basis of the measurement of these costs, but also on the perceptions of stakeholders involved in AESs. When investigating the influence of TCs on managerial decision making, Buckley and Chapman (1997) found that managers very often do not know what TCs are, but that they do take them into account, albeit not in a numerical way. They therefore claim greater importance for the perception of TCs, since it is this that determines their effect on decision making. Perception of TCs does not necessarily correlate with the exact measurement of TCs, as shown by Love and Roper (2005) who compared economists' and managers' predictions of outsourcing activities based on TC arguments. Because of the importance of perceptions regarding TCs, some studies use this instead of real TC measurements (see e.g. Brockhoff, 1992 and Badstue, 2004). The use of perceptions is also theoretically consistent with the concept of bounded rationality, which refers to human behaviour that is intentionally rational but only to a limited extent (Simon, 1978). The data used have been collected within the framework of the European research project ITAES[4] and reflect the situation regarding AESs in Europe. However, the scope of the results goes beyond the European case and can even be extended to policy areas other than the agri-environmental one.

3. Factors Influencing Public TCs Relating to AESs

This section gives an overview of the factors influencing public TCs. According to Oliver E. Williamson (1985, 1996, 2003, 2005), the main founding father of TCE theory, TCs are influenced by: (1) the behaviour of the actors involved in the transaction, (2) the attributes of the transaction, which are the asset specificity of the transacted good or service, the frequency of the transaction and the level of uncertainty regarding the outcomes of the transaction, (3) the institutional arrangements or governance structures and (4) the institutional environment in which the transaction takes place. Several empirical studies are available specifically addressing the topic of agri-environmental policy. On the basis of the general literature on TC theory and sources in which the theory has been applied to AESs, four main categories of influencing factors can be distinguished: factors relating to the actors involved in AESs, the characteristics of the schemes, the institutional environment in which the schemes are designed and implemented and the natural environment upon which they are designed to act. These influencing factors are graphically represented in Fig. 1. Each of these factors, and the links between them, will be further explored as follows.

The main actors involved in the AES transaction are farmers and the government. The costs of a transaction depend on the number of trading partners involved—with lower TCs per participant when the number of participants increases (Stavins, 1995). For AESs with a higher uptake by farmers, economies of scale can result, with lower public TCs per participant and per unit of the desired environmental goods and services (Falconer et al., 2001; Falconer and Whitby, 1999, Eklund, 1999, cited in Nilsson, 2004). As well as the number of actors involved, the characteristics of the actors also play a role. The more heterogeneous the population of farmers taking up AESs, the higher the public TCs will be (Eklund, 1999, cited in Nilsson, 2004). Another important aspect concerning the characteristics of the actors is trust, which can also be seen as an informal institution (Williamson, 1993): the more the government trusts the farmers applying AESs, the less resource needs to be spent on monitoring and control (Falconer and Whitby, 1999). Costs for monitoring and control will also be influenced by farmers' attitudes towards AESs and their understanding of the schemes, because this will influence compliance (Falconer

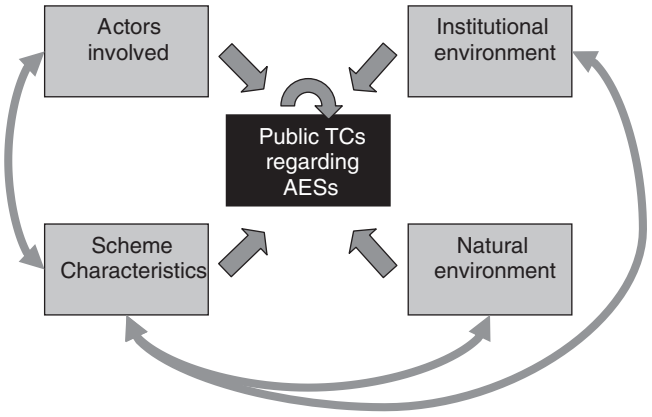

Fig. 1. Factors influencing public TCs.

[4] Integrated Tools to design and implement Agri-Environmental Schemes.

and Whitby, 1999). A good understanding or common ideology between the partners in the transaction can thus reduce public TCs (North, 1997). Attitudes towards and understanding of the schemes can be influenced by farmers' level of education (Eklund, 1999, cited in Nilsson, 2004), but also by their experience with AESs, suggesting the possibility of a learning effect (Falconer and Whitby, 1999). Finally, farmers' attitudes and level of understanding will be influenced by the way in which schemes are organized, and this is in itself an important public TC influencing factor.

The second category of influencing factors relates to the characteristics of AESs. Before going into detail, it is important to mention that AESs, as a specific form of agri-environmental policy aimed directly at public goods, involve higher public TCs than policy instruments applied to private goods, in the case of jointness in terms of production with a public good (e.g. taxes on pesticides) (Rørstad et al., 2007). A first important characteristic in this category is the degree to which the schemes are targeted towards site-specific environmental conditions and problems. This can be connected to Williamson's factor of asset specificity (Falconer and Whitby, 1999). Public TCs appear to increase with greater targeting or precision of the schemes (Rørstad et al., 2007; Peerlings and Polman, 2008). According to Falconer and Saunders (2002), however, the higher costs for designing more precise schemes can be offset by lower costs for monitoring. Another advantage of increased targeting and precision of AESs is a higher environmental effectiveness. This is particularly so when the environment is heterogeneous across the country, because the schemes are then better adapted to the local environmental conditions. According to Peerlings and Polman (2008), however, the increased environmental effectiveness of more targeted AESs can be offset by a lower rate of farm contracting owing to farmers' concerns over lock-in as a result of changing contractual terms.

