

**Public and Private Transaction Costs in  
Agri-Environmental Schemes:  
A case study on a Site-Specific Grassland  
Extensification Scheme in Hesse, Germany**

Kumulative Dissertation

zur Erlangung des Dr. agriculturae

des Fachbereichs Agrarwissenschaften, Ökotropologie und  
Umweltmanagement der Justus-Liebig-Universität Gießen

Vorgelegt von

Anja Weber, geb. Vater

geboren in Mannheim

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## List of Abbreviations

Art.	Article
ALR	<i>Amt für den ländlichen Raum</i> County Agricultural Administration
CAP	Common Agricultural Policy
CB	Certification Body
EAFRD	European Agricultural Fund for Rural Development
EU	European Union
GDP	Gross Domestic Product
HIAP	<i>Hessisches Integriertes Agrar-Umweltprogramm</i> Hessian Integrated Agri-Environmental Programme
HMUELV	<i>Hessisches Ministerium für Umweltschutz, Energie, Landwirtschaft und Verbraucherschutz</i> Hessian State Ministry for Environment, Energy, Agriculture and Consumer Protection
IE	Institutional Environment
MA	Managing Agency
NIE	New Institutional Economics
PA	Paying Agency
resp.	respectively
RDP	Rural Development Plan
SSGES	Site-specific grassland extensification scheme
TCs	Transaction costs
vs.	versus

## Overview part

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# 1 Introduction

## 1.1 Structure of the thesis

This thesis consists of two main parts, namely (1) an overview (chapters 1-4) and (2) the publications (chapters 5-7). The thesis concludes with a brief discussion (chapter 8).

The overview chapters aim to provide contextual information in order to understand the embedding of the publications into the wider context of research. This is necessary because the articles had to be written in a rather focused and concise manner in order to meet the journal requirements.

The overview chapters comprise an introduction to the field of research (chapter 1), which highlights the problem statement and research questions, followed by the main theoretical concepts underlying the thesis (chapter 2). Chapter 3 depicts the study area. It focuses on the agricultural structure in Hesse, particular environmental challenges faced and current agri-environmental policies undertaken. The chapter is followed by a synthesis of the main results (chapter 4).

The main research outcome of this thesis is presented in the publication part (chapters 5-7), which consists of three articles submitted to peer-reviewed academic journals:

- Article (1): Weber, A. 2014. Do Transaction Costs create Transaction Gains for Farmers Participating in an Agri-Environmental Scheme? *Journal of Environmental Economics and Policy*. DOI 10.1080/21606544.2014.886530.
- Article (2): Weber, A., 2014. How are public Transaction Costs in regional Agri-Environmental Scheme Delivery influenced by EU Regulations? *Journal of Environmental Planning and Management* 57 (6), 937-959.
- Article (3): Weber, A. 2015. Implementing EU co-financed agri-environmental schemes: Effects on administrative transaction costs in a regional grassland extensification scheme. *Land Use Policy* 42, pp.183-193.

The concluding discussion (chapter 8) highlights the implications of the main findings of this thesis and provides outlook on expected transaction cost related developments in the new funding period 2014-2020 in a broader context.

The sequencing of articles follows the chronological order of the research process, not the order of their publication. Being separately written journal articles, each of them can be read independently. A linear reader will face some redundancies, especially in the description of the agri-environmental scheme investigated and the literature overview at the beginning of each article.

An attached appendix contains the questionnaires and interview guidelines used to obtain empirical data as well as a list of further publications produced during the doctorate.

### 1.2 Problem statement and aim of thesis

Since their first introduction in 1992, agri-environmental schemes (AES) have become the most important policy instrument of the Common Agricultural Policy (CAP) to foster the provision of environmental goods via agriculture within the European Union (Höft, 2011; Hampicke, 2013). Environmental goods or benefits, e.g. enhancing and maintaining biodiversity, or countryside services, emerge besides food production as a joint product of agricultural land use; they are a result of specific agricultural production techniques, usually characterised by low input (Polman and Slangen, 2002; Harvey, 2003; Slangen and Polman, 2002; Hampicke, 2013). AES were primarily established to mitigate the negative consequences of productivity increases in agriculture during the second half of the 20<sup>th</sup> century; the increased use of pesticides or mineral fertilisers led to decreases in the provision of environmental benefits or even produced environmental hazards such as biodiversity losses, groundwater pollution, or soil erosion (Wilhelm, 1999; Höft, 2011). Facing such effects, society's demand for environmental goods increased and enhanced policy awareness (Wilhelm, 1999; Höft, 2011). Nowadays, policy approaches aim to ensure that non-commodity outputs meet the societal demand in quantity, quality, and composition (OECD, 2001; European Council, 2005).

However, fostering environmental goods' provision is difficult because they mainly occur as *externalities* of agricultural production (Slangen and Polman, 2002; Lehmann et al., 2009). Externalities arise in case the action of one agent influences the utility of another without him being compensated (Dahlman, 1979). Moreover, environmental goods often bear public good characteristics; they lack excludability and are non-rival in consumption to varying degrees (Hanley et al., 2001; Sandberg, 2007; Hasund, 2013). Biodiversity - for example, - is non-rival in consumption and at least partly non-exclusive, but its provision typically takes place in the private sphere; i.e. on privately owned pieces of land, and the costs of its provision – such as productivity losses due to extensified land use - are allocated to the farmer (Smits et al., 2008). As a result of such incentives, farmers tend to increase market good provision, which reduces the provision of environmental benefit (Coggan et al., 2010). However, underprovision of a socially demanded good reduces social welfare (Samuelson, 1954; Hasund, 2009). Such market failure is frequently the case in agriculture and makes policy intervention necessary and legitimate (Hagedorn et al., 2002; Slangen and Polman, 2002; Smits et al., 2008). To foster the provision of environmental benefits despite their unsuitability for conventional (private) market solutions, governments use policy instruments to set up alternative institutional arrangements. Such policy interventions range from regulatory approaches (e.g. establishing nature reserves on publicly owned land) to market-based approaches, such as agri-environmental schemes (AES) (OECD, 2001; Sandberg, 2007; Vatn, 2009)<sup>1</sup>. AES rely on voluntary, contract-based participation, and compensate farmers from public budgets for their losses in productivity resulting from the uptake of environmentally supportive management practices (Lockie, 2013).

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<sup>1</sup> Additionally, suasive or instructional attempts can be used to guide actors' behaviour (McCann and Easter, 1999; Pascual and Perrings, 2007).

However, given limited public budgets, AES are frequently subject to efficiency concerns (e.g. (Bonnieux and Dupraz, 1999; Wätzold and Schwerdtner, 2005). A scheme is considered to be efficient if it delivers a (comparative) maximum of a desired outcome at a given level of cost or provides a predefined level of outcome at lowest cost (Bonnieux and Dupraz, 1999).

To properly assess AES-related costs, not only the payments to farmers but also transaction costs (TCs) have to be taken into account (Falconer and Whitby, 1999). TCs are defined as “scheme organisational costs” (Falconer et al., 2001, p.84) and occur for both administrative agencies (public TCs) and farmers (private TCs) (Falconer and Whitby, 1999). On the public side, they depict “costs of setting up and running the organizational and contractual structure” of a scheme (Beckmann et al., 2009, p.694); on the private side, they result from time and money spent by farmers on (extra) tasks conducted in order to participate (Falconer and Whitby, 1999).

Empirical evidence revealed that both public and private AES-related TCs are non-trivial in magnitude but vary greatly between different AES<sup>2</sup>. Moreover, privately incurred TCs may hamper farmers’ participation (Falconer, 2000; Peerlings and Polman, 2004). Thus, reducing participation-related TCs by redesigning scheme regulations or even via public reimbursement is being discussed (Falconer 2002; European Council, 2005). On the public side, given a general decline in public budgets, possibilities to reduce public costs are of major interest.

Previous research has already explained differences between AES-related TCs with the help of actor- and scheme-related factors, the natural environment in which the scheme is designed to act, and the institutional environment in which the scheme is designed and implemented (Mettepenningen et al., 2009). However, these studies focus on inter-scheme differences in TCs and leave intra-scheme variances, although acknowledged (e.g. Mettepenningen et al., 2009), mostly unexplored. Nonetheless, understanding reasons for intra-scheme variances in public and private TC is crucial for designing AES, hopefully able to achieve efficiency gains on micro-levels. Moreover, prevailing TCs seem to depend strongly on the institutional design of a policy (Paavola, 2007; Vatn, 2009). The majority of German AES is implemented within the framework of the European Agricultural Fund for Rural Development (EAFRD), which is a part of the EU Common Agricultural Policy (CAP, Thomas et al., 2009). Nevertheless, its impact on upcoming TCs has not been investigated despite the fact that an influence has been recognised (Coggan et al., 2010; Mettepenningen et al., 2011)<sup>3</sup>. Understanding the influence of the CAP framework on regional TCs is also needed in order to assess and eventually improve the TC efficiency of AES. Against this background, this thesis aims to explain intra-scheme variances in magnitude and composition of public as well as private TCs of an action-oriented AES<sup>4</sup> within the regulatory framework of the CAP. To do so, the articles constituting this thesis address

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<sup>2</sup>A general literature overview on previous findings is provided in section 2.2.3; details are presented in the articles.

<sup>3</sup>Fährmann and Grajewski (2013) assess administrative costs for implementing EU cofinanced measures aimed to foster rural development; however, their analysis provides only broad descriptive results.

<sup>4</sup>Contrary to result-oriented schemes, where farmers are rewarded when specified environmental outcomes actually occur, payments in action oriented schemes are granted upon the adoption of specified agricultural practices presumed to provide environmental benefits (Matzdorf and Lorenz 2010).

different aspects of private and public TCs incurred in a Hessian AES aimed at securing site-specific grassland extensification. This case study allows addressing the topic from various angles and thus provides in-depth insights (Yin, 2009). Moreover, this approach allows the exploration of interdependencies between public and private TCs, which also goes beyond previous studies. In particular, the thesis investigates

- Reasons for differences in private TCs (Article 1, see chapter 5)
- Influences of the CAP/EAFRD regulations on public TCs and resulting spillovers onto private TCs (Article 2, see chapter 6),
- Differences in local public TCs (Article 3, see chapter 7).

Overall, the results reveal that a) the EAFRD regulations set the framework for AES design and implementation and thus influence the magnitude of both public and private TCs, b) the EAFRD causes allocative and distributive effects on both public and private TCs in Hesse and thus affects TC composition and incidence, and finally c) the degree of this impact varies subject to foremost actor-related factors, which d) provides an explanation for intra-scheme TC variances. By this, the results of the thesis add to scientific knowledge by complementing and extending existing findings.

The theoretical framework of the thesis is grounded in New Institutional Economics<sup>5</sup>, and the main methodological approach is deductive – empirical. The case study location and scheme were chosen for two reasons. First, the State of Hesse has undergone a decrease in its budget for AES in recent years due to changes in political priorities, which increased utilising funding possibilities offered by the CAP (HMULV, 2006). As a result, in the current funding period 2007-2013, six of seven AES are implemented with the help of EU co-funding, which implies compliance with the EAFRD funding regulations. This influences the operational framework of the Hessian agricultural administration and resulting TCs<sup>6</sup>. Second, the scheme itself was chosen because it is the most important AES in Hesse with respect to budget and intended participation (HMULV, 2006). Hesse holds a high number of environmental valuable grassland habitats<sup>7</sup> currently protected by the EU Habitats' Directive and shall be maintained or restored by voluntary AES participation (Kuprian, 2006; HMULV 2006; 2007). This draws the focus on participation-related TCs.

However, since this is an individual research project, the thesis is subject to some limitations: First, the scope of the study was limited by the time-consuming necessity of obtaining primary data. Second, the focus is on the (transaction) cost-side of the scheme, and the environmental outcome of the scheme is taken as fixed. Third, the articles analyse TCs of a given structural and political setting, and thus depict *static* TCs (Garrick et al., 2013, p. 198), ignoring dynamic effects. As a consequence of these limitations, the study does not provide a comprehensive efficiency analysis but investigates differences in the TCs incurred by the main actors. Therefore, the results remain explorative, and should be corroborated by subsequent comparative research.

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<sup>5</sup> See chapter 2 for a detailed depiction of the concepts underlying the particular analyses.

<sup>6</sup> See chapter 6 and 7.

<sup>7</sup> See chapter 3 for a broad description of the study area and references.

## 2 Theoretical Framework

This chapter complements the literature overviews in the articles. It provides an overview on the theoretical concepts in which the articles are settled and depicts the field of research. In the first subsection, TCs are defined and their sources are highlighted. I discuss two strands of theory – namely Transaction Costs Economics and Principal-Agency Theory – which investigate TCs but differ in their focus of analysis as well as in some of their assumptions. In the second subsection, AES (as one mode to govern particular nature-related transactions) are introduced. I describe specificities of nature-related transactions, and discuss literature investigating AES-related TCs. This chapter deals with general aspects; more detailed depictions of previous results can be found in the particular articles.

### 2.1 Transaction costs as costs of exchange

#### 2.1.1 Information deficiencies, contractual hazards and transaction costs

Economic exchange or *transaction* is a fundamental activity to allocate resources according to the preferences of the actors involved. While neoclassical economics perceives such an exchange to be without cost due to the condition of perfect information (Dahlman, 1979). Coase (1937, in his seminal article) withdraws the assumption of perfect information and describes the existence of *transaction costs* (TCs). In particular, transacting induces the following:

- *Information costs* to identify trading opportunities and suitable partners,
- *Negotiation costs* to specify the agreements of exchange,
- *Monitoring and enforcement costs* to safeguard the transaction's outcome (Dahlman, 1979).

Broadly defined, TCs are the “costs of running the economic system” (Arrow, 1969, p.1). Niehans (1971) defines them as costs that arise from the transfer of a good from one agent to another, apart from production costs. While production costs “depend only on the technology and tastes” (Arrow, 1969, p. 14), TCs vary due to changes in the mode of resource allocation (Arrow, 1969). Which TCs arise and at which magnitude depends on the nature of the good and the mode of exchange that governs a particular transaction (Williamson, 1998a).

Technically, TCs depict “resource losses due to imperfect information” (Dahlman, 1979, p. 148). Imperfect information and resulting uncertainty give way to contractual hazards, such as opportunistic behaviour, measurement problems or changing conditions over time which affect the transactional relationship (Williamson, 1979; 1998a). TCs result from those actions transactors undertake to manage these deficiencies (Coggan et al., 2010). TCs are one of the main research objects of New Institutional Economics (NIE), an economics' research area that deals with the function of institutions in economic exchange (see also Furubotn and Richter, 2008). According to NIE, institutions are formalised and non-formalised rules of behaviour which structure the economic, social and political behaviour of people and thereby reduce the uncertainty surrounding (economic) interactions and resulting

contractual hazards (North, 1990). These institutions facilitate or even enable exchange by affecting the relative price (the TCs) of the exchange itself (North, 1990).

According to Williamson (1998a; 2000), institutions work at four hierarchical levels, where the higher level imposes constraints on the level immediately below. He labels them (from macro to micro level perspective) *social embeddedness*, *institutional environment*, particular *institutional arrangements* (governance structures) and *incentive alignment*. The three lower levels especially are the subject of particular new institutional economics' concepts<sup>8</sup>.

Norms, customs, religions, traditions, etc. are located at the *social embeddedness* level (Williamson, 1998a; 2000).

The *institutional environment* consists of the legal, social and political rules that determine the context in which any economic activity takes place (Williamson, 1998a; 2000). By that, the institutional environment constitutes the 'rules of the game' – that is, it limits the choice of possibilities (Pascual and Perrings, 2007) - within which the single governance structures operate (Williamson, 1998a). This comprises specification and allocation of property rights (Demsetz, 1967) as well as those possibilities and rights that enable their legal enforcement (Williamson, 1998a). This (initial) assignment of rights to resources also influences their (latter) allocation due to the costs of their exchange (Coase, 1960; Paavola, 2007). An example is the EAFRD regulations to co-finance regional AES, which will be investigated in the course of this thesis.

*Institutional arrangements* - also denoted as governance structures or governance arrangements<sup>9</sup> (see Hagedorn, 2008) – depict (discrete) supporting structures for particular transactions (Williamson, 1998a). They aim to economise exchange in the presence of contractual hazards and resulting TCs (Paavola and Adger, 2005; Vatn, 2009). Institutional arrangements are at the analytical focus of Transaction Costs Economics (TCE). AES denote such a particular institutional arrangement.

The lowest level deals with *aligning incentives* between single economic actors and investigates the efficiency of contractual relationships established *within* a particular institutional arrangement (Williamson 1998a). This is the focus of Agency Theory (also known as principal-agency [PA-] theory or theory of incentives<sup>10</sup> (Sappington, 1991). PA-theory focuses on contract design to guide the actors' behaviour efficiently within the transactional relationship in the presence of particular contractual hazards. TCs arise to assess, monitor and/or measure the actors' performance in a particular contract-based transaction (Williamson, 1998a; Barzel, 2005) and are also denoted as *agency costs* (Jensen and Meckling, 1976; Erlei et al., 2007). Such PA-relationships exist e.g. between the EU and the Hessian administration and between the administration and the participating farmers<sup>11</sup>.

To sum up, the top two levels explore institutions ruling the possibilities of exchange in general; the bottom two levels investigate institutions that govern actual transactional relationships. Since the

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<sup>8</sup> These are *property rights theory*, *TCE* and *principal-agent theory* (Furubotn and Richter, 2008).

<sup>9</sup> Note that these terms are used interchangeably in this thesis.

<sup>10</sup> Note that these terms are used interchangeably throughout this thesis.

<sup>11</sup> See article 2 in chapter 6.

focus of this thesis is on the latter, the research articles apply analytical concepts derived from TCE and PA- theory. Their general features are briefly presented and discussed in the next pages. An application to nature-related transactions follows in section 2.2.

### 2.1.2 Theoretical approaches to investigate transaction costs

#### 2.1.2.1 *Transaction Cost Economics*

TCE provides a framework to identify institutional arrangements that mitigate contractual hazards of particular transactions at minimum TCs (Picot, 1991; Williamson, 1998a; Ménard, 2004; Hagedorn, 2008; Garrick et al., 2013). Such institutional arrangements range along an axis between the polar cases market and hierarchy and differ in TCs and coordination mechanisms (Williamson, 1979; 1985; 1998b): While markets rely merely on prices as a coordination mechanism; hierarchies use command-and-control instruments and thus encompass a wider range of incentivising, monitoring and sanctioning mechanisms (Picot, 1991; Williamson, 1998b). TCE uses *comparative efficiency* as efficiency criterion; for each transaction, specified by its characteristics, an optimum arrangement exists that minimises upcoming TCs and is thus comparatively efficient (Garrick et al., 2013). This implies that TCs do not decrease to zero. The basic unit of analysis is a (single) transaction, which takes place “when a good or service is transferred across a technologically separable interface” (Williamson, 1985, p. 1). Its characteristics – expressed as specifications of the dimensions *uncertainty*, *frequency* and *asset specificity* – as well as the *behaviour of the actors* involved constitute specific contractual hazards (Williamson, 1979; 1985; 1998b).

*Uncertainty* refers to any disturbances to which a transaction might be exposed (Williamson, 2000). It encompasses future states of the environment (i.e. any external present or future impacts on the contractual outcome), difficulties in observing and measuring the contractual outcome (or even to specify it at all), and the actors’ behaviour (Mettenpenningen and van Huylbroeck, 2009; Coggan et al., 2010). As a consequence, only incomplete contracts can be set up, and TCs may come up due to later (re-)specification, re-negotiation, and enforcement of the contractual outcome (Williamson, 1998b). In the presence of renegotiation, TCE also investigates adaptation possibilities of an institutional arrangement with respect to later adjustments (Brousseau and Fares, 2000).

Gaps in contracts also affect the degree of uncertainty about the actors’ behaviour (Williamson, 1979; 1998b). This comprises both *bounded rationality* and *opportunism* (Williamson, 1985). *Bounded rationality* acknowledges that people are rational but limited in their ability to foresee all contingencies that may arise (Simon, 1957). Thus, collecting and analysing information before, during and after transaction decisions are made is costly in terms of time and resources; this is also a reason to leave incomplete contracts to future specification (Williamson, 1998a; Leiblein, 2003).

*Opportunism* suggests that economic actors act self-interested with guile (Williamson, 1979; Leiblein, 2003). Such behaviour is facilitated when contracted actions cannot easily be observed and high uncertainty about actions and outcomes exists (Coggan et al., 2010). Leeways for opportunistic

behaviour also increase TCs for monitoring.

On the contrary, *frequent transacting* induces learning effects on price, quality, and behaviour of the trading partners and thus reduces TCs (Coggan et al., 2010; McCann, 2013). Consequently, recurring transactions between the same parties reduce marginal TCs due to reduced efforts for information and negotiation (Coggan et al., 2010).

The last and most important characteristic is the *specificity of assets* needed to generate the transactional good (Williamson, 1998a). It is defined by the asset's applicability in alternative purposes and may take a variety of forms – physical assets, human assets, site specificity, dedicated assets, brand name capital, and temporal specificity (Williamson, 1979; 1998a). Asset specificity is often a result of a prior investment (Coggan et al., 2010). High asset specificity gives rise to a condition of bilateral dependency; what may have been a large numbers supply condition before contracting gets transformed into a small numbers exchange relation thereafter (Williamson, 1998a). As a consequence, contractual hazards emerge; lacking alternative utilisations, the investing partner is locked-in (Williamson, 1979; Leiblein, 2003). The other partner may renegotiate the contract terms to attain a quasi-rent (*hold-up*) (Leiblein, 2003). Therefore, the investing partner seeks to devise safeguards to protect his investment (Williamson, 1998a). Such safeguards comprise credible inter-firm commitment options, such as adding penalties into the contract, providing additional information disclosure, or agreeing on modes for conflict settlement. To take transactions out of the market and organise them within a form of hierarchy is another safeguard (Williamson, 1998a). The higher the degree of asset specificity, the more likely a transaction is governed by hybrid forms or hierarchies (Williamson, 1998a; Ménard, 2004). Such an arrangement may even enable such transactions in the first place (Falconer and Whitby, 1999; Leiblein, 2003).

The more contractual hazards there are to mitigate in a particular transaction, the more important contract design becomes. Such design aspects are the subject of PA -theory, which is depicted in the next subsection.

### **2.1.2.2 *Principal-Agent-Theory***

PA theory focuses on the relationship between the contractors – constituted by a delegation of tasks and inherent information asymmetry- as the main source of contractual hazards. By merely addressing the contractual relationship between actors, this approach is in principle applicable on any governance structure (Slangen and Polman, 2002).

The PA-setting is as follows: a customer (principal) delegates a specified task to a contractor (agent) in return for a payment compensating the agent's effort or (opportunity) costs (Laffont and Tirole, 1993). One basic assumption is that both principal and agent are self-interested, rational actors<sup>12</sup> and aim to maximise their individual utility; however, their particular objective functions differ (Jensen and Meckling, 1976; Slangen, 1997). TCs arise as *agency costs* or *costs of delegation* (see also Jensen and Meckling, 1976; Tirole, 1994; Barzel, 2005; Bolton and Dewatripont, 2005).

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<sup>12</sup> This is an important difference to TCE which acknowledges bounded rationality.

Agency costs aim to reduce losses stemming from this preference divergence and comprise *monitoring expenditures* of the principal, which include any expenses to guide the agent's behaviour, *bonding expenditures* by the agent (i.e., expenses to ensure/guarantee compliance or some form of credible commitment on the side of the agent), and the *residual loss*, which depicts the principal's welfare reduction (Jensen and Meckling, 1976)<sup>13</sup>.

Trade-off relationships may exist between these TCs; residual losses might be lowered by monitoring; monitoring might be reduced by credible commitment (Picot, 1991). Thus, contract design also encompasses distributional decisions on who incurs these costs.

The central concern of PA -theory is contract design: contracts shall minimise agency costs in the presence of *uncertainty*, the agents' *attitude to risk* and *asymmetric information* (Sappington, 1991).

In PA-theory, *uncertainty* denotes that the contractual outcome not only depends on the agent's effort, but also on some random (external) productivity parameters, such as weather conditions in agriculture (Sappington, 1991). Contrary to the notion of uncertainty in TCE, the distribution of this random parameter is usually known (Erlei et al., 2007).

The second feature is the *agents' attitude to risk*. Agents are supposed to be risk-averse, which means they value a fixed value higher than an uncertain one whose weighted average yields exactly the same value (Slangen, 1997). Risk aversion implies that an agent would not bear the whole production risk in case of uncertainty, that is, he would not accept a contract which links remuneration only to the output (Bolton and Dewatripont, 2005).

The third feature is *information asymmetry*, which results from delegation per se. The agent is supposed to have private (hidden) information on both his ability to perform the task and on the effort he is willing to execute (Bolton and Dewatripont, 2005). Moreover, the principal cannot completely observe the actions of the agent (formally: the agent's effort to fulfil the delegated tasks, Laffont and Tirole, 1993). This might induce the agent to behave opportunistically prior to or after concluding the contract (Laffont and Tirole, 1993). Prior to contracting, the agent may claim that his capabilities and opportunity cost are higher than they actually are. This problem is labelled *adverse selection*, as the principal faces the risk to mandate an improper or comparatively expensive agent (Laffont and Tirole, 1993).

After contracting - given imperfect observability and an uncertain outcome - the agent may claim that exogenous circumstances hampered task fulfilment despite his own decision not to comply. This is labelled *hidden action* or *moral hazard* (Laffont and Tirole, 1993; Heinrich and Marschke, 2010).

*Adverse selection* can be reduced via screening or signalling measures<sup>14</sup> aiming to identify agents' capability and opportunity costs, and to design proper contracts at the expense of TCs (Slangen, 1997; Ferraro, 2008). Screening and signalling measures encompass information collection, offering a menu of contracts or allocating task delegation through procurement auctions (Ferraro, 2008).

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<sup>13</sup> In case the principal is the society, as depicted below for AES, this residual loss depicts social welfare losses.

<sup>14</sup> Screening refers to measures where the uninformed party (the principal) acts first; signaling refers to measures where the informed party (the agent) acts first (Fraser, 1995).

*Moral hazard* can be reduced in basically two ways: first, by offering a (monetary) incentive to the agent; e.g. a share of the residual gain of the principal. However, offering an incentive component requires the existence of a residual gain that can be distributed (Moe, 1984). Moreover, the power of such an incentive may be limited due to output uncertainty and the risk attitude of the agent. This gives way to the second option, which is to mitigate the moral hazard by monitoring or measuring the agent's performance (Sappington, 1991; Heinrich and Marschke, 2010). Monitoring comprises legal and technical oversight, defining standards, or prescribing structural and procedural requirements (Moe, 1991). However, the applicability of particular monitoring instruments depends on the measurability of the output (Huber and Shipan, 2000; Heinrich and Marschke, 2010).

In light of these features, contract design aims to define payment schedules that provide an optimal trade-off between the benefits of risk sharing and the costs of providing an incentive to the agent (Laffont and Tirole, 1993; Slangen, 1997). Thus, if possible, payment schedules should encompass an incentive component to motivate the agent to exert effort, and a fixed wage component as risk compensation (Furubotn and Richter, 2008). Furthermore<sup>15</sup>, contracts may specify additional built-in mechanisms such as screening/signalling and monitoring measures to meet hazards that cannot be eliminated by the payment schedule (see also Ozanne et al., 2001).

As mentioned above, PA-theory assumes that both the distribution of the random output parameter and the agent's attitude towards risk are known (Erlei et al., 2007). Consequently, and contrary to TCE, contracts in PA -theory are assumed to be complete, although suboptimal (Erlei et al., 2007). TCs are of concern when weighing the costs to establish safeguards to avoid or reduce adverse selection and moral hazard against the welfare losses which arise without safeguards. Thus, also in PA-theory, TCs do not decrease to zero.

### 2.1.3 Concluding remarks

TCE and PA theory provide important insights on how to organise transactional relationships in the presence of TCs and are perceived as complementary theories (Picot, 1991; Erlei et al., 2007). An important insight in both concepts is that TCs can be minimised but never decrease to zero. Yet, the differences between both concepts, namely the notion of uncertainty in TCE vs. the acknowledgement of risk in PA theory and the perception of contractual design (complete vs. incomplete) led to rather discrete applications in research (Williamson, 1998a; Erlei et al., 2007). Moreover, the concepts differ in their degree of formalisation; while TCE is a non-formalised approach; PA-theory usually uses mathematical modelling (Erlei et al., 2007).

In the following, AES as institutional arrangement to govern the provision of environmental goods are introduced. Prior to this, specificities of nature-related goods and resulting contractual hazards are briefly discussed, in the light of TCE and PA-theory. Finally, a literature review presents previous findings on AES-related TCs.

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<sup>15</sup> E.g. in case of a low power or absence of the incentive.

## 2.2 AES as institutional arrangements to govern nature-related transactions

AES shall foster the provision of public goods on private property<sup>16</sup> (Slangen and Polman, 2002; Smits et al., 2008) and are an example of the ‘beneficiary pays’ principle (Lockie, 2013). Based on a – usually multi-annual – contractual agreement between farmers and the agricultural administration, farmers agree on changes in land use towards environmentally friendly practices in return for a financial compensation for their loss of productivity (Lockie, 2013). From a NIE perspective, AES are *a long-term contractual relationship*, which is an intermediate between market and hierarchy (Ménard, 2004).

Following TCE, any arrangement aims to minimise those TCs necessary to mitigate contractual hazards. These, in turn, depend on the properties of the transaction governed by an AES as well as the behaviour of the actors involved. These properties are discussed in the next subsections.

### 2.2.1 Attributes of nature-related transactions and resulting contractual hazards

Depending on the good in question, nature-related transactions incur different specifications of uncertainty, specificity, and frequency (e.g. Falconer and Whitby, 1999; Rørstad et al., 2007):

The degree of *uncertainty* depends on external conditions, the impossibility to foresee future states of nature, and other informational limits.

Agricultural output is subject to stochastic *environmental conditions* such as the weather, which makes environmental good provision generally subject to uncertainty (Falconer and Whitby, 1999; Birner and Wittmer, 2004). Uncertainty also arises from difficulties in *observing and measuring* the good in question; therefore, its quality may be difficult to assess, which hampers assessing the actual value of an environmental good (Latacz-Lohmann and Van der Hamsvoort, 1998; Falconer and Whitby, 1999; McCann, 2013). Moreover, some environmental outcomes occur time-lagged (Falconer and Whitby, 1999; McCann, 2013) or lack separability and thus accountability (Hagedorn, 2008; McCann, 2013).

Uncertainty is also influenced by the *scope* of an environmental impact, which may occur at local, regional, or global levels (Birner and Wittmer, 2004; McCann, 2013), including the spatial scope of externality denoted by the degree to which producer/polluter and beneficiary/damaged deviate. This also may reduce accountability needed to properly assess and reward an environmental impact.

Uncertainty also arises from limits in knowledge on input-output relationships (e.g. the efficacy of actions), such as to what degree a specific practice actually harms or benefits nature (Hagedorn et al., 2002; Hagedorn, 2008). In principle, this accounts for both the administration and farmer.

*Asset specificity* in the context of AES primarily refers to specificity in physical assets of the production sites (Slangen and Polman, 2002; Birner and Wittmer, 2004; McCann, 2013).

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<sup>16</sup> The terminology used in this thesis follows the distinction of (Kleijn and Sutherland, 2003, p.949): Agri-environmental *programmes* are a collection of agri-environmental *schemes* within a common framework. Particular AES pursue different objectives and usually consist of one or several agri-environmental *measures*.

Agriculturally used sites are heterogeneous to a large degree; no two sites are identical (Falconer and Whitby, 1999; McCann, 2013). This implies that values of the environmental goods may vary widely between different types of sites – e.g. cropland, pastures, or field element objects (Hasund, 2013). Moreover, its particular location or management practices may affect the quality of a specific type and may induce within-type variances in quality (Rørstad et al., 2007). Site-specificity also encompasses the location of valuable assets, such as rare species, suitability for special purposes (e.g. creating a connected habitat), or when particular inputs create specific conditions for one species but not for another (Coggan et al., 2010). In TCE terminology, site specificity denotes a specific investment, as it often is an effect of prior land use decisions (Slangen and Polman, 2002). The site-specific grassland extensification scheme in Hesse, for example, explicitly aims at pertaining specific grassland habitats that have emerged due to extensified land use (see section 3.1.3). Finally, specificity may also refer to human resources, for example when farmers gained specific knowledge on environmentally friendly land use due to specific training or learning by doing and experience (Birner and Wittmer, 2004).

*Frequency* can be distinguished in *frequency of 'nature production'* and *frequency of contracting*. *Frequency of nature-production* may vary from single resource utilisation, e.g. conversion of arable land into grassland, to recurring (seasonal) utilisation patterns, such as pertaining extensive grassland (Hagedorn et al., 2002). The frequency of contracting refers to the duration of scheme participation; that is, in what time-spans contracting recurs (Falconer et al. 2002).

The particular specification of these dimensions when providing a specific environmental good induces a number of contractual hazards to be governed within the transactional arrangement.

*Site-specificity* induces bilateral dependency and may foster *opportunism*; site-specificity affects the quality of an environmental good and the related production costs. Different costs on different sites require TCs to identify suitable farmers and to calculate adequate payments, a situation subject to adverse selection (Falconer and Whitby, 1999; Ferraro, 2008). Moreover, site-specificity offers an opportunity for a hold-up situation. The agricultural administration as a representative for the societal demand is in need of ensuring the provision of the desired environmental good (Höft, 2011) and depends on (compliant) participation of the farmer<sup>17</sup>.

Besides a general production risk due to external conditions, *uncertainty* induces *measurement and adaptation problems* and may foster *opportunistic behaviour*.

Lacking knowledge about the efficacy of actions may affect actors' behaviour by influencing farmers' decisions towards nature-harming practices (Mettepenningen and van Huylenbroeck, 2009). Furthermore, farmers might not be aware of the effects of their management decisions in the case of spatial externality. In TCE's terms, these depict examples for bounded rationality. On the side of the administration, a lack of knowledge may lead to the misspecification of schemes. Thus, providing and obtaining knowledge, for example in form of agricultural extension services, might be crucial but at

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<sup>17</sup> Such a setting is discussed in article (1), see chapter 5.

the same time denotes TCs (Mettepenningen and van Huylenbroeck, 2009; Mettepenningen et al., 2011).

Lacking observability and measurability requires specifying the contractual outcome via proxy indicators (Latacz-Lohmann and Van der Hamsvoort, 1998). However, indicators' accuracy of inferences on environmental benefits vary, which affects TCs in terms of monitoring costs and welfare losses due to misspecifications (Choe and Fraser, 1999; Zabel and Roe, 2009). The same holds for monitoring techniques, which might be imperfect (Choe and Fraser, 1999). Moreover, attempts to reduce one uncertainty aspect may increase another; an example is to agree on management practices for a defined scope of hectares (so called action-based, area related AES, see Matzdorf and Lorenz, 2010). Such contracts reduce uncertainty to specify the contractual outcome and mitigate the production risk for farmers. However, they increase uncertainty that the aspired environmental outcome actually occurs (Matzdorf and Lorenz, 2010).

Lacking observability, measurability, and accountability may also foster opportunistic behaviour in terms of moral hazard (Coggan et al., 2010). From an economic point of view, whether a farmer behaves opportunistically depends on a cost-benefit reasoning on the gains and costs of (non-) compliance (Becker, 1968; Falconer and Whitby, 1999). A precondition is that non-compliance can be tracked, which, in turn, is subject to frequency and depth in monitoring (Osterburg, 2008) as well as the suitability of the indicators monitored and the monitoring techniques used<sup>18</sup>.

Opportunistic behaviour is also subject to a number of societal and institutional factors; the general legitimacy of actions in the light of social, cultural or legal norms (Hagedorn et al., 2002; Krutilla and Krause, 2010), values, beliefs and attitudes of actors (Siebert et al., 2006), the degree to which actors/stakeholders are involved in decision making and implementation activities (Beckmann et al., 2009) and their social environment and embeddedness (Winter and May, 2001; Pascual and Perrings, 2007) tend to foster compliance. Moreover, frequent recurrence of (trans-) actions can reduce uncertainty in efficacy and behaviour. Therefore, marginal TCs across all transactions tend to decrease due to reduced effort for information and search when transactions between the same parties are recurring (Mettepenningen and van Huylenbroeck, 2009; Rorstad et al., 2007; Coggan et al., 2010). This subject is addressed in the discussion on the duration of AES (see also Falconer and Whitby, 1999).

Finally, an important aspect associated is the degree to which a contract is subject to adaptation possibilities or flexibility; specified agreements reduce uncertainty by specifying the contractual outcome, yet at the cost of potential misspecification or reduced adaptation possibilities (Falconer et al., 2001), while general agreements rather offer leeways to fill in contractual gaps via re-negotiation.

To sum up, the features of nature-related goods induce a number of contractual hazards, such as difficulties to claim gains from nature production or related investments, leeways for opportunistic behaviour, a general production risk, and measurement problems.

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<sup>18</sup> This subject is addressed in articles 2 and 3 (see chapters 6 and 7).

AES design aims to mitigate such contractual hazards; however, as argued above, contractual solutions tend to be incomplete and may even induce trade-offs between different hazards. As an example, payments may be granted upon particular environmental results, which reduces opportunism but at the same time increases the production risk and thus uncertainty for farmers. Thus, AES design may take only part of the hazards into account while ignoring others. In consequence, AES design features vary widely<sup>19</sup>.

A number of theoretical and empirical works investigated AES-related TCs conceptualised as a consequence of both differences in contractual design and the environmental good to be provided. While theoretical works use principal-agent-based approaches, empirical work is settled in TCE. The next subsection presents the existent literature according to their theoretical foundation.

### 2.2.2 Transaction costs in agri-environmental schemes

#### 2.2.2.1 Analytical work based on Agency Theory

PA-based studies focus on the possibilities of contract design to mitigate contractual hazards coming up from information asymmetry and thereby reduce transaction costs. The neoclassical ideal serves as a benchmark. Using mostly formal modelling with numerical examples, these studies develop ‘second-best solutions’, which minimise upcoming welfare losses (and denote TCs, see section 2.1). In contrast to TCE based studies, PA-related studies do not investigate TC magnitudes empirically.

AES participation is perceived as PA-relationship with the administration as the principal and the participating farmer as the agent (Slangen, 1997). Information asymmetry stems from the heterogeneity of farms and farmers, which influences both their production costs for the environmental good and their likeliness to comply with the contract agreements (Slangen, 1997). PA-based studies investigate contractual solutions for reducing opportunistic behaviour in the form of *adverse selection* and *moral hazard* in the presence of risk-aversion, production uncertainty, and measurement problems.

In the context of AES, *adverse selection* means that a farmer can realise information rents by claiming his opportunity costs are higher than they actually are and obtaining a higher payment, which induces welfare losses (Slangen, 1997). *Moral hazard* occurs because the administration cannot completely monitor the farmers’ compliance with the contract. Given uncertainty in agricultural production, the farmer may claim exogenous circumstances hampering contract fulfilment despite his own decision not to comply. In the case of prearranged payments, the farmer generates an extra rent due to the difference of his costs (effort) and the level of payment (Slangen, 1997). This also results in welfare losses.

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<sup>19</sup> Mettepenningen et al. (2013) non-comprehensively group the various aspects of institutional solutions into implementation flexibility (eligibility criteria, management practices, duration of contracts, adaptation possibilities), scope (single measures, schemes, whole-farm approaches), payment design (result vs. action based, individual vs. flatrate, action based), design aspects (participatory or not) and assistance in implementation (governmental advice, cooperation of farmers).

