AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

The 82nd Annual Conference of the Agricultural Economics Society

Royal Agricultural College

31st March to 2nd April 2008

Potential of differentiated payment levels based on standard cost approaches: A case study of selected rural development measures in Germany

Frank Offermann, Hiltrud Nieberg and Judith Hecht
Institute of Farm Economics, Johann Heinrich von Thünen-Institute (vTI)
Federal Research Institute for Rural Areas, Forestry and Fisheries
Bundesallee 50, 38116 Braunschweig, Germany
frank.offermann@vti.bund.de

Copyright 2008 by Offermann, Nieberg and Hecht. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Abstract

In accordance with EU regulations, payment levels for several measures of rural development programs are calculated on the basis of standard cost approaches, using 'typical' or average figures for costs incurred and income forgone. Resulting uniform payment rates have been frequently discussed and criticised as being inefficient, having a low cost-effectiveness and generating excessive windfall profits. However, few empirical studies exist which quantitatively examine potentials of a more differentiated standard cost approach. By using German farm accountancy data, this study analyses effects of a payment differentiation according to regional and farm individual characteristics on producer rents, budget expenditures and economic efficiency. Preliminary results show that though overcompensation could be reduced in most cases, savings in budget expenditure are often small and might be even offset by increasing administration costs. Generally our analysis indicates that potential benefits of differentiated standard cost approaches can be partly exploited if a) variances of the cost of participation in the universe of farms are high and the discriminatory natures of differentiation are significant, and b) positive correlations between costs and environmental benefits are strong.

Keywords: differentiated payment levels, efficiency, cost-effectiveness, standard cost approach, rural development schemes, agri-environmental measures

1. Introduction

In accordance with EU regulations, payment levels for several measures of rural development programs are calculated on the basis of standard cost approaches, using 'typical' or average figures for costs incurred and income forgone. A recent EU report (European Commission, 2005) noted that resulting uniform payment rates contrast with the fact that many member states and regions have schemes covering a fairly large geographical area, and recommends that more work could usefully be done on the efficiency of measures. The related ongoing discussions about introducing more differentiated payment schemes in general focus on three different research directions. The first line of argument is favouring to pay farmers for the production of public goods instead of compensating them for participating in specific extensification measures. Other authors concentrate on the analysis of auction schemes with farm individual bids as an alternative to fixed payment levels. And a third approach addresses the possibilities of improving the performance of standard cost approaches by a further differentiation, e.g. small-scale regional or even individual farm differentiation. Whereas the first two approaches have received extensive attention in research (see e.g. Latacz-Lohmann and Schilizzi 2005, for a review of auction schemes in agri-environmental programmes), few empirical studies exist which quantitatively examine potentials of a more differentiated standard cost approach. Our paper resumes the discussions of more differentiated approaches to determining payment levels and analyses effects of a payment differentiation according to regional and farm individual characteristics on producer rents, budget expenditures and economic efficiency. Particularly, the study aims to go beyond other predominantly theoretical discussions on payment level differentiation by quantitatively analysing the benefits of more differentiated standard cost approaches for selected agri-environmental measures (AEM) using farm accountancy data from Germany. The remainder of this paper is organised as follows: first, the effect of flat-rate payments based on standard-cost approaches is illustrated, followed by a discussion of the motivations for differentiated approaches and the subsequent outline of an evaluation framework and related indicators. Then, a short overview of the data used for the numerical analyses is given. Chapter 4 provides an overview of the main results as well as the outcome of sensitivity analyses. The paper concludes with a summary of main findings and an outlook on future research questions.