A second factor in the category of characteristics of AESs is the scope of the schemes, or whether farmers can take up single agri-environmental measures, a combination of measures in AESs or a whole farm approach, such as in Ireland or the UK. Offering a combination of measures to farmers has an equivalent in the business world in the 'block booking' of movies, which reduces time and resources spent on redundant sorting and re-pricing (Kenney and Klein, 1983). As an equivalent, the bundling of agri-environmental measures in schemes or whole-farm approaches could also reduce the efforts of the responsible administration. On the other hand, fine tuning the measures in a scheme could increase its design costs. Related to this is the concept of connectedness, which means that transactions can be linked to each other and this can influence the costs involved. Whether this connectedness leads to decreasing total TCs (e.g. because two regulations require the same administrative tasks) or increasing total TCs (e.g. because more coordination is required) depends on the situation (Milgrom and Roberts, 1992). Whole-farm approaches are also more custom-tailored, which can result in higher monitoring and control costs (Smits et al., 2008).

In the category of characteristics of AESs, a third influencing factor relates to whether the farmers can cooperate in implementing the schemes, like in the Dutch system of agrarian nature associations. As well as reducing farmers' private TCs, they can also play a role in reducing public TCs through the leading role they play in trust building. In addition, they disseminate knowledge and experience amongst farmers and can establish internal control mechanisms, thereby decreasing the need for monitoring and control by the government (Smits et al., 2008).

Another important factor in terms of the characteristics of AESs, is the degree to which the scheme objectives are pursued by monitoring. Simply giving farmers compensatory payments will be less costly than ensuring that they actually change their management practices. The cost of controlling compliance by farmers will depend on the technology available for monitoring and administration (Falconer and Whitby, 1999). But even with good monitoring systems, there may still be information asymmetry between farmers and the government, because not all fraud can be easily detected and not all farmers will be controlled (Smits et al., 2008). Non-compliance with the scheme's requirements is however not necessarily due to deliberate fraud, it can also be caused by a lack of scheme transparency so that farmers are unclear as to how they should implement the schemes. (Falconer and Whitby, 1999). This factor relates to Williamson's attribute of uncertainty regarding the outcomes of the transaction. A final factor in this category is the age of the schemes, which can be linked to Williamson's attribute of frequency of the transaction. The more experience the government has with AESs, the lower public TCs will be, again indicating a learning effect (Falconer et al., 2001; Falconer and Whitby, 1999). The stage in the lifecycle of the schemes will also influence public TCs, with higher costs observed in the first phase when schemes are established and contracts drawn up (Whitby, 2000).

A third category of factors influencing public TCs relates to the institutional environment, or the broader set of rules and regulations surrounding the design and implementation of AESs. One element of this institutional environment is the extent to which different political parties, societal groups and different administrations are involved in the design of AESs. The higher the number of parties involved, whose role can go from decision-making to merely giving advice, the higher public TCs can be, due to conflicting opinions. A specific influence on public TCs comes from political involvement in AESs. Political actors may prefer flexibility in agri-environmental programmes so that they can be easily adapted when politically advisable. However, the more frequently the programmes have to be changed, the greater the workload for the administrations and thus the higher the public TCs (Smits et al., 2008). On the other hand, significant changes to the institutional framework of AESs are unlikely to be encouraged by the political system because of path dependency: everybody has adapted to the institutional framework and therefore it is costly to change it (North, 1990). Finally the decentralization of the Administration will play a role: a more decentralised approach to AES design, e.g. in a regional Agricultural-Environmental Forum, leads to higher TCs. This is however offset by a higher level of environmental effectiveness as a result of more targeted and precise AESs (Eggers, 2006). This illustrates the link between the institutional environment and the characteristics of the schemes.

A final factor influencing public TCs relating to AESs is the natural environment. The condition of the natural environment will influence the efforts of the government in the design and implementation of AESs. As such, it influences the characteristics of the schemes, which, as mentioned earlier, can be targeted to a greater extent with a more heterogeneous environment.

Finally, the arrow in Fig. 1 going from public TCs towards the same box indicates that different types of TC can be positively or negatively correlated with each other, such as high costs for stakeholder participation at an early stage could decrease monitoring and enforcement costs later (for a general discussion of the interrelationship between different transaction costs see Furubotn and Richter, 2005, pp.47–57).

Much of the literature described previously made use of primary or secondary data on public TCs for AESs in order to identify the influencing factors. The next section will describe how the methodology used in this research is composed of several elements.