Studies addressing *adverse selection* focus on the trade-off between welfare losses due to costs for establishing individual contracts vs. the costs for overcompensating farmers in the case of standardised contracts (see also Moxey et al., 1999). The analyses model various instruments with respect to their capability to reduce adverse selection. Slangen (1997) and Moxey et al. (1999) use two-type models with efficient and inefficient farmers and suggest offering different types of contracts for these types of farmers ('screening'). Latacz-Lohmann and Van der Hamsvoort (1998) analyse potential benefits and possible drawbacks of auctions as a self-revealing mechanism. Canton et al. (2009) focus on the possibility to reduce adverse selection via spatial targeting of an AES.

In a non-formal approach, Ferraro (2008) discusses and compares these different instruments, namely obtaining information on observable landholder attributes (so called 'costly-to-fake signals'), offering menus of contracts ('screening') and procurement auctions. He finds these approaches to vary substantially in institutional, informational and technical complexity; nevertheless, the more complex approaches screening contracts and auctions are at least theoretically more capable of reducing informational rents compared to obtaining costly-to-fake signals<sup>20</sup>.

Studies investigating *moral hazard* focus on the trade-off between arising monitoring costs and costs (losses of environmental benefit) due to farmers lacking compliance, given that the contract cannot fully rely on the use of incentives, as uncertainty prevails (Ozanne et al., 2001, see also section 2.1.2.2). Farmers' willingness to comply is perceived as a rational decision from weighing the gains against the costs of (non-)compliance (Becker 1968; Ozanne et al., 2001). Reasons for differences in compliance are traced back to farm and farmer attributes. The resulting models show a positive relationship between compliance and

- Farmers' degree of risk aversion (Ozanne et al., 2001),
- Additional production uncertainty (Fraser, 2002; 2012),
- Lower compliance costs (Hart and Latacz-Lohmann, 2005) and
- The duration of scheme participation (Fraser, 2012).

Accordingly, the models suggest that these aspects should be taken into account in AES contract design in order to reduce TCs. Yano and Blandford (2011) find these results persist in the presence of production uncertainty due to a change/restriction in input use (e.g. pesticides) with a risk-reducing or risk-neutral impact on production (output); however, if the input restriction increases the production risk, the positive impact of risk aversion on compliance is reduced to a minimum.

These studies investigate *incomplete* monitoring (see section 2.2.2.1)<sup>21</sup>, and, by definition, only "true" detections are stated (Choe and Fraser, 1998). In contrast, *imperfect* monitoring acknowledges the existence of erroneous inspection results. Such *imperfect* monitoring is only addressed by Choe and Fraser (1998, 1999). They show that less accurate monitoring increases the social costs and thus

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<sup>20</sup> Uthes and Matzdorf (2013) point out that these advantages seem not to persist in real world application due to high informational requirements and resulting costs.

<sup>21</sup> *Incomplete* monitoring means that not every defection is detected, e.g. due to partial monitoring (Choe and Fraser, 1998).

lowers the net benefits of scheme implementation due to the costs incurred to correct the failures and due to a compensatory payment for farmers as they bear a risk of being mis-detected. As will be discussed in the course of this thesis (especially in article 2, see chapter 6), imperfect monitoring is actually occurring during scheme implementation, however, rarely addressed in theory.

### **2.2.2.2 TCE-based analyses**

According to its focus on comparative efficiency, studies rooted in TCE focus on inter-scheme differences in magnitude and composition of private TCs (Falconer, 2000; Falconer and Saunders, 2002; Mettepenningen and van Huylenbroeck, 2009; Mettepenningen et al., 2009), public TCs (Falconer et al., 2001; Nilsson, 2009; Ollikainen et al., 2008, Mettepenningen et al., 2011), or both (Falconer and Whitby, 1999; Rørstad et al., 2007) in order to assess TCs and to identify their drivers to improve policy design. Upcoming TCs are distinguished in categories along the transaction process, i.e. information, negotiation, and monitoring and enforcement costs, and mostly assessed as (monetised) working time (McCann et al., 2005) All studies have in common that they assess TCs comparatively and not against the neoclassical ideal of zero transaction costs.

Their overall approach bases applications of the TCE concept on nature-related transactions as depicted in section 2.2.1. Influences on TCs are foremost sought in different aspects of heterogeneity, grouped into scheme- and actor related factors, as well as features of the natural and institutional environment in which the scheme is implemented (for an overview, see Mettepenningen and van Huylenbroeck, 2009). The main overall findings are

- The existence of fixed and variable TC components which allow generating economies of scale foremost in whole-farm approaches (Falconer, 2000), and
- The existence of learning effects that reduce relative TCs over time for both farmers and the administration in the course of scheme implementation (Falconer, 2000; Falconer et al., 2001).

Another important result – and in line with TCE - is a positive relationship between TCs and scheme specificity (Falconer et al., 2001; Falconer and Saunders, 2002; Rørstad et al., 2007; Ollikainen et al., 2008), resulting from higher informational needs to meet the heterogeneity of sites and/or farmers.

In consequence, trade-offs emerge in scheme design between TC efficiency and (environmental) scheme precision (Vatn, 2002); moreover, the results highlight the role of (costly) information provision for farmers for scheme success (Falconer, 2000; Mettepenningen et al., 2009).

Further studies assess the comparative advantage of AES as voluntary agreements opposite to regulatory approaches in terms of upcoming (public) TCs (Kersten, 2004; Jongeneel et al., 2012). Additionally, some studies theoretically and empirically discuss the comparative efficiency (due to reduced TCs) of alternative institutional arrangements within particular AES, such as cooperative arrangements (Slangen and Polman, 2002; Polman and Slangen, 2002), whole-farm approaches

(Falconer, 2000) or auction-based contracts (Groth, 2007).

In contrast to the - rather formally rigid - PA-approaches, TCE based studies encompass a wider range of influencing factors; attributes such as a positive attitude towards nature conservation, experience or a common ideology between the transacting parties are discussed to reduce opportunistic behaviour, and thus TCs (Falconer, 2002; Mettepenningen and van Huylenbroeck, 2009; Coggan et al., 2010).

These studies focus on inter-scheme differences in TCs and leave intra-scheme variances - although acknowledged (e.g. Mettepenningen et al., 2009) - mostly unexplored. Moreover, the results obtained so far are – although highlighting the main influences – far from providing a comprehensive picture. However, understanding factors affecting intra-scheme variances in public and private TC is crucial for assessing and eventually improving the TC efficiency of AES. Moreover, prevailing TCs strongly depend on the institutional design of a policy (Paavola, 2007; Vatn, 2009). The majority of German AES is implemented within the CAP framework (Thomas et al. 2009); however, its influence on upcoming TCs has not been investigated despite a recognised influence (Coggan et al., 2010; Mettepenningen et al., 2011). Understanding the influence of the EAFRD framework on regional TCs is also needed in order to assess and eventually improve AES.

### **2.2.3 Concluding remarks**

This section provided an introduction in the field of research by discussing the theoretical background and presenting the relevant literature. The review reveals that the empirical focus is on inter-scheme variances; intra- scheme variances are not thoroughly addressed. Moreover, the studies only investigate the relationship between the (local) administration and the farmer; influences related to the institutional environment, namely the embedding in the CAP, remained ignored. Nonetheless, these findings provide the scope to construct the conceptual frameworks underlying the articles constituting this thesis.

Before the main results of the thesis are presented in chapter 4, an overview of the study area is provided in the next section.

### 3 Study Area

This chapter provides some general, mainly descriptive information about the State of Hesse, thus extending the information presented in the articles. It highlights interrelationships between Hesse's main landscape features, the Hessian agricultural structure, related environmental challenges and recent counteracting developments in Hessian agri-environmental policy.

#### 3.1 General features

The state of Hesse is one of the 16 German States (*Länder*), located in its centre. It was formed as an administrative and political entity after the World War II as result of a political decision; it was one of the three administrative districts of the US occupation zone (Freund, 2002). Therefore, its administrative borders were chosen somewhat arbitrarily and the state is characterised by a historically grounded cultural heterogeneity (Freund, 2002). Heterogeneity also characterises the Hessian landscape; features vary at large and imply heterogeneity in land use possibilities and in the resulting agricultural structure (Freund, 2002). However, being an administrative entity, any (agricultural) political decisions taken at state level apply to Hesse as a whole.

Below the state level, the administrative structure is organised into three hierarchical levels (top-down): three higher administrative districts (*Regierungsbezirke*), 22 county districts (*Landkreise*) and four urban districts (*Stadtkreise*) at the medium level – displayed in figure 1 -, and 426 communities (*Gemeinden*) (HMULV, 2006).

In 2011, Hesse covered an area of 21,114.8 km<sup>2</sup> and was inhabited by 6.1 million people (Hessisches Statistisches Landesamt, 2012c). Taking the mean, Hesse is relatively densely populated with 284 inhabitants per km<sup>2</sup>, but the population density varies strongly between the sparsely populated North East (<150 inhabitants per km<sup>2</sup>) and the more densely populated South West (> 300 inhabitants/km<sup>2</sup>) (Hessisches Statistisches Landesamt, 2012a).

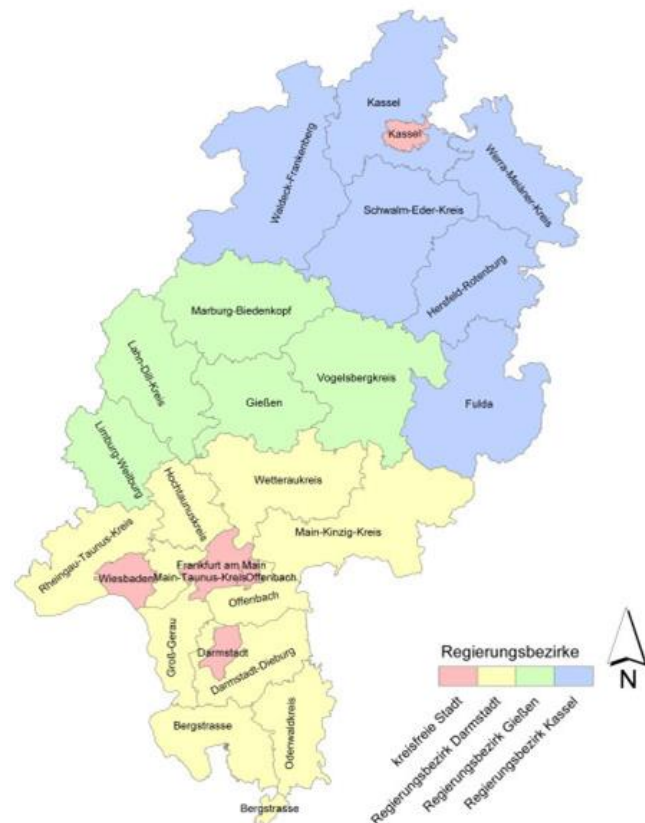


Figure 1: Administrative structure in Hesse - district level  
Source: HMULV 2006, p.21.

### 3.1.1 Landscape and land use

Hesse is completely located in a mid-range mountain area (Freund, 2002). Only a small percentage of area, the Rhine valley, is located at an altitude below 100 metres above sea level (a.s.l.). The highest altitudes are located in the east near the border with Bavaria (600-950 metres a.s.l., Freund, 2002). Important rivers are the Rhine in the southwest (also forming the border with Rhineland-Palatinate), the Werra and the Fulda in the northeast (which both form the Weser at the border with Lower Saxony), and the Main, crossing mid-Hesse from east to west.

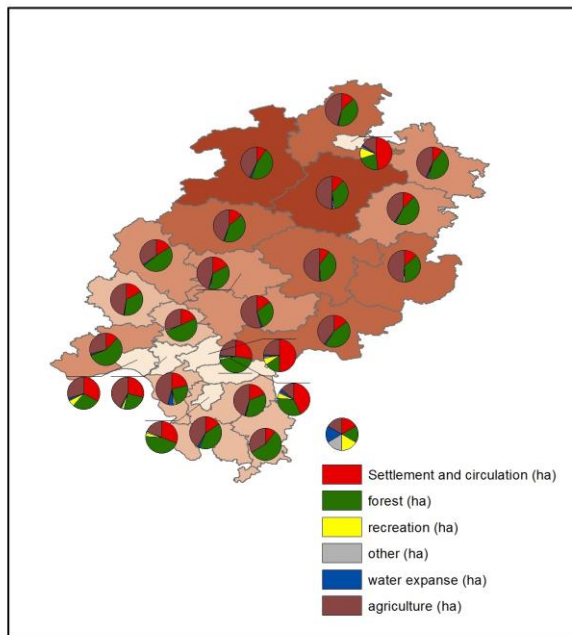


Figure 2: Distribution of types of land use in the Hessian counties. Author's calculation based on Hessisches Statistisches Landesamt (2012a).

More than  $\frac{3}{4}$  of the Hessian total area is covered by nature; forest area covers about 40% of total area, and 36% of total area (766,437 ha) is used for agricultural purposes (Hessisches Statistisches Landesamt, 2012b). However, contrary to the forest area which actually increased about 0.9 % from 839,104 ha in 1991 to 847,240 ha in 2011, the agricultural area decreased about 4%; from 927,518 ha in 1991 to 889,010 ha in 2011 (Hessisches Statistisches Landesamt, 2012b). The main reason for this decline is that agricultural land was converted into areas for settlement and circulation. The average land consumption was around 4 ha/day between 1992 and 2006 (Singer-Posern et al., 2008);

the share of area used for settlement and circulation increased from 14% in 1992 to about 15.5% at the end of 2011 (Hessisches Statistisches Landesamt, 2013a).

Figure 2 indicates the land use in the Hessian county districts according to their type of use in 2012 (Hessisches Statistisches Landesamt, 2012a). Settlement and circulation area is prevalent in the Rhine-Main region (Main-Taunus-Kreis; Offenbach). Forest is prevalent in the Hochtaunuskreis, the Rheingau-Taunus-Kreis, and the Odenwaldkreis; all three are located in rather mountainous areas. High shares of agricultural area are found in the northern counties (Kassel, Schwalm-Eder), in the East (Fulda, Vogelsberg) and in the Rhine-Valley (Gross-Gerau, Darmstadt-Dieburg, see figure 3).

### 3.1.2 Agricultural structure in Hesse

In 2012, the agricultural sector added a share of 0.5% on average to the Hessian GDP (Hessisches Statistisches Landesamt, 2013b). However, this contribution varies widely between the different counties and follows the distribution of agriculturally used land (UAA) (figure 3): While the northern counties Waldeck-Frankenberg, Schwalm-Eder, Werra-Meißner and Vogelsberg (highest with 2.9%) contribute a share of more than 2% to the Hessian GDP; the urban counties located in the Rhine-Main-region contribute below 0.5% (Hessisches Statistisches Landesamt, 2013b).

In 2010<sup>22</sup>, 62.2% of the UAA was used as arable land (Germany: 70.9%), 37.0% as permanent grassland (Germany: 27.9%), 0.4% as vineyards (Germany: 0.6%), and 0.2% for permanent fruit growing (Germany: 0.4%, Hessisches Statistisches Landesamt, 2012c). The pertinent share of grassland of about one third of the UAA (see Freund, 2002, and Elsholz, 2012, for different periods) is an indicator of rather low natural potential (Freund, 2002).

The agricultural use adheres to the heterogeneous landscape features. In the south, especially in the Rhine valley, besides crops, sensitive products such as asparagus or strawberries are also cultivated (Hessisches Statistisches Landesamt, 2012c). Arable land predominates in the low-land regions, e.g. in the central north and the south (Elsholz, 2012). Grassland predominates in the sub-mountainous regions in the west, east and south east (see figure 4). Accordingly, these areas are characterised by grassland-dependent agricultural use (dairy or husbandry farming, Elsholz, 2012).

Owner-run sole holder farms are the prevalent organisational form; in 2010, 16,514 of the 17,805 agricultural holdings counted were run as sole holder farms, of which only 5,227 (31.7%) were run full-time. This is substantially below the German average of 49.6% (Hessisches Statistisches Landesamt, 2012c, see also figure 6). Farms run as legal entities are of minor importance; this referred to only 111 farms or 0.6% (Germany: 5,062 or 1.7%) (Hessisches Statistisches Landesamt, 2012c).

In 2010, the average farm size was 43.0 ha, which is below the German average of 55.8 ha (Hessisches Statistisches Landesamt, 2012c). However, the picture changes when a distinction is made between farms run full-time part-time; the average size of farmers run full-time is about 74 ha; the average size of farms run part-time is about 23.5 ha (HMUELV, 2012a).

With respect to the number of agricultural holdings, Hesse follows the overall trend in structural change; while the number of agricultural holdings is constantly decreasing (from 160,000 farms in 1949 to 5,000 farms in 2009), the particular mean farm size increased from about 6 ha in 1949 to 43 ha in 2011 (Hessisches Statistisches Landesamt, 2012c).

Figure 5 shows the distribution of holdings among Hesse. Most farms are located in counties with a high share of UAA. However, when comparing figures 5 and 6, it becomes obvious that a high number of holdings do not necessarily imply a high percentage of full-time farming.

This observation is important, as it implies that policy instruments to foster maintaining different agricultural landscape features must address both full-time and part-time farmers.

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<sup>22</sup> In 2010, the last complete statistical survey on Hessian Agriculture (“*Landwirtschaftszählung*”) took place.

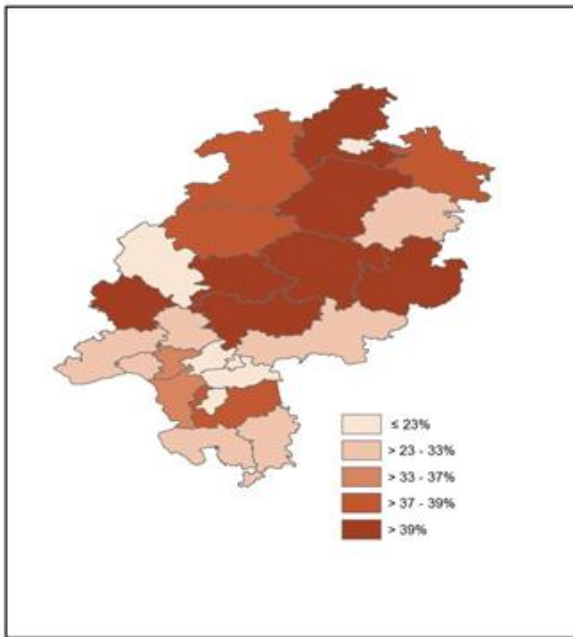


Figure 3: UAA as percentage of total area. Author's own depiction based on Hessisches Statistisches Landesamt (2012b).

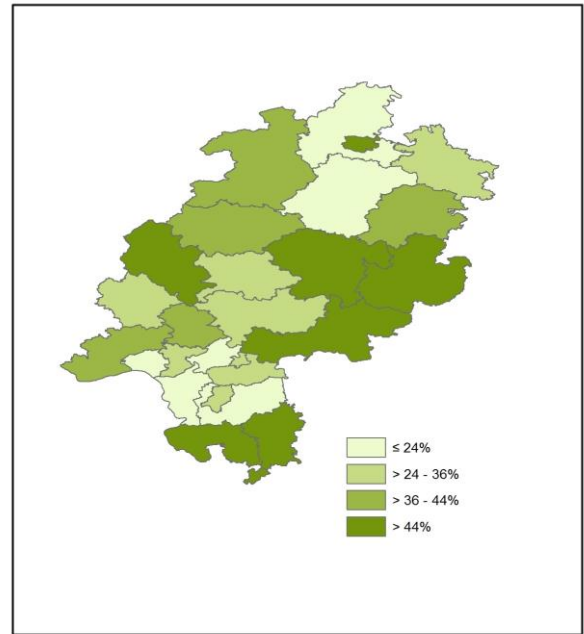


Figure 4: Grassland as a percentage of UAA. Author's own depiction based on Hessisches Statistisches Landesamt, (2012b).

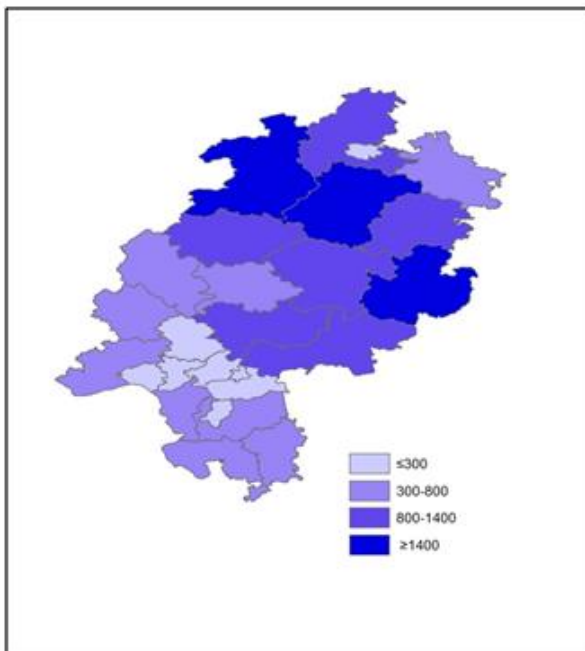


Figure 5: Number of agricultural holdings. Author's own depiction based on Hessisches Statistisches Landesamt, 2011).

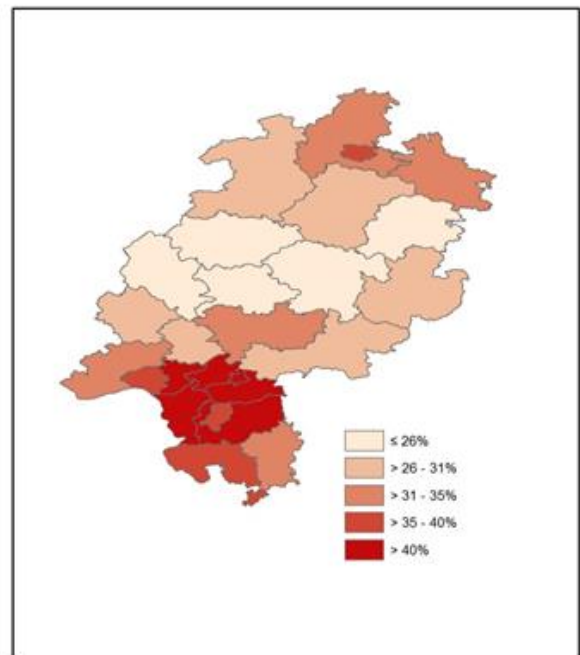


Figure 6: Sole run fulltime holdings (% of total farms). Author's own depiction based on Hessisches Statistisches Landesamt (2011).

### 3.1.3 Grassland-related environmental challenges

Agriculture influences the state of grassland<sup>23</sup> in many ways. Features such as meadows, for example, which provide habitats for rare species, were generated by generations of small-scale, extensive land cultivation (Wilhelm, 1999). On the other hand, intensification of grassland management, e.g. via mineralisation and the use of pesticides, has led to losses in biodiversity (Wilhelm, 1999; Slangen and Polman, 2002). Moreover, grassland is an important nitrogen storage area and inhibits soil erosion. A reduction of grassland due to ploughing increases the risk of erosion and groundwater pollution (Wilhelm, 1999).

Hesse possesses a substantial number of UAA (arable as well as permanent grassland) considered as ecologically important. In accordance with the *Council Directive 92/43/EEC Of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora*, the so-called *Habitats' Directive*, 639 areas covering 440,000 ha (21% of total Hessian surface area) were declared as area protected by the NATURA 2000 framework by 2007 (HMULV, 2008), see figure 7)<sup>24</sup>. Habitat sites amount to 211,209 ha in total, thereof 47,340 ha UAA, which represents about 5 % of total UAA. Among this scope, grassland holds the major share with about 40,854 ha (14% of total grassland). However, in line with the depicted landscape heterogeneity, the distribution of protected areas among the counties differs. Figures 7 and 8 depict the distribution of protected areas, indicated as a percentage of total UAA, or a percentage of protected grassland.

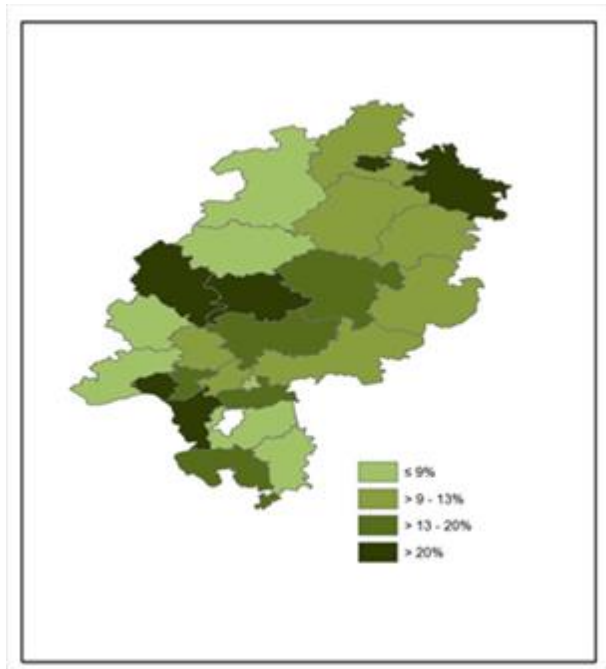


Figure 7: percentage of grassland/total grassland protected by the Habitats' Directive. Author's own depiction based on *Hessen-Forst, Forsteinrichtung und Naturschutz (FENA)*, Giessen (unpublished data).

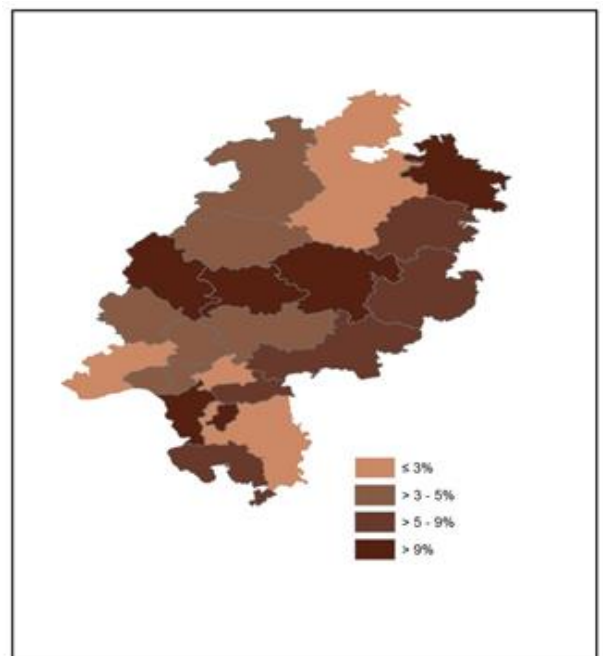


Figure 8: Percentage of UAA protected by the Habitats' Directive. Author's own depiction based on *Hessen-Forst, Forsteinrichtung und Naturschutz (FENA)*, Giessen (unpublished data).

<sup>23</sup> Grassland is picked out as a grassland-preserving AES is in the focus of this thesis.

<sup>24</sup> NATURA 2000 provides the European Framework for both the protection of bird sites (secured by the Birds' Directive) and important habitat sites (secured by the Habitats' Directive) (European Commission, 2013a).

Ecologically valuable grassland is predominately located in the sub-mountainous areas (see figure 8). As mentioned above, part-time farming prevails there. Thus, managing such grassland areas is mainly up to part-time farmers.

### **3.1.4 Trends and challenges in Hessian agriculture**

Agriculture in Hesse faces some general trends and challenges.

First, the demand for settlement and circulation areas constantly increases and results in losses of agricultural area (Hessisches Statistisches Landesamt, 2013a). As a countermeasure, envisioned land consumption has been capped at 2.5 ha per day to maintain a sufficient area for agricultural and environmental purposes (HMUELV, 2012a). Moreover, current regional planning aims to counteract such land consumption and has established 100,000 ha of agricultural area as a priority area, distributed within the higher administrative districts (HMUELV, 2011).

Next, as mentioned above, Hessian agriculture follows the general trend of structural change. Farm size increases continually in order to increase competitiveness, which is also a matter of incentives set by policy (HMULV, 2006). Investment assistance programs (e.g. of the CAP, see below) provide incentives to increase the capital intensity of agricultural production. Accordingly, a substantial increase in labour productivity took place in recent years, especially in counties with a high contribution to the Hessian GDP (HMULV, 2006).

However, such trends towards capital intensive farming endanger the persistence of farming in the less favoured areas, especially in the mid-range mountains, where agricultural land use, especially of grassland, is secured by a high number of part-time farmers (HMULV, 2006). Land use intensification may also induce losses of grassland. As grassland plays an important role not only for preserving habitats but also for water protection purposes (see above), preventing such losses is also a topic of Hessian agri-environmental policy (HMULV, 2006). Finally, the state of Hesse aims to fulfil the goals of the Habitats' Directive with negotiated agreements such as farmers' voluntary participation in AES prior to regulatory approaches (HMULV, 2006; HMUELV, 2012a). Thus, it is important that farming persists in areas containing a high number of ecologically valuable sites (see again figures 7 and 8).

The next sub-section depicts the main approaches of Hessian agri-environmental policy, complementary to the details provided in the particular articles.

## 3.2 Agri-environmental policy in Hesse

### 3.2.1 General features

The Hessian agri-environmental policy is to a large degree embedded in rural development policy, and its main funding sources are the EU (CAP) and the federal government (GAK - *Gemeinschaftsaufgabe Verbesserung der Agrarstruktur und des Küstenschutzes*; Joint Task for Improving Agricultural Structure and Coastal Protection) (HMUELV, 2011)<sup>25</sup>. Together with contributions of the Hessian state and communal budgets, the total public budget for rural development in the period of 2007-2013 was about €715 million, with the ‘second pillar’ of the CAP (see below) as the main funding source (HMUELV, 2011).

Since 1999 (the *Agenda 2000* reform), the CAP has been implemented via two “pillars”. The first pillar is regarded as the main successor of the initial CAP<sup>26</sup> and comprises market regulation measures and direct payments (Eggers, 2005). It is completely financed by the CAP budget (Eggers, 2005). In the funding period 2007-2013 in Hesse, direct payments covered single payments to farms, premiums for protein crops, and an additional grassland premium for dairy farmers; market regulation measures included structural aid for viticulture, measures within the common organisation of the market of fruits and vegetables, aid for the provision of school milk and aid for marketing honey (HMUELV, 2011). In 2011, the total sum of pillar one payments was €227,724,651, with a share of 99.2% for direct payments (HMUELV, 2011).

In the *Agenda 2000* reform, in order to justify the still relatively high payments to farmers, environmental issues became more and more important, and the minimum level of environmental standards mandatory for receiving direct payments (e.g. by introducing “cross compliance” in 2003) has been constantly increasing ever since (Osterburg and Stratmann, 2002; Hespelt, 2004; Elsholz, 2012). Moreover, as an instrument to explicitly address the structural and environmental development challenges in rural areas, the EU Council regulation 1698/2005 established the *European Agricultural Fund for Rural Development* (EAFRD), the so-called “second pillar” of the CAP. It aims to promote “competitiveness of agriculture and forestry by supporting restructuring, development and innovation, improving the environment and the countryside by supporting land management, [and] improving the quality of life in rural areas and encouraging diversification of economic activity.” (European Council, 2005, Art. 4).

Contrary to the ‘first pillar’ funding, support is not limited to agricultural holdings; communities as well as citizens may obtain money for promoting tourism or village renewal, for example. Second, while pillar one is implemented homogeneously in the particular member states, pillar-two-related funding takes place upon particular rural development plans (RDPs)<sup>27</sup>. Third, measures supported by

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<sup>25</sup> Additionally, some cross compliance features serve environmental goals (HMUELV, 2011)

<sup>26</sup> For detailed overviews on the development of the CAP since its beginnings in the Treaty of Rome (European Economic Community, 1957, Art. 39), see Eggers (2005) or Elsholz (2012).

<sup>27</sup> See article 2 in chapter 6 for a detailed depiction of the implementation requirements.

the second pillar have to be co-financed at shares between 50 - 75% by the member states (European Council, 2005).

Agri-environmental programmes are supported by the second pillar. Additionally, member states can offer wholly self-financed agri-environmental programmes (Hespelt 2004).

The current Hessian RDP follows four main development axes (HMULV, 2006, HMUELV, 2010, 2012b) which aim to

- Enhance the competitiveness of agriculture and silviculture (axis 1, 26% of EAFRD budget),
- Improve environment and landscape (axis 2, 54% of budget)
- Enhance the quality of life in rural areas and diversify rural economy (axis 3, 6% of budget),
- Use the LEADER approach<sup>28</sup> (axis 4, 7.5% of budget)

In the current funding period, the total Hessian public budget for EAFRD measures contains about €480 million (HMUELV, 2012b), of which about €250 million stem from the CAP budget<sup>29</sup> (HMUELV, 2010; 2012b). Additional federal funding from the GAK accounts for about €235 million (HMUELV, 2012b). Nevertheless, compared to the previous funding period 2000-2006, a budget reduction of about 22% took place (HMUELV, 2012b).

Within axis 1, agro-investment support has a clear priority with a share of 70% of the axis' budget (HMUELV, 2012b). The second most important aspect is investment in (public) agriculturally-related infrastructure measures, such as land consolidation (21% of axis 1) (HMUELV, 2012b). Within axis 2, compensation payments for farming in less favoured areas holds the highest share of the budget (48%) (HMUELV, 2012b). The agri-environmental programme *HIAP* comprises about 46 % of the axis 2 budget. Priority within axis 3 is on village renewal (86% of the axis 3 budget); the focus of axis 4 is on improving quality of life/diversification measures (91.5% of axis 4 budget).

### 3.2.2 Aim, budget and performance of HIAP

*HIAP* provides a general implementation framework for six agri-environmental schemes, namely fostering organic farming, winter greening, setting up buffer or flower strips, mulch and direct seeding (introduced in 2010), environmentally friendly viticulture and site-specific grassland extensification (HMUELV, 2012b). The structural aim of *HIAP* is to preserve the small scale land use system which is typical for Hesse and to withdraw rededication of agricultural land (HMUELV, 2012b). Environmental aims include securing biodiversity, soil and water protection, and climate protection (HMUELV, 2012b). The actual funding priority is on fostering organic farming with an intended participation of 1,850 farms and a scope of 78,000 ha; followed by mulch and direct seeding with an intended participation of 3,000 farms or 60,000 ha (HMUELV, 2012b).

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<sup>28</sup> LEADER stands for 'links between actions of rural development' and is an instrument to mobilise and deliver rural development in local rural communities via an explicitly participatory approach (European Commission, 2013b)

<sup>29</sup> Including modulation shifts after the Health Check and the EU economic stimulus package.

The focus of the site specific grassland extensification scheme, which is in the focus of this thesis, is to counteract the trends in grassland decline/intensification in order to fulfil the goals of the Habitats' Directive. The scheme is intended to cover 45,000 ha or 9,000 farms, with priority of participation given to farmers managing sites secured by the Habitats' Directive or other nature protection laws (HMUELV, 2012b). Buffer/flower strips shall be set up on 6,000 ha (2,000 farms), winter greening shall be done on 20,000 ha (4,500 farms), and the viticulture measure on 297 ha (180 farms) (HMUELV, 2012b).

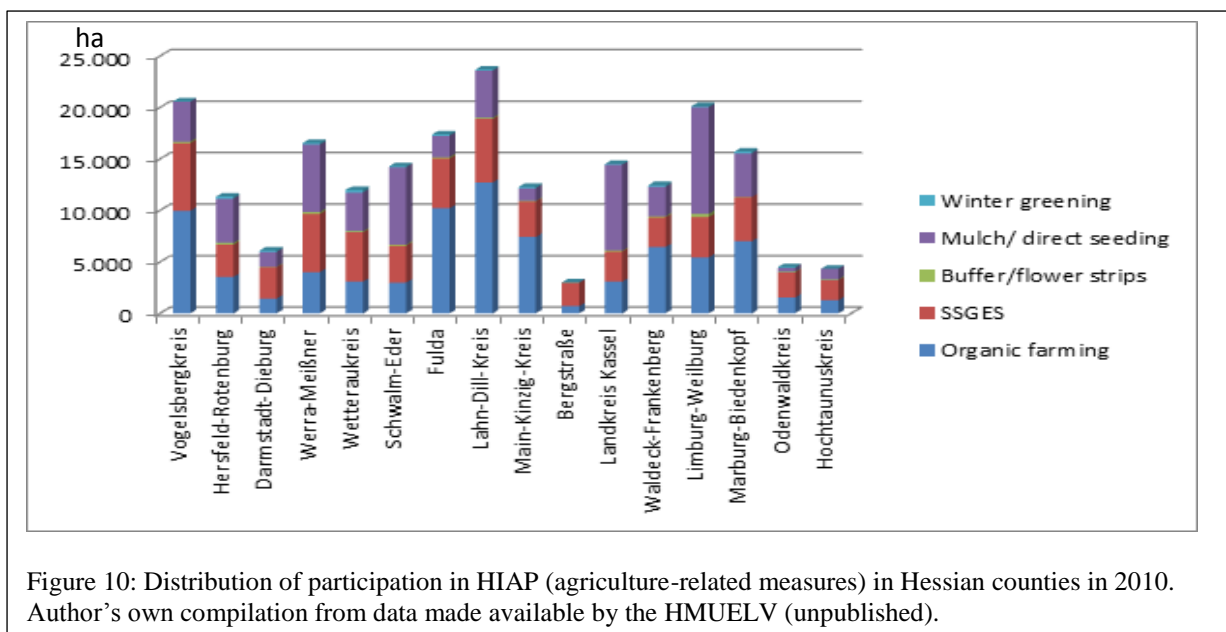
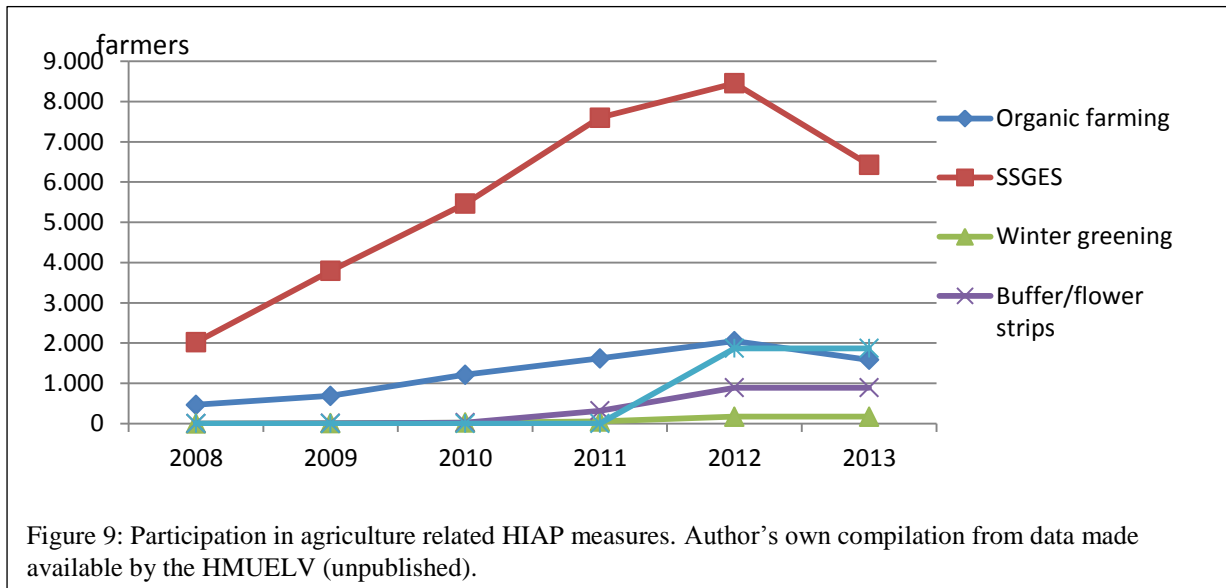
Single schemes can be combined to a certain extent (HMUELV, 2012b). All schemes are action-oriented. Payments to participating farmers are granted upon application and compliance with the funding regulations and are calculated as an average compensation for income losses and additional effort (flat-rate payments) (HMUELV, 2012b). Compliance is checked by off and onsite monitoring (HMUELV, 2012b)<sup>30</sup>. To reach a sufficient participation rate in order to meet the intended scope, the payments had to be raised several times during the funding period (HMUELV, 2010).

