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Methodology for analysing private transaction costs

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Abstract

When farmers decide to uptake a AES contract, they face many operational and other costs. This report describes the different categories of private transaction costs (TCs). As opposed to public TCs, private TCs are at the expense of the farmer. The latter include information, negotiation, opportunity, administration, monitoring and control costs that arise before, while and after the implementation of the AES. This report presents a conceptual framework which indicates the importance of transaction costs and proposes two hypothesis to be tested. The next section defines transaction costs and explores its different categories. Section 4 gives a literature overview on how transaction costs have been measured and modelled in environmental schemes, introduces a model on contract choice and discusses different options for data collection.

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1 Introduction

In many rural areas in Europe the demand of agri-environmental goods is much higher than the supply. The characteristics of the agri-environment as a public good and the inherent high level of uncertainty involved, make a private market for these goods and services difficult. The resulting conflicts in resource use are motive to the government for initiating voluntary programmes (Falconer & Whitby, 1999). Yet, agri-environmental schemes (AES) are more than just implementing or changing the production system. The uptake of environmental efforts is also a process of learning, innovation, information and contracting. The government has interest to stimulate farmers to uptake AES measures in the sense that farmers can contribute to sustainable development by having a more environmentally friendly production process. Hence, the government promotes these environmental friendly production with financial incentives.

By uptaking AES the farmers promise to supply public services to the community, in the form of nature for recreation or by taking care of the environment. Typically, these public goods and services are non-rival and non-excludable (as the use of nature by one will not endanger or diminish the potential use by another; and no one can be excluded from the use of public goods), which result in unclear property rights. They are therefore not “traded” on a market, nor will the community in most cases pay the farmers for the beautiful “scenic view” (Whitby, 2000) (exceptions are rural tourism, labelled products from organic agriculture, on-farm sales and inviting children on the farm).

Hence the government is seen responsible to provide the proper financial and support incentives for farmers to produce the public services, indirectly paid by the community through taxing system. It is worth mentioning that the government is also seen responsible to deal with the “environmental bads” or externalities, in particular to define property rights and assign the particular owners of pollution (Whitby, 2000).

AES are based on long-term, voluntary contracts between farmers and government, wherein the farmer promises to manage the ecological environment according to codes of practices inscribed and in return for compliance is paid a compensation fee. Yet, the changes in production practices will incur a number of costs (in inputs, time, and knowledge). Furthermore a high amount of administration is involved, as well as time-consuming learning, gathering of information on production systems and contracting, negotiation and control.

Belgian farmers involved in agri-environmental schemes often mention the high amount of administration, as well as the lack of knowledge on the production processes, schemes, compensation payments and institutional arrangements as major limiting factors to expand their environmental efforts. Farmers have to be interested in participating to the programme. They have to know what is required, and be able to make a decision based on a rational costs and benefits basis. The most important benefits are the compensation payments, while the costs include both direct costs and implicit costs to the new arrangement. The latter are often not taken into account, but these transaction costs do matter!

In short, the public-good status of providing nature and ecological capital makes it particularly difficult for the farmers to make sensible allocation decisions in particular within a traditional neo-classical approach. The neo-classical economic theory pictures the decision-making unit or firm as a black box, a production function, wherein inputs are transformed into

outputs according to laws of technology (Williamson, 2003). A firm's level of capital and labour is related to its productive output (Lieblein, 2003), whereby market pricing coordinates the use of resources (Demsetz, 1983 cited in Williamson, 2003). This however will explain little on the inner workings, nor on the firm's reaction on uncertainty or potential opportunism in contracting. It is therefore that this report proposes to analyse the AES through a "new lens" (cf. Williamson, 2003). It focuses on the "the costs of doing business, and the social rights and obligations (institutions) which people contrive to reduce them" (Hubbard, 1997), and therefore applies a Transaction Costs Economy (TCE) approach. We investigate on the private transaction costs related to the type and terms of AES contracts towards a better understanding of the farmer's behaviour, the dynamics of the institutional arrangements and the environmental impact of a AES policy.

TCE is situated within the New Institutional Economics (NIE), and analyses how transaction costs can be minimized under the most "optimal" governance structure. Central to the TCE is that simple transactions are matched with simple modes of governance, while more complex exchanges with more complex forms of organisation (Leiblein, 2003). Any deviation will incur new costs.

Transactions costs are defined by Coase (1961) as "those costs of carrying out a transaction by means of an exchange on the open market", and "in order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on". In this logic, transaction costs can be measured by taking the economic value of resources used in locating trading partners and executing transactions. Or the difference between prices paid by the buyer and received by the seller can be a proxy for the transaction costs involved in the marketing of goods (Wang, 2003).

In the approach of Williamson, transaction costs are secondary costs of negotiation and enforcement. As will be elaborated in the next sections, transaction costs are considered to explain the alternative forms of economic organisation and contractual arrangements. Therefore, it is put forward that, amongst others, uncertainty, transaction frequency, asset specificity and opportunism will have a critical effect on the transaction costs. So, instead of measuring the costs directly, comparative analyses of different organizational or contractual choices are more frequent (Wang, 2003).

The next section elaborates on the importance of transaction costs in contracting and analyses the implications for contracting following New Institutional Economic theory. The following section gives a definition of transaction costs including a discussion on the differences between private and public transaction costs. Section 4 gives a literature overview on the transaction costs analyses, while section 5 provides references towards the methods used to measure transaction costs.

2 A conceptual framework

2.1 Why transaction costs?

Deciding to participate in an AES will depend on many factors, including characteristics of the farmer’s family, farm structure, environment, institutional environment, but also the economic or financial situation of the farm business (Figure 1). It can be argued with Falconer (citing Newby (1977)) that the business motives are decisive to the uptake of AES contracts.

Yet agri-environmental goods and services are public goods for which no market provides a price. As argued above, the neo-classical theory does not provide a satisfactory answer on the allocation decision of the farmers. We argue that the contract and contract terms are more important than the production function in explaining the farmer’s behaviour towards the uptake of AES. We thereto put forward a conceptual framework of analysing private transaction costs to explain the farmers’ behaviour towards AES contracts.

In the simple framework presented in Figure 2, we distinguish three major groups of actors in the participation of AES, namely farmers, government and the community. Each group has its own reasons why farmers should/could participate in AES: (a) the *community* enjoys the rural areas, as a place to come to nature. It is concerned with the preservation of that nature, and has concerns on the ecological situation of the countryside. The rural areas are for some a place to live, while for others who live in urban areas it is a place to relax; (b) the *government* is concerned with sustainable development of rural areas, and therein the preservation of the ecological capital (nature, diversity, ecology, landscape amenities), economic and social support of the farm sector. The farmers are the agents of the environmental change to achieve the policy goals (Falconer, 2000); and (c) the *farmers* are concerned with ecology, because nature constitutes their working environment. According to Falconer (2000) two aspects are important in the agri-environmental decision-making, namely (1) the attitude of the farmer towards the environment, and the willingness to uptake on-farm environmental measures, and (2) the attitude towards AES and the way these are implemented (e.g. policy objectives, financial compensation, procedures involved).