4. Methodology

Because of the scope of this study, which covers a total of nine European countries, obtaining government figures on TCs and using secondary data to identify public TC influencing factors was a difficult task. Therefore a standardised face-to-face questionnaire was chosen

with close-ended, mainly Likert scale, as well as open-ended questions. The advantage of this kind of structured interview is that it can be used to assess perceptions of TCs. Problems with this approach are the high costs and the fact that it is time-consuming. Moreover, respondents are asked to estimate future costs or remember costs from the past, which could lead to less reliable results (McCann et al., 2005). Apart from questions on public TCs, the questionnaire also contained questions regarding the organization to which the respondent belongs, the natural environment, the effectiveness, efficiency and objectives of AESs, participation of actors in AES design and implementation, and institutional alternatives for AESs. A series of definitions of the concepts used preceded the questionnaire. A definition of TCs was provided, after having posed the question as to how much time was spent on the following AES related tasks: design, notification of AESs (to the European Commission), contracting, payment, monitoring, control, evaluation, advice and support. After the respondent had answered this question, public TCs were defined as the total costs involved in these activities, excluding the compensation payment for farmers, or the total costs of setting up and running the organisational and contractual structure for AESs. The translation of the questionnaire for the different countries was done by the researchers from each country and was facilitated by a meeting with the responsible researchers and a document with written guidelines.

Table 1 depicts the obtained sample and shows that, in general, the agricultural administration is represented most in the sample, followed by the environmental administration and farmers' associations. Environmental associations and researchers are represented to a lesser extent. Because of the intention to interview all actors from all administrative levels who are, or could be, involved in the design of AESs, a small number of representatives from hunting, tourism, consumer or any other relevant associations were also questioned. However, the number of respondents in these groups was too small to conduct reliable statistical tests. Therefore, all groups with less than ten members are summarised in the group 'Others'. In order to identify the individuals to be interviewed, firstly the relevant organizations were identified who were in some way involved in AESs. The researchers in each country, who had previous experience with AES related research, started from the organizations they knew to be involved. Within these, individuals were selected who were personally responsible for, or at least directly involved in AES design, administration or control. These individuals then indicated other people whom they also knew to be involved. The final selected sample was discussed with the leading researchers. Through this combination of purposive and snowball sampling, in each case study a sample could be obtained with the best possible representativeness for the population of interest. Full representativeness, or interviewing all of the individuals involved, was not possible owing to budget limitations, but the most important, leading actors were always incorporated. The distribution of respondents over the different categories in all countries reflects, to some extent, the structure of relevant and interested actors in the field of AESs in each country.

Table 1
Number of respondents by type of organization and country.

Region/type	AgAd	EnAd	FaAs	EnAs	Res	Other	Total
Flanders (BE)	7	11	3	4	2	3	30
Czech Republic (CZ)	12	8	5	5	3	3	36
Finland (FI)	22	6	14	3	2	0	47
Basse-Normandie (FR)	18	8	10	1	3	1	41
Brandenburg (DE)	7	10	4	5	5	7	38
Ireland (IE)	1	0	1	2	3	2	9
Veneto and Emilia Romagna (IT)	8	3	9	2	5	3	30
Friesland (NL)	4	2	2	2	7	2	19
Northeast England (UK)	6	7	2	9	2	3	29
Total	85	55	50	33	32	24	279

Legend
AgAd: Agricultural Administration.
FaAs: Farmer Association.
Res: Research.
EnAd: Environmental Administration.
EnAs: Environnemental Association.

In order to identify factors influencing public TCs, the first method used was to find a proxy for TCs associated with the design and implementation of AESs, which could then be used as a dependent variable in a statistical regression containing several explanatory variables obtained through the questionnaire. The proxy for public TCs chosen in this research is the percentage of working time the individual respondents, apart from the farmers, spent on AESs. The respondents were asked to estimate the average percentage of their time spent on AESs per year, over the period 2000 till 2006. Explanatory variables, as described in Fig. 1, relate to the behaviour of the actors in the transaction, the attributes of the transaction, institutional environment and governance structures and the heterogeneity of the natural environment.

The second method involves investigating the perception of factors influencing public TCs. The respondents were specifically asked to assess to what extent certain predefined factors, based on the literature review, influence public TCs. Additionally, and as a response to Buckley and Chapman (1997) mentioned earlier, attention is paid to levels of knowledge concerning public TCs. In accordance with the relevant literature, the hypothesis is that actors involved in AES design have only limited knowledge of the TCs associated with the design process. Respondents were asked to evaluate this knowledge and compare it to their knowledge on the environmental effectiveness of AESs, which was expected to be higher. In order to avoid generic results, only the knowledge of the national agricultural administration was assessed, which is usually the most important actor in the design process.

Finally, respondents could give their own view on public TC influencing factors in an open question. This yields important qualitative information, which can help with the interpretation of the statistically obtained results. In the following section the results, obtained via these three methodological approaches, are presented.