The mid-term review of the RDP in 2010 revealed that HIAP only partially met the intended goals (HMUELV, 2010). While organic farming and site-specific grassland extensification covered 60,100 ha and 33,804 ha, respectively, in 2010 and participation meanwhile is considered sufficient, winter greening (195 ha) and buffer/flower strips (45 ha) showed a low performance until 2009 (HMUELV, 2010). For both, payments were increased substantially respectively funding regulations were amended in 2010, which raised their acceptance substantially (HMUELV, 2010, see also figure 9). In 2010, the time of the mid-term review, about one third of Hessian grassland was entered into HIAP (site-specific grassland extensification and organic farming); 34% of the total contract area is located within the NATURA 2000 area (HMUELV, 2010). Thus, a positive impact on the environment is assumed (HMUELV, 2010). However, only 6 % of arable land was covered by HIAP (HMUELV, 2010). Figure 9 depicts the participation development for the agriculture-related measures within HIAP in the actual funding period, indicated by participating farms; figure 10 shows the importance of the particular measures, indicated as participation (ha) in the different counties. Participation is highest in central Hesse (*Vogelsbergkreis, Lahn-Dill-Kreis, Limburg-Weilburg, Fulda*), which are rather grassland-dominated, hilly regions and relatively low in the south of Hesse (*Hochtaunuskreis, Darmstadt-Dieburg, Bergstrasse, Odenwaldkreis*). The participation rate indicates that the scheme is also currently attractive to part-time farmers (see also article 1). Within the measures, organic farming is favoured in the hilly regions of mid-Hesse (*Vogelsbergkreis, Lahn-Dill-Kreis, Fulda*). Site-specific grassland extensification is well-accepted throughout all counties, but is especially important in the grassland-dominated, hilly counties (*Vogelsbergkreis, Wetteraukreis, Lahn-Dill-Kreis, Odenwald*). Meanwhile, with the substantial increase in payments/ha, mulch and direct seeding form an important share of total HIAP participation in the particular counties, with a focus in northern Hesse (*Schwalm-Eder-Kreis, Landkreis Kassel*). However, buffer/flower strips as well as

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<sup>30</sup> Details on the implementation process are presented in the articles.

winter greening show low performance (HMUELV, 2012c). Interestingly, the participation rates have been decreasing since 2012, when farmers first fulfilled the contract period of 5 years and seemingly did not re-enter the scheme; which was probably due to a lack of clarity in the future development of the scheme regulations in the next funding period.



### 3.3 Concluding remarks

This chapter provided context to understand several environmental aims pursued by Hessian agri-environmental policy. As Hesse is characterised by heterogeneity in many features, policy faces the challenge of meeting the resulting requirements with regulations capable of covering all related aspects. Moreover, Hesse strongly depends on EU and federal funding. The next section presents the main results of the thesis articles, which highlight how policy implementation affects related TCs.

## 4 Summary of article results

### 4.1 Preliminaries on theoretical and methodological approaches

The methodological approach of the articles is deductive and empirical; primary data was obtained in three different interview approaches. TCs are operationalised mainly as (monetised) working time (McCann et al., 2005); article (1) also accounts for mileage. TCs are allocated to the stages of the transaction process, taking into account search and information costs, negotiation costs, and monitoring and implementation costs (Dahlman, 1979). Testable hypotheses in the articles are derived from particularly developed conceptual frameworks. For testing, in each article a set of variables was constructed based upon the distinction in scheme- and actor-related factors as well as features of the natural and institutional environment. The theoretical foundation of the articles is TCE, although a (non-formal) PA- setting is used in articles (2) and (3) to model the influence of the CAP framework on regional TCs. Moreover, the TCE approach is supplemented by insights from PA-literature to hypothesize differences in actors. Overall, the conceptual frameworks are based on a functional understanding of TCs, that is, public and private actors incur TCs (in principle) as result of a rational cost-benefit reasoning in order to obtain a particular transactional gain. By this, all articles contribute in both conceptual and practical ways to a broader notion of TCs.

### 4.2 Descriptive summary of articles

**Article (1)** examines intra-scheme variances of farmers' TCs, using quantitative data obtained from participating farmers in two Hessian counties. The starting point for the article was the observation that a number of TC-constituting tasks is undertaken by the farmers themselves. Since the contracts between farmers and the agricultural administration contain some negotiable elements – for example parts of the premiums and the specific measures to be carried out to by the farmers - a working hypothesis was constructed that states that farmers 'voluntarily' incur TCs in order to achieve higher transactional gains, i.e. higher per ha payments. Consequently, both absolute and relative TCs were investigated, the latter expressed as a payment-per-TC- ratio. Explanations for the differences in TC expenses were sought in the heterogeneity of farm attributes and farmers' particular contract specification. These aspects were sorted into the TCE dimensions frequency, asset specificity, and uncertainty. Descriptive results indeed reveal large variances in privately incurred TCs. They also show that the majority of costs incurred are due to compliance requirements, as one could expect from the scheme regulations. Although the results do not support the overall working hypothesis, they nonetheless provide explanations for variances in farmers' TCs: 'Voluntary' TC expense especially seems to serve as a safeguard for securing the participation-related income, which seems to be valued distinctively by farmers depending on their preference for scheme income compared to other income possibilities. The main contribution of article (1) is to show how variances in farmers' TCs can be

linked to differences in income risk management<sup>31</sup> and to point out that TCs might be the monetary expression of a “willingness to participate”.

**Article (2)** places the Hessian scheme implementation process in the context of the CAP funding denoted by the EAFRD regulations. In particular, the article qualitatively investigates the effects of structural and procedural requirements of EAFRD regulations as impacting occurrence and composition of regional public TCs. The analysis relies on a conceptual framework that combines principal-agent approaches as applied in (economic-) political science with findings from AES-related TC approaches. By that, I -non-formally- modelled regional scheme implementation - the transaction between Hessian administration and farmers - as nested transaction (Williamson, 2000) within the superposed transaction between EU and the Hessian administration.

Data was obtained from qualitative interviews conducted with the main Hessian administrations involved. Results show that upcoming (public) TCs can a) be allocated to the different transactional relationships and b) be distinguished in scheme-related costs/tasks necessary to pursue environmental policy goals and reimbursement-related costs/tasks necessary to prove compliance with the co-financing regulations. Results also reveal that EAFRD-based structural and procedural requirements shape the operational regional implementation process towards reimbursement-related tasks and may even induce a trade-off between scheme/environmental- and reimbursement-related issues that could endanger the environmental goals of the SSGES. Moreover, the EAFRD framework induces spill-overs onto farmers' TCs, which increase both public and private TCs. The main contribution of article (2) is to – qualitatively - identify budgetary, allocative, and distributive effects on regional public - and partly private - TCs induced by the EAFRD framework.

Based on this distinction between scheme-related and reimbursement related tasks, **article (3)** investigates the existence of such a trade-off between both task blocks by quantitatively examining the working time allocation of Hessian agricultural administrations in the counties (ALRs). The background for empirical analysis is provided via the insights of multi-task principal-agent models (Holmstrom and Milgrom, 1991). Multitask PA-models state that incentives - respectively monitoring or performance measurement - must be balanced across competing tasks in order not to induce a crowding out of one task by the other. As argued in the article, the incentives offered in actual scheme implementation are biased, which makes the existence of a crowding out likely. Hypotheses to investigate the ALRs' time allocation are built upon differences in structural county features, administrative features and scheme performance-related issues in a deductive approach by utilising the results from article (1). Descriptive results show that reimbursement-related effort requires the major part of working time; EAFRD regulations indeed have a guiding effect. Nevertheless, regression results reveal that particular county-related, scheme performance-related, and ALR-related drivers partly outweigh these effects. The major contributions of article (3) are a) to make a multi-task PA-framework useful for investigating TC expenditure as trade-off decision and b) – together with the

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<sup>31</sup> In a non-formal sense.

findings of article (2) - to critically assess the impact of the EU compliance regulations on AES-related TCs. This is especially important in the light of presumably increased monitoring duties in the upcoming funding period 2014-2020.

Figure 11 provides a comprehensive picture of the areas of investigation allocated to the particular articles. Arrows in light grey denote intuitive exploration. The next two sections summarise the particular findings of the articles.

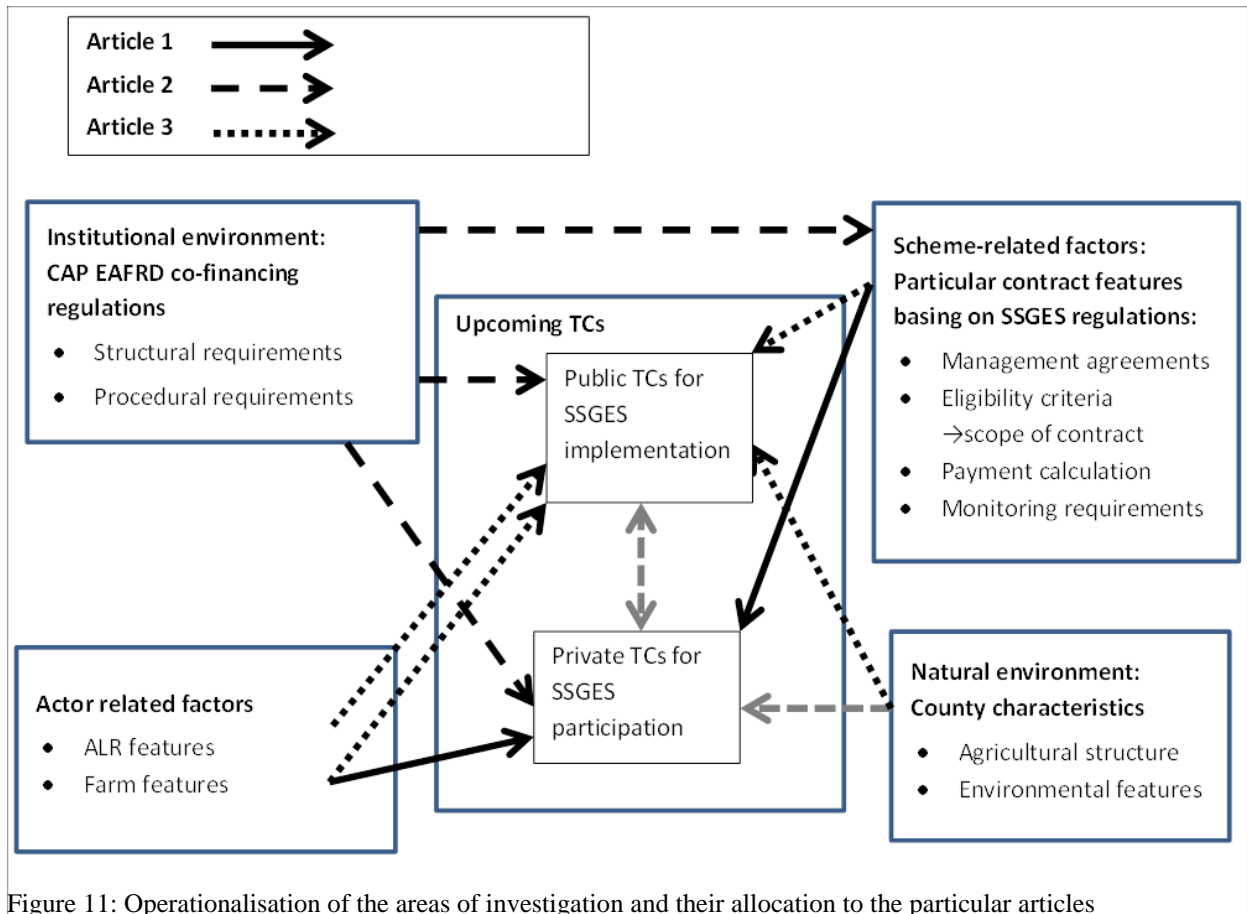


Figure 11: Operationalisation of the areas of investigation and their allocation to the particular articles

### 4.3 Synthesis of article results

#### 4.3.1 Descriptive results

The results obtained in articles (1-3) show that both farmers' TCs for SSGES participation and public TCs for carrying out the SSGES are non-trivial; in monetary terms, farmers expend 171.96 € per contract for informational issues, 126.84 € for negotiation tasks and 1,141.69 € for implementation issues on average, yet with a substantial variance (Art. 1). TCs/ha for the whole contract period are 95.33 € on average, farmers' average TCs - expressed as a percentage of payments - are about 7% (Art. 1). Higher TCs generally go in line with a lower payment/TC ratio; moreover, during the transaction stages, no evidence was found that TCs in early transaction stages cause TC savings at later stages for farmers (Art. 1). Thus, *ceteris paribus*, farmers' TCs serve neither to obtain gains during the transaction stages nor to maximise the overall net gain.

On the side of the implementing administration, quantitative results for TCs (Art. 3) reveal that

negotiation costs and administrative checks require the highest share of weekly working hours, similar also in the average percentage (24% respectively 29%). Acquisition costs (9%), costs for post-processing on-site checks (11%) and coordination costs (10%) require the least share of working time; effort on stating the ALRs own compliance with EU regulations requires about 16% of working time on average. After sorting these costs into the two task blocks, the findings show that reimbursement-related costs form the major share of overall TCs. However, akin to the results for farmers' TCs, the quantitative results reveal that both weekly working hours spent on particular tasks as well as their relative share varies at large between the particular county administrations (Art. 3).

To sum up, the descriptive results reveal that the majority of both public and private TCs incurred during actual scheme implementation refer to monitoring issues (Art. 1-3). Thus, concluding from TC magnitude to importance, the potential *moral hazard* of both the administration (being an agent of the EU) and the farmers (being agents of [EU and Hessian] administrations) is the major contractual hazard addressed in contract design. However, the results also exhibit large variances for both public and private TCs, which aggravate developing AES with reduced TCs in a lump sum approach. In the next subsections, the article results on factors causing these variances are presented in a synthesised manner according to the categorisation depicted above.

### 4.3.2 Institutional environment

The institutional environment, as conceptualised in this thesis, is constituted by the EAFRD regulations which specify the structural and procedural requirements necessary to obtain the reimbursement for SSGES payments. The regulations mainly aim to prevent a misuse of funding (which denotes a form of moral hazard) and are the root of most monitoring requirements (Art. 2).

Structural requirements of the EAFRD require TCs to due to implementing additional administrative units, due to additional interactions and increased co-ordination. Procedural requirements of the EAFRD influence SSGES regulations, e.g. due to minimum contract duration requirements, criteria for application and eligibility, payment calculation and caps, and required administrative and onsite checks (Art. 2). Thus, the EAFRD sets the framework in which AES design and implementation takes place and influences TCs and the transactional outcome through its impact on the terms of exchange. Moreover, the regulations do not account for variances in compliant behaviour, neither on the side of the administration nor of the farmers; thus welfare losses occur (Art. 1-3). Besides its effects on magnitude and composition, the EAFRD framework also causes distributive and allocative effects. Its main influences are as follows:

1. The institutional environment shifts an important share of TCs to implementing administrations and causes distributive effects between the EU and local level (Art. 2 and 3).
2. Procedural requirements influence scheme-related factors (see below) by determining the regulatory framework for AES design and implementation (Article 2).

3. The institutional environment affects actors' behaviour and induces *allocative effects between the particular TC categories* (Art. 2 and 3); the prospect of losing (part of) the reimbursement seems to have a deterrent effect on the application of rules in public administrations (Art. 2), and financial dependency on the reimbursement shifts the workload of ALRs from technical to compliance issues (Art. 2 and 3). Both result in a prioritisation of reimbursement-related tasks (Art. 3). Moreover, the monitoring focus is on procedural correctness and not on environmental results.
4. The EAFRD regulations concerning the ALRs' own compliance generate fixed costs and thus induce *allocative distortions*; ALRs with less contract area are relatively more affected by EU checks, despite the fact that their share of the total reimbursement is lower. As a result, the total administrative costs per ha under contract are higher in such counties. However, these costs are paid from the Hessian budget, while the benefits of these checks occur at the EU level (Art. 3).

### 4.3.3 Scheme-related factors

As pointed out above, the procedural requirements of the EAFRD influence SSGES design and implementation, which in turn affects performance-related public TCs. This influence can be summarised under the following aspects:

First, the majority of private and public TCs occur as a consequence of the highly specified monitoring requirements of the EAFRD (Art. 2 and 3), which also include farmers' documentation duties (Art. 1). Prescribing a 100% scope of administrative checks and documentation by farmers limits the exploitation of economies of scale and time for both administration (Art. 2 and 3) and farmers (Art. 1), which denotes welfare losses, as scheme implementations remains relatively costly over time. However, the results of article 3 show that only some of the monitoring regulations can be avoided by designing part of the payments as top-ups, which reduces per/ha costs for spatial monitoring.

Second, the methods and procedures to measure compliance prescribed in the EAFRD affect public and private TCs; compliance statements rely mainly on spatial indicators as references (Art. 1-3). However, monitoring (as currently practiced) tends to produce unintended non-compliance and sometimes even delivers erroneous results (Art. 1 and 2). Correcting such errors causes substantial effort, which depicts additional TCs for farmers and administration (Art. 1-3).

Third, scheme regulations inhibit economies of scope for farmers participating in several schemes; the reduced premium organic farmers receive seems not to outweigh their additional TC expenses (Art. 1). Also, keeping the pasturing log as in the case of contracting on a grazing agreement induces additional documentary effort, which is not outweighed by the higher basic per/ha premium (Art. 1). However, farmers incur lower per-ha TC and obtain a higher payment per TC the more of their grassland is managed under the SSGES agreements (Art. 1).

Fourth, scheme regulations cause private and public TCs due to limited adaptation possibilities and may even induce losses to farmers in the form of sunk costs once a contract is concluded (Art. 2). In the case of a contract extension, a farmer may work under different regulations, which leads to different treatments of the same facts and causes additional effort in the ALRs and inconsistencies for the farmers (Art. 2). On the side of the administration, economies of scale and learning effects for reducing implementation costs cannot be achieved with frequent changes in regulations (Art. 2 and 3).

Finally, the results of article 3 also reveal interrelationships of TCs within the implementation process of the administration; the more area is under contract, the less time is spent on acquisition and negotiation; at the same time, effort for administrative checks increases.

Summarising the main impacts of scheme-related factors on both public and private TCs reveals the following:

1. Scheme design and implementation regulations hamper obtaining economies of scale, scope, and time.
2. Scheme-related factors cause spill-overs onto farmers' 'TC-efficiency' subject to the choice of management agreements, participating in the SSGES as top-up, and the share of their grassland they are able to enter into the scheme.

Both aspects highlight the role of policy design on resulting TCs. Nonetheless, actors respond differently to this set of rules in terms of incurred TC magnitude and composition, as will be depicted in the next subsection.

#### **4.3.4 Actor-related factors**

Actor-related factors as investigated in the articles comprise ALR features, denoted as the level of staffing (Art. 2 and 3) and business and management characteristics of farms (Art. 1) indicating foremost a) a volatility in production output and b) dependency on farm income.

As pointed out above, dependency on reimbursement to enlarge the regional budget provokes a rather risk-averse application of rules and a prioritisation of reimbursement-related tasks on the side of the administration, which is also tightened by the regulatory focus of the EAFRD (Art. 2 and 3). This effect is intensified in the case of staffing shortages, which exist throughout all administrative units (Art.2). The more personnel are available, the less reimbursement-related tasks are prioritised (Art.3).

Higher TCs incurred by farmers reduce their gain from scheme participation. Results reveal that the volatility of production output and a consequent uncertainty about the resulting market income are important factors for incurring both voluntary and mandatory TCs (Art. 1). In order to obtain a 'secure' SSGES income even a comparatively lower payment/TC ratio is accepted. Thus, TCs rather serve as a safeguard for securing participation-related income.

Surprisingly, full-time farmers expend substantially more TCs throughout the whole transaction process than their part-time colleagues (Art 1). *Ex ante*, fulltime farmers prefer an individual, bilateral setting for discussing scheme particulars with the ALR, which is more time consuming (Art. 1).

Interestingly, if the share of full-time farmers in a county is high enough, this even influences the time share of ALRs spent on negotiation tasks (Art. 3, see also below). One explanation is that the high TC expenditure is due to the importance of calculable and stable income for full-time farmers; alternative explanations are that full-time farmers may have a) lower opportunity costs of time, b) obtain economies of scope due to frequent interaction with the ALRs, or c) incur lower total costs due to lower production costs.

Finally, as pointed out in the subsection on scheme-related factors, organic farmers (*ceteris paribus*) have a substantial disadvantage; the reduced premium they receive seems not to outweigh their (additional) TC expenses. This is also true for farmers expecting higher opportunity costs due to changes in management.

To sum up, actors respond differently to the framework created by the EAFRD:

1. How restricting the necessity to prioritise reimbursement-related tasks in the agricultural administration is depends on the personnel available. Thus, EU co-financed schemes seem to require a certain degree of staffing.
2. Differences in farmers' TC expenses seem to resemble differences in valuing the income obtained via scheme participation. Both voluntary and mandatory TCs seem to be an investment to secure part of the farm's income via (calculable and stable) payments for AES participation, preferred to income from market goods' production in case this is highly volatile or farm income is the most important source of income.
3. Interestingly, results on both public and private TCs allow linking factors indicating aspects of uncertainty to the magnitude and composition of TCs incurred, which highlights TC expense as a mode of risk management. Thus, these results both confirm and extend prior theoretical findings (Fraser 2002).

### **4.3.5 Natural environment**

Investigating the role of the natural environment with respect to its influence on public and private TCs is important mainly for two reasons: on the one hand, ALRs face different levels of necessity to pursue environmental goals due to differences in the scope of protected grassland in the counties. Moreover - as mentioned above – different groups of farmers may value income from scheme participation differently, which influences related TCs. If a particular group of farmers is prominent in a county, this causes spillovers onto the ALRs working time allocation (Art. 3). Furthermore, the natural environment as taken into account refers to county characteristics in terms of environmental features (share of protected grassland) and factors depicting the importance of agriculture in the particular county (magnitude of UAA) and professionalism in farming (share of fulltime farmers).

Results show that county characteristics are the most important drivers for the ALRs working time allocation (Art. 3). Interestingly, the number of full-time farmers shows the largest impact, while

the impact of the magnitude of protected grassland is lowest. Therefore, the ALRs' working time decisions seem at least partly to be requested by farmers rather than be induced by environmental concerns. This implies that, without this incentive, ALRs rather work 'by the book', that is, they respond to the incentives set by the regulations.

County characteristics also cause shifts between acquisition and negotiation costs in the ALRs; a high share of acquisition in counties with less professional farming seems to be induced by the ALRs' attempts to secure the desired participation rate. In contrast, a high share of individual negotiation in counties characterised by a high degree of professionalism in farming seems to be a spill-over effect from farmers' time expenses to ALRs' time expenses (see above). Moreover, relatively high investments in negotiations lead to fewer failures found in the on-site checks, as the need for post-processing is low in such counties. This seems at least partly to outweigh the mandatory effort related to the administrative checks in such counties and may reduce (public) TCs. Moreover, this result (again) highlights the role of information provision for farmers on scheme success. However, these findings also imply that ALRs in counties with no such structural features are at a disadvantage with respect to environmental compliance by farmers. Because Hesse has to rely on part-time farmers to maintain ecologically valuable grassland, this is an especially important issue to be addressed (see chapter 8).

To sum up, ALRs allocate their time between both scheme-related cost categories in order to respond to particular county circumstances and as a result of spillovers of farmers' TCs.

#### **4.4 Concluding remarks**

The articles identify magnitude and composition of public and private TCs in SSGES implementation. Moreover, they identify important drivers and interdependencies between public and private TCs occurring as spillovers, cost shifts and distributive effects. Using the terminology of the conceptual framework, features exist that lower or raise the costs for TC inducing tasks within a particular setting. Investigating and highlighting such aspects is the major contribution of this thesis to this field of research.

The results of these findings are briefly discussed with respect to their implications for future scheme design and implementation in chapter 8. Prior to this, the following three chapters present the articles in full.

## 5 Do Transaction Costs create Transaction Gains for Farmers Participating in an Agri-Environmental Scheme?<sup>32</sup>

*Anja Weber*

### Abstract

Participating in agri-environmental schemes (AES) induces transaction costs for farmers, originating from time and money spent on tasks related to participation. High transaction costs may inhibit scheme participation, which would endanger the environmental goals aspired. To date, farmers' transaction costs have been investigated from a cost-minimising perspective, implying fixed gains from participation. Nonetheless, participation contracts may contain negotiable parts. In such a case, especially, cost-constituting tasks undertaken by farmers' own attempts could serve gain-maximising: Farmers can utilise additional information to increase their transactional gain, namely the payment. This paper addresses this question by investigating transaction costs of farmers participating in a site-specific grassland extensification scheme in Hesse, Germany, which contains negotiable features. Upon insights from information economics and transaction cost economics, the study discusses possible gains and tests the impact of farm and scheme-related features on both absolute and relative transaction costs, the latter conceptualised as payment/total transaction costs ratio. Results reveal that a higher transaction costs expense goes in line with a lower payment/transaction costs ratio; however, higher transaction costs expense predominates for particular farms features indicating dependency on AES income. Thus, voluntary transaction cost expenses seem to serve as a safeguard for securing participation-related income.

**Keywords:** transaction costs; agri-environmental schemes; Germany

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## Introduction

In the last two decades, society's expectations of agriculture have been changing. Besides the production of food and fibre, society's demand for environmental benefits has constantly increased (OECD 2001). In the European Union (EU), agri-environmental schemes (AES) have become a prominent policy measure for enhancing the provision of such agriculture-related environmental benefits (European Council 2005). From a governance perspective, AES are a contractual mechanism for transacting environmental goods or services between the farmer (seller) and an agricultural authority as the representative consumer (Hagedorn, Arzt, and Peters 2002). Farmers receive payments when they carry out agri-environmental commitments. However, besides a proper design, a sufficient participation rate is crucial for providing the expected environmental outcome (Falconer 2000; Mettepenningen and van Huylenbroeck 2009; Mettepenningen et al. 2013).

According to contract theory, a farmer will agree on a contract if the resulting gains at least cover his opportunity costs (Bolton and Dewatripont 2005). In case of AES participation, these comprise forgone profit/income, for example, due to reduced production yields because of extensification, extra effort due to fulfilling the management agreements, and participation-related transaction costs (TCs) (Falconer 2000; Mettepenningen, Verspecht, and van Huylenbroeck 2009). TCs are 'scheme organisational costs' (Falconer, Dupraz, and Whitby 2001, 84) and occur for both administrative agencies (public TCs) and farmers (private TCs) (Falconer and Whitby 1999). Private TCs originate from time and money spent by farmers on tasks conducted in order to participate and consist of a fixed part due to participation per se and a variable part due to the duration and scope of the scheme (Falconer and Whitby 1999; Falconer 2000). Private TCs reduce the farmers' net premiums (Falconer 2000) and may even inhibit scheme participation (Falconer 2000; Peerlings and Polman 2004).

Empirical evidence reveals that farmers' TCs are non-trivial but vary greatly between different AES (Falconer 2000; Falconer and Saunders 2002; Rørstad, Vatn, and Kvakkestad 2007; Mettepenningen and van Huylenbroeck 2009; Mettepenningen, Verspecht, and van Huylenbroeck 2009).

Falconer (2000) investigates certification costs for participating in organic farming schemes and finds that TCs form a minimum of 5% of compensation payments. She also finds that farm size reduces relative TCs due to high initial fixed costs in whole-farm approaches.

Falconer and Saunders (2002) compare scheme-related TCs – specified as negotiation and on-going costs and conceptualised as timely effort – of individually negotiated and standard management agreements. The authors assume that individually negotiated schemes are more targeted and provide a higher level of environmental benefits than standardised agreements. They find negotiation costs for standard agreements to be substantially lower than for individually negotiated schemes. However, standardised schemes are more expensive in terms of annual on-going costs. Besides the difference in upsetting the contracts, the authors reveal that learning effects reduce TCs over a scheme's life cycle. Establishing a new scheme turns out to be relatively costly.

Within a study of public and private (total) TCs of different agri-environmental policy measures in Norway, Rørstad, Vatn, and Kvakkestad (2007) also investigate farmers' TCs for several AES. They investigate TCs according to the policies' specificity and frequency, and find private TCs range from 2.3% of payments in an AES fostering reduced tillage up to 9.1% of payments in an AES preserving cattle breeds. While frequency reduces TCs, they find scheme specificity, expressed by the degree of precision and the quality of the environmental benefit aspired to substantially increase TCs.

The most detailed investigations of farmers' TC in AES are presented by Mettepenningen, Verspecht, and van Huylbroeck (2009) and Mettepenningen and van Huylbroeck (2009). Mettepenningen, Verspecht, and van Huylbroeck (2009) investigate magnitudes and composition of total TCs (measured in terms of working days) found in several AES from 10 European regions. They find mean TCs (including wages) of 40.20 € (std. 77.3), ranging from 0 to 1.006 €.

In a complementary study, Mettepenningen and van Huylbroeck (2009) test several scheme-related, contract-related and farmers' socio-demographic factors on their influence on total and particular TCs by comparing upcoming TCs with those of a reference scheme. They find search and negotiation costs – but not monitoring and enforcement costs – significantly influenced by the region in which they are implemented. The authors also find a positive influence on search costs (effect size yet below the reference) when farmers obtain some professional training apart from AES participation. Specific investments necessary due to scheme participation affect search, negotiation and monitoring costs positively (compared to the reference scheme). Search and negotiation costs also increase with the area under contract. Farmers participating in several AES incur higher monitoring costs. This also holds true for farmers stating that they do not trust the administration, for older farmers, holdings with a higher income, and when farmers had obtained financial advice from the Ministries of Agriculture.

These studies have in common that they discuss TCs from a cost-minimising perspective. They (implicitly) assume that the gain from participation is fixed and that particular factors may help to decrease the costs (conceptualised as time) necessary for obtaining participation-relevant information. However, a number of schemes contain negotiable agreements, which affect premium as well as related effort (e.g. Thomas et al. [2009] for German AESs). In case of a negotiable outcome, additional information may be gathered to generate transactional gains, like a higher premium per hectare (ha). Moreover, these studies rather explain inter-scheme differences in TCs than intra-scheme variances and do not explicitly address the high number of 'voluntarily' conducted TC constituting tasks.

To address these gaps, this study investigates farmers' TCs and their influencing factors from a gain-maximising perspective with the help of an explorative case study on an EU co-financed site-specific grassland extensification scheme (SSGES) in Hesse, Germany. This scheme was chosen mainly for three reasons. First, its regulations contain a number of negotiable aspects but the scheme itself aims at a comparatively fixed environmental outcome (HMULV 2006). In an (non-EU co-financed) AES with completely free negotiable agreements, potentially higher payments/ha would have to be assessed to a potentially higher environmental gain. Second, at least in Germany, the EU

co-financed AES form the majority of AES (Osterburg and Stratmann 2002; Thomas et al. 2009). Third, the EU regulations provide relatively tight prescriptions with respect to payment calculation, which is limited to cover calculated opportunity costs without any further income generating possibility (European Council 2005). Although the EU allows for integrating a compensation of TCs into the payments (European Council 2005), at least in Germany, in most AESs payment calculation is still limited to covering the foregone income and additional effort (Thomas et al. 2009)<sup>33</sup>. Nonetheless, farmers frequently undertake TC generating activities even on their own initiative although they are not compensated (Beckmann et al. 2003; Weber and Nuppenau 2010).

To explore potential TC-related gains, the study investigates both absolute and relative TCs. Relative TCs are conceptualised as output/input relationships, namely payment/ total TCs. The TCs are measured as effort (time and mileage) to gain information during the stages of transaction. Particular informational and transactional gains are delineated by applying the scheme regulations to the actual Hessian setting. A number of farm-and contract-related factors are tested for their influence on total and relative TCs of participating farmers with the help of bootstrapped General Linear Models.

Results reveal that a higher TC expense mostly occurs for particular farm features related to production uncertainty and goes in line with a lower ratio of payment to TCs. Instead of maximising the premium/ha, voluntarily expended TCs rather seem to serve as a safeguard for securing participation-related income.

The paper is organised into six sections. In the next section, scheme details are depicted, followed by a description of data and methods. The subsequent section develops the conceptual framework and delineates testable variables. Then, results are presented and discussed. A brief conclusion completes the paper.

### **Scheme details**

Hesse is one of the larger German states, located in its centre. In 2010, agriculturally utilised area covered about 36% of total area, one-third being permanent grassland, which was managed by 17,805 agricultural holdings, one-third of them run full time (Hessisches Statistisches Landesamt 2012). The majority of Hessian farmers (76%) are livestock holders; owner-run sole holder farms are the prevalent organisational form (Hessisches Statistisches Landesamt 2012).

Especially in the sub-mountainous areas of Hesse, structural change leads to a continuing decrease in the number of farms. These areas are characterised by marginal productivity and small section land use, but at the same time account for a substantial share of environmentally valuable grassland sites protected by the Habitats' Directive (HMULV 2006). Farmers tend to intensify land use by ploughing up suitable grassland or completely refrain from using it agriculturally due to

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<sup>33</sup> Considering all German states, only Lower Saxony offers TC compensation in the current funding period (Thomas et al. 2009).

marginal productivity (HMULV 2008). However, abandoning the grassland leads to increased soil erosion, decreased water protection and a loss of biodiversity (HMULV 2006).

To counter this downward trend, the state government of Hesse aims to secure grassland by voluntary participation in a SSGES (HMULV 2006, 2008). The scheme aims to support small section land use to prevent grassland from being abandoned and to preserve ecologically valuable grassland habitats (HMULV 2006). It was established in 2007 within the overall Hessian Agri-Environmental Programme ‘HIAP’ (HMULV 2006), offered within the ‘second pillar’ of the Common Agricultural Policy (CAP) of the EU (HMULV 2006, 2008). The scheme is a synthesis of two antecedents; a site-specific landscape pertaining programme based on individual agreements (state financed) and a standardised grassland extensification scheme encompassing the total grassland of a farm (EU cofinanced) (HMULV 2006). The regulations differ substantially from the antecedent ones.

Participation is based on a management contract between farmers and the particular county’s agricultural administration, *Amt für den ländlichen Raum* (ALR). According to EU co-financing regulations, the contract period is five years and 45,000 ha were intended for enrolment (HMULV 2006). The general eligibility of sites depends on a confirmed ecological value. As the Hessian government aims to fulfil the goals of the EU Habitats’ Directive<sup>34</sup> by voluntary AES participation, habitats specified by the Habitats’ Directive are given priority. Sites protected by State environmental protection laws or inventories are also eligible, in case the SSGES agreements go beyond the mandatory management restrictions (HMULV 2009). Actual eligibility is subject to a scoring system (Weber 2013). If eligible in principle, the sites applied for are rated according to their ecological value. The ALR sets a cut-off point when its budget is exhausted; however, in recent years, the budget exceeded the sum needed for the sites applied for (personal communication).

The scheme is action oriented, which means that payments are granted upon the adoption of specified agricultural practices presumed to provide environmental benefits (Matzdorf and Lorenz 2010). These management agreements comprise both mandatory and negotiable parts (HMULV 2009). Mandatory agreements include prohibiting grassland conversion, the use of chemical or synthetic pesticides and surface irrigation or melioration. Agricultural use has to take place at least once a year; a second or third use may be agreed upon due to habitat characteristics. The choice for either a grazing or a mowing agreement on each site is negotiable (HMULV 2009). A further mandatory requirement is to keep a detailed field log and, in the case of a grazing agreement, also a pasturing log. Furthermore, farmers have to allow the administrative audit team to conduct on-site checks on the farm (HMULV 2009).

In addition, particular contract specification refers to premium composition, which likewise consists of both a fixed and negotiable part. The state-wide basic premium for each type of agreement is fixed; grazing agreements are paid more than mowing agreements (200 and 110 €/ha, respectively). Premiums denote an average compensation for income forgone and additional production costs; TCs

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<sup>34</sup> Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

are not compensated (HMULV 2009). A top-up payment for exceptional effort (ecologically valuable special services, EVSS) is negotiable. The EVSS premiums are calculated as presumed extra effort due to specificities of the contract site such as slope, wetness, difficult accessibility or special technical requirements. They are predefined in three levels of intensity, linked to three levels of additional payment (25/50/75 €), and are also calculated as average extra effort (HMULV 2009). Specifying EVSS does not necessarily take place after a site inspection, but are often decided by ALR staff at a desk (Weber 2013).

Including payments for EVSS, a sum of 360 €/ha/year must not be exceeded. Double funding is strictly prohibited. Thus, farmers also participating in the organic farming scheme only receive a reduced payment for the SSGES, from which the premium for organic farming had been subtracted (HMULV 2009).

Because the scheme is EU cofinanced, farmers have to apply annually for the payment within the application for the CAP income subsidies (so-called single farm payments); payments are granted after the administrative units have checked farmers' compliance (HMULV 2009). Checks comprise off-site (administrative) and on-site checks. Off-site checks comprise annual checks of the spatial data rendered by the farmers within the payment application and cover 100% of data and thus 100% of farmers. Main monitoring outcome is the verification of the contract area; this spatial information constitutes the calculation base for the payment to farmers; these payments, in turn, form the basis for the latter EU reimbursement (Weber 2013). On-site checks are carried out on a randomly selected 5% sample of total participating farmers. They consist of area-related checks via field inspections or satellite pictures as well as management checks via field inspections and review of the field and pasturing log (see Weber [2013] for details). Monitoring outcome is the verification of both spatial- and management-related compliance (Weber 2013).

## **Data and methods**

### **Data collection**

Since information on farmers' TC expenses is not recorded, data was obtained directly via ex post interviews with farm heads (McCann et al. 2005). According to the aim of the study, the selection of interviewees was limited to participating farmers. Moreover, to capture the whole range of implementation costs, only farmers who had already participated for at least one complete contractual year were addressed. To control for distortions due to different habitat management necessities, their contract had to refer to the specified habitat of hay meadows.

Data was obtained with the help of a closed questionnaire that contained qualitative and quantitative aspects measured in nominal as well as in metric scales. The main part of the questionnaire referred to estimating frequency, time and travel costs spent on tasks related to scheme participation, and were requested as a discrete statement for the first year of participation. Telephone costs were not requested due to commonly used flat rates; postal charges were requested but left out of

the analysis due to marginality. A single task-related approach was chosen to capture the actual composition of TCs and to be able to distinguish between voluntary and mandatory tasks. This level of itemisation detail leads to more valid answers, for it alleviates the potential measurement errors of stylised ex post time reports where farmers may not recall their actual effort correctly (Juster and Stafford 1991; Juster, Ono, and Stafford 2003; McCann et al. 2005; Mettepenningen, Verspecht, and van Huylenbroeck 2009). This approach has been widely used to capture private TCs (e.g. McCann and Easter 1999; Falconer 2000; Beckmann et al. 2003; Mettepenningen, Verspecht, and van Huylenbroeck 2009; Mettepenningen, Beckmann, and Eggers 2011; Widmark et al.2013).

TC constituting tasks referred to in the questionnaire were identified from previous studies (Falconer and Whitby 1999; Falconer 2000; Falconer and Saunders 2002; Beckmann et al. 2003; Mettepenningen, Verspecht, and van Huylenbroeck 2009) and adjusted to the SSGES setting by examining the regulations and by consulting ALR staff. Special emphasis was given to those tasks not prescribed, but nonetheless undertaken by the farmers. This especially refers to the methods of gathering information. An overview is in Table1.

**Table 1:**

TC-constituting tasks. Italics indicate voluntarily conducted tasks.