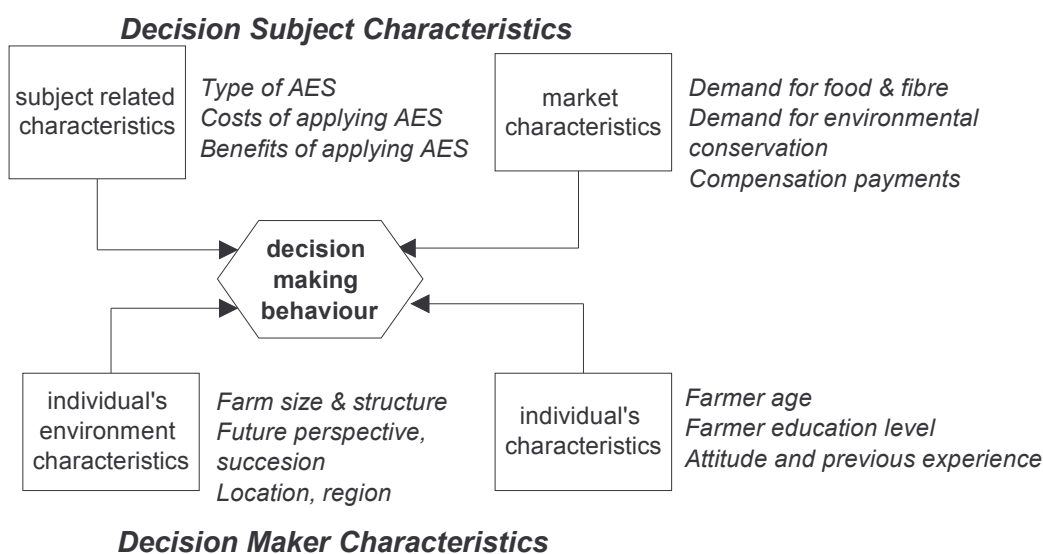


Figure 1: Decision making behaviour of farmers (Van Slembrouck, 2001)

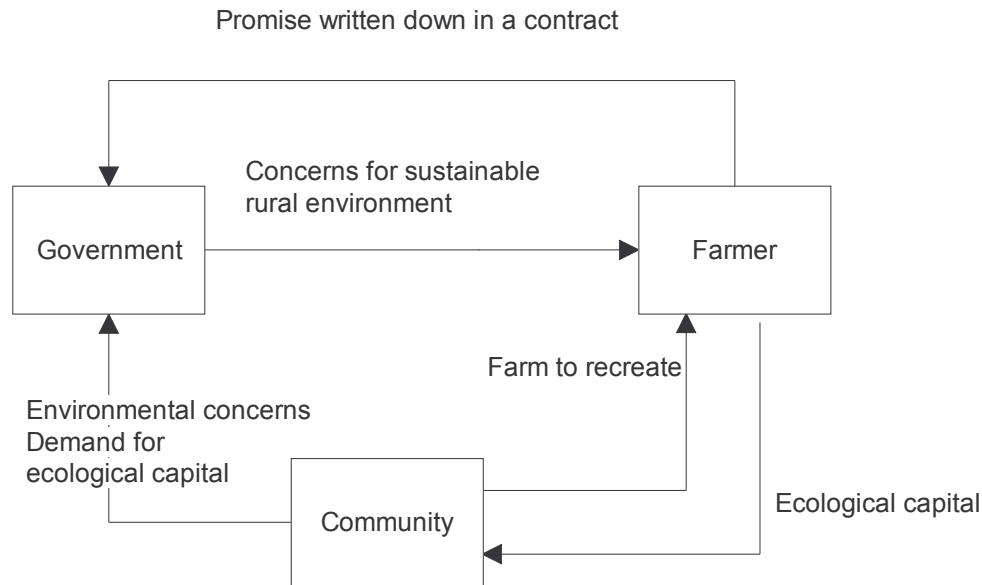


Figure 2: Motivation

It is also difficult to assess all costs and benefits for the community, government and farmers. In economic terms, the compensation payments are transfer payments within the society. The administration of these schemes incurs real resource costs (Falconer & Whitby, 1999), because every transaction will imply specific implicit and explicit costs (Hobbs, 1997). These implicit costs are also referred to as transaction costs.

We here argue that the contracts in the AES are transactions between the farmers and the government whereby the farmer are sellers and the government buyers of agri-environmental goods and services. Along with the TCE economy, contracts are shaped in such a way that the transaction costs are reduced. A way of looking at contracts is that due to bounded rationality and differentials in bargaining power, government is the major agent in the AES contracts so that the contract terms will in first instance reduce public transaction costs and only to a lesser extent the private transaction costs of the farmers.

By comparing the contracts in the different case studies, it is our aim to explain:

- How transaction costs influence the contract terms
- How contract terms can influence the success of the AES cross-country, including the way high transaction and administration costs are discouraging farmers to participate in AES
- How fixed contracts are the most effective and cost-efficient governance structure for farmers and governments to align ecological and socio-economic incentives
- What elements should be taken into account when redesigning AES

In this report, we focus on the farmers and hypothesize that farmers seek to maximize utility, and will then decide to participate in a AES when the benefits are larger than the costs. The benefits are a combination of the compensation payments accordingly the contract and the payments of the use of the farm amenities (farm tourism), sales at farm gate, farmers markets, premiums for organic agriculture... Costs then include the direct costs of implementing the AES, and the transaction costs (Figure 3a). The latter can be *ex-ante* to contracting such as search costs, information gathering and negotiation costs; running costs or *ex-post* such as control. The above reasoning also implies that the farmers, once decided to uptake the AES

contract, will seek to maximize the extra profits to be generated by the environmental measures described in the contract (Figure 3b).

$$\text{Max } \Delta\pi_{\text{farmer}} = \Delta R_{\text{farmer}} - \Delta I_{\text{farmer}} - \Delta TC \text{ (Private TC)}$$

The extra profit ($\Delta\pi_{\text{farmer}}$) is equal to the extra revenue (ΔR_{farmer}) minus the extra direct input costs (ΔI_{farmer}) and the extra private transaction costs involved (ΔTC).

The transaction costs involved in AES are therefore linked to the contracts between the three actors mentioned above. Figure 3c shows that the net compensation from participating in the AES is the remainder of the compensation payments and the transaction costs incurred. The difference between these public transaction costs and the private transaction costs are given in the following section. The transaction costs incurred by the farmer, or private transaction costs, can result to be a barrier for farmers to participate in voluntary agri-environmental schemes, for example related to making initial inquiries about scheme participation (Falconer & Whitby, 1999).

The organisation and administration of the programme also brings along high transaction costs. The public transaction costs will be important when evaluating the effectiveness of a AES policies. In this case, a transactional costs analysis can be useful to identify the scheme or combination and sequencing of schemes that minimize the total cost for the community, namely the scheme compliance costs (production costs or opportunity costs of producing agri-environmental goods) and transaction costs (Falconer & Whitby, 1999; OECD, 2003). The main focus in this study is to analyse the contracts between government and farmer and to describe and measure the private transaction costs involved.