5. Results: Factors Influencing Public TCs Regarding AESs

5.1. Identifying Public TC Influencing Factors Through Statistical Analysis Using a Proxy

As mentioned in the methodological section, one approach to determining public TC influencing factors is to perform a statistical analysis with a proxy for public TCs serving as a dependent variable. The proxy chosen here is the percentage of working time spent on one particular activity in the spectrum of AES related activities, namely contract design. Design not only involves the technical design of the schemes, but also the consultation process with all stakeholders, which precedes it. Each respondent was asked to estimate the average percentage of his or her working time spent on AES design per year, over the period 2000 till 2006. Percentages were requested instead of the actual number of hours spent, because this is easier to estimate and gives a better indication as to the perceived effort spent on scheme design. Personal working time was used, instead of working time per department/unit or organization, to be able to make the link with variables expressing personal opinions. In addition to scheme design, public TCs for AESs also comprise costs for notification and communication with the European Commission, contracting, organizing payments to farmers, monitoring, control, evaluation activities and provision of advice and support to farmers. Although information on the time spent on other tasks is also available, design was selected because

Table 2
Linear regression model on public TC influencing factors.

Ln % of working time spent on AES design		
Variables	Coefficient	P
Frequency of information exchange with researchers	0.112	0.418
Frequency of information exchange with farmers' associations	−0.497***	0.001
Influence of environmental administration on design process	−0.028	0.864
Influence of environmental associations on design process	−0.068	0.723
Opinion—EU administration trusts administration at NUTS 0&1 level	−0.186	0.212
Opinion—environmental administration trusts farmers	0.373**	0.044
Importance of the objective to reduce negative impacts of agriculture	−0.266**	0.049
NUTS0	1.197***	0.009
NUTS2	0.368	0.420
NUTS3	0.014	0.977
LAU	−1.602	0.136
Seriousness of environmental problems	0.042	0.320
Heterogeneity problem—soil quality	−0.182	0.236
Heterogeneity problem—water quality	0.391***	0.019
Heterogeneity problem—biodiversity	0.032	0.832
Opinion—agri-environmental problems interlinked	0.058	0.742
Constant	0.877	0.548
Number of observations	84	
F-statistic	4.01	
Prob>F	0	
R^2	0.489	

Significance level: *** = 0.01, ** = 0.05, * = 0.1.

the group of respondents involved in this activity was the largest. Other questions in the database are also specifically related to AES design and can thus be incorporated within the statistical model. The implementation phase was given less consideration in this research to avoid too long a questionnaire, which could negatively influence respondents' participation. Of course, only those respondents actually involved in design were included in the statistical model.

First of all, since this proxy variable for the proportion of personal working time spent on design of AESs is not normally distributed, the natural logarithm of the time is used as the dependent variable. Because of multicollinearity, several variables had to be excluded from the model. Descriptive statistics on the variables used in the model can be found in Table 3 in Appendix A. The linear regression model obtained (see Table 2) shows a significant effect for the frequency of information exchange with farmers' associations: the more information the respondent exchanges with these associations, the less time is spent on AES design. There is no influence observed for the actor group (Agricultural/Environmental Administration/Organisations, etc.), meaning that there is no significant difference between these groups in terms of their time spent on AES design. One possible explanation for the decreasing effect on time spent on AES design where there is frequent contact with farmers' associations could be that these organisations provide information which simplifies AES design. The involvement of farmers' organisations could also make the proposed AESs more acceptable for actors involved in the design, so that less discussion is needed in the design process. This result supports the hypotheses formulated in section 3 that the identity of the actors involved in the AES design process and the relationship between those actors influence public TCs. However, the observed influence could also be due to a crowding out effect: spending more time with farmers' associations leaves less time for AES design.

The respondents' opinions with regard to the statement "The environmental administration trusts farmers" also have an influence on the time spent on AES design. If the level of this trust is assessed to be higher, then more time is spent on design, which seems to contradict theory. Since in general, trust in farmers by the environmental administration is assessed to be low, this statement could, to some extent, reveal a critical precondition for efforts to design effective measures. Sako (2006: 277) for example, observed in a business study that in the USA and Japan "…high-trust suppliers were significantly more likely to spend a greater proportion of their contract time with customers in "joint efforts to improve the product of process…". So, one possible explanation for this result could be that if the critical trust condition is fulfilled, the administration will be more motivated to create better AESs which then takes more time. The positive relationship between trust and time spent in public participation processes has recently been shown by Enengel and Penker (2009). If trust is high, and there is a good relationship between farmers and the administration, the latter might also want to invest more time in creating practices which are less onerous for the farmers.

The following significant influencing factor relates to the type of AESs designed and their complexity. Less time is spent on AES design if the respondent believes that reducing the negative impact of agriculture is an important objective of the AES, than when the AES is believed to focus on stimulating positive externalities or adapting farming systems to the changing price and policy environment. This could be due to the fact that AESs focussed on stimulating positive externalities are relatively newer in the EU, so there is less experience in designing these schemes. Schemes focussed on positive externalities may also require more design efforts because of the more heterogeneous character of the environmental elements they target. Another explanation could be that they require more "environmental knowledge" on top of "agricultural knowledge" than measures aimed at reducing negative externalities. Therefore, to design these measures for positive externalities, the agricultural administration might need to consult more often with the environmental administration. Finally, despite the often not straightforward cause–effect relationship for negative externalities such as descreased water quality, the schemes targeting these problems can be relatively simple, like 'no use of chemical fertilizer'.

Concerning the institutional environment, the NUTS[5] level to which the respondent belongs, has an influence on AES design costs: the higher the level, the more time is spent on AES design, which reflects the actual centralised situation in the design of AESs.