Step in implementation process	Effort for specified tasks
Information	Time effort: <ul style="list-style-type: none"> <li>- <i>on internet search</i></li> <li>- <i>on official or professional press</i></li> <li>- <i>on information meetings from ALR</i></li> <li>- <i>on private consultancy</i></li> <li>- <i>talks to other farmers</i></li> <li>- <i>on meetings with officials in the ALR</i></li> <li>- <i>on telephone calls with the ALR</i></li> <li>- <i>on calculation of profit margins</i></li> </ul>
	Mileage
Negotiation	Time effort: <ul style="list-style-type: none"> <li>- <i>on the decision of which plots to put in contract (e.g. discussions with family members)</i></li> <li>- to fill in and</li> <li>- submit the application form</li> <li>- <i>meetings and telephone calls on negotiation with ALR on contract details</i></li> <li>- to make corrections in case of mistakes or amendments of the application</li> </ul>
	Mileage
Implementation: Contract Adjustments, Documentation/Monitoring, Control	Time effort: <ul style="list-style-type: none"> <li>- for adjustments on changes in farm specifics: time effort on calculation of new profit margins, meetings/calls with ALR due to contract adjustments, own effort, travel expenses</li> <li>- for keeping the field and pasturing log for each business year (9 months)</li> <li>- for the annual payment application</li> <li>- for control visits and post-processing</li> </ul>
	Mileage

Source: Own compilation based on Beckmann et al. (2003).

A clear assignment of tasks to either the information or negotiation stage is somewhat difficult, and both are often summarised as ex ante costs (Falconer and Saunders 2002). For the purpose of this

study, information and negotiation costs are distinguished according to the kind of information obtained; during the information stage, general, rather nonfarm-specific information on scheme conditions is acquired. Tasks conducted at this time were explained by the interviewer as ‘information-gathering tasks as long as you were not sure whether to participate at all’. Consequently, the negotiation stage begins when the farmer decides to participate – usually when he begins to fill out the application form – and individual contract specifics were considered and discussed with the ALR.

Apart from these task-related aspects, the questionnaire also contained sections referring to the characteristics of the contract area, contract details, changes in production and resulting opportunity costs, information on the farm structure, business indicators and socio-economic characteristics of the farm head in order to obtain testable variables.

The face-to-face interviews (60–90 minutes) took place in April and May 2010 on the farms. The interviewer filled out the questionnaire. Data was collected in a one-point approach in the Vogelsbergkreis and Eastern Wetteraukreis, two sub-mountainous Hessian counties with large shares of ecologically valuable grassland, a focus on grassland dependent agricultural use yet threatened by increasing abandonment of farming (HMULV 2006; Landrat des Wetteraukreises 2008; Amt für den ländlichen Raum des Vogelsbergkreises 2008). In one county, the ALR provided a list of about 50 participating farmers meeting the prerequisites to become part of the sample who were then asked to participate in the survey by the interviewer. In the other county, no such list was provided, so farmers meeting the prerequisites were requested by contacting the representative of the farmers’ association; further interviewees were gathered via snowball sampling. While only a minor number of farmers addressed refused to be interviewed at all, arranging dates became more and more difficult due to the advanced season; farmers initially willing to participate in the study later cancelled arranged dates. This led to a relatively low total sample size of 29; however, it represents 7% of total SSGES participants in both counties. However, the low sample size makes the results somewhat explorative.

A pre-test contained 16% of the sample; as a result, some questions were omitted, and the intended calculation of opportunity costs as percentages was replaced by dichotomous statements. The pre-test sample became part of the analysis; the revised questionnaire was re-addressed to them. Contract details were directly derived from the contract, business indicators from tax records. A description of the sample is provided in the Appendix.

### **Data analysis**

The calculation of TCs follows prior studies (Falconer and Saunders 2002; Beckmann et al. 2003; Mettepenningen and van Huylenbroeck 2009). First, the frequency of the single tasks was multiplied by their duration, and the resulting time values were summarised. Mileage was calculated based on the reported kilometres, multiplied by 0.30 €/km as practised for tax purposes. To obtain total TCs, time effort was monetised by the average wage rate for agricultural workers in order to be able to add it to the mileage. A wage rate of 16.86 €/hr was derived from the net wage rate and an additional 70% for

ancillary wage costs (KTBL 2008). Although a wage rate for agricultural workers may not reflect the actual income of the farm heads interviewed (which would be the farm's net gain) and does not resemble any differences in efficiency, it was used due to a lack of other income information. Moreover, use of the wage rate should not affect the analysis as the monetary expression is to a large degree a transformation of timely effort.

Costs for information and negotiation were treated as one-point ex ante costs (McCann et al. 2005); implementation costs (ex post costs) were extrapolated into the future by multiplying the first year costs by the contract duration of five years (Falconer and Saunders 2002). Costs indicated by particular farmers but likely to occur only once during the contract period (e.g. effort due to contract adjustments) were divided by five and distributed as a 20% share on each year of the contract period. Costs due to inspection visits were treated similarly when they occurred<sup>35</sup>. Extrapolation inhibits exploring possible economies of time, like learning effects (Falconer 2000); such an investigation would require a perennial survey, which was beyond the possibilities of this study.

Because the premium is not explicitly stated in the contracts, it had to be calculated from the contract details (scope, management agreements, number and intensity level of EVSS). A basic payment of 160 €/ha (HMULV 2009) was subtracted for farms managed in accordance with the organic farming scheme (see above). The calculated payment was multiplied by 5 according to the contract duration.

Statistical analysis was conducted with SPSS. The TCs and other metric variables were partly transformed into their natural logarithm to correspond to normal distribution. An initially conducted analysis of variance (ANOVA) showed no significant differences between both counties despite the different sample strategies.

For analysing absolute TC expenses, TCs per contract were chosen instead of TC/ha, because the particular contract scope is determined when the ALR has checked the eligibility of all plots applied for and approves the application. Thus, farmers end up expending ex ante costs without regard to the final scope of their contract. To keep results comparable, TCs/contract were also chosen as dependent variables for implementation costs. To investigate metric as well as binary variables together, a general linear mixed model (GLM) approach is applied. Due to the low sample size, all variables could not be included in one model. Variables were tested group wise, each with one factor and two covariates. Additionally, the regressions were bootstrapped. Bootstrapping is a method for assigning measures of accuracy to sample estimates by resampling (Efron 1979; Davison, Hinkley, and Young 2003), for example, when the specific sample may not be fully representative of the population due to a small sample size (Raudys and Jin 1991). Bootstrapping bases standard errors in a statistic upon the empirical distribution arising from repeated sampling from the researcher's data-set and is appropriate for GLM use (Moulton and Zeger 1991; Garson 2012).

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<sup>35</sup> Effort for farmers only occurs when non-compliance is stated. This applied to only three farms. Thus, these inspection costs were not included in the total costs.

## **Conceptual framework: linking TCs, informational gains and the gain from participation**

TCs arise due to imperfect information and result from those actions transactors undertake to manage the resulting uncertainty (Dahlman 1979; Coggan, Whitten, and Bennett 2010). Imperfect information exists because the characteristics of the goods to be exchanged are heterogeneous, because exactly estimating future transaction outcomes is impossible, and the behaviour of transacting partners in the presence of opportunism varies widely (Williamson 1979; Falconer and Whitby 1999; Leiblein 2003). TCs arise along the transaction process as (1) search costs in order to find an adequate transaction partner, (2) bargaining and decision costs in order to agree on the transaction terms and (3) monitoring and enforcement costs in order to make sure that each transaction party complies with the agreement (Coase 1937; Moxey, White, and Ozanne 1999). However, potential gains from gathering information have to be weighed against the related expenditures (Stigler 1961; Arrow 1996); in other words, information costs should be weighed against the costs (losses) due to lacking information.

In the next subsections, TCs occurring in the Hessian scheme are depicted and linked to particular informational gains<sup>36</sup> obtainable in specific transaction stages, followed by the delineation of testable variables.

### **TCs and informational gains along the transaction process**

#### ***Search and information stage***

At the search and information stage, contract parties aim to identify potential trading possibilities and partners, here given as scheme participation. If both transaction partners benefit from the transaction, it is reasonable for both of them to spend on search and information (Alchian 1969). In this study, this applies to both administration and farmer.

Besides, how a search is conducted by one party may induce search costs on behalf of the other party as well. If information is provided, for example, via information meetings, then this is time-consuming for both organiser and visitor.

The AES participation offers a transactional gain by providing a farm income alternative upon agreeing to a contract at the expense of opportunity costs. These opportunity costs vary according to particular structural factors and make the transactional gain obtainable via scheme participation more or less attractive (Falconer 2000). Thus, prior to participation, farmers have to obtain costly information about the (financial) consequences of scheme participation as well as non-participation in order to make a decision (Wätzold and Schwerdtner 2005).

In general, search costs are determined by the scope and duration of the search/ selection process, which in turn depend on the heterogeneity of the trading good or the trading partners (Dahlman 1979; Falconer and Whitby 1999; Birner and Wittmer 2004). However, subsequent long-term transactional

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<sup>36</sup> Note that the terms *transactional gain* and *informational gain* refer to distinct subjects. *Transactional gain* refers to the payment per TCs. *Informational gains* refer to benefits obtainable due to the expense of particular TCs. Conceptually, informational gains are an input factor which may increase the particular transactional gain.

relationships and/or the scope of the search might enable fixed cost effects, which reduce the search costs per ha (Falconer 2000; Coggan, Whitten, and Bennett 2010). Moreover, interrelationships between search cost expense and latter reductions in implementation costs – especially related to monitoring – are frequently discussed (e.g. Mettepenningen and van Huylenbroeck 2009).

As the SSGES regulations specify neither amount nor methods of providing information, the administrations' and farmers' actions are voluntary. Consequently, under the premise of acting rationally, farmers can be assumed to expect gains as long as they spend on information gathering. Action like reading additional publications or addressing the administration personally may help them to assess the value of the transactional gain per se; i.e. to assess the AES payment in relation to alternative income possibilities. Farmers may also utilise additional information to negotiate on better contract terms later on and/ or save time during the application process (Mettepenningen and van Huylenbroeck 2009). Resulting lower per ha TCs might offset the initial investment in the search. Such fixed cost effects were indeed found with respect to the latter contract scope (Falconer 2000; Mettepenningen and van Huylenbroeck 2009).

### *Negotiation stage*

The output of the negotiation stage is the participation contract specification. In this setting, this comprises the elicited plots which constitute the contract scope, and the management agreements and optional EVSS which constitute the per-ha premium the administration is willing to pay and at which the farmer is willing to participate. Negotiation is also frequently discussed as instrument to reveal farm-specific information to avoid welfare losses due to adverse selection; that is, farmers may claim their costs to be higher than they are and generate a producer surplus (Moxey, White, and Ozanne 1999; Wätzold and Schwerdtner 2005; Ferraro 2008). In case of individually negotiated payments, farmers may obtain such rents directly by claiming higher costs than the actual ones (Ferraro 2008). In case of flat rate payments, such rents can be generated by putting unproductive land into contracts (Canton, De Cara, and Jayet 2009; Quillérou and Fraser 2010)<sup>37</sup>.

The SSGES includes flat rate as well as top-up premiums. Besides simply filling in and eventually correcting the formal application, they could make additional efforts to negotiate via talks with the administration and thus try to maximise the premium. As the scope of the contract can only be influenced by the farmers to a limited degree, farmers may try to obtain higher per-ha premiums to generate rents by claiming an additional or a higher intensity level of EVSS. This is facilitated by the fact that EVSS payments are often granted from desk instead upon a site-inspection (Weber 2013); moreover, farmers do not have to provide a calculation concerning their effort.

In this perception, if initiated by the administration, negotiation costs depict 'costs of rent circumvention' (Bolton and Dewatripont 2005, 94); if initiated by farmers, they could depict rent-constituting cost. In any case, they are borne by both administration and farmers, as both are involved in negotiation; if the farmers realise rents, this should be resembled in a higher net payment.

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<sup>37</sup>However, if flat rate payments are cheaper to be administered, this might outweigh these welfare losses.

However, rent generating may not be the only reason for farmers to invest in negotiation, due to the market structure established by the scheme. The local ALR is the only contractor for a multitude of farmers which establishes a monopsonistic market structure. As an effect, the ALRs could exert monopsonistic power and pursue a ‘cost-dumping’ strategy. Restricted by budget constraints, the respective ALR could offer contracts on terms that secure site preservation at the lowest cost, i.e. at the level of the basic premium. The administration could push those farmers with a certain need to participate – for example due to income securing – into low-compensation participation. This situation represents a kind of lock-in, meaning it has the potential to generate extra rents when one transaction partner has few alternative contracting possibilities (Leiblein 2003). The other partner can make use of this situation by applying pressure and improving the contract conditions to his own benefit (Williamson 1985; Leiblein 2003). In such a case, agreeing on EVSS payments would not lead to higher net payments for farmers.

### ***Implementation stage***

The primary informational gain at implementation stage is to reveal whether farmers comply with their contractual duties in the presence of ex post opportunism, labelled moral hazard (Slangen 1997; Ozanne, Hogan, and Colman 2001). In principle, farmers could maximise their income by not complying with the agreements, receiving an unrestricted market income while at the same time being paid the prearranged compensation payment (Wätzold and Schwerdtner 2005). To avoid and/or detect moral hazard, the administration has to undertake costly monitoring (Ozanne, Hogan, and Colman 2001). Monitoring costs vary with the modes of monitoring and the monitoring frequency (Moxey, White, and Ozanne 1999).

In the SSGES, the documentary obligations shift a part of the burden of proof and the related monitoring costs to the farmers and thus induce distributional effects (McCann 2013). When entering the scheme, farmers have to anticipate these costs, especially as they have to bear them regardless of their particular willingness to comply. Farmers might be willing to bear these costs, for example, in case they value scheme participation more than their income alternatives. Further, this valuation may enforce compliance (including bearing its costs) in order not to risk the payment entitlement (Fraser 2002; Yano and Blandford 2009). Complying with documentation duties with a high degree of accuracy then serves as a kind of risk management even if this increases their costs (Fraser 2002; Yano and Blandford 2009). This also corresponds to the argument raised by Mettepenningen and van Huylenbroeck (2009), who find that farmers who do not trust in the local administration spend more on monitoring costs.

While the documentary effort is related to the contract scope and can thus be approximated roughly by the farmers, costs resulting from (unintended) infringements detected cannot be approximated precisely. Weber (2013) highlights that the monitoring techniques used may produce incorrect non-compliance statements. Especially, on-site checks via satellite surveillance tend to

produce erroneous statements, shadows of cows or forest mistaken for non-agricultural features lead to reductions of the contract area and thus of the payments (Weber 2013). Such errors induce enforcement costs for the farmers due to formal complaints; related costs also have to be anticipated. As a counteracting strategy, farmers may expend costs on information and negotiation in order to make as few mistakes as possible.

In the following section, factors are discussed that were either empirically found or can be theoretically argued to increase TCs in this specific setting. Their impact on the transactional gain is derived inductively from the regression results, by comparing absolute TCs with relative TCs.

### **Delineation of variables**

According to Transaction Cost Economics, the major theoretical strand to investigate TCs, TCs depend on the properties of the particular transaction – constituted by the dimensions frequency, uncertainty and asset specificity – as well as on the behaviour of actors involved (Williamson 1998b). In the following, these aspects are presented as discussed in the agri-environmental context. The focus is on those features which vary among the farmers within the fixed setting of the SSGES. Consequently, the delineated variables are either farm or contract related. Variables are presented in parentheses.

Frequent transacting induces learning effects on price, quality and behaviour of the trading partners and thus reduces TCs (Coggan, Whitten, and Bennett 2010; McCann 2013). Frequency is related to the duration of a scheme (Hagedorn, Arzt, and Peters 2002; Falconer and Saunders 2002). Re-participation, for example, may reduce upcoming search costs, as frequent transacting induces learning effects on price, quality and behaviour of the trading partners, also during the lifecycle of a scheme (Falconer, Dupraz, and Whitby 2001).

Because the scheme was established for the first time, and its recommendations depart strongly from its predecessor (HMULV 2006), effects of repeated participation (frequency over time) cannot be tested here. However, frequency aspects were taken into account in the form of economies of scope and scale. Farmers can participate in the SSGES as top-up to participation in the organic farming scheme (ORGANIC). Economies of scope might reduce additionally incurred marginal TCs (Hagedorn 2008; McCann 2013) and might even offset the losses due to the reduced top-up premium.

Economies of scale were found to reduce per ha TCs in case of high fixed TCs (e.g. Falconer 2000; Mettepenningen and van Huylenbroeck 2009). To test such effects, the scope of the area enrolled in a particular contract (HASSGES) is taken into account, as well as the share of the contract area per total farm grassland (SHCONTRACT). A higher share implies that less area is managed outside the scheme, which might reduce TCs for coordination, like considering distinctive management strategies on plots within and outside the contract.

Uncertainty raises TCs due to the necessity to provide safeguards to meet contractual hazards like opportunistic behaviour, measurement problems or changing conditions over time (Williamson

1998b). Uncertainty encompasses both outcome and actor-related aspects (Falconer and Whitby 1999; Coggan, Whitten, and Bennett 2010). Outcome related aspects refer to the circumstances of agricultural production, such as natural variability and erratic weather conditions (Falconer and Whitby 1999; Mettepenningen and van Huylbroeck 2009). Actor-related aspects comprise bounded rationality and opportunism (Williamson 1985). Bounded rationality acknowledges that people are rational but limited in their ability to foresee all contingencies that may arise (Simon 1957) In the agri-environmental context, for example, knowledge about the effectiveness of measures might be difficult to acquire due to difficulties in measuring and/or observing because of time-lagged outcomes and other hindrances (Falconer and Whitby 1999; McCann 2013).

Uncertainty may also foster opportunistic behaviour, in case such features aggravate observing compliance (Falconer and Whitby 1999; Coggan, Whitten, and Bennett 2010). Hessian farmers face uncertainty primarily in farm production, for example, due to volatility in production yields and resulting income insecurity. Scheme participation, in contrast, provides a calculable alternative in the farm's income portfolio, especially as the payments are action-related and do not demand a specified (and probably uncertain) outcome. Indeed, farmers were found to participate in AES in order to reduce risks from a volatile production of market goods (Wilson and Hart 2000). Fraser (2002) finds that uncertainty in farmers' production income enforces compliance with AES in order not to risk the payment entitlement. In such a case, farmers value the secure income more, although it might be lower than the actual, yet uncertain production income (Yano and Blandford 2009). Thus, farmers stating a high volatility in production yield (VOLATILITY) presumably spend more TCs and probably receive/accept a lower net gain. This effect might even be more severe when farm income is the most important household income source, that is, for full-time farmers (FULLTIME). However, a contrary effect is also possible; professional farmers might benefit from information comparatively more due to competence and obtain a higher payment via TCs expenditure.

A related argument is that securing income becomes more important if the farm business is in financial need due to its general business situation. Battershill and Gilg (1997) find that low income, such as on marginal farms, usually makes it necessary to generate alternative income sources. Hence, such farmers might also invest in compliance in order not to jeopardise the payments. In this study, the share of total CAP payments (including the income support from the single farm payments) per total farm revenue (CAP) serves as an indicator for financial dependency.

The last but most important dimension influencing TCs is asset specificity. Asset specificity is defined by the asset's applicability in alternative purposes and may take a variety of forms – physical assets, human assets, site specificity, dedicated assets, brand name capital and temporal specificity (Williamson 1998b). In the agri-environmental context, a substantial positive relationship between physical assets, namely site specificity (usually indicated by production-related opportunity costs), specificity of human resources (in terms of technical knowledge level or experience), and scheme specificity (e.g. the degree of targeting) and participation-related TCs is thoroughly found (Falconer

and Whitby 1999; Hagedorn, Arzt, and Peters 2002; Vatn 2002; Birner and Wittmer 2004; Hagedorn 2008; Rørstad, Vatn, and Kvakkestad 2007).

To participate in the SSGES, specialised technical knowledge is not required. However, production-related opportunity costs may vary between the farmers and influence TCs. For testing, these opportunity costs are calculated as the sum of management changes due to scheme participation as indicated by the interviewee (OPPORTUNITY COSTS). To control for influences of different contract specifications, both the weighted sum of EVSS/ha<sup>38</sup> (EVSS) as well as the scope of the grazing agreement per contract (GRAZING) are included in the analysis. Both features increase the premium; moreover, they might be a negotiation result. At the same time, they may go along with higher TCs, for instance, due to keeping a pasturing log. Therefore, it is of interest if the additional TCs are outweighed by the higher premium.

## Results and discussion

### Descriptive results

TCs found for SSGES participation are substantial, and result from a number of tasks conducted even on a voluntary basis. On average, farmers spent nine hr on informational and six hr on negotiation tasks. Implementation tasks for the whole contract period required 67.41hr on average and thus the majority of time (and costs), probably due to the substantial reporting duties. TCs/ha for the whole contract period is 95.33 € on average, albeit with a substantial variance. Average TCs expressed as a percentage of payments are about 7%, also with a wide range. Table 2 depicts the main descriptive results.

**Table 2**  
Total TCs of farmers in scheme participation.

	First year		Total contract period	
	mean	std.	mean	std.
TC/contract (€)	527.10.	432.70	1440.48.	1667.44
TC/ha contract area (€)	33.85	48.63	95.33	202.82
TC/plot (€)	51.87	57.66	133.98	176.23
TC per € payment	0.13	0.17	0.07	0.14
Information costs/contract (€)	171.96	142.44	171.96	142.44
Negotiation costs/contract (€)	126.84	127.32	126.84	127.32
Implementation costs/contract (€)	228.34	317.33	1,141.69	1,586.65
Information costs (%)	40.7	24.6	24.6	23.4
Negotiation costs (%)	27.5	19.7	15.0	13.6
Implementation costs (%)	31.8	22.4	60.5	27.1
Productivity: Premium/TC (€)	18.10	17.97	46.30	50.67

Source: Author's own calculation.

At the search and information stage, farmers obtain information from a variety of sources with a preference for face-to-face communication. The most important informational sources are reading official brochures (82.2% of farmers), commercial or advisory journals (69% of farmers, 14.7%

<sup>38</sup> That is, the average amount of EVSS per ha of contract area.

reading more than one) and attending informational meetings provided by the ALRs (69% of farmers); 6.8% of farmers even attended more than three meetings. Additional informative talks to ALR staff via telephone or bilateral meeting are frequently undertaken. Sixty-nine percent of farmers phoned at least once (24% of farmers phoned more than five times), 49% of farmers arranged at least one meeting (10.3% arranged more than three meetings) and 52% of the interviewed farmers also reported at least one conversation with other farmers as an information source (24% of the interviewees reported more than three talks). Only a small number of farmers gathered information from the internet and from consulting private extension services (14% of interviewees for each).

Farmers also conduct a number of negotiation activities. Besides filling in the application form, 73% of the farmers had at least one negotiation meeting at the administration (37.9% reported more than two meetings) and 55% of interviewees phoned the ALR at least once for negotiation purposes (20.6% reported more than three phone calls). In addition, most of the farmers (76%) reported that they submitted the contract personally to the administration to discuss last minute details.

At the implementation stage, TCs are mainly constituted by documentary effort. However, the interviews revealed that the frequency and duration of log keeping varies greatly. Some farmers simply make daily notes on a calendar and fill in the log once a week; others use professional software and keep their log daily.

Due to different TC categorisations and measurements, the results cannot be directly compared to previous findings; thus, a comparative statement is not possible. Even so, in line with earlier findings (e.g. Falconer 2000; Falconer and Saunders 2002), ex ante costs comprise the highest share of TCs in the first year of participation, and the share decreases over the whole contract period, even though no further degressive effects could be taken into account due to the extrapolation (see 'Data and methods' section). This highlights the important effect of scheme duration on relative TCs.

The next section discusses explanations of the variances in TCs, which were derived from the regression results.

### **Regression results**

Table 3 shows significant results for a number of variables. However, since the sample size limited the number of variables to be included into each regression, the impact of the intercept is highest with respect to significance level and effect size in all regressions. This indicates that a number of important variables exist that are not explicitly addressed in the particular regression<sup>39</sup>.

The regression results reveal that higher TCs generally go in line with a lower payment/ TC ratio (fourth and fifth columns of Table 3); moreover, during the transaction stages, significant variables show no changes in sign, which would have indicated TC savings due to prior TC expense. Thus, with all else being equal, TCs serve neither to obtain gains during the transaction stages nor to maximise the overall net gain.

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<sup>39</sup> However, they might be included in one of the other regressions.

Interestingly, however, the regression results reveal significant impacts mainly for factors related to uncertainty and asset specificity; frequency-related factors show a minor impact. Overall, farm-related factors were prominent. This deserves a closer look. The remainder of this section depicts the GLM results in detail<sup>40</sup>.

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<sup>40</sup> Results were counterchecked by excluding organic farmers from the sample in order to control for the different premium calculation modes. However, the significant impacts persisted.

Table 3: Results of GLM regressions

	Ln Information Costs(€)			Ln Negotiation Costs (€)			Ln Implementation (€)			Ln Total TCs (€) (5 years)			Ln Payments/total TCs (5 years)		
	Coeff.	Std. err.	p-value	Coeff.	Std. err.	p-value	Coeff.	Std. err.	p-value	Coeff.	Std. err.	p-value	Coeff.	Std. err.	p-value
Intercept	<b>3.797***</b>	0.491	0.001	<b>3.436***</b>	0.628	0.001	<b>4.233***</b>	0.497	0.001	<b>5.234***</b>	0.297	0.001	<b>4.627***</b>	0.298	0.001
ORGANIC = yes	<b>0.809**</b>	0.368	0.034	0.351	0.494	0.455	-0.136	0.890	0.875	0.355	0.428	0.401	<b>-1.205**</b>	0.431	0.007
OPPORTUNITY COSTS	<b>0.143**</b>	0.044	0.005	0.126	0.106	0.235	0.127	0.115	0.260	<b>0.141(*)</b>	0.077	0.078	-0.030	0.095	0.751
GRAZING (%)	0.411	0.516	0.441	0.600	0.664	0.372	<b>2.079**</b>	0.685	0.010	<b>1.320**</b>	0.416	0.003	<b>-1.454**</b>	0.427	0.007
<i>BIC</i>	<i>83.148</i>			<i>99.958</i>			<i>118.955</i>			<i>91.651</i>			<i>99.749</i>		
Intercept	<b>4.593***</b>	0.343	0.001	<b>3.648***</b>	0.561	0.001	<b>3.687**</b>	1.152	0.002	<b>4.848***</b>	0.757	0.001	<b>5.010***</b>	0.776	0.001
FULLTIME = yes	<b>0.851(*)</b>	0.466	0.061	<b>1.295*</b>	0.653	0.050	<b>1.613(*)</b>	0.885	0.061	<b>1.371*</b>	0.573	0.021	<b>-1.687**</b>	0.553	0.006
CAP (%)	0.010	0.009	0.206	<b>0.030*</b>	0.013	0.035	0.022	0.015	0.154	<b>0.018(*)</b>	0.010	0.074	<b>-0.025*</b>	0.011	0.028
HASSGES (ha)	0.003	0.006	0.437	-0.004	0.014	0.693	0.010	0.013	0.338	0.005	0.010	0.520	0.014	0.010	0.140
<i>BIC</i>	<i>62.548</i>			<i>86.442</i>			<i>108.649</i>			<i>86.859</i>			<i>92.168</i>		
Intercept	<b>5.507***</b>	0.371	0.001	<b>4.179***</b>	0.478	0.001	<b>5.576***</b>	0.734	0.001	<b>6.530***</b>	0.478	0.001	<b>2.891***</b>	0.546	0.001
VOLATILITY = yes	<b>0.432(*)</b>	0.256	0.103	<b>0.963*</b>	0.442	0.064	1.106	0.637	0.113	<b>0.895*</b>	0.388	0.042	-0.579	0.431	0.194
SHCONTRACT (%)	<b>-1.013(*)</b>	0.551	0.097	-0.382	1.017	0.709	0.620	1.012	0.512	-0.055	0.705	0.921	<b>1.656*</b>	0.715	0.021
EYSS (ha)	<b>-0.145*</b>	0.071	0.023	-0.022	0.132	0.806	-0.103	0.213	0.381	-0.064	0.125	0.436	-0.034	0.117	0.675
<i>BIC</i>	<i>78.241</i>			<i>99.168</i>			<i>126.312</i>			<i>99.969</i>			<i>105.979</i>		

p<sup>0</sup>= 0, 1; p<sup>0.05</sup>; p<sup>0.01</sup>; p<sup>0.001</sup>.  
 \*Note that with bootstrapping, p is the probability of getting a result as strong or stronger than the observed result just by chance of taking another sample n-1 of the researcher's sample (Garson, 2012).

### ***Factors related to frequency***

The results do not support the existence of economies of scope and indicate only limited economies of scale. ORGANIC has a substantial, negative impact on the payment/TC ratio as well as on information costs; impacts at the other TC stages are not significant. Given that organic farmers expect a reduced premium, they have a relatively high demand for (general) information. This is also reflected in the low payment/TC ratio. Instead of obtaining economies of scope, using the SSGES as top-up for the organic farming scheme seems to be relatively costly in terms of TCs. Compared to conventional farmers, organic farmers *ceteris paribus* have a substantial disadvantage. The reduced premium they receive seems not to outweigh their (additional) TC expenses.

A significant impact of the contract scope on any TCs, which could indicate economies of scale, was not found. This is somewhat contrary to the findings of Mettepenningen and van Huylenbroeck (2009), who find a reducing impact on information and negotiation costs due to fixed cost effects. The absence of such effects here might be a result of the eligibility criteria of the SSGES, probably as a result of the farmers' lack of discretion in determining the final contract scope. Weber (2013) reports that some farmers even apply for all their sites and leave the decision of which sites to enter into the scheme up to the ALRs. Obtaining economies of scale in that case would instead be a result of chance. Moreover, as the documentary effort refers to all plots, economies of scale at the implementation stage are also unlikely (Weber 2013).

However, farmers managing a high share of their grassland under the SSGES are able to achieve some economies of scale. The significant positive impact of the share of contract area on the premium/TC ratio probably results from the substantial negative effect on information costs. Farmers managing most of their grassland in areas eligible for scheme participation thus seem to reduce their effort in considering alternative decisions.

### ***Factors related to uncertainty***

Surprisingly, full-time farmers expend substantially more TCs throughout the whole transaction process than their part-time colleagues. The effect size is largest at the implementation stage and smallest at information stage. Full-time farmers also obtain a lower payment/TC ratio. Since maximising income can be considered important when farm income is the most important income source, these findings (especially the negative effect on the payment/TC ratio) are rather puzzling. However, some explanations are possible: first, the high impact on implementation costs may result from more professional modes of book-keeping in terms of frequency and accuracy.

Second, the impact at the information and negotiation stage may result from frequent interactions with the ALRs, especially since these are also contact agencies for matters concerning other aspects of agricultural policy. Agricultural policy in recent decades – especially in the EU – has made public support a regular part of farmers' income; information gathering and interacting with agricultural administrations is thus likely to form a regular part of (professional) farm management. This may have

led to overestimating the effort in the interviews. Moreover, farmers may achieve economies of scope through frequent interaction with the ALRs, that is, information gathered might also be used for other purposes besides scheme participation.

Finally, full-time farmers may have lower opportunity costs of time; part-time farmers are employed elsewhere and have to conduct their informational tasks in their leisure time<sup>41</sup>.

The impact of VOLATILITY is more straightforward. Reported volatility goes in line with higher total TCs and the coefficient for the payment/TC ratio is negative, although just below significance. Volatility also has a significant positive impact at the information and negotiation stage with a considerably high effect size. At the implementation stage, the effect size is even higher yet just below significance. Obviously, uncertainty is an important factor on voluntary as well as mandatory TC expenses. Especially the latter supports the role of risk aversion on compliance (Fraser 2002; Yano and Blandford 2009). Mettepenningen and van Huylenbroeck (2009) argue in a similar way; they find that when farmers have low trust in administrations, they increase their implementation effort. The authors argue that farmers probably spend more time on paperwork because they fear penalties. However, in this study, the positive impact is not only found at the implementation stage. It seems that farmers facing production uncertainty are willing to expend substantial TCs in order to obtain a secure income, even when they obtain a comparatively lower payment/TC ratio.

In line with this, the dependency on subsidy income (CAP) was also found to have a significant increasing effect on total TCs, corresponding to a lowering effect on the payment/TC ratio. A significant positive effect exists particularly for negotiation costs; effects on information and implementation costs are positive but just below the significance level. However, the effect size of the variable is rather low.

### ***Factors related to asset specificity***

In line with earlier findings, total TCs increase with higher opportunity costs (e.g. Falconer and Whitby 1999; Vatn 2002; Rørstad, Vatn, and Kvakkestad 2007). With respect to the particular cost categories, opportunity costs have a positive impact on information costs, the effect on the payment/TC ratio is slightly negative but not significant. Obviously, farmers invest more in information collection, the more the changes in management they expect. However, the particular effect size found for the significant results is rather small. This might be due to the location of the study area, which is characterised by marginal farming. Opportunity costs seem to play a minor role for TC expense in comparison to regions where farming is more intensive.

The weighted sum of EVSS as a possible negotiation result has a significant (negative) impact only at the information stage yet with a comparatively low effect size. Agreeing on (additional) EVSS is either not subject to the farmers' discretion or not utilised as instrument to increase the premium.

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<sup>41</sup> This may also imply that the ALRs attempt to ease participation-related effort for part-time farmers in order to secure a sufficient participation rate. In that case, it might be the ALRs who were locked in and face additional effort in order to carry out the transaction.

In contrast to the results for EVSS, farmers expend substantially more total TCs the higher the scope of the grazing agreement per contract is, denoted by GRAZING. This negatively affects the payment/TC ratio. A high impact on total TCs probably results from substantial efforts at the implementation stage. Keeping the pasturing log seems to induce substantial additional documentary effort, which is not outweighed by the higher basic per/ha premium.

### **Implications**

Although the findings do not support the general hypothesis of the study and their interpretation is explorative due to the case study approach, the findings provide some interesting explanations for intra-scheme TC variances. Interestingly, the causes for variation (voluntary) TC expense lie in farm attributes rather than, in particular, contract specifics. For some farmers, TCs seem to play the role of an investment to generate a part of the farm's income via (calculable and stable) payments for AES participation, preferred to a rather uncertain income from market goods' production.

Under the current scheme regulations, both full-time and organic farmers were better off with respect to TC expenditure if they participated without much effort to obtain information in order to realise a maximum transactional gain. The fact that especially full-time farmers do not 'economise' on TCs raises the question on their actual opportunity costs of time; a topic which should be addressed in further research.

However, an important caveat is that both types of farmers may have advantages when compared to their counterparts, which might outweigh the TC-related disadvantages. For one, full-time farmers may mitigate the low payment/TC ratio via savings in production costs due to economies of scale in agricultural production. This might also apply to organic farms; they might face fewer opportunity costs and possible production-related economies of scope. For an overall evaluation, it is thus important to consider the total costs of participation (Falconer and Saunders 2002).

Another interesting fact is that, *ceteris paribus* scheme features do affect the individual benefit/cost ratio of the farmers. Farmers obtain a higher payment/TC ratio when they have a high share of their grassland in the contract. Other scheme features affect the payment/TC ratio negatively. First, the higher premium for the grazing agreement does not outweigh the additionally incurred TCs. Next, economies of scale – although usually found for scheme-related TCs – seem to be unachievable within the existent monitoring regulations (cf. Weber 2013). Obviously, whether a factor is influential seems to be context specific. This highlights the role of policy design on resulting TCs (Krutilla and Krause 2010; Weber 2013). To better control for such effects, AES-related TCs should be investigated with regard to the particular scheme regulations in a joint approach.

Apart from such practical implications, the most interesting result is the general impact of uncertainty related factors on farmers' TC expense. Farmers stating volatility of output expend substantially more TCs throughout the whole implementation process. A preference for a stable income seems also to influence the related TC expense. The secure (yet comparatively lower)

payment/TC ratio seems to be preferred compared to the uncertain market income. In that case, TC expense could be perceived as ‘willingness to pay’ for participation, somewhat in the sense of revealed preferences (Samuelson 1938; Varian 2006). While a number of studies have investigated participation motives of farmers (see e.g. Siebert, Toogood, and Knierim [2006] for an overview), little is known about whether such motives are mirrored in participation-related TC expenses. Further research should take this into account.

Finally, taking the SSGES as an example, the findings reveal that assessing a TC component within the premium calculation remains difficult. The study revealed that – foremost at the information and negotiation stage – the number and frequency of TC constituting tasks varies greatly between farmers and is often subject to their own decision. Especially the latter offers incentives for farmers to overstate their effort, which would result in new informational deficiencies of the ALRs and probably additional costs documenting the information-related effort. Within the example of the SSGES, it seems more appropriate to amend the payment calculation for organic farmers and/or either increase the premium for the grazing agreement. However, the prohibition of double funding actually inhibits a premium re-calculation for organic farmers.

Moreover, the related documentary duties could be reduced to increase the payment/TC ratio. However, the documentary duties mainly originate in the EU co-financing regulations, which at the moment hampers any attempts at state level to reduce them (Weber 2013).

## **Conclusion**

This case study investigated farmers’ TCs in a regional SSGES with negotiable components. Its main attempt was to explain intra-scheme variances in TC expenditure under the hypothesis that TC expense serves at maximising the per ha premium. Although the results do not support a gain maximising role of TC expenditure, they nonetheless provide some explanations for intra-scheme TC variances. Higher TCs expense predominates for particular farms features indicating dependency on AES income. Thus, (voluntary) TC expenditure seems to serve as a safeguard for securing participation-related income. Moreover, the results suggest that participation motives might be related to the expense of TCs, a subject that should be addressed in further research.

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## Appendix

**Table A2:** Description of the sample

	mean	std.	min/max
Organic farms (%)	31.00		
Fulltime run farms (%)	69.00		
Arable land (ha)	49.92	83.53	0 - 300
Grassland (ha)	86.34	63.14	4.63 – 250.00
Volatility in output = yes (%)	41.40		
Subsidies CAP/ total revenue (%)	38.40	23.28	9.20 - 87.70
Farm head's strategic focus (%):			
Suckler cow husbandry	37.90		
Dairy farming	31.00		
Arable farming	13.80		
Others	17.20		
Scope of contract (ha)	30.90	30.5	3.46 - 115.49
Total number of plots /contract	19.72	27.86	4.00 – 148.00
Contract area/total grassland (%)	41.00	0.28	3.00 – 100.00
Weighted EVSS/ha (%)	3.27	3.41	
Annual premium (€)	7.610	7759.34	
Annual premium /ha (€)	273.89	61.30	
Age farm head (yrs.)	48.70	10.39	
Sex of farm head (%):			
male	89.70		
female	10.30		
Farmers' professional degree (%):			
none	37.90		
Traineeship	13.80		
Advanced training	31.00		
University degree	17.20		

Source: Author's own calculation.

## 6 How are Public Transaction Costs in regional Agri-Environmental Scheme Delivery influenced by EU regulations?<sup>42</sup>

*Anja Weber*

### **Abstract**

Implementing agri-environmental schemes (AES) induces private and public transaction costs (TCs). To date, research has investigated TCs stemming from the relationship between (regional) administrations and farmers. However, implementing AES within the EU's Common Agricultural Policy (CAP) offers partial reimbursement of payments but implies an additional transaction and TCs. This paper investigates the effects of EU regulations on occurrence and composition of regional public TCs qualitatively by using Hesse, Germany, as a case study. Using insights from political science theories, I present results from interviews with administrative units: EU-required structural and procedural prerequisites shape the regional implementation and draw the focus towards expense of EU-based TCs. Moreover, there are spillovers onto farmers' TCs. Thus, the CAP framework is an important influencing factor, and resulting TCs may reduce the budgetary benefit obtained from the reimbursement.