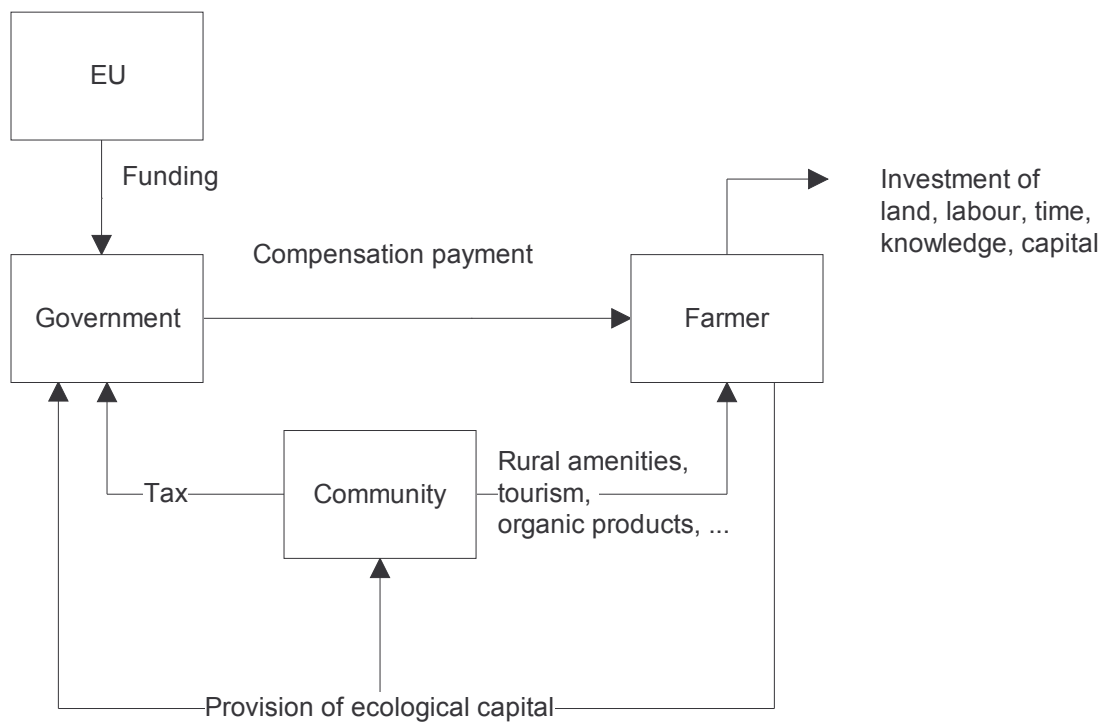


Figure 3a: Extra revenues and extra costs

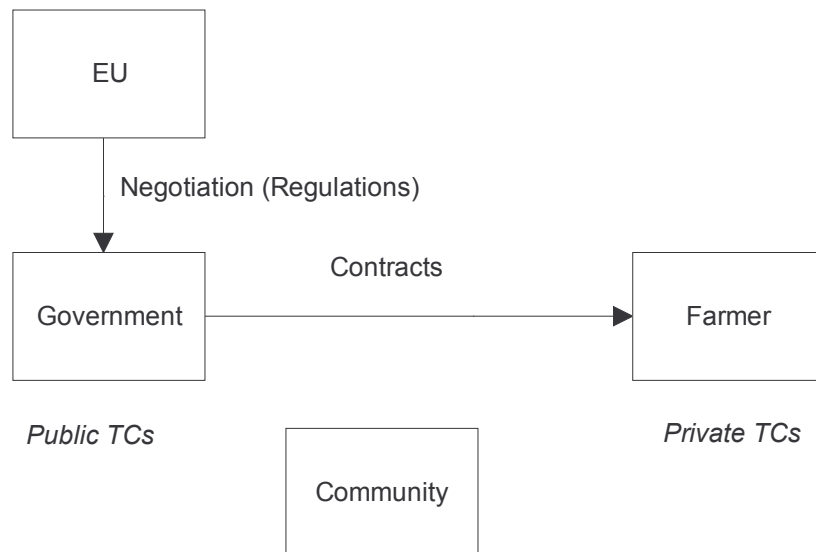


Figure 3b: New transaction costs involved

PRIVATE		Private transaction costs of participation in the scheme	Net compensation from participation in the scheme (i.e. notional profit foregone by the farmer)
PUBLIC	Public transaction costs (administrative costs of operating the scheme)	Compensation payments to participants	

Figure 3c: Private and public policy transaction costs (Falconer & Whitby, 1999)

2.2 Hypothesis to be tested

As argued above, we assume that a farmer maximizes utility from his conventional farm activities and from the environmental benefits. Yet both utilities are the result of a production function in which efforts, including inputs, fixed inputs and labour are invested to reach outputs.

The benefits of participating in the AES should outweigh the costs. The latter include both input costs, (semi-) fixed cost and transaction costs. The transaction costs pose a specific problem, as they are not evenly distributed over the time frame of the contract. E.g. they can be composed of high ex-ante costs, relative monitoring costs and high control costs.

It is expected that the burden of the ex-ante costs and the expected monitoring and control costs will influence the choice of participating in a AES and the choice of the contract, along with the expected net benefit from the contract namely the level of compensation payments, the direct costs associated with the conservation and the direct utility derived from the conservation [or as will be shown in section 4.3: $E = f(m, c, tc_p, u(Q))$ with m level of compensation payments, c direct costs associated with conservation, tc_p farmers private transaction cost for participating in conservation schemes, and $u(Q)$ direct utility derived from conservation, which obviously is a function of Q and consequently an indirect function of E].

With regard to the contract theory, it is argued that contracts are shaped in such a way that the transaction costs are reduced. Yet farmers are often “cost-takers” when it comes to transaction costs. The farmer should therefore decide on whether or not to engage in a AES and, if yes, in which contract.

The first hypothesis is then:

The farmer’s decision to uptake an agri-environmental contract and his choice in type of contract depends on farm characteristics, the implementation costs involved, the level of ex-ante transaction costs and the perceived importance of compensation payment and transaction costs.

Sub-hypotheses are that:

1. *The transaction costs involved should not be underestimated and are directly related to the institutional arrangements and the institutional environment.*
2. *The level of transaction costs are higher with*
 - a. *Information costs – these are ex-ante costs including the time and money spent to collect information on the contract terms, and its implementation, also including acquiring specific knowledge. It also concerns the assessment of the opportunity costs of time spent to implement the contract and foregone benefits of crops and livestock;*
 - b. *Negotiation costs – these are costs to conclude the contract, including the time and money spent on administration of the contract and the waiting time before the approval of the contract.*
 - c. *Control costs – these costs include time and money spent to daily monitor the implementation of the contract, the administration to fulfil for the control, and the burden of control.*
3. *The level of transaction costs are also influenced by perceived importance of:*
 - a. *Specific investment – this includes the investment in people, infrastructure, knowledge specific to the implementation of the agri-environmental scheme.*
 - b. *Frequency of contracts – it is argued that the transaction costs for a new contract will be lower compared to the initial contract because the less specific investments are needed.*
 - c. *Uncertainty and the level of trust in the government*

The second hypothesis becomes:

A cost-benefit analysis of the current agri-environmental contract [in which the farmer evaluates the net benefits as the compensation payment minus the net benefits foregone, the costs of implementation of the agri-environmental contract and the transaction costs involved] reveals the importance of transactions costs (asset specificity, uncertainty and frequency) relative to the operational costs.

3 Defining transaction costs

3.1 *Transaction cost economics*

In the neo-classical economic theory production decisions are taken under the assumption that transaction costs are zero. In this case, resource allocation will not be influenced by the form of the governance structure. Yet, transaction costs do matter. Moreover governance forms are organised in such a way that these costs are minimized. A firm is then an “efficiency-inducing administrative instrument that facilitates exchanges between economic actors” (Leiblein, 2003).

In TCE the basic unit of analysis is the ultimate unit of activity: a transaction (Commons, 1932). And transactions between economic actors are costly. Governance is then the means “to infuse order, thereby to mitigate conflict and to realise mutual gain” (Williamson, 2003).

The two major assumptions of TCE are that (1) individuals within a firm are boundedly rationale. This is because the high complexity and uncertainty of the working environment limits them to fully plan and predict the future outcome and the contingencies that may arise; and that (2) some economic actors are “self-interest seeking with guile” (Williamson, 1975) or subject to “frailties of motive” (Simon, 1982). The risk of opportunistic behaviour of the trading partner and the bounded rationality result in high costs in time and resources to search for information on the contracting environment and the firm. It is thereby also costly to identify the untrustworthy individuals ex ante to the transaction (Williamson, 1996).

The above assumption implies that market contracts are by definition incomplete. It would be too costly to negotiate and write complete contingent claims contracts. Furthermore, trading partners invest in costly mechanisms to monitor and enforce contractual performance (Leiblein, 2003).

Although not directly applicable to AES contracts as the government unilaterally proposes these contracts, the TCE predicts the contractual arrangements will align with governance structure. Basically, simple transactions are matched with simple governance structure, while more complex exchanges are associated with more complex forms of organisations. Deviations are less efficient, and will incur high transaction costs (Leiblein, 2003). This calls for an analysis on how the contract terms including the payments influence the level of uptake of the agri-environmental contracts. The lack of negotiation in the contract design results in higher information costs for the farmers. It can be argued that a larger uptake of AES can be reached with a larger involvement of farmers in the process of contract-design.