Finally, the natural environment also seems to have an influence on AES design costs. The model shows that the higher the perceived heterogeneity of water quality problems, the more time is spent on AES design.

However, to validate these results and gain a better understanding, further steps are required. The next step consists of asking the stakeholders directly which factors they believe influence the cost of AES design.

5.2. Assessing Perceptions on Factors Influencing Public TCs: Quantitative Approach

In this section respondents were asked to assess the influence of specific factors, as predefined by the researchers, on AES design costs. Respondents were not limited to those involved in design, because

[5] NUTS means Nomenclature of Territorial Units for Statistics. It provides a uniform breakdown of territorial units for the production of regional statistics for the European Union. It is a three-level hierarchical classification of regions within a member state, mainly based on existing institutional divisions, but also on size of the area. NUTS 1 is the highest administrative level (e.g. Länder in Germany). The level of districts and municipalities is called "Local Administrative Units" (LAU) and are not subject to the NUTS regulation.

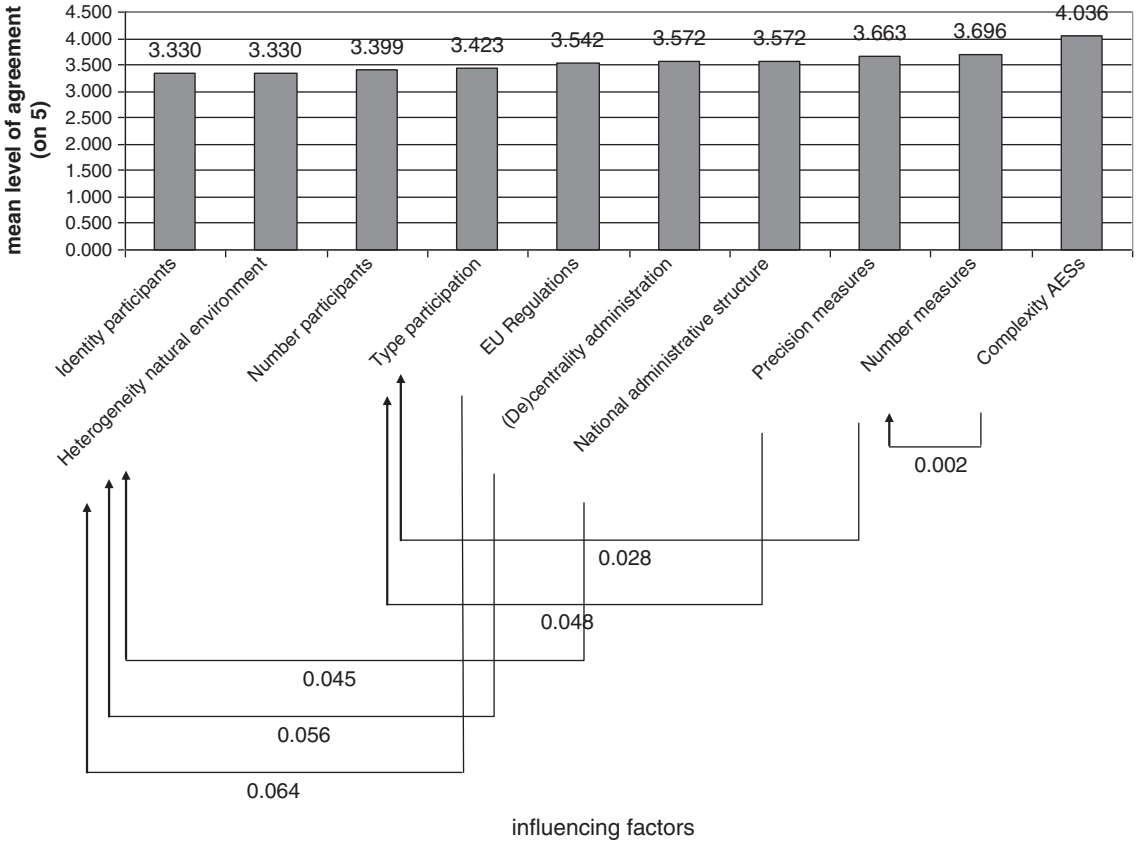

Fig. 2. Factors perceived as influencing AES design costs.

other actors, who are sometimes unable to participate in AES design owing to political pressure, can also have a valuable opinion on this. This was done on a Likert scale from 1 (totally disagree that the factor influences design costs) to 5 (totally agree that the factor influences design costs), including the possibility for the respondent to have "no opinion". Fig. 2 gives the results for all the respondents, with the mean level of agreement on the Y-axis. "No opinion" answers were not taken into account in the calculation of the mean. The factors are put in order of increasing importance and the arrows show where the differences in mean level of agreement between the factors start to be significant (based on a T-test, p-values are given). For example, the mean level of agreement for the factor 'Number of measures' is significantly higher than the mean level of agreement for the factor 'Type of participation' and all factors with a lower level of agreement. It is however not significantly different from the mean level of agreement for the factors situated in between these two. The figure shows that the complexity of the schemes is considered as the most important factor influencing AES design costs. This factor is followed by the number of measures and the precision of the measures. Thus, according to the respondents, public TCs are most strongly affected by the nature of the measures and the object of the transaction (the asset). Of lower importance are factors relating to the institutional environment and governance structure, such as the (de)centrality of the Administration, EU regulations, and the national Administrative structure. Factors belonging to the category of actors' behaviour, as defined in the literature section, such as the type of participation, the number of participants and the identity of the participants, are perceived to have a lower influence. Also the heterogeneity of the natural environment is perceived not to influence public TCs too greatly. Overall, little variation can be observed in perceived importance between the different factors. It is possible that TCs involved in AES design are influenced by several factors of equal importance, but this result could also be due to a lack of knowledge by respondents with regard to TCs. If respondents do not have a clear idea of TCs, then they might be inclined to avoid underestimating the importance of the factors, just to be on the safe side. If, however, all factors were of more or less equal importance, then reducing TCs is not an easy task because it requires focussing on several factors.