**Keywords:** Transaction costs; institutional environment; agri-environmental schemes; policy implementation; Germany

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## 1. Introduction

Agri-environmental schemes (AES) are a widely used policy instrument for fostering the provision of environmental benefits via agriculture. Farmers are paid in return for carrying out agri-environmental commitments. Conceptually, AES are contractual mechanisms between a farmer/seller and agricultural administration as a representative consumer (Hagedorn, Arzt, and Peters 2002). However, in addition to the payments, AES require transaction costs (TCs) on behalf of farmers and administrations. On the administration's side, they are "costs of setting up and running the organisational and contractual structure" (Beckmann, Eggers, and Mettepenningen 2009, 694), and are labelled public TCs or administrative costs (Falconer and Whitby 1999). TCs as part of the gross costs reduce the benefit obtained from payments (Falconer and Whitby 1999). TCs in general owe their existence to imperfect information in market exchanges (Dahlman 1979) as well as in exchanges in the administrative or political sphere (Paavola and Adger 2005). Imperfect information exists due to heterogeneity of the characteristics of the good to be exchanged and, in the presence of opportunism, due to heterogeneity in the behaviour of the transacting partners (Falconer and Whitby 1999). Transaction costs arise as results of those actions transactors conduct to manage these information deficiencies (Coggan, Whitten, and Bennett 2010). Along the transaction process, it becomes necessary to expend: (1) search and information costs to find an adequate transaction partner; (2) bargaining and decision costs to agree on the terms of the transaction; and (3) policing and enforcement costs to make sure that each transaction party complies with the agreement (Coase 1937; Dahlman 1979).

Empirical evidence identifies various factors that influence public TCs in AES (Falconer and Whitby 1999; Falconer and Saunders 2002; Vatn 2002; Rørstad, Vatn, and Kvakkestad 2007; Ollikainen, Lankoski, and Nuutinen 2008; Nilsson 2009; Mettepenningen, Beckmann, and Eggers 2011; Jongeneel, Polman, and Slangen 2012). Mettepenningen, Beckmann, and Eggers (2011, cf. for a broader discussion) synthesised them as actor-and scheme-related factors, the natural environment in which the scheme is designed to act, and the institutional environment in which the schemes are designed and implemented.

These studies focus on the interaction between a regional administration and farmers. However, many member states of the European Union (EU) offer AES within the European Agricultural Fund for Rural Development (EAFRD). The EAFRD is part of the EU's Common Agricultural Policy (CAP) and provides a partial reimbursement of national AES payments upon compliance with funding regulations. By this, the EU pursues its own environmental policy goals and at the same time eases the member states' budgetary constraints. In Germany, where design and implementation of AES is a duty of the *Länder* (states), especially those with difficult budget circumstances make extended use of this possibility (Osterburg and Stratmann 2002; Eggers, Laschawski, and Schleyer 2004). However, offering AES within the EAFRD establishes a further transaction, namely between the EU and the

member state's administrative level in charge, and the regional administration acts as an agent for implementing EU policy goals. As the CAP has one of the highest degrees of regulation amongst the EU's policies and leaves only little discretion for EU member states (Franchino 2004; Swinnen 2010), this transaction is likely to be superimposed creating a general institutional environment (IE) (Williamson 2000) for the transaction between regional administration and farmer. As a consequence, first, extra TCs due to this additional relationship are likely to occur that affect the composition of public TCs at the regional level. Moreover, second, the IE constituted by EU regulations may have an influencing effect on those factors previously identified to influence public TCs. EU-related TCs may thus reduce the budgetary benefits obtained from the co-financing.

This paper investigates these assumptions with the help of a qualitative case study in Hesse. Hesse is one of the larger *Länder* and has had to cope with severe budget cuts in recent years (HMULV<sup>43</sup> 2006). In the current EU funding period (2007–2013), Hesse has been implementing AES, such as organic farming, intertilling, buffer strips etc., via the Hessian Integrated Agri-Environmental Programme 'HIAP' with a total budget of €140M and a 50% EU co-funding share<sup>44</sup>. The most important AES with respect to intended participation and budget is site-specific grassland extensification (SSGES), an area-based scheme consisting of a basic agreement and negotiable extra services (HMULV2006; see Weber 2011, for details). It is a fusion of a formerly state-financed site-specific grassland extensification scheme ('HELP') and a farm-related general extensification scheme which already had been co-financed by the EU ('HEKUL') in the previous funding period (HMULV 2006). The scope of the intended area to be enrolled was reduced from 105,000 ha (HEKUL/HELP) to 45,000 ha in HIAP (HMULV 2006). Several increases in payments were necessary to ensure a sufficient participation rate of 4000 farmers and approximately 42,000 ha in 2011, as HELP farmers faced an initial 30% lower payment and initially refrained from participation (HMULV 2008; HMUEL 2012). As it will be shown, future participation may also be affected, as the implementation within the EAFRD also affects farmers' TCs.

The study approach is explorative and positive; empirical evidence is derived from a document analysis of the relevant EU regulations and a content analysis of semi-structured interviews conducted with Hessian administrative units. The analytical framework (Section 2) connects the findings from the mentioned AES-related TCs approaches with positive theories from political science, which deal with the guiding effect of regulations. It also depicts the main regulations for EU reimbursement, and delineates resulting TCs typologies and their incidence at the regional level. Data and methods are described in Section 3. Section 4 depicts which tasks arise in AES implementation and how they are operated due to regulations. Resulting TCs are indicated and the main implications of the findings are discussed. Apart from supporting the assumptions, the results imply the existence of a trade-off

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<sup>43</sup> HMULV was the name of the Ministry HMUEL 2006.

<sup>44</sup> HIAP is further co-funded by the federal task 'Joint Action for Improvement of Agrarian Structures and for Coast Preservation (Gemeinschaftsaufgabe Verbesserung der Agrarstruktur und des Küstenschutzes, GAK)' that induces additional regulations. However, these are not included in this study.

between scheme-related and reimbursement-related TC expenses. Moreover, spillovers onto farmers' TCs occur. A brief conclusion is provided in Section 5.

## **2 .Analytical framework**

### **2.1. AES-related public TCs and the institutional environment**

TCs arise as design and implementation of AES induces several informational requirements: on the possible environmental benefits to be provided by the scheme; on the appropriateness of sites (e.g. heterogeneity in characteristics, in location-specific opportunity costs or in ecological value); on management agreements capable of providing these benefits; and on a difficult, often time-lagged observability of the outcome (Falconer and Whitby 1999). The latter is due to difficulties in assessing input to output, because stochastic environmental factors such as weather conditions also affect the output (Falconer and Whitby 1999). In this setting, opportunistic farmers may try to generate rents. This moral hazard is difficult to detect and induces monitoring costs (Ozanne, Hogan, and Colman 2001).

To meet these informational requirements, TC expenditure aims to identify site characteristics and possible transaction partners, e.g. the incidence of the habitats and their owners, to preserve management practices (Wätzold and Schwerdtner 2005), to negotiate AES contract terms in order to meet heterogeneous incentives and farmers' opportunity costs, and to monitor compliance with the agreements, including pursuing deviations (Fraser 1995).

Empirical evidence reveals that high informational needs in the case of heterogeneity (of sites as well as of farmers) indeed result in higher TCs, if this heterogeneity is met by precisely designed schemes (Falconer, Dupraz, and Whitby 2001; Vatn, 2002; Rørstad, Vatn, and Kvakkestad 2007; Ollikainen, Lankoski, and Nuutinen 2008). In contrast, economies of scale due to a high number of participants and the scope of area enrolled can be achieved, reducing relative TCs especially in the case of high fixed costs (Falconer, Dupraz, and Whitby 2001; Nilsson 2009). Moreover, learning effects due to experience are generally found to reduce TCs over the scheme's life cycle (Falconer and Whitby 1999; Falconer, Dupraz, and Whitby 2001; Rørstad, Vatn, and Kvakkestad 2007; Nilsson 2009). A certain degree of constancy in scheme provision is thus recommended (Falconer and Whitby, 1999).

Apart from a distinction along the transaction stages, TCs can be divided into set-up and on-going costs, and into fixed (i.e. independent of scope, payments or participation rate) and variable (v.v.) costs (Falconer and Whitby 1999; Ollikainen, Lankoski, and Nuutinen 2008).

In addition to these empirical findings, several factors are concluded from a theoretical viewpoint. The likeliness of moral hazard behaviour of farmers is discussed from an economic (Becker 1968) as well as from a social science perspective (Winter and May 2001). Farmers may either find no economic advantage in non-compliance or refrain from it due to social pressure. Moreover, farmers with positive attitudes towards the scheme are assumed to comply due to an intrinsic motivation

(Falconer and Whitby 1999). This is related to low enforcement costs (Mettepenningen, Beckmann, and Eggers 2011). Trust in farmers falls into the same category (Smits, Driessen, and Glasbergen 2008; Mettepenningen, Beckmann, and Eggers 2011). Low enforcement costs are also assumed in cases where farmers have a good understanding of the scheme; therefore, more information provision could lead to fewer failures (McCann and Easter 1999; Falconer and Whitby 1999; Falconer and Saunders 2002).

The influence of the institutional environment (IE), i.e. the broader set of rules and regulations in which the transaction takes place (Coggan, Whitten, and Bennett 2010), to date has mainly been assessed from a theoretical viewpoint<sup>45</sup>. The IE contains the “formal rules of the game” (Williamson 2000, 597), which comprise “rules, laws and, constitutions... and their enforcement characteristics” (Hagedorn 2008, 360). They aim to structure incentives in human interaction and thus “affect the performance of the economy by their effect on the costs of exchange and production” (North 1990, 5). In brief, the particular IE sets the frame in which a particular transaction may take place and influences transaction costs and transaction outcome by its impact on the terms of exchange. Thus, the IE may lower but also raise transaction costs (North 1990), which means that it is an important influencing factor.

Regulations are an important part of the IE. They define a policy and its formal implementation (Bourblanc et al. 2012). However, the delegation of implementation from the legislator (principal) to an executive administration (agent) may induce agency losses due to the administration’s information advantage concerning its actual work and the absence of comprehensive monitoring possibilities (McCubbins 1999). This is labelled ‘bureaucratic drift’ and may reduce the socially desired outcome as formulated in the policy (Moe 1997).

In economic relationships, the principal counteracts agency losses by offering incentives to comply, e.g. a share of residual gains (Moe 1984). However, such reward mechanisms are limited in political principal-agent relationships (Moe 1984). Consequently, political principals favour the use of hierarchical control mechanisms (Moe 1984, 2005).

One possibility is to limit administrative discretion (i.e. “the power or the right of deciding according to one’s own judgment” (Langbein 2009, 84) by specifying structural and procedural requirements already in the underlying legal framework (McCubbins, Noll, and Weingast 1989). This is labelled the structure-and-procedure approach (Carrigan and Coglianesi 2011). Prerequisites may include “structural choices, including defining the agency’s mission, establishing its internal organizational structure, and choosing its location within the larger executive branch” (Spence 1999, 415). This allows the creation of a framework where a frequent intervention of the principal may not be necessary if the deterring effect of the sanctions is high enough (Huber and Shipan 2000).

These requirements cause TCs; set-up costs arise for the legislative in policy formulation and enactment as well as for the implementing administration, which has to set up the required structures

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<sup>45</sup> Mettepenningen, Beckmann, and Eggers (2011) included the IE as those administrative levels involved in AES design in their study.

and secure the required procedures. In cases when these requirements are policy-specific, the upcoming TCs bear the characteristics of specific investments (Williamson 1979; Fernandez 2007), and may create path dependence to offset high set-up costs (North 1990).

Moreover, required structures and procedures may reduce but not replace the expense of ex post costs, as monitoring, e.g. by regular visits, hearings, reports, checks on performance indicators etc. still remains necessary (McCubbins, Noll, and Weingast 1989; Heinrich and Marschke 2010). These costs also represent TCs, namely enforcement costs, which also arise for both the legislator and the implementing administration. However, by imposing procedures upon the administrations, legislators shift a substantial part of TCs to the implementing administration. Recommended structures and procedures also determine the level of discretion left for administrative agents to act. From an economic viewpoint, there is a trade-off between costs and gains of delegation (Epstein and O'Halloran 1999). While the legislator's information on administrative performance might increase due to tight structural and procedural prescriptions, distributive losses may occur on the regional level due to uniform standards (Huber and Shipan 2000).

If the policy area is complex, gains from leaving discretion could be achieved due to a greater knowledge of the administration (Langbein 2009), while too little discretion may have a hampering effect (Epstein and O'Halloran 1999; Stephenson 2011; Gailmard 2012). In connection with deterrence, an administration might also be kept from testing alternative methods or procedures for creating administrative innovations (Whitford 2002). With little discretion, the possibilities of an administration to respond to changing circumstances and new information are reduced (Huber and Shipan 2000). Moreover, administrative employees might also be driven by intrinsic motivation such as attitudes or ideology (Heinrich and Marschke 2010); its negligence may lead to unnecessarily tight regulations, implying inefficiently high TCs.

Positive evidence on the scope of how much is left to discretion reveals that legislators leave more discretion if they assume the administration's preferences are close to their own ('ally principle', Epstein and O'Halloran 1999). Heterogeneous administrative preferences – resulting in little discretion – are also assumed if a central legislative decision is implemented by different administrations in particular regions (Moe 1997). In addition, the type of policy pursued plays a role; in the EU context, Franchino (2001, 2004) showed that distributive policies – where large sums of money are redistributed between the member states – are implemented with less discretion. He argued that a high level of specific rules, procedures and criteria provide proof for the donor states that recipient states do not deviate from the policy aims agreed upon. This constitutes a form of credible commitment (Huber and Shipan 2000) between donor and recipient states. In this case, the IE is an institutional response to the policy area pursued (Huber and Shipan 2000).

Thus, in addition to set-up and running costs, centralised regulations leaving little discretion may induce adaptation costs as well as distributive losses in the region according to a deviance from its own preferences (Huber and Shipan 2000; Hagedorn 2008). In contrast, economies of scale and the

implementation of uniform standards in terms of credible commitment can be achieved by central approaches (Huber and Shipan, 2000).

These aspects reveal that the IE may also have distributional effects on the incidence of TC, especially in cases where gains from and expenses of TCs are allocated at different administrative levels. Within an IE, economies of scope are assumed to reduce TCs when one transaction can be linked to another, e.g. when the same regulations require the same tasks (Hagedorn 2008; Mettepenningen, Beckmann, and Eggers 2011). Conversely, efforts at co-ordination may raise TCs. In addition, incorporating a policy programme into an already existing one may lower the costs of one programme relative to another, especially if property rights concerned remain unchanged (McCann and Easter 1999; McCann et al.2005). This may also lower costs for information and adoption (Coggan, Whitten, and Bennett 2010). In contrast, frequent changes in the prevailing rules raise TCs (Mettepenningen, Beckmann, and Eggers 2011). Thus, the formulation of particular institutional rules influences the level and distribution of TCs and the governance outcomes (Paavola and Adger 2005).

To answer the question about which regional TCs result from required structures and procedures, the main regulations of the EAFRD have to be investigated.

## **2.2. Requirements of the EAFRD**

Co-financing AES is regulated in the European Agricultural Fund for Rural Development (EAFRD) (European Council 2005b), which constitutes the so-called ‘second pillar’ of the CAP. While the ‘first pillar’, the European Agricultural Guarantee Fund (EAGF), regulates the financing of market and income support measures for farmers, the EAFRD stipulates the terms and conditions for co-financing rural development measures (European Council 2005a). AES are considered to be an important part of rural development by “supporting the sustainable development of rural areas and responding to society’s increasing demand for environmental services” (Art. 35). Technically, the EU co-finances AES by partially reimbursing payments upon declarations of expenditure submitted by the national administration in charge (European Council2005a). Regionally differentiated percentages of reimbursement, which range from 50–75%, imply distributive effects on the regional public budgets (European Council 2005a, Art. 74). A high number of structural and procedural requirements for reimbursement can be found:

First, member states have to implement the EAFRD via Regional Development Programmes (RDPs) that comprise the regional development strategy for the whole funding period of six years (European Council 2005a). RDPs encompass all aims, strategies, measures, finances, the nomination of administrative units and their responsibilities (Art.16). Measures not specified in the RDP cannot be reimbursed.

Measures also have to be in line with content-related requirements; area-related AES, i.e. those that require management agreements on particular sites<sup>46</sup>, have to meet criteria for design such as minimum commitment standards, a duration of at least five years, and criteria for payment calculation (European Council 2005a, Art. 39). RDPs and any future amendments have to be approved by the EU Commission (Art. 18, 19). Annual evaluations and progress reports have to be submitted (Art. 83). In addition, detailed ex ante, ex post and mid-term evaluations are obligatory (Art. 85f.). Since the RDP is set up for an entire six-year funding period with the mentioned limits on amendments, AES and their implementation are more or less fixed.

Second, the EU requires EAFRD implementation via a specified administrative structure of three regional units with different responsibilities and mutual control functions (Art. 74):

A Managing Authority (MA) in charge of running the whole RDP “in an efficient, effective, and correct way” (Art. 75), referring to the technical aspects of the RDP.

A Paying Agency (PA), responsible for EU-compliant RDP processing, which involves checking and documenting the required procedures before payments are authorised (European Council 2005b, Art. 6; European Commission 2006a).

A Certification Body (CB) that checks and certifies the PA by annually inspecting its work in a formal procedure (European Council 2005b, Art. 7).

Third, the EAFRD requires processing the AES via an Integrated Administration and Control System (IACS) as its primary database (European Commission 2006b, 2009). IACS data enables the identification of farmers, the identification of payment claims and the complete traceability of payment entitlements. It also provides the required monitoring data. It contains detailed GIS-based area-related information on agriculturally used plots and is the base for the selection of the control samples in various measures (Nitsch et al. 2012).

Implementing provisions of the Commission further specify the practical implementation of AES (European Commission 2006b). Farmers have to submit applications of participation and payment claims due on the same deadlines as their Single Payment Application (Pillar I) (Art. 8-9) at the latest on 15 May each year (European Commission 2009, Art. 15). A system that provides objective eligibility of sites has to be used. Applications have to contain precise, site-specific spatial plot information. Payment applications have to be checked via administrative (off-site) and on-the-spot checks (Art. 10) before payment processing. Standards for both types of checks are specified in European Commission (2006b, Art.11–16), with a focus on the sites’ eligibility criteria and the correctness of the spatial data rendered by the farmer.

On-the-spot checks include the survey of plots and have to be conducted on a minimum sample of 5% of participants. Deviations from the area-related data presented have to be fined according to the percentages given in Art. 16. While member states have some discretion in how to deal with non-

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<sup>46</sup> Besides area-related measures, entire farm schemes such as organic farm aids can be reimbursed. However, the latter are not included in the analysis since their processing differs strongly and the Hessian budgetary focus is on area-related measures (cf. HMULV 2006).

compliance of management commitments (Art. 18), the treatment of area-related infringements (i.e. an over-declaration of plot size) is prescribed by the EU (Art. 16, 22 ff.).

The treatment of payments eligible for reimbursement is regulated in Reg. (EC) 1290/2005 and applies for both pillars of the CAP. It contains details on the procedural requirements of fund management, including financial management details, deadlines, penalties, the treatment of paybacks and reporting commitments (European Council 2005b). It also lays down the principles for payment calculation, processing, and payment caps (Art. 39). Those expenditures eligible for reimbursement are depicted in Art. 70f., as well as the prerequisites for accounting and reimbursement (European Commission 2006a).

Finally, the Commission is obliged to monitor the financial processing via regular checks of management and control systems, reports or by on-the-spot checks conducted by Commission officers (Art. 36, 37). In the case of deviations, reductions or the suspension of reimbursement can be applied, and further sanctions are possible.

This depiction shows that the terms for reimbursement highly regulate the structure and procedures of AES implementation. Consequently, administrative discretion at the member states' level is limited. The rather strict requirements with their focus on a correct calculation base seem to form a credible commitment according to the distributive component of the policy, giving proof to donor member states that their money is spent in accordance with the policy aim, and misuse of funds is prevented (Beblavý 2009). Moreover, the instrument 'reimbursement' itself shifts the risk of obtaining co-funding to the regional level and creates an important incentive to comply (Beblavý 2009). It is important to note that member states have to bear all costs induced by the implementation and management of the structures and procedures (Osterburg and Stratmann 2002). This already indicates distributive effects.

### **2.3. TC typologies and their incidence**

The set-up and running of the required structure and procedures requires the expense of TCs by the member states. Specifying measures and their later evaluation aim to control the environmental policy aims; monitoring and control requirements aim to accomplish payments correctly as a basis for latter reimbursement. Therefore, taking the particular source of informational needs into account, upcoming TCs can be distinguished in scheme-related TCs, which aim to pursue the environmental goals and are related to the scheme's objectives and attributes themselves (Mettepenningen, Beckmann, and Eggers 2011), and reimbursement-related TCs, which have to be expended in order to meet the criteria for obtaining reimbursement.

Since the reimbursement is hectare-based, the EU focuses on the correctness of spatial information and the stream of payments rather than on environmental results. The spatial information forms an important indicator of (regional) scheme performance, as it determines the sum of the reimbursement. Table 1 depicts the resulting TC categories arising in Hessian AES implementation

from both relationships and conceptualises them either as scheme or reimbursement related.

It becomes obvious that TCs resulting from the administration-farmer relationship are part of overall AES implementation costs. Thus, the transactional relationship between administration and farmer is nested (Williamson 2000) within the wider IE of the EAFRD. Table 1 also shows that a substantial number of tasks are at least partially reimbursement-related.

From the EU point of view, this regulatory framework offers economies of scope, as the use of the IACS has proved useful in its application to direct payments (Nitsch et al. 2012) and now also serves as a database for the EAFRD. In addition, standardised monitoring requirements across the whole EU may create economies of scale at the EU level. However, distributive losses due to under-use of regional knowledge, a missing ability to react to changing circumstances and an out-crowding of intrinsic motivation may occur at the regional level. TC-reducing effects, such as regional economies of scale or scope, learning effects and taking farmers' attitudes or trust into account might also be affected. Further, co-ordination efforts between the various actors and due to the various regulations are likely to be necessary.

Prior to presenting results in Section 4, materials and methods are briefly described in Section 3.

EU - Hesse	Hesse - Farmers	Scheme (S)/ Reimbursement (R)
<b>Information stage</b>		
<ul style="list-style-type: none"> <li>Gathering information on EU regulations</li> </ul>		S
<b>Negotiation stage</b>		
<ul style="list-style-type: none"> <li>AES design within RDP design</li> </ul>		S/R
<ul style="list-style-type: none"> <li>Submission of RDP to EU</li> </ul>		S
<ul style="list-style-type: none"> <li>Amendments upon EU request</li> </ul>		S
<b>Implementation stage</b>		
<ul style="list-style-type: none"> <li>Set-up and running of MA, PA, CB</li> </ul>		R
<ul style="list-style-type: none"> <li>AES processing</li> </ul>	<p><b>Information stage</b></p> <ul style="list-style-type: none"> <li>Acquisition of participants</li> </ul> <p><b>Negotiation stage</b></p> <ul style="list-style-type: none"> <li>contract specification and contracting</li> </ul> <p><b>Implementation stage</b></p> <ul style="list-style-type: none"> <li>Administrative checks</li> <li>On-the-spot checks</li> <li>Contract adjustments</li> <li>Processing of payments</li> <li>Imposing sanctions</li> </ul>	<p>S</p> <p>S</p> <p>R</p> <p>S/R</p> <p>S</p> <p>S</p> <p>R</p>
<ul style="list-style-type: none"> <li>AES amendments <ul style="list-style-type: none"> <li>Review of suggested amendments by all involved departments</li> <li>Major cases: Re-submission of RDP to EU</li> <li>Minor cases :Statement of EU compliance by PA</li> </ul> </li> </ul>		<p>S/R</p> <p>S/R</p> <p>S/R</p>
<ul style="list-style-type: none"> <li>Stating compliance to be eligible for reimbursement <ul style="list-style-type: none"> <li>Delivery of monitoring data</li> <li>Attending Commission's control visits</li> <li>Correction of failures etc.</li> <li>Annual check by the CB</li> </ul> </li> </ul>		<p>R</p> <p>R</p> <p>R</p> <p>R</p>
<ul style="list-style-type: none"> <li>Reimbursement upon declaration of expenditures</li> </ul>		S
<ul style="list-style-type: none"> <li>Evaluation</li> </ul>		S

Table 1. Allocation of tasks in transaction stages and categories according to the PA relationships.

### 3. Materials and methods

This study provides an explorative insight into practical AES implementation at the operative level. Its aim is to reveal how operative tasks are influenced by the IE and which corollary effects occur in terms of transaction costs. Thus, the approach is positive and not designed for comparison with other institutional settings. I chose a qualitative interview approach suited to explore unknown relationships and causalities (Witt 2001).

As in previous studies (e.g. McCann and Easter 1999; Mettepenningen, Beckmann, and Eggers 2011), I took staff working time as proxy for TCs, albeit in a qualitative sense. For data gathering, I conducted semi-structured expert interviews. Experts are persons who have privileged access to the information necessary to answer the research questions (Meuser and Nagel 1991). As with structured interviews, semi-structured interviews follow an interview guideline but leave some discretion for the interviewer to follow leads that arise during the interview (Bernard 2000). This approach allows a fuller understanding of the issues than asking for pre-defined standardised answers (McCann and Easter 1999) and is common in policy implementation analysis (e.g. McCann and Easter 1999; Conteh, 2011; Liefferink, Wiering, and Uitenboogaart 2011; Bourblanc et al. 2012).

The interview guideline covered the particulars of work content, modes of labour division, communication modes between the different administrative units, difficulties occurring in the scheme implementation process and their influencing factors. Starting points were the implementation steps described in previous studies (e.g. Falconer and Whitby 1999; Ollikainen, Lankoski, and Nuutinen 2008).

I conducted seven interviews between January and March 2011 with Hessian desk officers from the involved administrative units, focusing on SSGES implementation. In 2011, the AES had already been implemented for four years, which means that the phase of learning and adaptation due to establishing the new AES regulations was over.

Since Hesse had already implemented EAFRD-AES in previous funding periods, the recommended administrations also existed (HMULV 2006). Consequently, the interviews refer to a mature phase of implementation (Falconer, Dupraz, and Whitby 2001; McCann et al. 2005) with established agents. I began by asking the interviewee to describe her/his function. The interviews were narrative and did not necessarily follow the order of the guideline. They lasted from 1–3 hours and took place in the respective administrations. All interviews were taped and transcribed verbatim in German. In order to present quotations in the result section, I translated the sentences correspondingly.

Expert interview analysis aims to reveal supra-individual commonalities and to identify action-guiding dicta (Meuser and Nagel 1991). Consequently, the main analytical approach is interpretative and deducts particular aspects from the data by using theory-based categories (Meuser and Nagel 1991). For analysis I used the computer-based qualitative analysis software MAXQDA (Kuckartz 2010). The initial categorising followed the guideline sections but then developed further in an

inductive and recursive process during several stages, when possible corollary effects were identified and investigated further (Strauss and Corbin 1990; Meuser and Nagel 1991). The main reason is that answers given exceed the initial questions and in turn provoke further questions, which are then readdressed to the data (Witt 2001). This subsequent category refinement allows systematic

data exploitation and the discovery of underlying relationships (Bernard 2000).

The final code system refers to the stages of AES processing, the actors involved, its influencing factors and resulting effects. Multiple-coded sequences depict inter-code relationships (Meuser and Nagel 1991). References to the interviews are given in parentheses (Interview no.: paragraph no(s)). However, the caveat remains that the results are based upon the perceptions of respondents and need not necessarily reflect actual situations (Egeberg and Trondal 2009).

#### **4. Results and discussion**

This section first depicts the organisational structure set up in Hesse as stated in the Hessian RDP and related documents. It also depicts resulting TCs. Next, influences on the AES implementation process as derived from the interviews are illustrated.

##### **4.1. The Hessian administrative structure and interaction**

Hesse established the MA in the Ministry of Environment, Energy, Agriculture, and Consumer Protection (HMUELV), where one department is responsible for AES design, the formulation of technical implementation regulations, and submission of the annual progress reports and evaluations (HMULV 2006). The CB is also located in the HMUELV (HMULV 2008).

The function of the PA was outsourced from the HMUELV in 2008 to several departments of the Wirtschafts- und Strukturbank Hessen (WIBank), a state-owned yet privately acting entity (HMUELV 2010). The main reason for outsourcing was a policy of privatisation pursued by the former premier (I1:40). The PA delegated the acquisition of scheme participants, eligibility checks, contracting and off-site checks to the 16 agricultural administrations of the 22 Hessian counties, the *Ämter für den ländlichen Raum* (ALRs). The ALRs process the actual contracts and interact with the farmers (HMULV 2006).

##### **4.2. TCs resulting from the administrative structure**

This administrative structure causes co-ordination efforts between HMUELV and WIBank and creates different lines of hierarchies for the ALRs. The HMUELV provides budget and designs measures (scheme-related aspects), while the PA implements regulations and provides technical facilities to meet reimbursement necessities (reimbursement-related aspects). In brief, the institutional setting is characterised by multi-level processes and frequent interactions between the different actors. In addition to the specific investments in the set-up and running of the organisational structure, coordination costs between the different units arise.

Moreover, task delegation heightens the costs for maintaining compliance. First, outsourcing put the PA in the focus of EU audits (I7:159). Next, delegating part of its functions to the ALRs increases

the frequency of EU audits due to the number of agents involved; in addition, the EU Commission recommended an increase in the number of internal checks by the PA (I3:257, 261).

Figure 1 shows the administrative structure and the occurrence of tasks as stated in the interviews. Bold letters indicate reimbursement-related tasks. Arrows indicate the units involved.

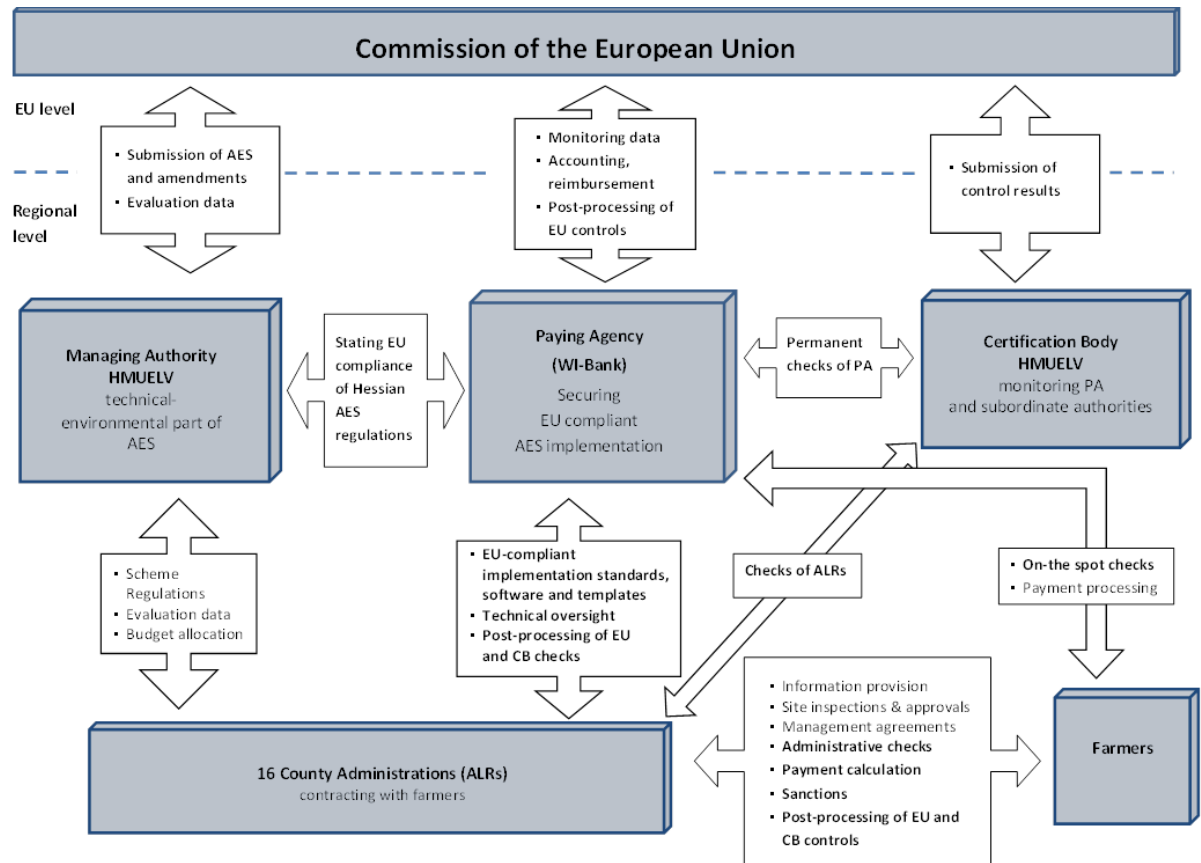


Figure 1. Administrative structure and interactions in Hesse.

In order to reduce complexity and exploit possible economies of scope to offset these highly specific investments, standardisation in processing is attempted. The HMUELV adjusted state regulations to align with EU regulations in order to harmonise the different funding possibilities (I2:48, 50). The WIBank also conducts financial processing of AES, apart from the EAFRD, in order to use synergies. Moreover, joint processing often occurs, as processing discretionary tasks cannot often be separated from processing mandatory tasks (I1:74). Thus, the EU-required structure seems to create path dependency (North 1990), at least in the use of the administrative structure.

In addition, the implementation provisions of the PA for the ALRs greatly standardise procedures to secure a homogenous implementation throughout Hesse (I3:9). The PA determines deadlines for particular processing steps (I6:234–236, 335, I7:67) and provides the IACS standard data system management, which serves as the common database for all units and all processing tasks (I3:34–39).

High set-up costs might yet become efficient if they decrease over time, e.g. by lowering running costs, due to economies of scale or learning effects etc. (Ollikainen, Lankoski, and Nuutinen 2008). However, this depends on whether the achievement of such effects is possible within the

administrative procedures. This is explored in the next section.

#### **4.3. Influences on TCs in AES design and amendments**

The current AES was designed by the HMUELV as part of the Hessian RDP. During the funding period, AES amendments might be recommended upon political decisions (I2:98), poor AES performance (I2:98), upon evaluators' reports (I2:68) or changes in EU regulations (I2:30). However, the six-year validity period of the RDP narrows the discretion to react, and amendments have to be approved. While some amendments only require the PA's statement of EU compliance (foremost to meeting IACS requirements, I3:195), others require re-submitting and re-approval by the EU. This demands coordination and causes TCs. As a consequence, the HMUELV avoids marginal amendments, and collects minor changes over several months to submit them in total (I2:60).

Hessian desk officers frequently take part in round table discussions of the *Länder* in order to discuss and formulate proposals on EU regulations. This is stated to allow collective negotiation power to be exerted (I2:142, 154). Furthermore, information can be gathered on how to maximise funding by regulation application (I1:241; I2:16, 24, 32, 160; I4:113). These meetings resemble TCs; however, their expense aims to prevent TCs at other stages.

If amendments concern operational or farmer-related tasks, the HMUELV asks the ALRs to give a statement (I2:88, 102, 182). However, the ALRs state that the PA often withdraws their suggestions later on, due to a failure to comply with EU regulations (I6:616; I7:137). Despite the fact that the HMUELV would like to activate regional or 'street-level' knowledge (Heckman, Heinrich, and Smith 1997), this only seems possible in a limited way. In general, agreement finding with the PA is said to be difficult.

The general perception is that the PA does not use its full scope of discretion but rather behaves in a risk-avoiding manner in order neither to jeopardise the reimbursement nor itself become subject to inspections (I1:121; I2:82). The following quotation stresses the PA's view:

Interviewer: But discretion, that's not a bad thing in principle, is it?

Interviewee PA: Well, for the EU, it is a bad thing, because it says: 'Discretion is also the opportunity to manipulate'. (I3:262-263)

In general, implementing AES within the EAFRD is said to be a take-it-or-leave-it decision, as reimbursement requirements are independent from its particular sum (I2:211-212):

"As soon as you get one Euro from the EU, you have to stick [completely] to the rules" (I2:214, corresponding addendum by author).

While substantial discretion on technical environmental aspects is stated, this, however, is reported not to be exploitable due to the compulsory use of the IACS and strict sanctioning rules (I1:65, 252; I2:164). This implies a trade-off between environment-related and reimbursement-related design aspects and a possible shift in regional preferences. Indeed, concessions in scheme design and an abandonment of particular environmental aims were reported (I2:206, 224), an effect that has been

observed in other Länder as well (Osterburg and Stratmann 2002; Eggers, Laschawski, and Schleyer 2004; Eggers 2005). Therefore, Hesse seems somewhat locked-in; its budgetary situation allows neither the eschewal of EU cofunding nor the set-up of additional state-financed schemes. The latter is reported to be a prominent way to obtain EU money as well as pursue one's own policy goals, practised by other Länder (I2:230).

#### **4.4. Influences on TCs in AES implementation**

The IACS and its monitoring and control requirements also influence the implementation process because they shape the implementation rules given by the PA and determine the required technology (I7:11).

##### **4.4.1. Application and contract specification**

Processing AES applications, concluding contracts, checks and payment delivery follow standardised procedures. First, the submitted application is entered into the database. Farmers have to mark sites they have applied for on aerial photos rendered by the PA. Formal checks are conducted to avoid double application and to ascertain eligibility (I7:13, 15). Scoring is used to assure objective eligibility criteria, as objectivity is also monitored by the EU (I1:226; I7:13; I6:20). ALR officers may override the system when they consider a site valuable despite a low score (e.g. due to personal knowledge), but they have to submit a statement of justification (I6:212; I7:31–33). As the officers are held responsible in case of EU checks, this option is taken ambivalently (I6:212; I7:33). Scheme-related aspects may be traded-off against EU compliance, and deterrence hampers the utilisation of regional knowledge.

The parallel submission of single payment, AES participation and payment applications are required in expectance of synergy effects on operations (HMUELV 2010). However, working peaks and an extended processing time are reported (I6:42; I6:339). The software frequently generates failure messages during the application and payment processing, since the particular applications rely on different programming basics. Therefore, the system frequently declares part of the applications to be 'not EU compliant' (I3:71, 275; I6:299ff, 363, 587), which causes internal checks and frequent repair efforts (I6:363; I7:83) and thus seems to have the opposite effect on regional TCs.

Specifying management agreements on the sites is up to the ALRs. The ALRs make proposals based on habitat characteristics, discuss and agree upon them in consensus with the farmers (I6:61-63, 84, 187; I7:15, 25, 39, 45–49). However, ALR officers state that the reported working peaks do not allow for substantial on-the-spot assessments of sites to identify the most suitable management agreements (I7:49). The lead officers, who have an ecological training background, regret this shift towards administrative tasks (I7:49).

This increase in administrative tasks has been observed ever since IACS was made compulsory for AES implementation (Osterburg and Stratmann 2002). Contract signing does not usually occur before the following year due to lags in procedures (I1:175, 183; I6:44, 90, 140, 225, 353, 580; I7:65,

99). However, since the contract period begins on 1 January, farmers have to comply with the management agreements on every applied plot prior to contract signing (I7:58–59), as they do not know which plots will finally be approved (I7:60–61). Some farmers apply for all their plots in order not to miss the deadline and specify their actual preferences afterwards (I3:13; I7:27, 39–41). This induces implementation and compliance costs on behalf of the farmers, which would resemble sunk costs in case the particular plot was not eligible. Moreover, it induces later adjustment effort in the ALRs.