TCE starts from the principle that “transactions, which differ in their attributes, are aligned with governance structures, which differ in their costs and competencies, in a discriminating (mainly transaction-cost-economising) way” (Williamson, 1991). A TCE analysis therefore implies the following broad steps:

- Characterising transactions
- Describing governance structures, and
- Developing a discriminating alignment between both.

The next section gives a definition of transaction costs, whereby a distinction is made between private and public transaction costs. Section 4 then provides a discussion on the

characterisation of transaction, and contract terms, and presents a model that explains the influence of transaction costs on the uptake of AES contracts.

3.2 *Private transaction costs*

Transaction costs are search (information) costs, negotiation costs and monitoring and enforcement costs (Hobbs, 2003). The costs are intrinsic to every transaction, yet due to their nature they are difficult to define and measure. Other definitions of transaction costs include: (a) “all those costs that cannot be conceived to exist in a Robinson Crusoe economy, where neither property rights nor transactions, nor any kind of economic organisation can be found” (Cheung); (b) “the costs of running the economic system” (Arrow, 1969); and (c) “the costs that arise not from the production of goods, but from their transfer from one agent to another. At root, essentially, are the information deficiencies faced by one or both of the transacting parties and the costs of removing such deficiencies” (Dahlman, 1979 cited in Falconer and Whitby, 2001).

Search costs arise prior to the contracting, as the partners collect information on the contract itself, on the economic and financial consequences, the possible work load and so on. Negotiation costs are the costs of drawing the contracts, while monitoring are ex-post to the transaction. They result from the monitoring and control of the way the contract is complied and include an assessment of the product quality, timely deliverance ... and efforts ensuring that the contract agreements are adhered to (Hobbs, 2003). Furthermore, a number of hidden transaction costs can arise.

Falconer and Whitby (1999) present a typology of transaction costs (Table 1). Some of the transaction costs are private (incurred by the farmer), while other are public or state agency costs. A second distinction is made between fixed and variable costs. For the fixed costs, economies of scale in, for example, information and knowledge gathering can be realised. Other costs will depend on the hectares entered such as for example farm mapping and conservation auditing prior to entry.

As shown in Table 2, the type of costs will depend on the policy approaches. The voluntary contracts as those of the AES will incur information, set-up, promotion, contracting and policing costs. As mentioned above, a more complicated scheme with more management options incurs higher negotiation costs and enforcing agreements. But the transaction costs are not increasing linearly with the number of schemes a farmer uptakes. For example, a farmer with a positive attitude towards sustainable development is expected to be less inclined to cheat, which would reduce the transactional costs of establishing management agreements and the costs of monitoring and enforcement. Some costs such as initial surveys can be shared. Yet, inversely administrative costs could be increased through the need to co-ordinate schemes and to prevent double payments (Falconer & Whitby, 1999).

Figure 4 shows that private transaction costs are also clearly spread in time. Some, mainly fixed transaction costs to gather information and negotiation, will occur ex ante to the EAS, while more variable costs such as administration and monitoring arise during the contract. Expenditures to organise the control of the AES are ex post.

3.3 Public transaction costs

Policy-related transaction costs fall beyond the scope of this research and report, but they should not be underestimated (see also Figure 3 and Table 1). Falconer and Whitby (1999) indicate that the most important public transaction costs are the costs of the administrating agencies. These result from a set of administrative activities including (these costs are also mentioned in Table 1) (OECD, 2003):

- Designing a policy: determining the modalities of payments (e.g. amounts, selection criteria, etc.) or defining cross compliance conditions
- Obtaining consensus on the policy: informing the public of the proposed policy
- Collecting revenues: collecting taxes
- Selecting areas: getting applications and judging whether they should be approved or not based on the selection criteria
- Implementing the policy: disbursing the payment
- Monitoring the policy: monitoring whether the condition required by the policy is met
- Enforcing the policy: taking actions when the condition is not met.

The public transaction costs should then be set against the effectiveness of the policies, in order to improve the value for money of the public expenditure on agri-environmental measures (Falconer & Whitby, 1999).

Table 1: Typology of transaction costs (adapted from Falconer and Whitby, 2001)

Main category	Sub-category	State agency costs		Participant costs	
		Fixed	Variable with number of participants	Fixed	Variable with e.g. ha entered
Information	Surveying of the designated areas	X			
	Designation of area and designing management prescriptions	X			
	Re-notification /re-design of prescription	X			
	Farmers being informed on the scheme •Information gathering •Participation of courses / workshop •Time spent to collect and assimilate information •Time spent to make decision to participate •Costs spent to collect and assimilate information			X	X
Contracting	Promote of the scheme to farmers	X	X	X	
	Negotiation between organisation and farmers		X	X	X
	Administration of contract (making payments)		X	X	X
Policing	Environmental monitoring and scheme evaluation	X			X
	Enforcement of farmer compliance		X	X	X

Table 2: Types of administrative costs in different policy approaches (Falconer & Whitby, 1999)

	Information, set-up, promotion	Contracting	Policing
Persuasion and advice	X		
Regulation	X		
Market mechanisms (e.g. taxes)	X		
Tradable permit schemes	X	X	X
Voluntary management agreements	X	X	X
Public purchase of land	X	X	