Several of these variables are also correlated. On the basis of a principal component analysis, using a Varimax rotation, the ten variables could be reduced to four factors showing which variables are correlated. The first factor relates to the institutional environment and is thus highly correlated with the original variables number and identity of participants in AES design, the type of participation, the (de-)centrality of the administration and the national administrative structure. Factor 2 relates to the characteristics of the AES and is most correlated with the variables number and complexity of AESs. Factor 3 is mostly correlated with the heterogeneity of the natural environment and the precision of the measures and factor 4 with the EU regulations. More information on this factor analysis can be found in Table 4 in Appendix B.

Very important to note concerning the perceived influence of factors on AES design costs is the high number of respondents with no opinion on the matter. For every factor taken into consideration, between 30 to 60% of the respondents had no opinion. In particular, the influence of the institutional structure on design costs was difficult to assess. The effect of the number of measures, their complexity and the heterogeneity of the natural environment was the easiest to evaluate.

Detailed analysis reveals that the type of organisation to which a respondent belongs is a particular determining factor for having an opinion on factors influencing design costs or otherwise. Officers from the agricultural administration and researchers have an opinion on the factors influencing AES design costs significantly more often than other groups ($p<0.01$). The fact that respondents from the environmental administration more often give "no opinion" answers than their colleagues from the agricultural administration, may indicate their lesser involvement in the AES design process.

Respondents were also explicitly asked to assess the level of knowledge of the national agricultural administration, which is usually the most important actor involved in AESs, regarding public TCs. It was also important to assess the awareness of national agricultural administrations regarding the loss of environmental utility owing to poorly designed AESs. Assessment was undertaken through evaluating statements on a scale from 1 (strongly disagree) to 5 (strongly agree), including a "no opinion" option. The assumption is that civil servants in the administration have a better knowledge of the environmental effects of scheme design than of the financial aspects of AES design and implementation. For both TCs and utility losses, there was a high number of "no opinion" answers (respectively 28% and 27% of interviewees), indicating that, in general, respondents might not be very much engaged with these issues. The majority of the respondents who gave an opinion believed that the knowledge of the administration on these two topics was low. Over all respondents, the mean level of agreement with the statement 'the knowledge of the administration with regard to TCs is high' was 2.6 (s.d.[6] 1.2) out of 5. For the statement 'the knowledge concerning utility losses caused by imprecise AESs is high', the mean level of agreement was 2.4 (s.d. 1.1) out of 5. So, it seems that the interviewees estimate the knowledge of the administration on TCs to be slightly higher than their knowledge on environmental utility losses. However, when respondents were asked whether they saw a difference in knowledge between the different levels of the agricultural administration, 29% answered yes (again, around 50% of the actors had no opinion on this question). The open question relating to this topic revealed that knowledge on utility losses due to imprecision are noticed more at lower administrative levels. The explanation that is often given for such observations is that individuals at such levels are closer to the issues of concern. For public TCs, respondents perceive a higher level of knowledge at higher administrative levels, although several point out that knowledge on TCs is generally lacking.

Alongside this quantitative approach towards assessing perceptions on factors influencing public TCs, an open-ended question permitted a qualitative approach to this issue.

5.3. Assessing Perceptions on Factors Influencing Public TCs: Qualitative Approach

The open question on public TCs regarding AES design and implementation provoked a wide diversity of additional comments on public TCs. Despite the fact that many respondents seem to find TCs an interesting issue, there seems to have been little reflection on this, leading to diverse comments and a lack of overall structure. However, issues that gained particular attention were TCs in relation to regulations, effectiveness and the cost of measures, continuity of AESs, distribution of cost components of AESs and knowledge and measurement of TCs.

[6] Standard deviation.

Concerning the impact of regulations on TCs, there were complaints that EU regulations contribute to increased TCs, e.g. because of extensive reporting requirements. Some respondents suggest that the abandonment of national co-financing would reduce TCs. Others point to the impact that national administrative procedures in the application process have on TCs, and argue for the administrative pathway to be simplified or shortened to reduce TCs. Information technology solutions were suggested as a possible way to achieve this. Simplification of the application process would also benefit farmers, because some respondents claim that many farmers no longer have an overview of the schemes and the administrations responsible for them. Another common answer was that greater continuity of AES policies could decrease TCs.