Changes in tenancies or personal circumstances during participation may cause adjustments in the contract scope or management agreements (I6:52; I7:53). While adjustments in the contract scope prior to signing are possible, later amendments are problematic, for the EU requires the maintenance of a five-year commitment (I6:168, 193). Scope adjustments are therefore executed only up to the deadline of the first payment application (I6:193; I7:51). Thus, the farmer receives no payment, even though he has already managed his sites according to the agreements for several months (I6:193, 195), which means that participation costs for the farmers are sunk costs. Technically, the farmer has to resign, the ALR has to reset the whole contract with all procedural requirements and a new contract has to be concluded (I7:53) which severely affects the ALRs' workload (I6:96, 100, 102; I7:53). Adjusting management agreements is even more problematic; regardless of the reasons, the farmer has to resign, pay everything back and re-sign a new contract (I7:149). This procedure requires more effort, for both the administration and the farmer, than a mere adjustment.

#### **4.4.2. Administrative checks**

Before payments are released, the ALRs conduct administrative checks. Farmers again submit information on the plots' exact location and scope by marking them on aerial photos. The contract area is approved due to exact location, scope and possible usage restrictions by comparing it with layers deposited in the database (I3:49). Deviations of more than 2% in size induce a contract adjustment with a reduced scope (and consequently reduced payments) (I6:331; I7:93) and require the process described above. The PA implements the layers in order to provide a high degree of standardisation and make the complex monitoring requirements manageable (I3:298). However, the ALRs report that benefits from standardisation are partly offset by upcoming failures:

A persistent problem is that the system itself is error-prone, and many manual corrections have to be made (I6:292-294, 306, 340; I7:71, 75). False information in the layers by the PA induces severe repairing effort in the ALRs. A substantial number of stated deviations also results from unintended imprecision; the scale on the photos (1:5000) is approximate compared to the scale used in the system layers and in on-the spot checks (I1:103; I3:73; I6:20, 305). From a compliance point of view, these deviations are area-related infringements that reduce payments and induce possible sanctions (I6:303-305). The use of GIS-based data became compulsory during the last funding period and is said to have increased the procedures' complexity and error-proneness (I3:73) because its application does not

match farmers' possibilities.

Changes in the environment may actually have happened, reducing plot size. However, the system cannot distinguish between permanent (e.g. construction of a shelter) and temporary reductions (e.g. piles of firewood), which requires additional manual control or on-site checks (I7:83). Permanent changes in the environment cause paybacks, sometimes even for previous years, even when they are not caused by the farmer, and agricultural use (e.g. pasturing instead of mowing) might still be possible (I6:427ff.). Moreover, the aerial photos themselves are error-prone (e.g. shadows of cows mistaken for non-agricultural features)(I1:83, 87;I7:75, 85) and may lead to erroneous adjustments to the disadvantage of the farmer. This causes TCs in terms of 'repairing effort' in the administration as well as for the farmers, who are forced to formally complain.

These aspects influence the amount of monitoring costs. As checks refer to the single plots, the realisation of economies of scale in monitoring costs seems to be difficult. Moreover, the EU requires a control scope of 100% in each participation year. TC-reducing effects such as trust or learning cannot be utilised.

#### ***4.4.3. On-the-spot checks***

Parallel to the administrative checks, the PA conducts on-the-spot checks. EU inspection criteria are crucial in control procedures "if one cent of EU-money is involved" (I5:83). The regulation recommends a selection of 75–80% of controlees for a risk analysis with annually assessed criteria (I5:45, 51, 57, 69) and upon random sampling (I5:45). The focus of on-the-spot checks clearly is on spatial correctness (I5:141) and farmers' compliance with documentation duties (I3:136; I6:253). Management agreements are scrutinised according to seasonal possibilities and may take place at several times (I5:103–105). The scope of the scrutinised area per farm depends on the percentage of deviations found in field surveying (I5:87, 171). The number of 100% checks is reported to be high (I5:93); however, as mentioned above, deviations do not necessarily occur due to intended cheating.

Since the compulsory control scope of 5% of participants cannot be inspected by visits, part of the checks is conducted via remote sensing by satellites (I3:145; I5:177). This also may cause erroneous results (I5:197). If area-related deviations are stated, the farmer is asked to give a statement before paybacks or sanctions are imposed (I5:187). If he does not agree with the result, an on-the-spot survey is conducted (I5:187; I6:394). In the case of erroneous initial results, additional monitoring actually represents correction costs. Deviations found raise the probability of becoming part of the control sample in the following year (I5:45ff), and a high total number of deviations increases the required total control scope in the next year (I3:147). Both aspects increase Hesse's monitoring costs, although the deviations found might stem from error-prone monitoring.

Post-processing these inspection results is the duty of the ALRs and concerns both the rightly and wrongly stated results (I5:187, 217; I6:255; I7:117). Actual area-related deviations are approved (I5:143; I7:119), data correction is made (I5:183), and the contract is adjusted (I7:83) in accordance

with the processing described above. If deviations from management agreements were stated, the farmer is contacted and given time to react (I7:117). The possibility to adjust contracts and deal with deviations smoothly will supposedly soon be abolished by the PA, as it was found to be non-compliant with EU regulations (I7:151). This will probably increase monitoring costs for administrations and farmers. Farmers would be sanctioned every year for area deviations (I7:151), and the probability of being chosen for on-the spot checks would rise (I3:147). ALRs fear that this will severely affect farmers' willingness to participate (I7:151).

Increasing sanctions not only influence the percentage of on-the-spot checks. The EU Commission might assess the frequency of sanctions as consequence of a systematic implementation failure and will probably raise her inspection frequency as well. In turn, this would affect the administrations' compliance costs. Abolishing the present regulation could thus induce a chain reaction of additional monitoring, resulting in an increase of TCs.

#### ***4.4.4. Processing of payments***

The calculation of payments is based on the particular regulation valid at the time of application; since these are frequently revised, the calculation bases vary and complicate the calculation (I7:99). While these amendments are intended to improve scheme implementation conditions for the farmers, the ALRs face a higher complexity with every new regulation because previous regulations remain binding for those contracts concluded during their validity (I2:174; I6:162,168–174,180–181; I7:129). One officer stated: “To date, I have three different EU regulations on how to deal with paybacks and sanctions in AES (I7:129) ..., and every one induces different calculation modes” (I7:131). Thus, in the case of a contract extension, a farmer may work under different regulations. This leads to different treatments of the same facts (I6:179–181, 184) and causes additional effort in the ALRs and incongruences for the farmers. Moreover, economies of scale and learning effects to reduce implementation costs cannot be achieved with frequent changes in regulations (Falconer, Dupraz, and Whitby 2001).

The PA processes payments upon release by the ALRs. This does not usually take place before February of the following year (I4:9; I6:233). Thus, farmers face substantial income uncertainty, as they receive their first payment 1.5 years after entering the contract (I6:547, 285). Payment processing has to be completed by 15 October due to the end of the EU's fiscal year, which is reported to be a substantial tightening constraint (I4:34). The PA aimed to standardise payment processing and subtracts paybacks or sanction fees from the payment (I4:127–129). While this generates economies of scope in the PA, it induces advisory efforts in the ALRs, as the resulting payment notes are said to be too complicated for farmers to understand (I6:522–547; I7:101–105).

#### ***4.4.5. EU-compliance requirements***

In addition to checks within the IACS, the CB regularly surveys and personally checks the PA (I1:133; I3:311). Inspections range over all administrative units and take place during the whole year (I1:141; I5:268; I4:101; I7:161). They cover the general organisation of AES processing and subjects such as IT security or financial management (I4:101–103; I3:311; I6:433). Results are reported to the Commission annually (I1:141). Stated failures are mostly technical, e.g. mistakes in system operations (I1:145). Divergences arise between the CB and ALRs on how to judge particular cases. The ALRs consider some practices of farmers in line with management agreements upon personal knowledge; however, these statements are questioned by the PA or CB, who favour a literal application of regulations (I3:104ff; I6:420ff). As a consequence, the ALRs refrain from using their knowledge. In addition, checks of the CB often are reported to be error-prone, as they do not take ALR particulars into account (I6:453, 462, 484; I7:179), inducing effort in the ALRs due to submitting a response (I6:453, 462). ALR officers draw attention to the fact that the focus of compliance is on procedural correctness and not on environmental results (I6:443).

While the PA regards EU checks as part of quality management to enhance conformity with EU requirements (I3:301–303), the ALR officers' perspective is rather on the inspection's efficiency:

Sometimes during the checks, it's like counting peas. ...If there is only €2.50 of overpayment, then it seems questionable whether one has to talk about it for three hours. (I6:437).

In addition to these checks, the Commission itself scrutinises scheme implementation by standardised IACS statistics on expenses, paybacks, checks, etc., which refer to each scheme participant and each cent (I3:167, 209–211; I4: 39–43, 55–73) and form the basis for the Commission's selection of areas and farms for 'on-the-spot inspections' (I3:211). These take place at least once a year (I3:217); additional visits may occur due to the CB report (I3:311). Controls are said to be very substantial. They refer to the whole process of implementation (I3:217; I4:89, 105) and to working conditions with respect to data security (I7:167).

The outcome of these checks affects Hesse in many ways. The EU may declare failures as systematic, which indicates an inappropriateness of the control mechanisms or standards used (I3:229). Stated failures are extrapolated onto all Hessian participants. This induces sanctions and paybacks of reimbursements (I3:229). However, the extrapolation may overestimate the actual deviations, which in turn leads to overestimated paybacks. This would severely affect the regional budget. This view causes a high deterrent effect and makes the PA avoid any risky decisions on how to interpret the regulations (I1:117; I3:229). Likewise, the HMUELV formulates rules in a risk-avoiding manner and conducts additional internal checks in view of EU visits (I1:89, 95).

#### **4.5. Main implications and recommendations**

The study reveals that EU regulations are an important influencing factor on TC occurrence in AES implementation. Reimbursement-related TCs, especially those concerning monitoring requirements, reduce the net benefits obtained from co-financing. Structural and procedural requirements cause a high complexity of tasks, a high degree of mutual dependencies, and frequent interaction between the different regional agents. This affects set-up and running costs as well as coordination costs. Monitoring requirements seem to dominate the process as a whole. Moreover, the required depth of control strongly influences TCs in AES processing; the subsequent correction effort is substantial.

The high data-keeping standards induced by the IACS seem to be hard to meet in reality and raise the probability of failures. Error-prone inspection results also imply substantial TCs for farmers and affect the size of the required control sample and the control frequency by the Commission. Intended economies of scope by using the IACS seem not to occur on regional but rather on EU level in terms of standardised monitoring and resulting comparability between the member states. Mettepenningen, Beckmann, and Eggers (2011, 648) even suggested that EU regulations can be understood “as a conscious strategy to save TCs at the EU level”. TC-reducing factors such as trust between the transaction partners or an intrinsic motivation to comply are not integrated in the regulations. Learning effects that may decrease TCs over time also seem to be rarely exploitable due to frequently changing regulations. Instead, adaptations in regulations – although intended to be a response to changed circumstances – may have an increasing effect on TCs.

Attempts to exploit economies of scope or scale in order to reduce TCs in one administration often have negative spillover effects onto TCs of subsequent units. This also applies to failures or time lags occurring in a particular unit. The interplay between the actors and resulting implementation rules is further influenced by the diverging preferences of MA and PA. As obtaining full reimbursement is the declared goal, the PA seems to be the dominant agent, and its risk-averse decision making affects the whole implementation process. Changes in the farmers’ environment cannot be easily absorbed due to strict application of regulations, and require substantial adaptation effort at the ALR level. The deterrence of losing the reimbursement effects not only causes existing discretionary scope to be not utilised, but also offsets regional knowledge. Administrative agents are afraid of audits that may arise due to decisions on regional necessities. This implies distributional losses on a regional level and distortions in preferences (Heinrich and Marschke 2010). Scheme-related aspects seem to be traded-off against EU compliance.

A shortage of staff is stated to be a problem throughout all administrative units and leads to the prioritisation of mandatory tasks and to the negligence of discretionary (although important) ones (I1:220; I1:185, 204f.; I3:333). However, the compulsory tasks are mostly reimbursement-related. Thus, scheme-related tasks crucial for scheme effectiveness (Mettepenningen, Beckmann, and Eggers 2011) might even be crowded out. Providing additional personnel could solve the problem, but this

would also increase TCs. Obviously, AES implementation within the EAFRD requires a certain level of staffing.

EU regulations also seem to affect farmers' future scheme acceptance. The EAFRD already requires TC expense by participating farmers due to compulsory documentary effort (Falconer and Whitby 1999; Mettepenningen, Verspecht, and Van Huylenbroeck 2009). However, as shown, farmers additionally face substantial TCs due to wrong control statements. Moreover, they bear a relatively high risk with respect to income security. Substantial TCs on behalf of farmers are an important hampering factor for scheme participation, which endangers intended environmental results (Falconer 2000; Mettepenningen and van Huylenbroeck 2009).

Features of Hesse, for example a low budget and scarcity of personnel, may also be found in other regions. Consequently, the main implications of this study may also apply, which draws the focus onto the general features of the IE.

The postulate not to waste public money, which justifies the compliance effort put upon agents, disregards that these compliance costs are also borne by the public. Consequently, compliance should be subject to cost-benefit reasoning, i.e. weighing the marginal costs of compliance against their marginal gains (Stigler 1970). This implies several recommendations.

First, to date, the EU offers only a partial reimbursement of payments (50–75%) but requires 100% regulation implementation at the expense of the member states. While a 75% share might justify a high degree of interference, this is questionable at a 50% level. Besides, uniform requirements do not take into account the regional willingness to comply. Instead, they omit the occurrence of intrinsic motivation. As argued above, administrations may vary in their commitment. Both aspects imply that monitoring regulations should differentiate between regions. However, what seems reasonable from an economic point of view may not be enforceable in the political sphere.

Second, providing the co-funding by an ex post reimbursement shifts the risk to the member states. In this context, the choice of using spatial data as the basis for reimbursement is disputable. Unlinked to ecological data, spatial data as main performance indicator may evoke a distorted agent response, i.e. administrations tend to focus on meeting the performance standard instead of the actual goal (Heinrich and Marschke 2010). This is intensified as the required mechanisms were found error-prone, and substantial effort has to be spent in order to secure the reimbursement. In addition to affecting regional scheme implementation and acceptance, regional ecological goals might even be crowded out. Thus, hectare-based ex post reimbursement ought to be revised in favour of an ex ante budget share.

Finally, the EAFRD creates an institutional environment in which – contrary to the principle of fiscal equivalence (Olson 1969) – payers and beneficiaries of compliance differ. The compliance requirements are justified by the necessity to protect the financial interests of the EU (European Commission 2006a, Art. 9), which makes limiting discretion and monitoring regional agents' behaviour reasonable from their point of view (Franchino 2001; Beblavý 2009). Potential gains from

economies of scale and scope due to a centralised approach and the connection of the EAFRD to other funds of the CAP also seem to be achieved at the EU level. However, these distributive effects are rather problematic from a regional perspective. Under the current regulatory framework, the costs of the ex ante control mechanisms, as well as a substantial part of ex post control costs, are borne by the member states, while the benefits of control occur primarily at the EU level. In this setting, the EU does not need to take costs resulting from the regulations into account. An (at least) partial reimbursement of regional administrative costs would facilitate the situation of poorer member states/regions and provide for a more balanced occurrence of costs and benefits.

## 5. Conclusion

This study showed that the EAFRD as institutional environment has a substantial influence on which TCs arise in Hessian AES implementation. ‘EU-based’ TCs have to be expended due to the required implementation of additional administrative units, to additional interactions and due to co-ordination. Moreover, a substantial number of TC-constituting tasks in AES processing are reimbursement-related. TC-reducing factors such as economies of scale or scope seem to be scarcely achievable at the regional level; trust or intrinsic motivation to comply cannot be taken into account.

Decreasing effects on public TCs seem to be achieved rather at the EU level. Therefore, the EAFRD also implies important distributive effects. Further, a dependency on obtaining the reimbursement shapes the actual implementation focus and seems to shift the workload from technical to compliance issues. Even a trade-off between scheme-related and reimbursement-related tasks may exist. Moreover, reimbursement-related regulations have spillover effects onto those TCs borne by farmers and thereby possibly hamper future scheme acceptance. Therefore, EU-based public TCs partly erode the gains obtained from the reimbursement and should be taken into account in policy evaluation.

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## 7 **Implementing EU co-financed agri-environmental schemes: Effects on administrative transaction costs in a regional grassland extensification scheme**<sup>47</sup>

*Anja Weber*

### **Abstract**

Implementing agri-environmental schemes that are co-financed by the Common Agricultural Policy of the European Union requires administrative compliance with several regulations. This affects the magnitude and composition of transaction costs incurred by agricultural administrations in terms of working time spent. Distinguishing between scheme-related tasks to reach the environmental goals of the scheme and tasks necessary to obtain the EU reimbursement, this study investigates a possible trade-off in working time allocation with the help of a multi-task principal-agent conceptual framework. Agricultural county administrations of the German state of Hesse serve as case study. Results show that the highly specified reimbursement-related tasks require most of the administrations' working time. However, several factors exist that induce an enhanced provision of scheme-related tasks, foremost a higher share of professional farmers in the county and a certain level of staffing. Nonetheless, the study also reveals that part of the EU-related monitoring effort is fixed and thus increases per contract costs in counties with fewer participants. The findings imply that a reconsideration of the compliance regulations is needed, especially in light of more standardised compliance duties as expected for the upcoming funding period 2014-2020.

### **Keywords**

Transaction Costs; Agri-Environmental Scheme; Multi-task Principal Agent Theory; Common Agricultural Policy; Germany.

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## 7.1 Introduction

### 7.1.1 Problem statement and outline

Agri-environmental schemes (AES) have become a prominent instrument to enhance the delivery of environmental benefits from agriculture. Farmers receive payments when carrying out agri-environmental commitments, such as reducing the use of pesticides or of stocking rates. AES are a contractual mechanism for the transaction of such environmental goods or services between the farmer (seller) and an agricultural authority as a representative consumer (Hagedorn et al., 2002). This transaction induces transaction costs (TCs) for both the administration and farmers (Falconer and Whitby, 1999). On behalf of the administration, such *public TCs* (Falconer and Whitby, 1999) are “costs of setting up and running the organisational and contractual structure” of a scheme (Beckmann, Eggers, and Mettepenningen 2009, p. 694).

Technically, TCs depict “resource losses due to imperfect information” (Dahlman, 1979, p. 148). Imperfect information and resulting uncertainty give way to contractual hazards such as opportunistic behaviour or measurement problems, which affect the transactional relationship (Williamson 1998). TCs result from those actions the parties involved undertake to manage these deficiencies (Coggan et al., 2010). TCs comprise search and information costs to identify trading opportunities and suitable partners, negotiation costs to specify the agreements of exchange, and monitoring and enforcement costs to safeguard the outcome of the transaction (Dahlman, 1979). With respect to the provision of environmental goods, informational deficiencies mainly exist due to large heterogeneities in agricultural as well as farm business features which affect their quality and price of the desired environmental good (Falconer and Whitby, 1999; Wätzold and Schwerdtner, 2005). Moreover, gaps in observability and measurability of the farmers’ actions offer leeway for moral hazard by farmers (Coggan et al, 2010; McCann 2013). Thus; AES-related TCs comprise issues such as identifying and selecting appropriate sites and farmers, negotiating the contract agreements, and monitoring farmers’ compliance with these agreements (Moxey et al. 1999; Wätzold and Schwerdtner, 2005).

With a focus on the transactional relationship between farmers and the implementing administration, several studies investigated public TCs coming up during AES design and implementation in terms of administrations’ working time spent (e.g. Falconer and Whitby, 1999; Falconer and Saunders, 2002; Rørstad et al., 2007; Ollikainen et al., 2008; Mettepenningen et al., 2011; Jongeneel et al., 2012). Features related to the scheme itself, the actors involved, the natural environment in which the scheme is supposed to act, and the institutional environment – i.e. the broader set of rules and regulations in which the schemes are designed and implemented - were identified as influencing factors (summarised in Mettepenningen et al., 2011). Moreover, the studies highlight that effort - constituting TCs - induced by issues related to the environmental aim of the scheme, such as properly identifying site characteristics, the incidence of important habitats and their holders and to specify adequate management practices increases with the specificity of a scheme

(Falconer et al., 2001; Vatn, 2002; Rørstad et al., 2007; Ollikainen et al., 2008). This might even result in a trade-off between scheme precision and transaction costs (Vatn, 2002). Furthermore, a relationship between information provision for farmers, farmers' understanding of the scheme's aims and principles, and their subsequent compliance has frequently been discussed (Falconer and Whitby, 1999; Mettepenningen and van Huylenbroeck, 2009; Pannell et al., 2013). Thus, a sufficient proportion of administrative working time has to be spent on informational issues addressing the environmental aspects of the scheme (labelled *scheme-related issues*, see Weber 2014a) to ensure farmers' understanding of the scheme and by that a high quality of scheme implementation.

Within the European Union (EU), member states have the possibility to provide AES within the European Agricultural Fund for Rural Development (EAFRD), which is part of the EU's Common Agricultural Policy (CAP). The EAFRD offers a partial reimbursement of national AES payments conditional upon compliance with its regulations (European Council, 2005). By this, the EU is able to pursue its own environmental policy goals and at the same time eases the member states' budgetary constraints. In Germany, where design and implementation of AES is a duty of the *Länder* (States), those with a poor budget situation especially make extended use of this option (Osterburg and Stratmann, 2002; Eggers et al., 2004). However, the EAFRD reimbursement regulations contain substantial structural and procedural requirements that specify the regional administrations' monitoring and reporting duties. They also specify the conditions under which payments to farmers can be granted and how they have to be calculated and processed (see Weber [2014a] for a broad discussion). These requirements have to be integrated in the scheme regulations. As a consequence, the EU regulations substantially affect the TCs of designing co-financed AES (Mettepenningen et al., 2011; Weber 2014a) as well as TCs related to the implementation procedures (Weber, 2014a). Such 'reimbursement-related' TCs affect regional TC composition (Weber, 2014a). Moreover, a dependency on the reimbursement seems to shift the focus of (limited) administrative working time towards such tasks in order not to jeopardize the reimbursement (Weber, 2014a).

Given a fixed working time available, administrations may face a trade-off with respect to which tasks to perform. Focusing on reimbursement-related tasks as a consequence of both budgetary needs and the risk of losing part of the reimbursement may result in neglecting scheme-related tasks. This could endanger the environmental aim of the scheme. A crowding out of scheme-related tasks by reimbursement-related tasks may even occur.

To investigate the existence of a crowding-out, I examine influences on working time allocations in county administrations in the State of Hesse, Germany, implementing a grassland extensification scheme with the help of a multi-task principal-agent conceptual framework. In particular, 1) I investigate the quantitative impact of EU-reimbursement –related tasks on actual time use allocation in the agricultural county administrations and 2) identify factors influencing the share of time expended on the particular cost categories. Costs assessment is based on a conceptual framework that distinguishes between scheme-related and reimbursement-related costs. Influences are tested with

Generalised Equations Estimations. Thus, this study is a quantitative complement to Weber (2014a).

The paper is organised as follows: in the following subsection, scheme implementation structures, details, and upcoming transaction costs are briefly described. Data stems from a direct interview approach and is depicted together with the methods applied in Section 2. Section 3 presents the conceptual framework as well as the hypotheses. Results are presented and discussed in Section 4. Some implications of the findings are presented in Section 5. A brief conclusion (Section 6) completes the paper.

### **7.1.2 Scheme implementation structure and details**

Hesse is one of the larger states of Germany, located in its centre. In 2010, agriculturally utilised area covered about 36% of the total area, one third being permanent grassland (Hessisches Statistisches Landesamt, 2012). The area was managed by 17,805 agricultural holdings, one third of them run full-time (Hessisches Statistisches Landesamt, 2012). Structural change leads to a continual decrease in the number of farms, especially in the sub-mountainous areas of Hesse, which are characterised by marginal productivity but at the same time account for a substantial share of environmentally valuable grassland sites protected by the EU Habitats' Directive (HMULV, 2006). Moreover, a high number of such valuable grassland sites are managed by part-time farmers (HMULV, 2006).

Both closing down cattle farms in such areas and land use intensification in more productive areas reduce the scope of grassland in Hesse. To counter this trend and prevent environmental damages such as water pollution, erosion, and habitat losses are major policy goals (HMULV, 2006). Consequently, the grassland scheme was established in 2007 to prevent grassland from being abandoned; furthermore, it serves as an instrument to secure grassland sites protected by the Habitats' Directive (HMULV, 2006). It is co-financed by the EAFRD with a share of 50% (HMULV, 2006). The scheme is a synthesis of two predecessors; a site-specific scheme to maintain landscape based on individual agreements (state financed) and a standardised grassland extensification scheme encompassing the total grassland of a farm (EU co-financed, HMULV 2006). However, its implementation regulations and related duties differ substantially from the antecedent ones, and so the scheme is treated as newly set up.

Actual scheme implementation takes place at the county level. The 16 agricultural administrations of the 22 counties of Hesse, the *Ämter für den ländlichen Raum* (ALRs) recruit participants, conclude and process the actual contracts, and interact with the farmers (HMULV, 2006)<sup>48</sup>. This makes them the main (public) acting agent in scheme implementation.

The ALRs derive specifications of tasks and duties on the one hand from the Hessian State Ministry of Environment, Energy, Agriculture, and Consumer Protection (HMUELV) and on the other hand from the WIBank, which acts as Paying Agency and thus enforces the application of EU

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<sup>48</sup> The ALRs are also involved – but to a minor degree- in scheme design issues (see Weber 2014a). However, these issues are not considered in this article.

regulations (HMUELV, 2010). The ministry provides technical, scheme-related implementation regulations. The WIBank provides regulations concerning the prerequisites of reimbursement, i.e. those that specify monitoring and reporting duties of both farmers and the administrations themselves. Both types of regulations govern the related administrative processes by specifying the ALRs' tasks and duties (HMUELV, 2010; Weber 2014a). Therefore, both types of regulations constitute transaction costs (North, 1990; Weber, 2014a). Besides the issues they address, the major difference between both types of regulations is that reimbursement-related issues are specified in far more detail with respect to structural and procedural requirements than scheme-related issues (Weber, 2014a).

Priority for participation in the grassland scheme is given to farmers managing habitats specified by the EU Habitats' Directive; sites protected by other nature protection laws may also be eligible. When farmers apply for participation, the eligibility of the proposed sites is checked, and contract details are specified. These refer to management agreements as well as to payment composition. Contracts contain fixed and negotiable management agreements. Fixed agreements refer to the prohibition of grassland conversion, the prohibition of chemical or synthetic pesticides, and the prohibition of surface irrigation or amelioration. Negotiable agreements comprise the choice of either a grazing or a mowing agreement on each site (HMULV, 2009).

Payments consist of a basic premium for each type of agreement, which is fixed state-wide, and payments for exceptional effort ("ecologically valuable special services," EVSS), which is negotiable and contains several payment elements. Grazing agreements are paid a higher premium (200 €/ha) than mowing agreements (110 €/ha). EVSS payments are calculated as a presumed extra effort due to specificities of the contracted area, such as slope, wetness, or difficult accessibility and can be specified in three levels of intensity. These are linked to three levels of additional payment (HMULV, 2009). According to EU requirements, farmers have to apply annually for the payment within the application form for the single farm payments (HMULV, 2009). Payments are calculated and processed after the EU required administrative checks. These checks do not apply to management-related compliance but rather refer to the correctness of area declaration submitted by the farmers. This spatial information not only serves as a proxy for the environmental outcome of the scheme but also constitutes the calculation base for the payment to farmers; these payments, in turn, form the basis for the latter EU reimbursement (Weber, 2014a). The scope of administrative checks is 100% of plots (and thereby also 100% checks of participating farmers).

In addition to these administrative checks, a minimum of 5% of participants are checked on-the-spot with respect to area declaration (that is, the contract plots are surveyed geophysically to assess their exact acreage) as well as to management related compliance by a separate audit team sent out from the Paying Agency. In case the team traces area-related or management-related deviations, the ALRs have to post-process the results, that is, correct the spatial plot information in the system (again), correct the contracts, induce paybacks, or impose sanctions. However, inspection results are reported to contain a number of erroneous statements, which constitute additional costs due to the

correction efforts of both farmers (Weber, 2014b) and administration (Weber, 2014a).

Additionally, the ALRs' are themselves subject to various checks of their performance by their supervising administrative units as well as by the EU Commission itself. Such checks comprise inspection visits, file checks, and reporting duties (Weber, 2014a)

## 7.2 Material and methods

For analysis, I use working time allocation information obtained from the ALRs in Hesse. Time use information has formed the database for several TC studies in an AES context (e.g. McCann and Easter, 1999; Mettepenningen et al., 2011).

The respective administrative staff of all 16 ALRs was asked to state the percentage of working time allocated to the particular implementation steps defined by specified tasks (see Table 1) in a standardised, closed, self-reported questionnaire *ex post* for 12 months (McCann et al., 2005). Tasks were identified from previous interviews (Weber, 2014a).

Monthly data were required for two reasons: first, to capture potential variances of task occurrence throughout the year, e.g. according to deadlines; second, such an approach is assumed to facilitate the estimation of workload *ex post* (McCann et al., 2005) and to alleviate potential measurement errors of stylized *ex post* time reports (Juster and Stafford, 1991; Juster et al., 2003; Mettepenningen et al., 2009). Percentages instead of the absolute time value were requested, as the level of staffing and consequently the available working hours vary substantially between the ALRs (see Table A1 in Appendix). Moreover, the statement of percentages instead of working hours avoids tendencies to over-report (Singell et al., 1996; Juster et al., 2003), as the plausibility of answers - answers had to add up to 100% of AES-related working hours - could be easily checked by the interviewees. Additionally, the share of working time spent on non-AES-related tasks was requested<sup>49</sup>.

A ranking of tasks within the categories based on the frequency of their occurrence was also requested. However, this was stated to be too complicated by most of the officers and was incompletely filled in, so this part could not be taken into account in the later analysis.

The reference year for the statements was 2011; sampling took place between December 2011 and May 2012. Because the reference year 2011 is in the middle of the current EU funding period (2007-2013), one could assume that the phase of learning and adaptation that might influence TCs (Falconer et al., 2001) is over. Nonetheless, scheme implementation was not in a phase of mere maintenance (Falconer et al., 2001), as new participants were still gathered. However, according to the one-year approach, neither dynamic effects nor TCs for particular contracts (along their life cycle: Falconer et al., 2001) could be captured in this manner.

Based on this data, TCs were quantified as average weekly working time spent on AES processing. For that purpose, the reported percentages were multiplied first with the respondents' average weekly working hours spent on scheme implementation. Next, these particular results were summarised for the whole ALR. The aggregation was necessary due to the functional organisation of

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<sup>49</sup>However, in the latter analysis, this item showed no significant effect (see section 4).

task sharing in most ALRs. According to this constraint, only those ALRs were added to the sample when the whole administrative staff in charge of grassland scheme processing answered a questionnaire.

However, since participation in the study was voluntary, some ALRs refrained from participation, for they feared the results could be used to compare their work conduct with other ALRs or even be subject to performance assessments. Due to these concerns, it was also agreed that no personal factors (attitudes, statements, etc.) would be asked for. Finally, monthly data from eight (out of 16) counties were included in the sample so that the total sample size  $n$  is 96.

In a first analytical step, analyses of variances (ANOVAs) including *post hoc* tests (Scheffé) revealed that no significant differences existed between the particular months but rather between the particular ALRs. This was a first hint for existing differences between the ALRs despite the common setting.

For regression, I used a Generalized Estimations Equation Model (GEE), since the structural characteristics of the counties remain fixed over 12 months and thus the monthly observations are not independent (Garson, 2012). GEE models allow the regression of such correlated data (Hanley et al., 2003). The item “county” served as subject variable and the particular months (1-12) as within-subject variables. The chosen working correlations matrix is “independent”, as it offered the best goodness-of-fit. The monthly particular share of a TC category (time spent on TC category/total time spent on implementation) serves as the dependent variable. Coordination effort (see table 1) could not be allocated to particular cost categories, as it occurs in any process stage. Therefore, it was treated as overhead effort, and because it would not influence the relative shares of the remaining cost categories, it was left out from the regressions.

Structural characteristics of the particular counties were either derived from or calculated based on official statistics (Hessisches Statistisches Landesamt, 2012), or on data provided upon the author’s request by other administrative units (*Hessen-Forst, Forsteinrichtung und Naturschutz FENA*, DE-Giessen). Scheme performance indicators, such as the area entered into the scheme and the number of EVSS agreed upon were obtained from the State Ministry of Agriculture. In case an ALR administers more than one county, indicator variables were either summarised or calculated as a weighted average. All variables were transformed into their natural logarithm in order to meet the conditions of normal distribution and make the effect sizes comparable.

### 7.3 Conceptual framework

The conceptual framework of this paper is developed in three steps. First, upcoming transaction costs are conceptualised and sorted into different categories. Second, insights of the multi-task principal-agent model are presented and applied to the Hessian context. Third, testable hypotheses are developed.

#### 7.3.1 Upcoming transaction costs

The conceptual framework is based on differences in the regulatory depth and the related incentives to perform the required administrative tasks. At the root of these differences are distinct transactions or contractual relationships that induce the upcoming administrative TCs.

One transaction is established by the AES contract between the State of Hesse and Hessian farmers, which regulates the provision of environmental benefits by the participating farmer. This transaction governs the environmental concern of Hesse, here e.g. fulfilling the goals of the Habitats' Directive, by voluntary AES participation. Accordingly, related tasks - or *scheme-related costs*<sup>50</sup> - aim to fulfil the environmental goals by achieving a sufficient scheme participation rate and thus encompass tasks directly related to policy (content)delivery (cf. Weber, 2014b). In particular, these costs aim to find potential participants by providing information, and specifying management agreements and premium components, thereby ensuring both the provision of environmental goods and the participation of farmers.

The second relationship is established by the EAFRD, which constitutes a transaction between the EU and the member state's administrative level in charge. This transaction governs the financial support of regional AES by the EU.

The contractual relationship between EU and regional authorities is that of principal and agent: the EU (principal) delegates the provision of AES to its member states (agents) in exchange for an (albeit partial) reimbursement of payments (Weber, 2014a). To avoid bureaucratic drift (i.e. to align the member states' actions with the preferences of the EU) the reimbursement regulations contain a number of structural and procedural requirements that specify the regional administrations' as well as the farmers' monitoring and reporting duties. These have to be embedded in scheme design and thus directly affect both administrations and farmers' TCs (see Weber 2014a for a broad discussion). Given that monitoring requirements are specified by the EAFRD, the transaction between the administration and farmers is embedded in the transaction between the EU and the State of Hesse. Thus, this transaction creates a general institutional environment (North, 1990; Williamson, 2000; McCann, 2013) for the transaction between the regional administration and the farmer (Weber, 2014a). From the perspective of the EU, a high level of specific rules, procedures, and criteria gives proof for the donor states that recipient states do not deviate from the policy aims agreed upon (Franchino, 2001). This

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<sup>50</sup>The labeling of the cost categories follows Weber (2014a).

constitutes a form of credible commitment (Huber and Shipan 2000) between donor and recipient states.

Consequently, related administrative tasks constitute *reimbursement-related costs* and aim to prove that Hesse fulfils the requirements for obtaining the reimbursement; specifically that it sets up and run the required administrative structure and procedures (Weber, 2014a). Since the reimbursement is related to the area enrolled in the scheme, the EU focuses on the correctness of area declarations as a prerequisite. Consequently, spatial information forms one important part of (regional) performance measurements; moreover, it determines the sum of the reimbursement. For the ALRs, these requirements comprise administrative checks to trace area-related infringements, to post-process the results of the audit team conducting the onsite checks, and to impose and process sanctions in case of deviations. Sorting both types of monitoring costs into this category is due to its procedures being highly specified in the reimbursement regulations; moreover, the focus of monitoring is not on environmental outcomes but on correct spatial area declaration as basis for the reimbursement<sup>51</sup>. However, this does not imply that monitoring farmers would not take place if the scheme would not be co-financed by the EAFRD. However, monitoring farmers in the only AES that Hesse offers without EU co-financing explicitly focuses on management compliance, not on area declaration (HMULV, 2010). Moreover, monitoring procedures in this state financed scheme are described in much less detail and offer substantially more discretion to the ALRs (HMULV, 2010).

Table 1 depicts the TC-constituting tasks as conducted in the ALRs. The sorting of TCs into the two types distinguishes the tasks mainly according to the particular transaction from which they originate and which are at the root of the task-specifying regulations (Weber, 2014a). Specifying measures and their later evaluation aim to achieve the environmental policy aims, whereas monitoring requirements mainly aim to accomplish payments correctly and give proof to the EU. The category “coordination” comprises tasks for solving general problems, e.g. from communication failures. They occur in every implementation step and were thus denoted as overhead costs.

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<sup>51</sup>Post-processing the results of onsite checks might also refer to management-related infringements. Thus, their assessment as reimbursement related costs might be less clear despite their regulatory depth and their origin from EU regulations. However, as the results are obtained separately for the different cost types within the overall categories, possible distortions due to this prior sorting are avoided.

**Table 3**

Transaction cost categories and their constituting tasks

Scheme-related	Information and acquisition costs	<ul style="list-style-type: none"> <li>Organising information meetings etc. for farmers</li> <li>Personal acquisition and extension of farmers</li> <li>Pre-selection of sites (including on-the spot visits)</li> </ul>
	Negotiation costs	<ul style="list-style-type: none"> <li>Registration of applications and first eligibility check</li> <li>Ecological evaluation of applied sites</li> <li>Contract specification with farmers</li> <li>Setting up and sending out contracts</li> <li>Adjustments due to farmers' request before signing</li> <li>Acquisition report to HMUELV</li> </ul>
Reimbursement-related	Implementation costs	<ul style="list-style-type: none"> <li>Administrative checks and payment processing</li> <li>Check of payment application</li> <li>Administrative checks</li> <li>Release of payments and processing of payment notifications</li> <li>Adjustments upon farmer's request</li> <li>Impose penalties</li> <li>Post-processing of on-site and remote control results in database</li> <li>Communication with farmers upon results</li> </ul>
		<ul style="list-style-type: none"> <li>Post-processing on-site checks</li> <li>Post-processing of on-site and remote control results in database</li> <li>Impose penalties</li> <li>Communication with farmers upon results</li> </ul>
	Stating compliance with EU regulations	<ul style="list-style-type: none"> <li>Prepare and submit monitoring data for Paying Agency and HMUELV</li> <li>Effort due to internal audits</li> <li>Effort due to legal and technical oversight by Paying Agency</li> <li>Effort due to checks by EU units</li> </ul>
	Coordination	<ul style="list-style-type: none"> <li>Attending working groups and internal meetings, skill enhancement</li> <li>Communication with Paying Agency (Effort to solve reimbursement-related problems/questions)</li> <li>Communication with HMUELV (Effort to solve technical problems/questions)</li> </ul>

Own compilation upon Weber (2014a).

As described above, the two task blocks differ with respect to the underlying regulatory depth. Scheme-related procedures are specified in much less detail than reimbursement-related EU regulations and leave discretion to the ALRs as to and how much of them to provide. For instance, ALRs decide themselves how many public informational meetings they offer or if they specify management agreements based on an on-site inspection or just from a desk. Moreover, ALRs are not subject to immediate sanctions in case the outcome (in terms of area under contract) does not meet the intended level.

Reimbursement-related tasks, however, are specified in high detail and leave little discretion to

the ALRs (Weber, 2014a). Frequent monitoring and control – also checking of administrative compliance - takes place by the EU, and deviations induce immediate consequences, e.g. in the form of payback requests of the reimbursement, increases in monitoring frequency, and probably tightened working and monitoring standards for officers (Weber, 2014a).