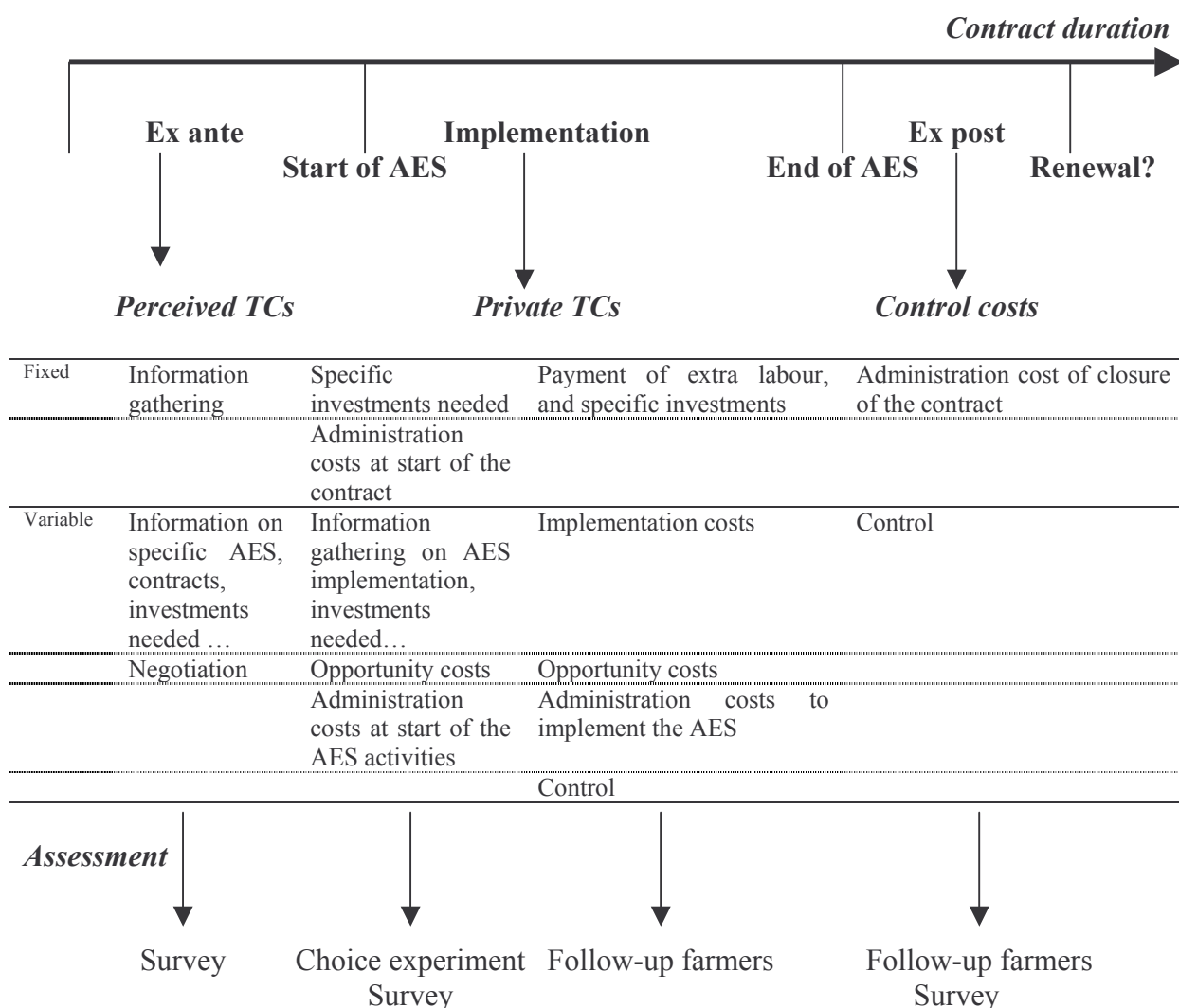


Figure 4: Private transaction costs arising during contract

4 Assessing transaction costs in environmental schemes

Wang (2003) presents a survey of the literature on the measuring of transaction costs. His survey is, according to himself, a sketch of the broad landscape of the field of transaction costs measurement. He makes a distinction between the empirical studies focussing on a direct measurement of transaction costs as the economic value of resources used in locating trading partners and executing transactions and the assessment of secondary costs of negotiation and enforcement (see Williamson). Other studies look at the costs of government regulation imposed on market entry and transaction, or at agents-specific transaction costs (in contrast with transition-specific costs) where the identity of economic actors contribute more easy transactions as the agents are well acquaintances so that various information problems are overcome.

Wang (2003) mentions a few studies on the importance of transaction costs in environmental and ecological economics. Firstly, a set of literature describes the transactions involved in emission trading (e.g. Soloman, 1999; Tietenberg, 2002). Colby (1990) measured policy-induced transaction costs in water allocation. These include attorney's fees, engineering and hydrological studies, court costs and fees paid to state agencies, and alternatively, the cost of waiting for state agency approval. Finally reference is given to the evaluation of costs related to emission trading systems.

An extended bibliography on transaction costs economics can be found on the website: <http://www.ssu.missouri.edu/faculty/HJames/tce-bib.htm>. The bibliography refers to a set of literature on empirical evidence on transaction costs with regard to (a) vertical integration, (b) long-term contracting, and (c) organisational issues. On the importance of transaction costs in long-term contracting the literature survey reports on contracts for provision of petroleum coke, coal, and natural gas and railway contracts. Examples in the agricultural sector are for long term contract for timber, in tenancy choices and for the marketing of Maine Lobster and fresh fish.

Hobbs (1997) describes the importance of transaction costs in cattle farming. A clear description is given of the information, negotiation and monitoring costs involved in transactions on slaughter cattle marketing. The relative importance of these costs are estimated in a Tobit limited dependent variable analysis of the choice between live-weight (live-ring auctions) and deadweight (direct-to-packer) sales.

Vakis et al (2003) analyse the transaction costs that occur when farmers sell part of their crop on the market. They estimate a semi-structural conditional logit model of the market choice, whereby the choice of the market is function of predicted effective farm-level prices, and of market information that accounts for fixed transaction costs. The effective farm-level prices result from the difference between predicted idiosyncratic prices that would be received on all markets and the idiosyncratic proportional transaction costs that would be incurred to reach all markets. This model is applied to market choices of households in Peru. It is e.g. shown that fixed transaction costs are reduced when farmers receive information from their neighbours.

The importance of transaction costs in the market integration of smallholder potato farmers in the Peruvian Andes is analysed by Maltoglou and Tanyeri-Abur (2004). The analysis reveals that market integration is also influenced by information, negotiation and monitoring costs in addition to transport costs and market prices. Similarly, Omano (1998) studies the tension

between gains from specialisation and the increase in farm-to-market transaction costs by using non-separable household models. It is shown that the tension between transaction costs and specialisation may contribute to the prevalence of inter-cropped cash-crops on small farmers, in apparent disregards of foregone yields and income from greater specialisation involving pure-stands.

Transaction costs are difficult to calculate and this for two reasons. Firstly, they are not easily observed; it is not possible to calculate hypothetical transaction costs for organisational forms that are not chosen, thus, transaction costs that a single firm can face in alternative organisational arrangements cannot be quantified *ex ante*. Secondly, the data needed to compare organisational forms are not easily quantifiable. An analysis of transactions would be more significant if the attributes of the transaction could be related to data on organisational form or contract arrangements (Masten, 1996).

Because of the difficulty of assigning a price to transaction attributes and assuming that the organisational arrangements are chosen to economise the transaction costs, empirical research that aims to apply a direct cost measure is scarce (Williamson, 1995). The application of a comparative institutional approach is more general. According to Williamson (1995), discrete institutional alternatives should be compared, allowing attributes of the transactions to be defined, and the incentive and adaptive attributes of the alternative governance structure to be described (Williamson, 1995). Masten (1996) redraws the question for comparative institutional analysis as: “How does the performance of a firm that adopted a particular institutional arrangement compares with how that same firm would have performed had it adopted an alternative?”

The main challenge to compare the different AES across the case studies is the diversity of information that will come out. Falconer and Whitby (1999) draw attention to the difficulties of comparing the many different schemes, with different objectives, implemented at different times, in a different economic and social environment, and within different legal and political frameworks. It is therefore important to describe the factors determining the level of transaction costs, and thereto an analysis of the transaction and of the governance structure is needed. As the AES are by the EU regulation 5 year contracts, it would be more important to compare the contract terms.

Empirical analyses on private transaction costs in voluntary schemes as agri-environmental contracts are rather scarce. Falconer (2000) reports that a number of studies analysed the farmer’s attitude towards conservation, but that only a few have looked into the mechanisms of scheme implementation and the transactions and transaction costs that are involved. To our knowledge, Falconer (2000); Falconer and Whitby (1999), Falconer and Saunders (2002) and Vatn (2002) are the only studies with an attempt to measure the transaction costs involved in agri-environmental contracts, and will be discussed in this section. Examples of applications of the TCE for the comparative analysis of institutional arrangements in agriculture (most of them analysing market channels) include Masten *et al.* (1991), Masten (1996), Ménard (1996), Hobbs (1997), Verhaegen (2001) and Vant (2001).

4.1 Transactions

A starting point of analysing the private transaction costs is to study what transactions are involved and what interactions are needed as the bare minimum for effective policy operation (Falconer, 2001). According to Williamson (1996) a transaction takes place when a good or

service is transferred across a technologically separable interface. Ménard (2000) defines a transaction as a transfer of rights, while Hobbs (1995) sees it as an exchange of products between two stages of a production or distribution chain, as the product changes in form and/or in ownership rights.

Within the latter definition it can be argued that the uptake of AES contracts is a transaction between the farmer and the government, as the farmer “sells” ecological capital. In this way, the government is regarded as the buyer and the landowner is the seller of agro-environmental goods. As mentioned above, the different policy structures and their relative appropriateness in supplying agri-environmental goods can then be evaluated from their transactional characteristics (Falconer & Whitby, 1999).

The critical human factors are bounded rationality and opportunism, which can result in organisational failure when combined with some environmental factors. The three critical dimensions of transaction influence its costs, namely uncertainty, frequency of transaction, and the level of durable transaction-specific investments (Williamson, 1979). These are important to assess the transaction costs involved. The next paragraphs give an overview of how the characteristics of transactions involved in environmental schemes can be described.