The relationship between the effectiveness of the schemes and public TCs is a major issue in most regions studied in this research. The overall opinion seems to be that TCs can be high, as long as they are offset by a high level of effectiveness for the schemes. This however seems to be very difficult to determine. Several respondents believed that TCs for AESs are currently not in proportion to the effectiveness of the schemes. Some respondents argued that AESs should in fact be evaluated on the basis of their environmental effectiveness and the corresponding TCs. In the opinion of several respondents TCs increase with the complexity of schemes, but this can in turn lead to greater benefits.

Respondents' opinions are divided as to how total AES TCs are distributed over the different activities relating to AESs. According to several respondents, implementation of the schemes is relatively costly and this is mainly the result of the high costs of ensuring farmers' compliance with scheme requirements. Other respondents indicated that scheme design and communication are the most expensive AES activities.

Several respondents believed there to be a lack of information and knowledge on TCs relating to AESs, although some said this is because administrative work is difficult to value.

Trust was also an issue often referred to in the responses to the open question. Overall, respondents believed that trust in farmers can differ greatly between different administrations (with a higher level of trust by agricultural administrations), political parties and also individuals. A lack of trust would however increase control costs according to some respondents.

The qualitative analysis shows that opinions on TCs are diverse and rather detailed. This might be due to the absence of discussions on TCs between and within all administrative levels and actor groups (Eggers et al., 2007).

6. Discussion and Conclusions

In this paper different quantitative and qualitative techniques were combined to assess public TC influencing factors relating to AESs and stakeholders' perceptions of them. Knowledge of public TC influencing factors is useful in enabling appropriate action to be taken to decrease these costs.

The stakeholders involved in AESs (excluding farmers), perceive that AES design costs are mostly influenced by factors relating to the object and attributes of the transaction, that is factors that relate to the schemes themselves. The complexity of the schemes, the number of AESs that need to be designed and the required precision of measures are perceived to be the factors with the greatest influence. The open question however reveals that this does not necessarily imply a desire for a smaller number of schemes and for schemes that are homogeneous: well functioning AESs may be costly. When judging TCs, the costs associated with failure to meet targets or environmental utility losses should always be taken into account. However, a number of stakeholders believe that the high TCs involved in current AESs do not

correspond to their environmental benefits. It is necessary to achieve a better balance between TCs and the environmental effectiveness of AESs in order to increase acceptance of the schemes and ensure their future.

As regards the precision of AESs, the statistical model shows a significant positive relationship between the heterogeneity of the environmental problems and AES design costs, which respondents perceive to be a less important influencing factor. It also identifies another significant influencing variable in this category, namely the objective of the scheme. The model predicted lower AES design costs if the main objective of AESs is only to reduce the negative environmental impacts of agriculture, suggesting that it is much more difficult to design schemes to stimulate the positive externalities of farming. On the other hand, AESs stimulating positive externalities of farming may contribute to a more positive relationship between farmers and the government, increasing trust and thus decreasing monitoring and control costs. A possible reason why scheme-related factors are perceived to be the most important could relate to the fact that they can be more easily pictured than, for instance, the effect of the institutional governance structure or environment. The high number of "no opinion" answers obtained within the latter category of influencing factors is striking.

In general, all questions concerning TCs show a high number of "no opinion" answers, indicating a low level of knowledge by the stakeholders on this topic. Stakeholders who express an opinion, assess the agricultural administration's level of knowledge regarding TCs as rather low, especially at the lower administrative levels. This is to some extent offset by a perceived higher level of knowledge regarding environmental utility losses at these levels. These results indicate that organising AESs at an intermediate administrative level, such as NUTS 2, has the potential to generate AESs that are environmentally more effective in a heterogeneous natural environment, without the resulting TCs being too high (see also Beckmann et al., 2009).

In the perception of the stakeholders, who participates in the design process is not such an important influencing factor. However, the model suggests that if farmers' associations are more frequently heard, AES design costs would be lower. Possible explanations for this observation are that farmers' organisations provide useful information which can simplify AES design, or that their involvement makes the proposed AESs more acceptable for actors involved in the design. Involvement of farmers' organisations in AES design could however not only influence public TCs, but also the uptake of the schemes by farmers, again because of increased trust in the AESs.

Governance structures and the institutional environment, such as the (de)centrality of the administration, the national administrative structure and EU Regulations, are perceived as the second most important factor influencing AES design costs. EU Regulations are often featured in responses to the open question. In the case of more decentralised structures, the question arises as to whether EU requirements could be fulfilled on all these lower administrative levels. High TCs could potentially impede this, so greater flexibility could be required on the part of the Commission. On the other hand, the strict EU regulations could be understood as a conscious strategy to save on TCs at EU level, but investigating this was outside the scope of this research.

Trust is often observed in research as a factor influencing TCs. The model shows a significant influence of trust, with higher design costs if trust in farmers by the environmental administration is high. This result seems to run counter to theory, but it could be that a high level of trust of the environmental administration indicates a critical precondition which if fulfilled would result in greater efforts to design good measures. The open questions reveal that trust is a complex issue, which can differ according to the type of administration, the political party in charge and also between individuals. Transaction costs economics usually predicts that trust reduces TCs however it is more complicated than that. Trust may enable transactions which are not possible without it. In this case, not less but more time is spent in order to generate an overall higher value (for the role of trust and value creation in business networks see, e.g. Tsai and Ghoshal, 1998).