To sum up, the main distinctive feature between scheme- and reimbursement-related tasks is the detail to which the related processes are specified and prescribed and/or their execution is measured. Moreover, the particular consequences in case of non-observance differ. Given that ALRs have a fixed amount of working time for scheme implementation, staffing shortages and resulting time restrictions might induce trade-offs between performing scheme-related and reimbursement-related tasks. Such a setting can be conceptualised as a multitask principal-agent setting (Holmstrom and Milgrom, 1991). The following section presents an application of this analytical concept in order to investigate the ALRs' time allocation decisions.

### **7.3.2 The multi-task principal-agent approach**

In the implementation setting just described, ALRs face two different blocks of tasks. Their effort, i.e. their working time, has to be allocated between them. As time can only be spent on one task or the other, they are assumed to be competing. Moreover, each task block is endowed with particular incentives. Such a setting can be investigated with the help of the multi-task principal-agent model. Principal-agent theory serves as a theoretical framework to analyse problems and solutions occurring in delegations characterised by information asymmetry and uncertainty in private as well as in public relationships (e.g. Whynes, 1993; Tirole, 1994; Heinrich and Marschke, 2010). The central concern of principal-agent theory in such a moral hazard context is to develop an appropriate contract structure that ensures that the agent's actions result in those outcome levels the principal requires (Walker, 2000; Dixit, 2002). Such contracts usually offer a payment schedule with a share of the residual gain to incentivise the agent and additional monitoring and or performance measurement (Bolton and Dewatripont, 2005).

A number of works (e.g. Holmstrom and Milgrom, 1991; Whynes, 1993; Tirole, 1994; Dewatripont et al., 2000; Walker, 2000; Courty and Marschke, 2003; Dixit, 2002) extend the basic single-task principal-agent model to situations where the principal either requires several tasks from one agent or the required task has more than one dimension; additionally, these different tasks exhibit different degrees of observability and measurability (Holmstrom and Milgrom, 1991; Whynes, 1993; Tirole, 1994). In multi-task situations, the agent has to allocate his effort among competing tasks. The agent's effort allocation decision now depends on his particular costs of effort on both tasks, the variances of the particular risk of both tasks, and the particular incentives – the share of the residual - offered by the principal. Moral hazard behaviour comes up due to differences in the observability of both tasks, which may lead to an under-provision of the unobserved or unmeasured task.

Holmstrom and Milgrom (1991) assess that

“Incentives for a task can be provided in two ways: either the task itself can be rewarded or the marginal opportunity cost for a task can be lowered by removing or reducing the incentives on competing tasks. Constraints are substitutes for performance incentives and are extensively used when it is hard to assess the performance of an agent.”(p.27).

They also show that increasing the marginal incentives to increase the output of task 1 draws effort away from task 2. Therefore, incentives help direct the agents’ allocation of attention among multiple tasks (Holmstrom and Milgrom, 1991).The decision for any time allocation between substitutive tasks is thus also a consequence of which task is more valued by the principal (Tirole, 1994).

In public agencies, incentive payments are less prevalent for enforcing the agents’ effort, often due to difficulties in specifying all outcome dimensions<sup>52</sup> (Tirole, 1994). Instead, rules and procedures, compliance monitoring and performance measurement aim to guide the agents’ effort (Moe, 1984, 1997; Whynes, 1993; Tirole, 1994). Furthermore, lacking possibilities of outcome specification lead to linking monitoring and performance measurement to input or output instead of outcome (e.g. Wilson, 1989; Tirole, 1994; Dixit, 2002). Applications of the principal-agent model are widely found on design and implementation of performance management in public administration studies (see Heinrich and Marschke [2010] for a review).

Tirole (1994) points out that “a government official will pursue mission 1 if the government or private labor markets, or else voters, pay attention mainly to his performance on task 1. Accordingly, he will neglect task 2” (p.10). Based on these insights, the ALRs’ time use allocation can be perceived as being subject to the particular disutilities of the task blocks, which, in turn, are a consequence of the particular incentives provided by the principal.

To sum up, the main implication of multitask models is that incentives - respectively monitoring or performance measurements - must be balanced across the tasks in order not to induce a crowding out (Holmstrom and Milgrom, 1991; Dewatripont et al., 2000).

Transferring these insights to this study, the situation can be perceived as follows: the ALRs are mandated to implement an AES that encompasses several tasks, allocated in two blocks. The desired outcome in terms of environmental benefit is observed by the number of enrolled hectares as proxy; actual effects on environmental quality are not measured thoroughly. The required task blocks vary due to their particular depth of procedural specification as well as in their consequences of non-fulfilment. Remuneration (partial reimbursement) is granted upon the measured outcome dimension. Although work performance affects the overall ALR budget and not the personal income of the particular ALR officers, a multi-task principal-agent framework can be applied (see e.g. Heckman et

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<sup>52</sup>According to Wilson, (1989, p. 158), output consists of the work agents undertake (actions), whereas outcomes can be thought of as the results of agency work, or in Wilson’s words “how, if at all, the world changes because of the output.”

al. 1997 for officers in job training agencies). Accomplishing this outcome correctly is subject to procedural requirements; the related actions of the ALRs are monitored. In setting up performance standards and/or monitoring measures, the EU reduces the total amount of resources controlled by the agent; it thus reduces bureaucratic discretion. Achieving the required outcome dimensions induces effort (costs) for the ALRs in terms of the share of working time spent on the particular task. Nonetheless, performing scheme-related tasks cannot decrease to zero, because then the scheme would not be implemented at all, but the relative effort spent on scheme-related tasks may decrease. As discussed above, this may affect the quality of scheme implementation.

Theory predicts that partial monitoring is unlikely to yield an outcome superior to that resulting from an absence of monitoring, because monitoring/measuring only a part of an agent's performance leads to strategic adjustments in agents' task fulfilment, with a shift towards the monitored tasks (Whynes, 1993; Dixit, 2002). Agents "simply respond to controls in monitorable areas by reductions in output in non-monitorable ones" (Whynes, 1993, p. 441). Such adjustments may even create information asymmetry rents for the agent, because the reduction of producing the unmonitored output dimension may not be noticed (Walker, 2000).

However, recent research highlights that intrinsic motivation, attitudes, ethical purposes and/or aspects related to professionalism may also induce agents to provide unmeasured/unmonitored tasks, thereby reducing the necessity of monitoring (Heckman et al., 1997; Dixit, 2002). Weber (2014a) emphasises that most ALR officers have a training background in ecology and also care about quality aspects of the environmental outcome aspired by the scheme. She also finds that officers regret neglecting environmental issues in the implementation process.

Given that the regulations are identical for all ALRs, variances in time allocation are argued to rely on differences in incentives<sup>53</sup> to perform scheme-related tasks. The next section presents hypotheses as well as testable variables.

### **7.3.3 Hypotheses and variables**

Incentives to perform scheme-related tasks are argued to stem from three main sources: (1) agriculture-related, structural county characteristics, mirroring the importance of the scheme in a particular county, (2) scheme performance, and (3) ALR features. Acronyms for the variables are presented in parentheses. Due to the limits mentioned in section 2, intrinsic factors, such as personal attitudes or motivation could not be integrated into the hypotheses. However, a general positive attitude towards environmental goals can be assumed due to the training background of most officers.

(1) Agricultural structure and land use varies strongly between the counties. Grassland is predominant in the low mountain ranges of Eastern and Central Hesse, where farms are characterised by lower productivity. Arable land predominates in the south. The distribution of ecologically valuable grassland also varies (HMULV, 2006). Given such structural differences, the scheme can be

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<sup>53</sup>Note that in the remainder of the article, the term incentive is applied to any tool suited to guide the agent's behaviour.

considered to be of varying importance for both farmers and ALRs in the particular counties; ALRs face different levels of necessity to pursue environmental goals, and farmers may value income derivable from scheme participation differently according to varying opportunity costs.

(1a) The magnitude of grassland sites protected by the Habitats Directive (FFH) should positively influence the time share spent on scheme-related tasks.

As argued above, on the side of the administration, scheme-related tasks aim to ensure a sufficient participation rate to meet the goals of the Habitat's Directive. To pursue this goal, ALRs have to communicate their knowledge of the scheme's features, the eligibility of sites, etc., as well as the particular participation regulations to the farmers by providing informational material and meetings or via personal communication (Weber, 2014a). Moreover, they have to negotiate on the particular feasible management agreements, EVSS, and per-hectare premiums. Pursuing this goal and performing the related workload can be assumed to be of more importance the higher the scope of protected grassland in the particular county is.

(1b) The magnitude of utilised agricultural area (UAA) should positively influence the time share spent on scheme-related tasks.

The importance of agriculture in a county can be assumed to influence the performance of scheme-related tasks. Weber (2014a, 2014b) shows that farmers are also a source of administrative work, as they may request the ALRs' working time. Such requests are likely to increase with the number of farms or the magnitude of UAA<sup>54</sup> in a county.

(1c) The share of fulltime-run farms (FULLTIME) should positively influence the time share spent on scheme-related tasks.

Wilson and Hart (2000), Siebert et al. (2006), and Ruto and Garrod (2009) find farmers' participation decisions to be positively influenced by farm size, educational level, and a positive attitude towards conservation. Defrancesco et al. (2008) observe that farmers' participation decisions are also influenced positively by a high dependency on farm income. Weber (2014b) finds for farmers participating in the grassland scheme that whether or not farms are run full-time (indicating high dependency on farm income) also determines whether they expend more time obtaining information on scheme conditions. Therefore, variables that influence the participation decision of farmers may also be related to TC expense<sup>55</sup>.

(2) Next, scheme performance may affect the ALRs' working time allocation.

(2a) The scope of area (HASCHEME) should have an impact on the share of working time allocated to scheme-related tasks, although its direction is unclear.

Falconer and Whitby (1999), Falconer et al. (2001), and Nilsson (2009) find scale effects for implementation and monitoring costs when the number of participants or the scope of hectares under contract increases. If monitoring tasks increase sub-proportionately, a higher share of working time was available for scheme-related tasks.

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<sup>54</sup>Both variables were almost perfectly correlated positively, so one of them was omitted.

<sup>55</sup>Data on educational level as well as differentiated information on farm sizes were not available.

However, because scheme-monitoring regulations prescribe 100% administrative checks of plots, scale effects seem not to be achievable in this setting (Weber, 2014a). Moreover, a high number of hectares already enrolled in the scheme may lead to saturation; the necessity to invest in acquisition or negation for the ALRs decreases.

(2b) The number of ha with EVSS (HAEVSS) should positively affect the working time share spent on scheme-related costs.

Besides the scope of participation, contract specificity also affects TCs. Generally, a high degree of scheme specificity was found to increase absolute TCs (Rørstad et al., 2007; Ollikainen et al., 2008). Custom-tailored contracts increase information and negotiation costs but need not necessarily increase monitoring costs (Falconer and Saunders, 2002), as the latter depend on the modes of monitoring.

In the grassland scheme, different degrees of specificity exist due to the amount of EVSS/ha agreed upon for particular sites. EVSS agreements do not affect the spatial characteristics of a plot; consequently, they should not affect the time spent on administrative checks.

(3) As a last source, ALR-related features may affect the time share spent on scheme-related tasks.

The total time available for scheme-implementation (TTLTIME) should have a positive impact on the working time share spent on scheme-related tasks.

The endowment of the ALR with personnel<sup>56</sup> may affect time allocation decisions. If reimbursement-related tasks were prioritised (resulting in a rather fixed amount of necessary time, binding human resources), less time could be spent on scheme-related tasks whenever fewer personnel were available.

## **7.4 Results and discussion**

### **7.4.1 Descriptive results**

The descriptive results (Table 2) show that administrative checks and negotiation costs require the highest share of weekly working hours (left results' column), mirrored also in the average percentage (29% respectively 24%, right column). Acquisition costs (9%), costs for post-processing on-site checks (11%) and coordination costs (10%) require lower shares of working time; effort on stating the ALRs own compliance with EU regulations requires about 16% of working time on average. Sorting these costs into the two task blocks, the findings show that reimbursement-related costs form the major share of total TCs; scheme-related costs require a minor part of working time. These results confirm the qualitative results of Weber (2014a).

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<sup>56</sup> Note that TTLTIME indicates the time actually spent on scheme implementation and is therefore a proxy for the level of staffing. Moreover, as ALR officers sometimes also conduct tasks apart from scheme implementation, in the first regressions, a variable indicating capacity shifts was tested. However, as it showed no significant results, it was omitted from the final regressions.

**Table 2**  
Descriptive results

		Weekly hrs.		% of working time	
		Mean	$\sigma$	Mean	$\sigma$
Scheme-related	Acquisition costs	6.60	5.093	9.14	4.383
	Negotiation costs	18.13	15.776	23.85	13.086
Reimbursement-related	Administrative checks/payment	22.48	18.5742	29.17	0.1734
	Post-processing on-site checks	6.39	6.023	11.04	0.1201
	Administrative compliance costs	11.13	8.935	15.81	12.512
Overhead	Coordination costs	6.53	4.777	9.98	6.659
Ratio	Scheme/reimbursement costs			0.77	0.776

Own calculation.

However, the descriptive results reveal that both weekly working hours spent on particular tasks as well as their relative share varies at large. The following section depicts the results of the regressions and explores the underlying reasons for these variances in detail.

#### 7.4.2 Regression results

**Table 3**  
Regression results for factors affecting particular costs <sup>a)</sup>

	Acquisition	Negotiation	Administrative checks	Post-processing on-site checks	Reporting effort	Ratio of scheme/reimbursement related costs
Intercept	4.349* (4.819) <sup>b)</sup>	-13.493*** (32.009)	-9.315*** (27.413)	0.056 (0.001)	19.319*** (184.881)	-9.726*** (10.208)
FFH	-1.118*** (10.708)	0.764(*) (3.255)	-0.434 (1.656)	0.134 (0.097)	0.197 (0.617)	0.499 (0.874)
UAA	-1.488*** (23.082)	1.718*** (14.764)	-0.032 (0.009)	0.066 (0.023)	-0.663** (6.423)	1.224* (4.823)
FULLTIME	-1.945*** (23.082)	0.780(*) (2.541)	2.307*** (35.671)	-2.192*** (20.891)	-2.594*** (74.348)	-0.803 (1.688)
HASHEME	-0.328 1.266)	-1.103** (9.771)	1.347*** (24.251)	0.154 (0.207)	-2.310*** (118.502)	-1.503*** (11.175)
HAEVSS	0.803*** (16.761)	0.551** (9.771)	-0.354(*) (3.648)	-0.391(*) (3.009)	0.140 (0.935)	1.022*** (11.460)
TTLTIME	0.473** (9.484)	0.245 (1.730)	0.454** (8.756)	-1.029*** (29.151)	0.384 (1.007)	0.294 (1.505)
<i>QICC</i>	31.927	39.752	27.681	33.419	22.996	56.280

Significance levels: (\*) = 0.1; \* = 0.05; \*\* = 0.01; \*\*\* = 0.001.

<sup>a)</sup> Note that both dependent and independent variables were investigated as their natural logarithms.

<sup>b)</sup> Numbers in parentheses indicate the particular Wald-Chi<sup>2</sup> value.

The regression results depicted in table 3 reveal that all variables show significant effects in particular cost categories; however, their particular impacts vary. Moreover, the effect of the intercept coefficient is large and significant in most regressions. This indicates a substantial impact for additional, non-observed variables.

#### **7.4.2.1 Influences on the overall ratio**

To begin with, a look at the overall ratio of scheme-related to reimbursement-related cost categories (last column in table 3) reveals that the scope of UAA has the highest positive effect on the ratio, closely followed by the number of EVSS/ha. Thus, the importance of agriculture in a county seems to foster the provision of scheme-related tasks. The positive influence of EVSS/ha corroborates previous findings of a positive relationship between scheme specificity and the requirement for information and negotiation effort at the implementation level (Falconer and Saunders, 2002; Mettepenningen et al., 2011).

FFH and the level of staffing also have a positive effect, yet below significance.

The total contract area has a significant negative impact on the ratio. This means that if ALRs have to process a large number of hectares under contract, administrative working time seems rather to be fixed on reimbursement-related tasks. Scale effects, as found by Falconer and Whitby (1999), Falconer et al. (2001), and Nilsson (2009) cannot be concluded. However, as discussed above, their occurrence is unlikely due to the 100% scope of monitoring.

The impact of FULLTIME is also negative but below significance.

So far, the significant results are in line with the hypotheses, and a concrete crowding out of scheme-related by reimbursement-related tasks is not evident. Interestingly, both county characteristics and scheme performance indicators show a large effect on scheme-related tasks. This indicates that external as well as internal factors affect task performance and may compensate the low regulatory control.

The following section investigates whether these results on the aggregate costs also hold for the particular cost categories.

#### **7.4.2.2 Influences on particular scheme-related costs**

In line with the findings for the overall ratio, a high number of EVSS/ha and the level of staffing (here significant) positively influence the share of the time budget spent on *acquisition*, although with a relatively low effect size.

Nonetheless, negative effects prevail; remarkably, the share of full-time farms has the largest significant negative impact on acquisition costs, followed by UAA and protected grassland. At first sight, the latter findings contradict the results for the overall ratio.

However, contrary to their negative effect on acquisition, county characteristics have a significant positive effect on the share of the time budget spent on *negotiation*. UAA has the largest impact, followed by FULLTIME and FFH.

The number of EVSS/ha also positively affect the time share spent on negotiation. Staffing also shows a positive effect, yet below significance. Interestingly, the effect size of the EVSS/ha is larger than the effect size of the staffing level, which is comparatively low for both cost categories.

These results imply an opposing effect of county characteristics on scheme-related cost categories; the results indicate a time shift from acquisition tasks towards negotiation tasks. However, this does not necessarily imply that ALRs neglect information provision; the ALRs may benefit from fixed cost effects due to the modes of information provision (Falconer et al., 2001). The effort to prepare an information meeting, for example, is rather independent from the number of attendants. Moreover, a lower share of time spent on information provision does not necessarily imply reduced information quality. Instead, this shift towards negotiation efforts might be induced by the farmers themselves. Professional farmers seem to prefer an individual, bilateral setting for discussing scheme particulars they consider important instead of a non-personal situation in a general information meeting (Weber, 2014b).

Reversing this argument also supports this explanation: ALRs in counties characterised by a higher share of part-time farmers, less UAA and fewer hectares under contract increase the time share spent on acquisition. ALRs might take initiative in counties where agriculture is less important in terms of area as well as in terms of income, especially since the Hessian agricultural authorities have to rely on part-time farmers to maintain grassland use.

In brief, ALRs allocate the remaining time between both scheme-related cost categories in order to respond to particular county circumstances.

#### **7.4.2.3 Influences on specific reimbursement-related costs**

Results on the particular reimbursement-related cost categories also reveal a mixed picture; particular costs categories are subject to different drivers.

For the time share spent on *administrative checks and payment processing*, FULLTIME shows a significantly large positive effect, followed by the area under contract (HASCHEME). The latter indicates that effort for administrative checks can be directly related to scheme performance. Moreover, the comparatively large effect size does not support the existence of economies of scale. The effect of TLTIME is also positive, but with a substantially lower effect size. Interestingly, this positive impact indicates that additional manpower was even spent on these tasks. From an isolated point of view, this is rather puzzling. However, as argued below, there might also to be some opposing effects between reimbursement-related tasks.

In line with the hypotheses and the findings for the overall ratio, the number of EVSS/ha show a negative impact.

The findings for both HASCHEME and EVSS/ha are comprehensible in the light of the regulations for administrative checks and payment processing. The reimbursement regulations of the EAFRD require a mandatory monitoring scope of 100% of the contracted plots in order to verify the

spatial plot information (see above). Therefore, the number of hectares increases the amount of information to be checked *per se* and irrespective of deviations.

The number of EVSS/ha does not affect the spatial plot characteristics and therefore does not affect the monitoring effort. Thus, it is possible to reduce the upcoming monitoring effort at least partly by scheme design.

The impact of FFH and UAA is negative but below significance.

Regarding the share of working time spent on *post-processing on-site checks*, all significant effects are negative, with the largest impact found for FULLTIME, followed by the level of staffing and the number of EVSS/ha.

As the effort for post-processing on-site inspection results can be related directly to the scope of deviations found, the large effect of FULLTIME indicates that professionalism in farming goes along with a higher degree of compliance. This is in line with the findings of Fraser (2002) or Wilson and Hart (2000), who highlight that compliance may be a result of risk management: a high dependency on farm income induces farmers' compliance in order not to jeopardise the AES payment. Moreover, the relatively low effort to post-process the inspection results might be a consequence not only of the effort previously spent on negotiation but also of the comparatively high effort full-time farmers spend on documentary tasks (Weber, 2014b). Thus, higher TCs incurred by farmers seem to produce lower public TCs, which denotes an important spill-over effect.

For the magnitude of contract area (HASSGES), no significant impact was found. A possible explanation is that the selection of controlees is due to other criteria (Weber, 2014a). Furthermore, on-site inspections are conducted by a separate audit team, and neither inspections nor results can directly be influenced by the ALRs. This might also explain the substantial and significant negative effect found for the level of staffing.

To sum up, effort due to deviations found in on-site inspections might not be subject to a deliberate time use decision but rather a spill-over effect from the audit team's monitoring results; nonetheless, a positive internal spill-over due to a preceding investment in negotiation as well as from farmers' TCs seem likely.

For the share of working time spent on *stating administrative compliance*, all significant coefficients show a negative sign. FULLTIME has the largest effect size, followed by the magnitude of contract area and UAA. Especially the latter indicate possible fixed costs effects; reporting and compliance-related duties seem to constitute a kind of baseline effort for the ALRs. This implies that ALRs with fewer areas under contract are relatively more affected by EAFRD-based compliance issues, despite the fact that the magnitude of co-financing they will obtain later on is comparatively low.

The effect of FFH is positive but below significance; this is also true for the level of staffing.

Subsuming the main results reveals that - in absolute terms - the ALRs prioritise reimbursement-related tasks in their time use allocation decisions. However, the regression results reveal that drivers

to perform scheme-related tasks exist, although these tasks are less controlled by the underlying regulations.

Moreover, the differences between the effects within the cost categories show that neither scheme-related nor reimbursement-related costs can be lumped together. Instead, they are subject to different drivers. Scheme-related costs' categories especially seem to be traded off against each other. The next section discusses some implications of these findings.

## 7.5 Discussion and Implications

The results show that the main part of public TCs in the ALRs aim to mitigate possible moral hazard of both farmers and the implementing administrations themselves in order to prevent a misuse of EU funds. The results also reveal that such a focus tends to produce several distortive effects on time use allocation in ALRs. Additionally, the findings highlight the role of information provision and direct interaction between farmers and ALRs for implementing the scheme with a low level of deviations. In line with the multi-task principal-agent-setting, the results imply a more balanced regulatory control of the several tasks needed to ensure a more homogenous implementation of the scheme.

Within the current regulatory framework, the most important external drivers are *county characteristics*. Interestingly, the number of full-time farmers shows the largest impact with respect to effect size and significance, while the magnitude of protected grassland shows the lowest impact. Therefore, the ALRs' working time decisions seem at least partly to be requested by particular farmers rather than by the environmental concerns of the ALRs themselves. This implies that part of the ALRs working time decisions seem to be extrinsically decided.

Interestingly, a high share of individual negotiation in counties characterised by a high degree of professionalism in farming seems to be a spill-over effect from farmers' time expenses to ALRs' time expenses. In contrast, a high share of acquisition in counties with less professional farming seems to be induced by the ALRs' attempts to secure a sufficient participation rate.

County characteristics also seem to create spill-over benefits for the ALRs within scheme processing; the relatively high investment in negotiation in counties with a high degree of professional farming leads to fewer deviations found in on-site inspections. Such positive interdependencies were already highlighted by Falconer and Whitby (1999) and McCann et al. (2005) and seem to at least partly outweigh the mandatory effort related to the administrative checks in such counties. While this highlights the role of the natural/structural environment in which the scheme is implemented (Mettepenningen et al., 2011), these findings also imply that ALRs in counties with no such structural features are at a disadvantage with respect to scheme compliance by farmers. However, a substantial number of counties have to rely on part-time farmers to keep plots in agricultural use (HMULV, 2006). It therefore seems reasonable to increase the incentives for the ALRs to provide and for the farmers to make use of bilateral information and negotiation – e.g. by defining a minimum level of

extension services, supported by an increase in staff. This could reduce the later effort due to farmers' non-compliance.

*The influence of scheme performance variables* at least partly represent the result of previously conducted effort on acquisition and negotiation. It could be shown that scheme design may elude part of the mandatory monitoring effort induced by the EAFRD; implementing and processing high-quality contracts with at least partly individual features is possible without increasing monitoring effort. However, this applies only to the effort spent on monitoring farmers, and does not affect the compliance effort of the ALRs themselves.

Regarding the overall monitoring effort of ALRs (including stating their own compliance) the findings revealed distortive effects induced by the EAFRD compliance regulations: ALRs with less contract area are relatively more affected by EU checks, despite the fact that their share of the total reimbursement is lower. As a result, the total administrative costs per ha under contract are higher in such counties. However, these costs are paid from the Hessian budget, while the benefits of these checks occur at the EU level (Weber, 2014a). In light of this finding, either a modification of reporting effort in terms of relating it to the particular share of the reimbursement or an at least partial reimbursement of reporting effort by the EU should be considered.

Finally, results have shown that *staffing* matters: the more personnel are available, the less restricting is the necessity to prioritise reimbursement-related tasks. Staffing thus supports the effects of the other incentives to perform scheme-related tasks. This also implies that ALRs with little human resources might actually face a crowding out problem. Thus, EU co-financed schemes seem to require a certain degree of staffing.

The now confirmed EU regulations 1305/2013 and 1306/2013 governing the EAFRD in the funding period 2014-2020 have addressed part of these issues (European Parliament and European Council, 2013a, 2013b). Regulation 1305/2013 recognises an extended need for agricultural extension services. It requires but also co-finances the establishment of agricultural extension services to improve farmers' information on agri-environmental issues, which must be made available for all farmers (Art. 28). Although this currently addresses mainly the so-called *greening measures* to be implemented within the direct payments of pillar 1, spill-over effects onto AES offered within pillar 2 are intended, expected, and also likely to occur (ibid.). However, claiming such services increases those TCs incurred by farmers (Weber, 2014b). Especially part-time farmers, who would have to ask for such services in their leisure time, would probably require compensation for their additional effort or would otherwise refrain from participation.

This again brings up the issue of compensating farmers for their TCs incurred due to participation. Although a compensation of TCs could in principal be included in the payments to farmers, this option currently is not used in most German States (see Thomas et al., 2009). With respect to the frequency and depth in monitoring farmers, the new regulation 1306/2013 seems

to withdraw the previous postulate of extensive monitoring in favour of more regional adaptability (Art. 59). Potentially<sup>57</sup>, the administrations can exert more discretion in determining the particular scope of farmers and plots to be monitored and thus reward previous compliance. Furthermore, this would allow for realizing economies of scale and time, which were hampered in the funding period investigated. Overall, this would improve TC efficiency of both farmers and administrations by reducing allocative distortions.

However, the new regulations do not seem to alleviate the distortive effects due to the reporting effort of the implementing administrations. Regulation 1306/2013 even seems to increase the standardization and harmonization of procedures, such as how to apply rules on participation applications, deadlines, accounting, payment processing, as well as which and how monitoring and control statistics have to be submitted to the Commission (Art. 56ff.). Furthermore, the regulation explicitly postulates *deterrence* as the main strategy in order to protect the financial interests of the EU (ibid.), and the Commission threatens member states with a prompt termination or suspension of the payments (ibid). However, whether the actual effects of these standardisations rather increase the allocative and distributive effects on the implementation-related TCs on regional level or whether such effects are at least partially outweighed by the increased discretion (e.g. in how much to monitor farmers) cannot be judged upon in advance. Much depends on how these regulations are concretised by the implementation rules of the Commission yet to be decided on and whether the regional authorities will use the discretion offered (Weber, 2014a).

## 7.6 Conclusion

This study has investigated time use allocation of county administrations in the German state of Hesse for implementing an EU co-financed AES. Based on a multi-task principal-agent conceptual framework that distinguishes between scheme-related tasks to reach the environmental goals of the scheme and tasks necessary to obtain the EU reimbursement, this study investigates a possible trade-off in working time allocation. The results show that the regulatory depth of monitoring regulations induces a prioritisation of reimbursement-related tasks in absolute terms. However, county, scheme and ALR features exist that foster the provision of scheme-related tasks despite the fact that these are much less prescribed. In order to secure a more homogenous scheme implementation, balancing the incentives for conducting the particular tasks required for scheme implementation it was suggested.

Second, the study revealed that EU co-financed AES require a certain level of staffing; crowding-out effects between reimbursement-related and scheme-related tasks are most likely to occur in ALRs with fewer human resources. A third important result is that part of the EU-related monitoring effort is fixed and thus increases the per contract costs in counties with fewer participants.

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<sup>57</sup> This yet depends on what will be decided by the Commission in the related implementation regulations.

For the actual funding period, some of the new regulations concerning the implementation of the EAFRD increase the discretion of the regional administrations towards their interacting with farmers, while at the same time the reporting duties to the Commission seem to be severed.

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## Appendix

Table A1: Sample Descriptives

Variables	mean	$\sigma$	Min/max
<b>Structural county variables</b>			
Agriculturally used area (ha) (UAA)	49,912.45	13,793.14	16,842/69,136
Fulltime run farms (%) (FULLTIME)	29.45	0.05	19/42
Share of protected per total grassland (%) (FFH)	15.36	0.07	0.04/0.28
<b>Scheme performance variables</b>			
Scope of existent contracts (ha) (HASCHEME)	3,082.54	1,073.09	3,13.00/4,799.00
Scope of high-quality contracts (ha) (HAEVSS)	796.62	368.93	344.00/1,328.00
<b>ALR structural variables</b>			
Total time spent on scheme implementation (weekly hrs.) TTLTIME	71.59	35.51	17.55/161.40

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## 8 Concluding Discussion

The results of this thesis shed light on some unaddressed aspects of transaction costs coming up in AES implementation. In particular, this thesis aimed to explain intra-scheme variances in magnitude and composition of public as well as private TCs in an action-oriented<sup>58</sup> Hessian AES offered within the regulatory framework of the CAP. The articles constituting the main research outcome of this thesis addressed different aspects of private and public TCs. In particular, they investigated the following:

- Reasons for differences in private TCs (Article 1, see chapter 5).
- Influences of the CAP/EAFRD regulations on public TCs and resulting spillovers onto private TCs (Article 2, see chapter 6).
- Differences in local public TCs (Article 3, see chapter 7).

Overall, the results revealed that a) the EAFRD regulations set the framework for AES design and implementation and thus influences the magnitude of both public and private TCs, b) the EAFRD causes allocative and distributive effects on both public and private TCs in Hesse and thus affects TC composition and incidence, and finally c) the degree of this impact varies subject to foremost structural, actor-related factors, which d) provides an explanation for intra-scheme TC variances. In light of the prominent role AES play as CAP instrument to provide agri-environmental benefits, the findings help provide a more comprehensive picture of AES-related TCs, show the impact on TCs if offering an AES within the CAP framework, and thus potentially help to design regulations on both European and regional levels that alleviate the mentioned allocative and distributive effects and lead to more TC efficiency.

A number of implications have already been discussed within the articles. These dealt with issues of balancing costs and gains of scheme implementation among the different actors involved and raised the question whether farmers (article 1) or regional administrations (article 2 and 3) should be reimbursed for the TCs they incur. All articles also discussed aspects of allocative losses, addressing the trade-off between the EU's aim to protect its financial interests via harmonisation and standardisation and particular regional needs. So, in the following, only the overall implications of the findings as presented in chapter 4 are briefly discussed in a synthesised manner. In addition, a number of impacts on TCs expected due to changes in the EAFRD regulations in the current funding period 2014-2020 are presented.

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<sup>58</sup> Note that the results obtained are discussed with respect to action-oriented AES and may not directly be transferred to result-oriented schemes. For a recent review on result-oriented schemes see Burton and Schwarz (2013), for a viewpoint see Moxey and White (2014).

## 8.1 Summary of implications

For the funding period investigated, the EAFRD framework draw the focus of actual contractual design – concerning both the contractual relationship between EU and Hessian administration and between Hessian administration and farmers – to counteracting potential opportunistic behaviour in a more or less ‘one-size-fits-all’ approach.

As a consequence, *allocative effects* occur with respect to the particular cost categories. The focus on monitoring issues in contractual design is resembled in the high proportion of monitoring costs among total TCs. This accounts for both the administration and farmers during actual scheme implementation as well as for the substantial share of reporting costs found to state the administrations’ own compliance with the EAFRD regulations.

*Allocative effects* also occur between particular administrations and between particular ‘types’ of farm businesses. In case these differences result from differences in farmers’ opportunity costs of time (see chapter 5), a correction of the allocative effect would not be required in principle. In that case, TCs would be the expression of particular farmers’ preferences respectively their willingness to pay for participation.

However, the amount of time spent *by farmers* on negotiation and documenting issues is crucial for another reason: higher negotiation and documentation expenses go in line with fewer deviations found and thus lower costs on behalf of the administrations for tracking farmers. For the Hessian administrations, this indicates scheme success and in consequence requires less supervisory control by the EU.

Two recommendations come up from these insights. First, as the decision on how much to invest in negotiation and documentary issues is currently up to the farmers themselves – and, as shown, practised very differently by different ‘types’ of farmers – providing incentives particularly for part-time farmers’ to increase their effort on bilateral negotiation and their documentary duties seems to be a crucial issue. This could be pursued either by the ALRs in a regulatory approach or by providing incentives for the farmers. As article 3 has revealed, inducing the ALRs to increase their effort on such scheme-related tasks requires an increase in the incentives provided. Following the multi-task PA-approach, either an increase in regulating the provision of scheme-related tasks or a decrease in regulating reimbursement-related tasks should take place. With the help of such a regulatory approach, a specified level of information and negotiation would be made obligatory for farmers prior to scheme participation. Of course, this would mean an increase in farmers’ TCs, which, however, would be partially weighed out by the subsequent lower effort to correct deviations, and fewer payment subtractions. This leads to the second recommendation:

Actually, farmers incur substantial TCs without being compensated while the administration also participated from the related gains. Consequently, Hessian scheme regulations should integrate a TC reimbursement component into the payment calculation. In addition to a more balanced allocation of transaction costs and gains, such a compensation of TCs might provide an incentive for part-time

farmers to invest more of their time in negotiation and documentation issues, particularly if these are more enforced by the ALRs.

Finally, a number of allocative losses were found because actual scheme regulations do not account for variances in compliance, neither on the side of the administration nor on the side of the farmers (see section 2.2.2.1). A large amount of theoretical and empirical evidence suggests that TCs can be saved by allowing for different treatments of different types of farmers – an argument that also applies to different types of administrations (see article 2). Moreover, within the structural features investigated, scheme design and implementation regulations hamper the ability to obtain economies of scale, scope, and time for both the administration and farmers. Furthermore, article 2 (see chapter 6) highlighted a number of TCs related to the lacking adaptation possibilities of contracts with farmers during the participation period.

Apart from these allocative effects, the article results revealed also a number of *distributive* effects occurring between EU and Hessian administrative levels as well as between single county administrations. In the funding period 2007-2013, the state of Hesse had to bear the full costs for implementing the EAFRD while only receiving a partial reimbursement of payments to farmers. Setting up and running the structure and procedures required by the EAFRD induced a number of fixed costs. As a consequence, counties with fewer contracts bear a higher share of these costs. To mitigate such distributive effects, a (co)-financing of regional administrative costs for EU-related issues by the EU was recommended in article 2 (see chapter 6). An at least partial reimbursement of regional administrative costs would facilitate the situation of poorer member states or regions and provide for a more balanced occurrence of costs and benefits and thus result in better TC efficiency. Such cost sharing should easily be integrated into the given reimbursement structure.

Besides such practical implications, an important result of this thesis from a theoretical point of view is a relationship between TCs incurred and particular risk management attempts for both public and private actors. In particular, TCs incurred – especially those incurred on ‘voluntary base’ - seem to resemble the actors’ ‘willingness to pay’ in order to secure income (for farmers) or the budget (for Hesse). This finding should be corroborated by future (empirical) research to mitigate the limits of this case study approach (see section 1.2). Attention of future research should also be drawn on a relationship between participation motives of farmers and related TC expenditure. While a number of studies have investigated participation motives of farmers (see e.g. Siebert, Toogood, and Knierim [2006] for an overview), little is known about whether such motives are mirrored in participation-related TCs. In addition, such a relationship might also exist for the administrations in the EU member states: It would be interesting to know whether particular budgetary needs and a related need to receive the (full) EAFRD reimbursement are mirrored in the related public TCs.

## 8.2 Needs for future research

A number of issues have been raised in the course of the articles that could not be explored further within this thesis but should also be addressed in further research.

One point is a deeper empirical exploration of the cost effectiveness of the performance measurement and the monitoring techniques as used in actual scheme implementation, given that they tend to produce erroneous results. As pointed out in section 2.2.2.1, this topic is also rarely addressed in theory. A related gap is that little research investigates the (welfare) consequences resulting from the *choice* of performance indicators or monitoring techniques<sup>59</sup>, despite the notion that any kind of monitoring requires some form of performance measurement (Slangen, 1997; Latacz-Lohmann and Van der Hamsvoort, 1998)<sup>60</sup>. Given that *imperfect* monitoring – in connection to the *choice* of performance measurement and of monitoring techniques – seems to be a non-trivial issue in scheme implementation as it raises the social costs of AES implementation, more (empirical) attention should be spent on cost effectiveness assessments of monitoring costs and monitoring gains in future research.

## 8.3 Outlook on the new funding period

For the now begun funding period 2014-2020, both European Commission and Parliament state that “agri-environmental climate payments should continue to play a prominent role in supporting the sustainable development of rural areas and in responding to society’s increasing demands for environmental services.” (European Parliament and European Council 2013a, recital 22). In order, AES-related TCs will remain an important issue. The recently decided regulations (EU) No 1305/2013 and No. 1306/2013 on the new EAFRD (European Parliament and European Council, 2013a, 2013b) contain a number of aspects suitable to counteract some of the mentioned deficiencies which might improve the TC efficiency of scheme implementation.

First, regulation 1305/2013 allows for more flexibility in how to adapt contracts in response to business changes, also *ex post*. This might decrease TCs for correction for both the administration and farmers, enhance participation and prevent cut-offs in participation as depicted in figure 9 (see chapters 3 and 6). Maintenance in scheme participation could result in better ecological effects due to long term preservation and help to fulfil the goals of the Habitats’ Directive (Wilhelm, 1999).

Second, regulation 1306/2013 seems to withdraw the previous postulate of extensive monitoring of farmers in favour of more regional adaptability (Art. 59). Potentially<sup>61</sup>, the administrations can exert more discretion in determining the particular scope of farmers and plots to be monitored and thus reward previous compliance. Exerting such discretion would also allow for realizing economies of

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<sup>59</sup> Choe and Fraser (1999), for example, mention a weaker monitoring accuracy of remote sensing versus on-the-ground inspections, which were also cheaper.

<sup>60</sup> An exemption is Zabel and Roe (2009), who discuss several performance measurements like single indicator, multiple indicators, and relative performance measurement.

<sup>61</sup> This yet depends on what will be decided by the Commission in the related implementation regulations.

scale and time, which were hampered in the former funding period, and overall lead to more TC efficiency for both farmers and administrations by reducing allocative distortions.

Third, regulation 1305/2013 requires but also co-finances the establishment of agricultural extension services to improve farmers' information on agri-environmental issues, which must be made available for all farmers (Art. 28). Although this currently addresses mainly the implementation of the so-called *greening measures* within pillar 1, spill-over effects onto AES offered within pillar 2 are intended and expected (ibid.).