4.1.1 Asset specificity

Transaction costs are increased by high asset specificity, high uncertainty and low frequency of trading. Asset specificity is defined by Williamson (1996) as the “degree to which an asset can be redeployed to alternative uses and by alternative users without sacrifice of productive value”. A non-specific asset can be used for other, different purposes. A specific asset is a sunk cost, and investing creates risks for hold-up and lock-in situations (Rindfleisch and Heide, 1997; Sogaard 1994 cited in Verhaegen, 2001). Asset specificity implies a higher need for ex ante information and negotiation costs, as well as ex- post monitoring and enforcement costs (Williamson, 1996; Ménard, 1996).

Williamson (1996) makes a distinction between six sources of asset specificity, namely (citing from Verhaegen, 2001):

1. *Site specificity*: immovable property, or fixed assets are often not easily moveable. Like a factory built on a certain site, agri-environmental investments are strictly specific to the land.
2. *Temporal specificity*: transactions are constrained in time. This is especially true for investments in agricultural activities, because of the perishable character of food products, and the dependency on climatic factors.
3. *Specific physical assets*: these assets consist of investments in machines, buildings, software,... that can reduce the production costs compared with when more general assets would be used.
4. *Human capital*: farmers will have to invest time and effort in accumulating and fine-tuning craftsmanship and knowledge to comply to the AES contracts. A transaction that requires highly qualified craftsmen is more specific than those involving unskilled labour. Human capital is more than only training. It is also on-the-job learning, that is not re-deployable on the labour market because it involves highly efficient knowledge of production techniques, of machines
5. *Brand name specificity or reputation*: this type of investment is less important for most AES, except for e.g. organic production. It then includes the investments

required to use organic labels include changes in production practices and the compliance to a control system..

6. *Dedicated assets*: this is a special category of asset specificity. It are general purpose assets which are applied to a certain transaction. If the transaction is not concluded, these assets have no direct productive use for the investor.

It should be noted that there is no strict delimitation on these types of assets. For example the investment in a AES to increase the biodiversity in the borders of the fields will be site specific (fixed to the land), may include specific physical assets as it implies changes in production practices, and involve a learning process (specific human capital).

4.1.2 Uncertainty

High uncertainty (including environmental (or exogenous) and behavioural (or endogenous) uncertainty) increases costs for information gathering, negotiation, monitoring and thereby transaction costs, in particular covering for the opportunistic behaviour from one of the trading partners (Foray, 1995 in Verhaegen, 2001).

Environmental uncertainty refers to an unanticipated changes in the circumstances surrounding the exchange, while behavioural uncertainty leads to the increased need for monitoring the partners' compliance to the contracts. The latter is inversely related to the frequency of transaction and positively with the degree of asset specificity. Partners that often deal with one another will know each-other and a higher trust between both will reduce the risk for opportunistic behaviour, this facilitates the monitoring and so reduces transaction costs.

Agri-environmental scheme can imply high asset specificity or a change in the function of a certain fields, and this related to long-term contracts. This leads to clear problems of hold-up and/or lock-in situations (in Leneman et al, 2004 based on Polman and Slangen, 2004). Hold-up problems could occur as farmers engage in agri-environmental contracts for many years and have made changes in their farming system, while investing in specific assets. Incomplete contracts increase the need for farmers to have better guarantees as they are at risk of the government changing its contract terms. The risk on hold-up can be perceived important enough to withhold farmers from investment.

Also lock-in problems can prevent farmers to engage in AES. Farmers could feel uneasy with transforming part of the farm to nature, at risk of not being able to use that part of the farm for alternative functions (Leneman et al, 2004).

4.1.3 Frequency

Increased frequency with which the transaction costs occur can decrease the risk of opportunistic behaviour. When the frequency of transaction is high, the partners will establish a familiar (and more confident) relationship. A routine is created resulting in less negotiation and monitoring costs (Ménard, 1996 in Verhaegen, 2001).

For AES contracts important initial transaction costs are incurred when setting up the first contract. These initial costs will probably be less for a second or third contract. Economies can be large on e.g. human capital or on negotiation costs between the farmer and the government.

4.1.4 Guiding grid

In order to describe the attributes of transactions, a guiding grid is provided in Table 3. The answer to these questions for any type of AES in the case study area will give a qualitative assessment of the complexity of the transaction.

Table 3: Guiding grid to describe the attributes of transactions

Attributes of the transaction	Question to answer	Judgement
Asset specificity		
- site specificity	Which investments in immovable property or fixed assets, that are site specific, were needed?	High, medium or low
- temporal specificity	Are the activities time constrained due to their nature of the nature of the products?	High, medium or low
- specific physical assets	Which specific buildings, materials, machines, software, etc are needed for the transaction?	High, medium or low
- specific human capital	Which specific human capital is present in the transaction?	High, medium or low
- brand name specificity	Which brand name, label, etc is used in the transaction?	High, medium or low
- dedicated assets	Which dedicated assets are needed to effect the transaction?	High, medium or low
Uncertainty	Which elements cause uncertainty about the transaction for the involved actors?	High, medium or low
Frequency	What is the frequency of the transaction?	Yearly, three-monthly, monthly, fortnightly, weekly or daily
Instruments		
- incentive intensity	What are the incentives for the actors?	High- or low-power
- administrative control	What kind of administrative control is foreseen?	High, medium or low
Adaptation mechanism	How do the actors react to disturbances in the environment of the transaction?	Autonomous, mainly autonomous, autonomous and coordinated, mainly coordinated, coordinated
Contracts	What type of contract exists between the actors involved in the transaction?	Classical, neo-classical or relational ¹
Diagnosis	According to your analysis, what could be improved in the organization of the transactions? Do you see a more appropriate governance structure?	

4.2 Contract terms

Williamson (1979, cited in Verhaegen, 2001) distinguishes three types of contracting, namely classical contracting, neo-classical contracting and relational contracting. It can be argued that the agri-environmental contracts are neo-classical contracts. These are typically incomplete, long run arrangements in which the adaptation mechanism is defined to improve the capacity to adjust to unanticipated disturbances, and thus continuity of the relation is supported. Often third party assistance, arbitration in resolving disputes is foreseen. The original contract is always the starting point for further negotiations (Williamson, described in Verhaegen, 2001).

¹ Classical contracts, neo-classical contracts and relational contracts are discussed in the next section.

Classical contracts are described as short term, complete contracts for which the identity of actors is irrelevant, the nature of agreement is carefully delimited and written down in formal documents, remedies are narrowly prescribed, and if there are disputes they are settled before a court. Relational contracts are closed for an indefinite time period between partners whose identity is of crucial importance. They are extremely incomplete but norms of behaviour and shared codes of conduct must guarantee the partners that the relationship will develop in a way that is beneficial to both and disputes are settled internally (Williamson, described in Verhaegen, 2001).

According to the TCE (as explained in Masten and Saussier (2002)) contracts are devised for structuring ex-post adjustments, and for constraining wasteful efforts to influence the distribution of gains from trade, including ex post bargaining and hold-up activities in transactions supported by specific assets and ex ante sorting and search in contexts where additional information serves merely to redistribute rather than expand the available surplus. Two major questions are then posed, namely, (a) why do farmers agree and sign a AES contract, and (b) how is the uptake of AES contracts influenced by the structure of contractual agreements? The latter result from a negotiation process and therefore depend on the objectives of the contracting parties, underlying production relations, the nature and size of informational and strategic impediments to contract formation and enforcement (Masten and Saussier, 2002). The contractual agreements will influence the implementation of the contract, and so determine many of the private transaction costs. With regard to the AES contracts, it should be noted that many of the contract terms are unilateral decisions taken by the government. An often heard comment of the farmers is the lack of alignment of the contract terms with the farmer's situation and objectives. In the following section, we present a model that explains how the uptake of environmental efforts is related to the contract terms and the transaction costs involved.