Finally, the low level of knowledge concerning TCs in general is often referred to in the responses to the open question. These results prove that TCs are a concept that cannot be easily grasped, and tends to be something that is more intuitively understood by stakeholders.

The structured interviews yielding the data for this paper had a broader scope than TCs alone and also covered other aspects of the institutional organization of AESs such as (de-)centralization and the participation of stakeholders (see also Beckmann et al., 2009). This made the questionnaire quite long and demanding for the respondents, but also prevented deeper interrogation into the TC issue. Budget and time constraints moreover limited the amount of interviews undertaken per case, resulting in fewer interviews in some case studies than recommended by leading researchers. The Irish sample, with only nine interviews, and the Dutch sample, which was dominated by researchers, were particularly problematic. Nevertheless, it was decided to retain these countries in the sample because they still provide useful information. Although this affects the quality of the results, the 300 or so interviews undertaken with AES stakeholders in 9 European countries give a good general view on public TC determinants in European agri-environmental policy. Future research, focussing only on TCs, could provide further insights into specific phases of the policy cycle (i.e. not only the design phase). This is necessary to obtain an insight on factors influencing public TCs as a whole. Factors influencing AES design costs, the part of public TCs focussed on in this paper, are probably not the only factors influencing total public TCs. Their influence on total public TCs might also be different than on design costs. It would also be interesting to compare TCs for AESs with those associated with alternative agri-environmental governance types, such as the call for tender procedure that was introduced in agri-environmental policy with Reg. (EC) 1698/2005. (for a first step see Eggers et al., 2008). The relationship between trust of different actors and transaction costs in agri-environmental policy is another promising area for further research. At least for the design of AESs, this study reveals that critical trust factors result in more time spent, not less. This, finally, suggests that there is a need to pay more attention to the benefits of agri-environmental policies in relation to their (transaction) costs.

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[7] Integrated Tools to design and implement Agro Environmental Schemes.

Appendix A

Table 3
Descriptive statistics on the variables used in the linear regression model.

Variables	Mean	S.d.[a]	Frequencies				
			Never (1)	Once a year (2)	A couple of times per year (3)	Several times per year (4)	Once a month or more (5)
Ln % working time spent on AESs	0.868	1.570					
Frequency of information exchange with researchers	2.810	1.331	20	12	27	14	11
Frequency of information exchange with farmers' associations	3.333	1.216	10	4	36	16	18
			No influence (1)	(2)	(3)	(4)	Very high influence (5)
Influence of environmental administration on design process	3.393	1.271	5	20	18	19	22
Influence of environmental associations on design process	2.762	1.071	6	35	23	13	7
			Strongly disagree (1)	(2)	(3)	(4)	Strongly agree (5)
Opinion—EU administration trusts administration at NUTS 0&1 level	3.155	1.177	7	23	12	34	8
Opinion—environmental administration trusts farmers	2.202	0.847	15	44	19	5	1
			Objective not important (0)	Third most important objective (1)	Second most important objective (2)	Most important objective (3)	
Importance of objective to reduce negative impacts of agriculture	1.881	1.186	18	10	20	36	
			0	1			
NUTS0			62	22			
NUTS2			68	16			
NUTS3			58	26			
LAU			82	2			
Seriousness of environmental problems[b]	14.488	4.190					
			Very homogeneous (1)	(2)	(3)	(4)	Very heterogeneous (5)
Heterogeneity problem—soil quality	3.190	1.187	8	17	21	27	11
Heterogeneity problem—water quality	2.988	1.092	7	24	21	27	5
Heterogeneity problem—biodiversity	3.226	1.196	9	14	21	29	11
			Strongly disagree (1)	(2)	(3)	(4)	Strongly agree (5)
Opinion—agri-environmental problems are interlinked	4.095	1.025	3	3	13	29	36

a: Standard deviation.
b: Variable created as the sum of five variables concerning the seriousness of problems regarding: soil quality, water quality, water quantity, landscape and biodiversity (each measured on a scale from 1—no problem at all to 5—serious problem).

Appendix B

Table 4
Factors perceived as influencing public TCs: results of the principal component factor analysis (rotated component matrix).

	Factor analysis: 60% of the variance is explained			
	Factor 1	Factor 2	Factor 3	Factor 4
The number of participants/participating parties in the design process	0.545	0.469	−0.032	0.260
The identity/heterogeneity of participants in the design process	0.598	0.314	0.192	−0.040
The type of participation (consultation, right to vote, veto…) of different actors in the design process	0.458	−0.009	0.343	0.417
Centrality/decentrality of the administration	0.779	−0.075	0.085	−0.336
The national administrative structures	0.585	−0.161	−0.217	0.272
The number of measures offered	0.073	0.797	−0.124	−0.134
The complexity of AESs	−0.071	0.727	0.344	−0.051
The heterogeneity of the natural environment	0.079	0.176	0.540	0.023
The precision of measures	−0.021	−0.107	0.840	−0.003
The EU regulations	−0.042	−0.111	−0.003	0.885

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