Finally, regulation 1306/2013 on financing the CAP explicitly postulates that member states have to bear the administrative costs for running the CAP funds just for pillar one (Art. 19). Furthermore, article 51 of reg. 1305/2013 also seems to extend the applicability of the budget share offered within the 'technical aid'; parts of the administrative effort related to implementing the EAFRD might also be reimbursed. This implies an alleviation of the distributive effects between the EU and the State of Hesse mentioned above.

However, some of the mentioned effects on TCs are likely to persist in the new funding period:

First, double funding, between both different funds and different measures, is still prohibited (Reg. 1305/2013, Art. 28). The lower TC efficiency of farmers participating in the SSGES and the organic farming scheme (see article 1 in chapter 5) can thus only be met by either utilizing the full payment caps (which was not the case during the period investigated) or by integrating a reimbursement of additional TCs into the payments.

Second, regulation 1306/2013 even seems to increase the standardization and harmonization of procedures mentioned in article 2. This, for example, concerns how to apply rules on farmers' applications, deadlines, accounting, and payment processing, as well as monitoring and control statistics (Art. 56ff.). Furthermore, the regulation explicitly postulates *deterrence* as main strategy in order to protect the financial interests of the EU (ibid.), and the Commission threatens member states with a prompt termination or suspension of the payments (ibid.). However, whether the actual effects of this increase in standardisation rather increase the allocative and distributive effects mentioned above or whether they are at least partially mitigated by the increase in regional discretion offered with respect e.g. to monitoring farmers depends on how these regulations are concretised by the implementation rules yet to be decided on. Moreover, as highlighted throughout this thesis, the risk-avoiding behaviour of the Hessian administrative units might avoid the utilisation of such effects.

To sum up, the new regulations seem to reduce TC-related allocative distortions mainly in the relationship *between the administration and farmers*, while an effect on TCs in the relationship *between the EU and member state* remains questionable. Given that the transaction between EU and member state is superposed, the increase in standardisation might also reduce the positive effects assumed for the relationship between regional administration and farmers. However, as this thesis has revealed, the impact on the related TCs depends not only on how their actual regulations will be enforced by the EU but also on how 'risk-avoiding' these will be processed by the regional actors.

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## Appendix

### Questionnaire for article (1)

#### Transaktionskosten im Vertragsnaturschutz –

#### Fragebogen für Landwirte im HIAP-Förderverfahren „Standortangepasste Grünlandextensivierung“

Name: \_\_\_\_\_

Anschrift: \_\_\_\_\_

Tel. (für Rückfragen): \_\_\_\_\_

Lfd Nr: \_\_\_\_\_

Mit meiner Unterschrift erkläre ich, dass ich freiwillig an dieser Umfrage teilnehme. Ich bin damit einverstanden, dass zu wissenschaftlichen Zwecken Einsicht in meine Vertragsunterlagen beim zuständigen Landwirtschaftsamt genommen wird. Mir wurde versichert, dass meine Angaben vertraulich behandelt werden. Ich stimme einer Weiterverarbeitung meiner Angaben in anonymisierter Form zu. An einer Information über die Ergebnisse dieser Befragung bin ich interessiert.

Ja

Nein

Ort, Datum

Unterschrift

**Fragen zum Grünland**

Lebensraumtyp: Flächland-Mähwiese

Berg-Mähwiese

Wie viele **Flächen** bewirtschaften Sie im HIAP-Förderverfahren?

Anzahl Schläge: \_\_\_\_\_

Gesamt-(ha): \_\_\_\_\_

Durchschnittliche **Größe** der Vertragsflächen: \_\_\_\_\_ ha

Durchschnittliche **Bodenzahl** der Vertragsflächen (falls bekannt): \_\_\_\_\_

Durchschnittliche **Höhe** der Vertragsflächen ü. NN: \_\_\_\_\_ m

Sind auf einzelnen Schlägen nur **Teile eines Schlages** unter Vertrag?

Ja      Nein           

Falls ja, wie viele Schläge betrifft dies? \_\_\_\_\_ (Anzahl)

Auf wie vielen Vertragsflächen gäbe es **alternative Nutzungsmöglichkeiten**, wenn kein Vertrag zustande käme? \_\_\_\_\_ (Anzahl)

**Details über die Teilnahme am HIAP-Grünlandextensivierungsprogramm**

Aus welchem **Grund** nehmen Sie an diesem Programm teil?

Umweltschutz

Finanzieller Vorteil

Schläge müssten sonst aufgegeben werden

aus Gewohnheit

Sonstiges: \_\_\_\_\_

Haben Sie **davor** schon an **HEKUL** oder **HELP** teilgenommen?

(Falls ja, bitte Programm nennen) \_\_\_\_\_

Wurden Flächen aus HEKUL oder HELP ins HIAP-Programm übernommen?

Ja      Nein      Teilweise            

In welchem **Teilnahmejahr des laufenden Vertrags** befinden Sie sich? Bitte ankreuzen:

---

1	2	3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Haben Sie schon **früher** an **anderen** Agrarumweltprogrammen teilgenommen (außer HEKUL und HELP)?

Ja            Nein                                                       

Wenn ja, an welchem? \_\_\_\_\_

Nehmen Sie **derzeit** noch an **anderen** Agrarumweltprogrammen teil (außer HIAP-B6):

Ja            Nein                                                       

Wenn ja, an welchem?

\_\_\_\_\_

Angaben zu den Vertragsbedingungen:

**Mahdverpflichtung** auf \_\_\_\_\_ Vertragsflächen (Anzahl)

Gesamter Umfang: \_\_\_\_\_ ha

**Weideverpflichtung** auf \_\_\_\_\_ Vertragsflächen (Anzahl)

Gesamter Umfang: \_\_\_\_\_ ha

**NSL** auf \_\_\_\_\_ Vertragsflächen (Anzahl)

Gesamter Umfang: \_\_\_\_\_ ha

Wie hoch ist die vereinbarte **jährliche Gesamtprämie lt. Vertrag**? \_\_\_\_\_

Glauben Sie, dass die vereinbarte Prämie **über/genau auf/ unter** Ihren Produktionskosten liegt?  
(Nichtzutreffendes bitte streichen)

Planen Sie, nach Ablauf des Vertrags erneut am Förderprogramm teilzunehmen?

Ja            Nein            Weiß noch nicht                                                                                   

Falls Sie nach Ablauf des Vertrags wieder zur ursprünglichen Bewirtschaftung zurückkehren wollen, rechnen Sie mit hohen Umstellungskosten?

Ja            Nein                                                       

konkrete Vertragsvereinbarungen (bitte **Anzahl Schläge** angeben):

bei **Mahdverpflichtung**:

\_\_\_\_\_

vorgegebener Mahdtermin

vorgegebener Mahdzeitraum

zusätzliche Beweidung

zusätzliche Mahd

bei **Weideverpflichtung**:

zusätzliche Mahd

Festlegung der Beweidungsdauer

bei **NSL (bitte Anzahl der Flächen angeben)**:

St. 1

St. 2

St. 3

Erstnutzung

Relief

Aufwuchs

Standortverhältnisse

Verkehrslage/Flächenzuschnitt

Technik / besondere Nutzungsverfahren

**Angaben zu veränderten Kosten und Erlösen durch die Teilnahme am HIAP-Grünlandextensivierungsprogramm:**

Bei <b>Mahdvereinbarung:</b>	Ja	Keine Ände- rung	Inwiefern?
Gibt es einen <b>Rückgang</b> des Ertrags?			
Gibt es eine <b>Einschränkung</b> in der Nutzung?			
Ist eine Nutzung des Mahdguts als <b>Futter</b> möglich?			
Falls nein, ist eine <b>sonstige Nutzung</b> des Mahdguts möglich?			
Haben Sie <b>Bewirtschaftungsschwierigkeiten</b> durch die Festlegung des Mahdtermins/des Mahdzeitraums?			
Hat sich durch die Teilnahme der Verbrauch an <b>Düngemittel</b> reduziert?			
Gibt es durch die Teilnahme Veränderungen bei der <b>Kalkung</b> der Flächen?			
Besteht ein <b>erhöhter</b> Arbeitsaufwand (Mäher wieder anhängen, zusätzliche Mahd etc.)?			
Besteht ein <b>verminderter</b> Arbeitsaufwand (z.B. weniger Mahdgänge auf Vertragswiesen o.ä.)?			
Ist durch die TN die Anschaffung <b>spezieller Maschinen</b> nötig?			
Ist eine Nutzung über <b>Maschinenring</b> o.ä. möglich?			
Fortsetzung:	Ja	Keine Ände- rung	Inwiefern?
Werden die Maschinen <b>selbst</b> angeschafft?			

Werden die Maschinen <b>zusammen mit anderen LW</b> angeschafft?			
Wie hoch sind die <b>Mehrausgaben</b> für Maschinen?			
Sind durch die Teilnahme spezielle Schulungen nötig (z.B. Umgang mit neuen Maschinen)			Aufwand in Zeit: Aufwand in Euro:

Bei <b>Weidevereinbarungen</b>	Ja	Keine Änderung	Inwiefern?
Ist durch die Programmteilnahme eine Änderung der Viehbesatzdichte notwendig geworden?			
Ist bzw. war durch die Programmteilnahme eine Umstellung auf andere Tierrassen notwendig?			
Ist durch die Programmteilnahme die Futterqualität gesunken?			
Ist deshalb eine Zufütterung nötig?			
Gibt es durch die Teilnahme eine Nutzungsänderung (z.B. Schafe statt Milchvieh )			
Besteht ein <b>erhöhter</b> Arbeitsaufwand (z.B. häufigere Umtriebe, Zäune umstecken etc.)?			
Besteht ein <b>verminderter</b> Arbeitsaufwand (z.B. ing. weniger Weidegänge etc.)?			
Ist eine <b>spezielle Schulung</b> für die Weidehaltung notwendig gewesen?			

**Zeit- und Kostenaufwand im Zusammenhang mit der Teilnahme am Förderprogramm**

Zeitaufwand im Zusammenhang mit **Information**

	Häufigkeit	Gebühr	Aufwand in h/min pro Mal	Aufwand für Fahrten in km (einfache Fahrt)
Internetrecherche				
Zeitschriften lesen				
Informationsbroschüren lesen				
Teilnahme an Veranstaltung des ALR/Sonst.				
Telefonat mit dem ALR				
Beratungsgespräch im ALR				
Gespräche mit ldw. Beratern				
Gespräche mit and. LW				

	Aufwand in h/min	Falls anfallend. Gebühr	Aufwand für Fahrten in km
Auswahl möglicher Vertragsflächen			
Einholen der Erlaubnis des Eigentümers (falls nötig)			
Berechnung der Produktionskosten für Teilnahme („reicht die Prämie zur Deckung der Kosten?“)			

Wie berechnen Sie die **Produktionskosten (Deckungsbeiträge)** für die extensive Grünlandbewirtschaftung?

KTBL	<input type="checkbox"/>	
Sonstige Grundlage (Software)	<input type="checkbox"/>	
Eigene Kalkulation genau	<input type="checkbox"/>	
Eigene Kalkulation überschlägig	<input type="checkbox"/>	
Keine	<input type="checkbox"/>	
Berater	<input type="checkbox"/> Sonstige	_____

Wie berechnen Sie die **vermutlichen Mindereinnahmen** durch die Vertragsauflagen?

KTBL	<input type="checkbox"/>	Berater	<input type="checkbox"/>
Sonstige Grundlage (Software)	<input type="checkbox"/> Sonstige		<input type="checkbox"/> _____
Eigene Kalkulation genau	<input type="checkbox"/>		
Eigene Kalkulation überschlägig	<input type="checkbox"/>		
Keine	<input type="checkbox"/>		

Welcher Zeitaufwand entsteht für die Beantragung der Teilnahme:

durch **Fahrten** zum ALR , z.B zum Vereinbaren weiterer Prämien (NSL)

	Wie oft?	Aufwand in h/min	km pro Besuch (einfache Fahrt)
Fahrten zum ALR			
Telefonate mit ALR			

Für das **Ausfüllen** des Erstantrags:

	Aufwand in h/min
Mantelbogen	
Flächennachweis	
Nachbesserungen/ Fehlerkorrektur	

In welcher Form wird der Antrag abgegeben?

Persönlich                      per Post                           

Erforderlicher Zeitaufwand in h/min: \_\_\_\_\_

Wie viele **Rückläufe** gab es bis zur endgültigen Abgabe? \_\_\_\_\_

Wichtigster Grund für den Rücklauf: \_\_\_\_\_

Entsteht Ihnen Aufwand durch **rechtliche Neuregelungen** (z.B. Änderung der Beihilfesätze):

Ja                      Nein                                           

Wenn ja, in welchem Umfang ?

	Aufwand in h/min
Mantelbogen	
Flächennachweis	
Neuberechnung von Produktionskosten	

Entsteht Ihnen während der Laufzeit des Vertrages **Aufwand durch betriebliche Veränderungen** (z. B. veränderte Pachtverhältnisse)?

Ja  Nein

Wenn ja, in welchem Umfang ?

	Aufwand in h/min	Zus. Fahrtkosten/ Telefonkosten
Mantelbogen		
Flächennachweis		
Übernahmeerklärung		
Neuberechnung von Produktionskosten		

Finanzielle **Entschädigung** des Vorpächters/Vorbesitzers:

Ja  Nein

Wenn ja, in Höhe von: \_\_\_\_\_ €

Entsteht Ihnen während der Laufzeit des Vertrages Aufwand durch eine **stärkere Dokumentationspflicht** als für die „gute fachliche Praxis“ (CC)?

Ja  Nein

Aufwand für **Schlagkartei**:

	Wann führen Sie die Schlagkartei? täglich (T) wöchentlich (W) monatlich (M)	Wie oft?	Aufwand in h/min pro Mal
Schlagkartei			
Weidetagebuch			

Welcher Aufwand entsteht Ihnen im Zusammenhang mit der

**Prämienbeantragung?**

Für das **Ausfüllen** des Antrags \_\_\_\_\_ h/min

Für das **Abgeben** des Antrags \_\_\_\_\_ h/min

Wie oft (in wie vielen Jahren) haben Sie bereits Auszahlungen erhalten?

\_\_\_\_\_

Wenn ja: Brauchen Sie von Jahr zu Jahr **mehr/weniger/genauso viel Zeit** für die Prämienbeantragung? (Nichtzutreffendes streichen).

Können Sie **in etwa** angeben, wie viel Zeit mehr/weniger Sie brauchen? \_\_\_\_\_ h/min

Zeitaufwand im Zusammenhang mit **Kontrollen**:

Ist Ihr Betrieb schon einmal im Zusammenhang mit der Teilnahme am HIAP-Grünlandprogramm (oder HELP) kontrolliert worden?

Ja            Nein                       

Wenn ja:

	Aufwand in h/min	
Vorbereitung des Kontrollbesuchs		
Dauer des Kontrollbesuchs		
Nachbereitung des Kontrollbesuchs		

Gab es **Beanstandungen**?

Ja            Nein                                                       

Welche? \_\_\_\_\_

Welcher **zeitliche Aufwand** war mit den Beanstandungen verbunden? \_\_\_\_\_ h/min

Entstand Ihnen **darüber hinaus** finanzieller Aufwand (Rückzahlungen, Anwaltskosten) \_\_\_\_\_ €

**Betriebsstruktur bezogen aufs Jahr 2008/2009**

Planen Sie langfristig über einen Zeitraum von 10 Jahren hinaus?

Ja            Nein                                                       

Ausstattung:

Betriebsgröße: \_\_\_\_\_ (ha)

-davon eigene Fläche \_\_\_\_\_ (ha)

- Pachtpreis für Grünlandpachtflächen (Ø): \_\_\_\_\_ €/ha

Art der **Nutzung** (ha):

- Ldw. Ackerfläche \_\_\_\_\_ ha

- Dauergrünland: \_\_\_\_\_ ha

- Nawaro: \_\_\_\_\_ ha

- Dauerkulturfläche \_\_\_\_\_ ha

**Arbeitskräfte** auf dem Betrieb (Anzahl): \_\_\_\_\_

Davon: nicht entlohnte Familienmitglieder: \_\_\_\_\_

Lehrlinge \_\_\_\_\_

Meister \_\_\_\_\_

Arbeiter: \_\_\_\_\_

Saisonale AK: \_\_\_\_\_ von-bis \_\_\_\_\_ (bitte Monate angeben)

Produktionsstruktur

**Betriebsschwerpunkt:** \_\_\_\_\_

Erntefläche **Obst/Gemüse:** \_\_\_\_\_ (ha)

**Vieh** (Ø, Stück):

- Milchkühe: \_\_\_\_\_
- Mutterkühe : \_\_\_\_\_
- Sonst. Rinder: \_\_\_\_\_
- Geflügel: \_\_\_\_\_
- Schafe, Ziegen: \_\_\_\_\_
- Sonstige: \_\_\_\_\_

**Erträge** im Wirtschaftsjahr (alles, was nicht selbst genutzt wird, z.B. als Futter):

Ackerbau (dt), dar.:

Grünland (dt): \_\_\_\_\_

Milchleistung (l) : \_\_\_\_\_

Erträge aus Mutterkuhhaltung: \_\_\_\_\_

Erträge aus Fleischproduktion: \_\_\_\_\_

Erträge aus Obst-/Gemüseanbau (kg? ): \_\_\_\_\_

Erträge aus NAWARO (dt): \_\_\_\_\_

Erträge aus sonstiger landwirtschaftlicher Produktion: \_\_\_\_\_

Sind die jährlichen Erträge starken **Mengenschwankungen** unterworfen?

Ja            Nein                                           

Welche Erträge betrifft dies am meisten? \_\_\_\_\_

Wie hoch ist der **Wert des Anlagevermögens** (€) lt. Buchführung \_\_\_\_\_ €

Land : \_\_\_\_\_

Wirtschaftsgebäude : \_\_\_\_\_

Bauliche Anlagen : \_\_\_\_\_

Technische Anlagen und Maschinen : \_\_\_\_\_

Tiervermögen : \_\_\_\_\_

Welche **Umsatzerlöse** haben Sie im Wirtschaftsjahr erzielt? \_\_\_\_\_ €

Pflanzenproduktion: \_\_\_\_\_ €

Tierproduktion: \_\_\_\_\_ €

Lohnarbeit, Maschinenmiete: \_\_\_\_\_ €

Biogas u.ä: \_\_\_\_\_ €

Direktzahlungen, AGZ, Beihilfen? \_\_\_\_\_ €

Sind die jährlichen Umsatzerlöse starken Preisschwankungen unterworfen?

Ja            Nein                                       

Welche Umsatzerlöse sind am meisten betroffen? \_\_\_\_\_

Welchen **Aufwand** hatten Sie im Wirtschaftsjahr? \_\_\_\_\_ €

**Pflanzenproduktion:** \_\_\_\_\_ €

**Tierproduktion:**

**Energieproduktion:** \_\_\_\_\_ €

Sonst. **Materialaufwand**, davon \_\_\_\_\_ €

**Personalaufwand** : \_\_\_\_\_ €

**Betriebsergebnis** im Wirtschaftsjahr: \_\_\_\_\_ €

**Sozioökonomische Faktoren**

Betreiben Sie Ihren Betrieb im **Haupterwerb**?            Ja            Nein                               

Wenn ja, haben Sie **außerhalb** des Betriebs noch **weitere Einkünfte**?

Ja                        Nein

Geschlecht des Betriebsleiters: \_\_\_\_\_

Wie **alt** sind Sie? \_\_\_\_\_ Jahre

Welches ist Ihr höchster **Schulabschluss**? (Bitte ankreuzen):

- |                         |                          |
|-------------------------|--------------------------|
| Kein Abschluss          | <input type="checkbox"/> |
| Volks- bzw. Hauptschule | <input type="checkbox"/> |
| Realschule              | <input type="checkbox"/> |
| Fachoberschule/Abitur   | <input type="checkbox"/> |

Welche höchste **Ausbildung** haben Sie als **Landwirt** durchlaufen?

- |                          |                          |
|--------------------------|--------------------------|
| Keine Ausbildung         | <input type="checkbox"/> |
| Lehre                    | <input type="checkbox"/> |
| Meisterprüfung/Techniker | <input type="checkbox"/> |
| Studium                  | <input type="checkbox"/> |

Haben Sie eine Ausbildung in anderen Berufsfeldern:

- |                          |                          |
|--------------------------|--------------------------|
| Keine Ausbildung         | <input type="checkbox"/> |
| Lehre                    | <input type="checkbox"/> |
| Meisterprüfung/Techniker | <input type="checkbox"/> |
| Studium                  | <input type="checkbox"/> |

Sind Sie Mitglied in landwirtschaftlichen Verbänden? \_\_\_\_\_

Wenn ja, in welchen? \_\_\_\_\_

Vielen Dank für Ihre Mühe!!

**Raum für zusätzliche Bemerkungen:**

## **Interview guideline for article (2)**

### **Interviewleitfaden für die Befragung der HIAP durchführenden Stellen**

*Interviewziele: Influences of institutional presetting/ Scope of action possible within contractual governance mode*

#### **1. Was machen Sie genau?**

- Ihre konkrete Aufgabe im Vertragsprozess?

- Position der Aufgabe: Information LW, Durchführung, Kontrolle? Alles?

- Was sind Ihre Arbeitsinhalte?

- Inwiefern sind Sie autonom in der Entscheidung über Ihre Aufgabe(n)? Von welchen Stellen/Politiken werden Sie in Bezug auf Ihre Aufgabe beeinflusst?

- Welche Berichtspflichten haben Sie?

o Gegenüber Landesbehörden?

o Gegenüber der EU direkt?

- Wie wird Anpassungsbedarf ihrer Arbeit deutlich? Extern? Intern?

- Wie wird Anpassungsbedarf kommuniziert? Formal/Informell? Auf welchem Wege?

- Welche Problemfelder sehen Sie im Zusammenhang mit ihren Arbeitsinhalten?

o In welchem Bereich gibt es die meisten Probleme?

o Wie zeigt sich das?

o Worauf führen Sie diese Probleme zurück? EU? Landespolitik? Andere RL? Sonstiges?

**2. Wie läuft Ihre Arbeit/Aufgabe (n) ab?**

- Welche Arbeitsschritte umfassen Ihre Aufgabe(n)?

- Wie laufen diese Arbeitsschritte konkret ab?

- Inwiefern sind Sie autonom in der Entscheidung über die Durchführung Ihrer Aufgabe(n) bzw. die Gestaltung der einzelnen Arbeitsschritte?

- Wer nimmt Einfluss auf Ihre Aufgabe/Arbeitsinhalte? Auf wessen Aufgaben/Arbeitsinhalte nehmen Sie Einfluss?

- Mit welchen Stellen kommunizieren Sie während der Durchführung Ihrer Aufgabe? Wie ist diese Kommunikation gestaltet (formal/Informell)?

- Wie oft kommunizieren Sie mit diesen Stellen?

- Wie werden Ihnen Veränderungen in ihrer Aufgabe kommuniziert? Formal? Informell?

- Wie kommunizieren Sie Veränderungen Ihrer Arbeit? Formal? Informell?

- Wann werden Ihnen Veränderungen kommuniziert? Ex ante/Ex post

- Welche Problemfelder sehen Sie im Zusammenhang mit den anfallenden Arbeitsschritten?

o In welchem Bereich gibt es die meisten Probleme?

o Wie zeigt sich das?

o Worauf führen Sie diese Probleme zurück? EU? Landespolitik? Andere RL? Sonstiges?

**3. Wer ist an Ihrer Aufgabe beteiligt?**

- Welche Stellen/administrative Einheiten sind Ihrer Aufgabe vor- bzw nachgelagert?

- Sind andere Stellen /administrative Einheiten an Ihrer Aufgabe direkt beteiligt?

- Gibt es Abstimmungsbedarf mit diesen Stellen? Welchen?

- Worauf ist dieser Abstimmungsbedarf zurückzuführen? Inwiefern?

- Sind andere Politiken/RL (EU, Land, Sonstiges) ursächlich für die Beteiligung dieser Stellen/Einheiten? Welche? Oder ist das Ihre Entscheidung?

- Welche Problemfelder sehen Sie im Zusammenhang mit Art und Anzahl der Beteiligten?

o In welchem Bereich gibt es die meisten Probleme?

o Wie zeigt sich das?

o Worauf führen Sie diese Probleme zurück? EU? Landespolitik? Andere RL? Sonstiges?

#### **4. Wann werden Sie tätig?**

- Gibt es externe (von anderen Stellen) bzw. interne (eigene Qualitätsstandards) Vorgaben, wann Sie tätig werden? Welche?

- Kann man Ihre Aufgabe eher als Aktion oder Reaktion bezeichnen?

- Inwieweit sind Sie autonom in Bezug auf den Zeitpunkt ihrer Aufgabe?

- Welche Problemfelder sehen Sie im Zusammenhang mit dem Zeitpunkt ihrer Aufgabe?

o In welchem Bereich gibt es die meisten Probleme?

o Wie zeigt sich das?

o Worauf führen Sie diese Probleme zurück? EU? Landespolitik? Andere RL? Sonstiges?

## Questionnaire for article (3)

## Fragebogen zur Zusammensetzung der bei der Durchführung der flächenbezogenen Maßnahmen anfallenden Arbeitsschritte

**Sehr geehrte Mitarbeiter der Fachdienste Ländlicher Raum,**

im Rahmen meiner Doktorarbeit untersuche ich die anfallenden Verwaltungskosten zur Durchführung der **flächenbezogenen Maßnahmen von HIAP (kein Ökolandbau, kein Weinbau)**. Mein besonderes Interesse gilt der **Zusammensetzung Ihrer Arbeit**. Hierzu übersende ich Ihnen diesen elektronischen Fragebogen mit der Bitte um Ihre Mithilfe. Der Fragebogen gliedert sich in 2 Teile. Im 1. Teil geht es um Angaben zu Ihrem Landkreis und soziodemographische Angaben zu Ihrer Person. Der 2. Teil erfragt den Zeitaufwand für die anfallenden Tätigkeiten. Dabei sind für mich 2 Dinge von Interesse:

- Die Anteile einzelner Arbeitsinhalte, (z.B. Akquise, Antragsannahme, Auszahlung etc.) (orangefarbene Tabellen), sowie
- eine Gewichtung der dazugehörenden Arbeitsschritte (blaue Tabellen).

Um ein möglichst vollständiges Bild zu erhalten ist es wichtig, dass **möglichst alle Mitarbeiter, die mit der Durchführung der flächenbezogenen Maßnahmen befasst sind**, an der Befragung teilnehmen. Bitte lesen Sie die Fragen genau durch, und versuchen Sie, möglichst genaue Angaben zu machen. Dabei kommt es jedoch **NICHT** auf exakte Angaben an – wichtig ist, dass das **VERHÄLTNIS** der einzelnen Arbeitsanteile **ZUEINANDER** stimmt. Bitte schicken Sie den ausgefüllten Fragebogen per Post oder Email bis zum **15. Dezember** an mich zurück. Wenn Sie möchten, stelle ich Ihnen die Ergebnisse gerne zur Verfügung.

*Die Studie dient **nicht** dazu, die Umsetzung von HIAP in einzelnen Landkreisen miteinander zu vergleichen oder Ihre Arbeit in irgendeiner Form zu bewerten.*

*Die Auswertung Ihrer Angaben erfolgt anonym. Ihre Angaben werden vertraulich behandelt.*

Für Fragen stehe ich Ihnen jederzeit gerne zur Verfügung.

Vielen Dank für Ihre Hilfe,

Anja Weber

<b>1. ANGABEN ZUM LANDKREIS</b>		
Name des Landkreises: <i>(Nur zum Abgleich mit Strukturdaten. Der Name bleibt in der Auswertung unberücksichtigt.)</i>		
ganze Planstellen	davon besetzt:	ganze Stellen
<b>2. ALLGEMEINE ANGABEN</b>		
Ihre durchschnittliche wöchentliche Arbeitszeit (lt. Arbeitsvertrag):		
Ihre Aufgabe (bitte ankreuzen):		Std.
Fachdienstleitung <input type="checkbox"/> Sachbearbeitung/Verwaltung <input type="checkbox"/>		
Wie lange sind Sie bereits in der öffentlichen Verwaltung tätig?		Jahre
Wie viel davon in der Abwicklung von Agrarförderprogrammen?		Jahre
Ihr Alter:		Jahre
männlich <input type="checkbox"/>		Weiblich <input type="checkbox"/>

**2.1. TEILNEHMERAKQUISE**  
 Bitte gewichten Sie die einzelnen Tätigkeiten in der folgenden Tabelle nach Ihrem Aufwand (Häufigkeit und Dauer) relativ zu den anderen Akquisetätigkeiten; von 0 (fällt nicht an) bis 10 (nimmt sehr viel Zeit in Anspruch)

Zeitraum	Jan	Feb	März	April	Mai	Juni	Juli	August	Sep	Okt	Nov	Dez
Vor-/Nachbereitung/Durchführung von Informationsveranstaltungen												
Sonstige Öffentlichkeitsarbeit, Exkursionen etc.												
Aktive Akquise von Landwirten (Anschreiben, Anrufen, Einbestellen)												
Beratung (potentieller) Antragsteller per Telefon oder persönlichem Gespräch												
Auswahl potentieller Vertragsflächen (inkl. Ortsbesichtigung)												
Kontakt mit anderen Landkreisen												
Sonstiges												

**2.2 BEARBEITUNG DES TEILNAHMEANTRAGS**

Bitte gewichten Sie die einzelnen Tätigkeiten in der folgenden Tabelle nach Ihrem Aufwand (Häufigkeit und Dauer) relativ zu den anderen Bearbeitungstätigkeiten; von 0 (fällt nicht an) bis 10 (nimmt sehr viel Zeit in Anspruch)

Zeitraum	Jan	Feb	Mrz	Apr	Mai	Jun	Juli	Aug	Sep	Okt	Nov	Dez
Allgemeine Antragsfassung (Posteingangsbuch etc.)												
Eingabe der beantragten Flächen ins System (inkl. Abgleich mit Gebietskulisse)												
Erstellung fachlicher Bewertungsbögen (oder Vergleichbares) für NSL												
Festlegung NSL (oder Vergleichbares) für beantragte Flächen												
Punktevergabe inkl. „Feinjustierung“												
Abstimmung mit anderen Landkreisen wegen Flächenbewertungen												
Vor-Ort-Bewertung Flächen												
Abgleichung Vertragsinhalte (Flächen, NSL u.ä.) mit Landwirt (persönlich, telefonisch)												
Änderungen auf Wunsch des Landwirts												
Vertragsaufbereitung und -versendung												
Bearbeitung Rückfragen Landwirt nach Vertragserhalt												
Haushaltsmittelmeldung												
Sonstiges:												

**2.3 VERTRAGSDURCHFÜHRUNG**

Bitte gewichten Sie die einzelnen Tätigkeiten in der folgenden Tabelle nach Ihrem Aufwand (Häufigkeit und Dauer) relativ zu den anderen Durchführungstätigkeiten; von 0 (fällt nicht an) bis 10 (nimmt sehr viel Zeit in Anspruch)

Zeitraum	Jan	Feb	März	Apr	Mai	Jun	Juli	Aug	Sep	Okt	Nov	Dez
Abgleich Auszahlungsantrag mit Vertrag												
Nachträgliche Vertragsänderungen auf Wunsch des Vertragsnehmers												
Flächenwürdigung inkl. Überstimmen												
Luftbildverifizierung												
Überprüfen/Korrektur von Verschneidungen												
Freigabe der Auszahlungen												
Bescheiderstellung/Versand												
Kontakt mit Landwirten wegen Rückfragen/Beschwerden												
Kontakt mit anderen Kreisen (beiderseitig)												
Sonstiges												

**2.5 VOR-ORT-KONTROLLE**

Bitte gewichten Sie die einzelnen Tätigkeiten in der folgenden Tabelle nach Ihrem Aufwand (Häufigkeit und Dauer) relativ zu den anderen VOK-Tätigkeiten; von 0 (fällt nicht an) bis 10 (nimmt sehr viel Zeit in Anspruch)

Zeitraum	Jan	Feb	März	Apr	Mai	Jun	Juli	Aug	Sep	Okt	Nov	Dez
Vorbereitung der Akten auf Anfrage des Prüfdienstes												
Nachbearbeitung VOK: Schlagkartei/Weidetagebuch kontrollieren, Landwirte kontaktieren (zB wegen Einhaltung der Bewirtschaftungsauflagen etc.)												
Anlage Vorgang VOK im System												
Einleitung von Sanktionen												
Zusätzlicher Kontakt mit Prüfdienst wegen Unklarheiten (beiderseitig)												
Aufwand durch Fernerkundung												
Sonstiges												

**2.4 TÄTIGKEITEN IM ZUSAMMENHANG MIT VERBESSERUNGEN/ANPASSUNGEN VON HIAP SOWIE EIGENE WEITERBILDUNG**

Bitte gewichten Sie die einzelnen Tätigkeiten in der folgenden Tabelle nach Ihrem Aufwand (Häufigkeit und Dauer) relativ zu den anderen genannten Tätigkeiten; von 0 (fällt nicht an) bis 10 (nimmt sehr viel Zeit in Anspruch)

Zeitraum	Jan	Feb	März	Apr	Mai	Jun	Juli	Aug	Sep	Okt	Nov	Dez
Teilnahme an AGs, HIAP-Tag												
Interne Besprechungen, Formulierung von Stellungnahmen												
Kontakt/Besprechungen mit Wi-Bank im Zusammenhang mit Veränderungsbedarf (beiderseitig)												
Kontakt/Besprechungen mit HMUELV im Zusammenhang mit Veränderungsbedarf (beiderseitig)												
Kontakt mit anderen Landkreisleitern im Zusammenhang mit Veränderungsbedarf (beiderseitig)												
Zusätzlicher Aufwand wegen technischer Probleme (Wartezeiten, Aufwand für Klärung etc.)												
Zusätzlicher Aufwand wegen inhaltlicher Probleme (Wartezeiten, Aufwand für Klärung)												
Kontakt mit HMUELV (beiderseitig)												
Eigene Weiterbildung inkl. Teilnahme an Schulungen (z. B.:Sesterz)												
Sonstiges												

**2.6 INTERNE/EXTERNE PRÜFUNGEN UND ANFRAGEN**

Bitte gewichten Sie die einzelnen Tätigkeiten in der folgenden Tabelle nach Ihrem Aufwand (Häufigkeit und Dauer) relativ zu den anderen genannten Tätigkeiten; von 0 (fällt nicht an) bis 10 (nimmt sehr viel Zeit in Anspruch)

Zeitraum	Jan	Feb	März	Apr	Mai	Jun	Juli	Aug	Sep	Okt	Nov	Dez
Checkliste für Wi-Bank erstellen und übermitteln												
Datenanfragen für das HMUELV												
Berichtsaufwand aufgrund von Systemüberstimmungen												
Aufwand durch Kontrolle durch Innenrevision (inkl. Vor- und Nachbereitung)												
Aufwand durch Fachaufsichtsprüfungen (inkl. Vor- und Nachbereitung)												
Aufwand durch Kontrolle durch bescheinigende Stelle (inkl. Vor- und Nachbereitung)												
Aufwand durch Kontrolle durch EU-Behörden (inkl. Vor- und Nachbereitung)												
Sonstiges												

Wie viel Prozent Ihrer gesamten HIAP-Arbeit entfällt über das Jahr betrachtet auf die Teilnehmerakquise?  
(Bitte achten Sie darauf, dass alle SPALTENSUMMEN der orange unterlegten Tabellen jeweils 100% ergeben sollen.)

Monat	Jan	Feb	März	Apr	Mai	Juni	Juli	August	Sep	Okt	Nov	Dez
%												

Wie viel Prozent Ihrer gesamten HIAP-Arbeit entfällt über das Jahr betrachtet auf die Bearbeitung des Teilnahmeantrags?

Monat	Jan	Feb	März	April	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
%												

Wie viel Prozent Ihrer gesamten HIAP-Arbeit entfällt über das Jahr betrachtet auf die Vertragsdurchführung?

Monat	Jan	Feb	März	Apr	Mai	Juni	Juli	August	Sep	Okt	Nov	Dez
%												

Wie viel Prozent Ihrer gesamten HIAP-Arbeit entfällt über das Jahr betrachtet auf Vor-Ort-Kontrolle?

Monat	Jan	Feb	März	Apr	Mai	Juni	Juli	August	Sep	Okt	Nov	Dez
%												

Wie viel Prozent Ihrer gesamten HIAP-Arbeit entfällt über das Jahr betrachtet auf Verbesserung/Anpassung sowie eigene Weiterbildung?

Monat	Jan	Feb	März	Apr	Mai	Juni	Juli	August	Sep	Okt	Nov	Dez
%												

Wieviel Prozent Ihrer gesamten HIAP-Arbeit entfallen im über das Jahr betrachtet für interne/externe Anfragen und Prüfungen?

Monat	Jan	Feb	März	Apr	Mai	Juni	Juli	August	Sep	Okt	Nov	Dez
%												

Sind Sie außer mit der Bearbeitung von HIAP noch mit anderen Aufgaben betraut?  
Nein  Ja   
Wenn ja, tragen Sie bitte in der folgenden Tabelle ein, wie viel Prozent Ihrer gesamten Arbeitszeit über das Jahr betrachtet die Bearbeitung von HIAP ausmacht.

Monat	Jan	Feb	März	Apr	Mai	Juni	Juli	August	Sep	Okt	Nov	Dez
%												

VIELEN DANK FÜR IHRE ZEIT!

### **List of further publications produced during the doctorate**

- Weber, A. (2013): How does EU co-funding affect regional agri-environmental scheme implementation costs? 52. Jahrestagung der GEWISOLA, 26.09-28.09.2012 in Hohenheim, to be published in the proceedings of the congress.
- Weber, Anja (2011): Why do Farmers Spend Different Amounts of Transaction Costs in Agri-Environmental Schemes? Proceedings of the 2011 International Congress of the European Association of Agricultural Economists, August 30-September 2, 2011, Zürich. Available via AgEconSearch.
- Weber, Anja (2011): Transaktionskosten in Agrarumweltmaßnahmen - Notwendigkeit oder Notwendiges Übel? In: Weingarten, P.; Banse, M.; Gömann, H.; Isermeyer, F.; Nieberg, H.; Offermann, F. und H. Wendt (Hrsg.), Möglichkeiten und Grenzen der wissenschaftlichen Politikanalyse. (Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V., Bd. 46), Münster-Hiltrup: Landwirtschaftsverlag, 2011, S. 391-392.
- Weber, Anja, Nuppenau, Ernst-August (2010): Transaction Costs in Agri-Environmental Schemes: The Principal-Agent- Point of View, in: Juvancic, Luka (ed.), Proceedings of the 118th EAAE seminar "Rural development: governance, policy design and delivery", Ljubljana 25.-27. August 2010, pp. 425-439. ISBN 978-961-6204-51-4.
- Weber, Anja (2010): Erweiterte Möglichkeiten für den Schutz von Grünlandflächen durch kollektive Ansätze? Hessische Naturschutzverträge aus transaktionskostenökonomischer Sicht, in: Feit, Ute und Horst Korn (Bearb.): Treffpunkt Biologische Vielfalt IX, BfN-Skripten 265, Bonn - Bad Godesberg, S. 65-70.

## **Versicherung**

Ich erkläre: Ich habe die vorgelegte Dissertation selbständig und ohne unerlaubte fremde Hilfe und nur mit den Hilfen angefertigt, die ich in der Dissertation angegeben habe.

Alle Textstellen, die wörtlich oder sinngemäß aus veröffentlichten Schriften entnommen sind, und alle Angaben, die auf mündlichen Auskünften beruhen, sind als solche kenntlich gemacht.

Bei den von mir durchgeführten und in der Dissertation erwähnten Untersuchungen habe ich die Grundsätze guter wissenschaftlicher Praxis, wie sie in der „Satzung der Justus-Liebig-Universität Gießen zur Sicherung guter wissenschaftlicher Praxis“ niedergelegt sind, eingehalten.

Giessen, 22.05.2014