4.3 Models explaining the relationship between uptake of environmental efforts and transaction costs

It is our aim to provide insight on the importance of transaction costs to explain the uptake of AES contracts. The neo-classical theory assumes that everyone will maximize utility, whatever the objectives or the circumstances might be. Yet many factors can be of influence. It is assumed that the farmer will distribute his time over productive activities and leisure in such a way that the farm household profit is maximized. This maximization problem can be illustrated by (Drake *et al.*):

$$\text{Max } u = u(\pi_h, l_l, O_h)$$

$$\text{such that } l_l + l_o + l_e \leq (T - R)$$

π_h	farm household profit
l_l	amount of leisure in hours/day
O_h	other positive values derived from the activities within the household profit function
l_o	time spent on off farm work in hours/day
l_f	time spent on food and fibre (F&F) production in hours/day
l_e	time spent on environmental conservation in hours/day, and

$T-R$ 24 hours (T) minus the number of hours per day needed for physical relaxation

In this regression, the farm household profit in its turn depends on the economic characteristics of the production of food and fibre and environmental goods on the farm, namely:

$$\pi_h = P_f f(X_f, l_f) + w_o l_o + C_{ec} Q(.) - P_x X_f - P_{ec} E(.) - w_f l_f$$

herein

π_h	farm household profit
P_f	price vector for F&F goods produced on the farm
$f(.)$	production function for F&F products
w_o	wage for off farm work
C_{ec}	level of compensation payments for environmental conservation efforts
$Q(.)$	level of environmental conservation provided
P_x	input price vector for F&F production
X_f	inputs for F&F production
P_{ec}	input price vector for environmental conservation efforts
$E(.)$	function of conservation efforts, and
$w_f l_f$	external labour costs for F&F production

The conservation effort is assumed to be positively related with the level of environmental conservation provided (Q), so that $Q=f(E)$. The conservation effort function then becomes:

$$E = f(m, c, tc_p, u(Q))$$

with

m	level of compensation payments
c	direct costs associated with conservation
tc_p	farmers private transaction cost for participating in conservation schemes, and
$u(Q)$	direct utility derived from conservation, which obviously is a function of Q and consequently an indirect function of E

It can be expected that the level of compensation payments is positively related with the uptake of conservation efforts. And that E is negatively correlated with the direct costs and the private transaction costs. This model explains how private transaction costs influence the farmer's utility through the conservation effort function.

4.4 Assessing transaction costs

As mentioned above, transaction costs are difficult to measure. By describing the transactions involved and the contract terms, it should be possible to assess the complexity faced by the farmer. A survey of the complexity of the transaction, including the level of asset specificity, uncertainty and frequency, and of the contract terms can provide a quantitative judgement on the significance of the private transaction costs.

Quantifying the private transaction costs involved for every AES in every case study area is much more difficult. The farmers can be asked how much time and money is spent on

information search, contracting and control, yet only a comparative cost-benefit analysis can provide a true picture of the costs involved. This is because some private transaction costs can only correctly be calculated when the farmer compares the farm records with the AES contract with the records without the AES contract. Moreover, except for administrative costs, most transaction costs are not financial in nature, and can only be measured in terms of “time and utility” spent. Falconer and Whitby (1999) provide an analysis of the administration costs (these are non-trivial policy-related transaction costs) involved in case-study environmental schemes in 8 countries in the mid 1990s. Their results are copied in Table 4. Their analysis also showed that AES are generally more costly than other types of policies. Anecdotal evidence on the administration costs of other schemes in UK, Germany and Sweden is provided in Table 5.

Table 4: Administration costs of AES in case studies in 8 countries (Falconer & Whitby, 1999)

	Area-weighted	Participant-weighted	Expenditure-weighted
	Average annual administration costs (ECU per ha)	Average annual administration costs (ECU per participant)	Average annual administration costs (ECU per 100 ECU paid as compensation)
Austria	20.5	216.9	8.8
Belgium	58.6	388.6	63.4
France	75.6	1522.0	87.1
Germany	10.2	177.5	12.3
Greece	59.7	470.1	8.6
Italy	13.1	140.0	6.6
Sweden	9.1	190.4	11.3
UK	48.0	2445.5	47.9

Table 5: Transaction costs of agricultural commodity regimes (Falconer & Whitby, 1999, citing Lampe (1994), Kumm & Drake (1998), MAFF/IBAP (1997))

		Administration as % of total public scheme costs*
Germany (1993)	Arable area payments	4
	Livestock	20
UK (1996)	Arable area payments	0.8
	Set-aside	3.4
	All crops and set-aside	1.4
	Beef payments	4.9
	Sheep	2.5
Sweden (1997)	Arable area payments	3
	Livestock payments	4

*the costs are here presented in a different form than the table above. It is also worth noting that the data of Germany reflect the administration costs of the first year of the scheme, where after costs are thought to decrease.

A detailed description of the importance of transaction costs is found Falconer and Saunders (2002). The article describes the transaction costs involved in management agreements on sites of special scientific interest (SSSIs) in the North of England. The study shows the

importance of transaction costs in the total costs of implementing individually negotiated and standard management agreements under the Wildlife Enhancement Scheme. A life-cycle approach was applied, whereby the transaction costs were calculated for 47 agreements. Table 6 illustrates the main average results (in the article, a comparison is made between the different types of agreements involved).

Table 6: Mean transaction costs over the agreement life-cycle (Falconer & Saunders, 2002)

Average length of the agreement (years)	19.19
Total agreement negotiation costs (£)	493
On-going costs plus negotiation costs (£ per agreement)	8213
Total agreement transaction costs (£ per ha)	1204
Total compensation (£ per agreement)	38.371
Total compensation plus transaction costs (£ per agreement)	45.584
Transaction costs as a % of compensation	21.4
Total compensation (£ per hectare per agreement)	1358
Total compensation plus transaction costs (£ per hectare per agreement)	2562

Vatn (2002) presents Norwegian data on the level of transaction costs for different types of policy measures. The study argues that a transaction-costs-typology of policy measures in agriculture should also include whether a market for the goods exist or not. The typology is represented in Table 7. It is argued that for policy measures for which markets (payment system and market information) already exist and which can be related to either commodity inputs or outputs, much of the information will be available and control and contracting costs could be very low. This will also result in a low asset specificity. On the other hand, if policy measures are not attached to commodities, the transactions costs are expected to be more important. Vatn (2002) argues that it is difficult to define the terms ‘low’, ‘medium’, ‘high’. Table 8 presents the empirical evidence. The differences between the levels of transaction costs can be explained by the fact that some measures are regionally differentiated which brings information closer to the farmers, and by the differentiated implementation of the measures.

Table 7: Expected transaction costs for different goods and types of transactions (Vatn, 2002)

Characteristics of the transaction and good involved					
Policy measures	(A) attached to commodities		(B) applied to other elements than commodities		
	Low	Medium	Medium	Low	High
Asset specificity					
Frequency	High (A1)	Medium (A2)	Medium (B1)	Low (B2)	Low (B3)
<i>Transaction costs elements</i>					
Information	Low	Low to medium	Medium	Medium to high	High
Contract	Minimal	Minimal	Medium	Medium to high	High
Control	Minimal to low	Low to medium	Medium	Medium to high	High
Total TCs	Minimal to low	Low to medium	Medium	Medium to high	High

Table 8: Transaction costs for different types of policy measures in % of payments (subsidy or tax) (Vatn, 2002)

(A) Policy measures attached to commodities		(B) Policy measures applied to other elements than commodities	
A11. Price support to milk	0.24	B11. Acreage payments	1.0
A12. Tax on fertilizer	0.09	B12. Livestock payments	2.3
		B13. Subsidy for reduced tillage	6.8
A21. Tax on pesticides	1.1	B21. Acreage support organic farming	18.3
A22. Price support on home-refined dairy products	12.3	B22. Conversion support organic farming	29.0
		B31. Support for preserving cattle breeds	66.3
		B32. Support for special landscape ventures	53.9

From the above empirical studies it can be concluded that (a) transaction costs should not be underestimated, and (b) many studies report on public – policy related transaction costs, while the assessment of private transaction costs is very scarce.

4.5 Data collection

It is clear from the conceptual framework described above, that the “transaction” is central to our analysis. The data collected should therefore be linked to the various agri-environmental contracts by the farmers. As argued above the choice of contract and subsequent earned utility depend on the characteristics of the transaction (investment in specific assets, uncertainty and frequency), and the contract terms. To assess these a whole set of questions has to be developed.

The questionnaire would have to contain questions to assess: (a) ex-ante costs for gathering information; (b) negotiation costs; (c) monitoring and control costs; (d) specific investments (own time, family, volunteers, personnel, knowledge, physical assets); (e) yield and income foregone; (f) frequency of contract (new, renewed); (g) trust in the trading partner and (h) waiting time for approval. The number of questions would be very high.

We therefore propose to assess the private transaction costs in three ways (see also figure 4), namely

- A. Set of questions in the survey, whereby questions are proposed for farmers with (a) AES(s), farmers who wish to participate in a AES in the near future and farmers who wish not to participate in a AES.
- B. Analysis of the choice experiment
- C. Follow up of farmers.

A set of questions is proposed for farmers who want to apply for a contract and for farmers who are not involved in an agri-environmental scheme. The former are asked how they predict the transaction costs and the information needed, while the latter are asked the reason behind the non-interest in the contracts. Risks for hold-up and lock-in problems are important.

In the analysis of the choice experiment, the farmer should make trade-offs between certain attributes of AES including the average annual administration to be fulfilled and the level of

compensation. This will allow the simulation of the relative importance of the contract attributes.

Finally, a follow up of a small group of farmers is organised. A group of about twenty to thirty farmers engaged in agri-environmental contracts are asked to keep regularly (weekly) records of time and costs invested in all activities related to the implementation of the agri-environmental contracts for a whole year. This will allow a more accurate quantification of the transaction costs involved.

Thus, in each case study area, 20 to 30 farmers are asked to fill in record sheets provided. Records are collected on

- investments:
 - a. buildings, machinery, computer, perennial plants ...
 - b. costs of funding the investment: e.g. loan
- labour hours:
 - a. extra working hours of farmers, partner, children, family, paid/non paid labour to implement and monitor the AESs
 - b. extra courses
 - c. extra time for administration
- income and costs:
 - a. compensation payments
 - b. small investments, operational costs ...
 - c. increased costs for accountant
- decreased production of crops and livestock
- costs for control

Farmers are asked to keep records on labour hours, income and costs on very regular base (e.g. weekly). The farmers send the records back every three months, or the records are collected personally or by telephone.

The advantage of having a follow-up of farmers is that detailed information is collected on benefits, operational costs and transaction cost. The detailed information is needed to analyse the differences among countries (institutional situations), farmers and farms and agri-environmental measures. It furthermore reduces significantly the number of question in the questionnaire. In the follow-up farmers are not only asked to gather information on the AES aspects, but also to place the AES labour and costs in a more general perspective. Therefore we want to know, how much labour and expenditures a farmer is spending on a reference area (same surface, same land use) as on an area with AES.

The selection criteria for the farmers will emphasize more the diversity of possible transaction costs (TC's). Diversity of measures is wanted above diversity of farm types, therefore some farm systems are dissuaded. A measure with presumed high transaction costs and which probably will not have a high uptake has to be included. Diversity in TC's is also possible by including farmers that have just started with a scheme and farmers that imply different AES's.

4.6 Modelling the contract choice

Van Slembrouck (2002) (also Dupraz et al 2002) analyse how the characteristics of agri-environmental measures, along with farm and farmer characteristics impact on the farmers' participation in the measures. The proposed method models the maximisation of the farmers' utility. Thereby, the utility of the i^{th} farmer associated with the m^{th} combination is given by: (Dupraz et al, 2002; Van Slembrouck, 2002)

$$V_{im} = x_i' b_m + v_{im}$$

with V_{im} is the indirect utility
 x_i is the vector describing the farmer's preference and his farm characteristics
 b_m is the vector to be estimated
 v_{im} is the stochastic distribution term

Consider d_m to be the dummy variable reporting the choice of the i^{th} farmer about the m^{th} combination:

$$\begin{cases} d_{im} = 1 \\ d_{im} = 0 \end{cases} \Leftrightarrow \{V_{im} > V_{ik} \quad \forall k \neq m\}$$

$$P_{im} = \Pr\{d_{im} = 1\} = \frac{\exp(x_i' b_m)}{\sum_{k=0}^M \exp(x_i' b_m)}$$

This model is solved by a multinomial logit model.

Greene (2000) describes a multinomial logit model to solve choice problems that are individual specific. A model allowing J choices lead to a model solved by set of probabilities for $J+1$ choices for a decision maker with characteristics x_i . The probabilities are:

$$\Pr ob(Y = j) = \frac{\exp(\beta_j' x_i)}{1 + \sum_{k=1}^J \exp \beta_k' x_j} \text{ for } j=1,2, \dots, J$$

$$\Pr ob(Y = 0) = \frac{1}{1 + \sum_{k=1}^J \exp \beta_k' x_j}$$

The model implies that J log-odds ratios

$$\ln \left[\frac{P_{ij}}{P_{i0}} \right] = \beta_j' x_j$$

The log-likelihood can be found, when for each individual $d_{ij}=1$ if alternative j is chosen by individual i , and 0 if not, for the $J+1$ possible outcomes. For each i , one and only one of the d_{ij} 's is 1.

The log-likelihood is a generalization of that for the binomial probit or logit model

$$\ln L = \sum_{i=1}^n \sum_{j=0}^J d_{ij} \ln \text{Pr ob}(Y_i = j)$$

So, the above is a multinomial logit model. However, when the data consists of choice-specific attributes instead of individual-specific characteristics, a conditional logit model should be defined.

The model is similar to a multinomial logit model proposed above, namely

$$\text{Pr ob}(Y_i = j) = \frac{\exp \beta' z_{ij}}{\sum_{j=1}^J \exp \beta' z_{if}}$$

with $j=1,2,\dots,J$ for a total of J alternatives.

Vakis et al. (2003) used a conditional logit model to analyse the farmers' choices for markets, according to characteristics varying across alternatives and others invariant across market alternatives.

In order to test our first hypothesis, we would propose to build a conditional logit model for which the choice made between J alternative AES contracts or combinations form the dependent variable. The model can then evaluate the marginal effects of contract characteristics on the choice.

The answer to the second hypothesis should be linked to the model proposed in WP9.

5 Conclusion

We can conclude that due to its implicit nature, transaction costs can not be easily defined. However, many authors recognise the significance of private transaction costs for the uptake of agri-environmental contracts. But it is difficult to provide a quantitative assessment of the level of transaction costs. The costs incurred by the farmers mainly include time and resources invested in the search of information (on contract terms, area design, trustworthiness of the government's implementation, required changes in the production system, repercussion on the farming system...), in contracting, and in monitoring and control.

We argue that the transaction costs could be reduced when farmers would have more influence on the contract terms. We therefore analyse the characteristics of the transaction between farmers and government, to assess what factors influence the level of the transaction costs, so that the lacunas and problem areas can be better identified. A better alignment of the interests of farmer and government is believed to positively influence the uptake of agri-environmental contracts. And the higher supply of environmental goods will significantly contribute to sustainable development.

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