2. Payment differentiation

2.1 Conceptual framework

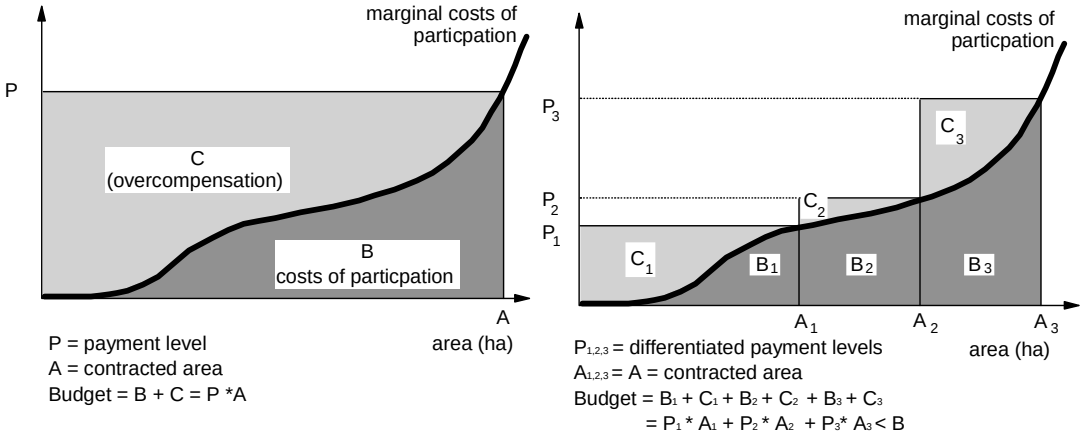
Many of the rural development measures in the EU offer a fixed per-ha payment to farmers for the compliance with a predetermined set of management prescriptions. The determination of payment levels is often based on standardised values for costs incurred by farmers from implementing the measures, which is explicitly endorsed in the EU regulation[1] for many rural development measures[2]. Figure 1 provides a schematic illustration of the effects of related simple flat-rate payments and more differentiated schemes on uptake and expenditure. Eligible land is sorted by costs incurred by farmers when participating. In favour of simplicity, for the time being we

[1] EC Reg 1974/2006, §53(1) Where appropriate Member States may fix the level of support [...] on the basis of standard costs and standard assumptions of income foregone.

[2] E.g., agri-environmental, Natura 2000, animal welfare and forestry measures.

assume constant marginal benefits for each unit of land brought into the programme, and the curve of participation costs represents the 'supply curve' of the public good.

Figure 1: Schematic illustration of the effect of flat-rate vs. differentiated payments



The basic idea of differentiating payments is not to offer a single payment level to all potential participants, but rather to try to separate farms (into groups) by their costs of participation. In theory, differentiated payment levels can be significantly lower than a uniform flat-rate and still provide a financial incentive for participation to the same number of farms, thus reducing budget expenditure.

Key issues for the analysis of payment differentiation are, firstly, the question of how to evaluate the performance of differentiated approaches, which is closely linked to the discussion of the objectives for differentiation, and secondly, the possibilities for an effective separation of farms into groups with different costs, or even approximation of individual costs, which is essentially an empirical question.

2.2 Objectives of payment differentiation

Payment differentiation is not an objective in itself, and the motivation for differentiating payments depends crucially on the point of view of the decision maker and the related underlying decision problem. Three main objectives for payment differentiation can be identified (Table 1):

- For policy makers at EU level, coherency with the general framework of agricultural policies and compliance to international treaties play an overarching role, which is reflected in the meticulous consideration of WTO concerns in the related EU legislation. Several paragraphs of the related legislation are targeted at fulfilling the Green Box requirements detailed in the Uruguay Round Agreement for Agriculture, Annex 2, § 12(b). In addition to almost exactly replicating the wording of the WTO text[3], further specifications of procedures for payment calculations are made to warrant that these comply with the intended objectives and purposes of the WTO text. Considerable effort is spent on detailing requirements for member states to ensure that payment calculations are based on objectives rather than political criteria, and that there is evidence and information on methodology, assumptions and parameters to allow the Commission to review

[3] EC Reg 1698/2005, §39(4): The payments shall be granted annually and shall cover additional costs and income foregone resulting from the commitment made.

consistency and plausibility of the calculations (EC Reg 1974/2006, §48(2), §53(2)). The rationality for payment differentiation thus lies in the attempt to limit the payments to actual participation costs and reduce overcompensation which may arise under flat-rate payment schemes and endanger WTO conformity.

- In the EU, it is the national or regional administration that is responsible for the design and implementation of concrete measures. On this level, in addition to the general framework for payment calculations being exogenously set, agricultural administration often faces quasi-fixed budgets for specific policy areas, and the decision problem poses itself as a maximisation of programme benefits under budget constraints. Payment differentiation in this context is an option to increase budgetary efficiency.
- From a more general economic point of view, the comparison of different policies needs to take into account overall benefits and costs for society.[4] In applied welfare economics – the traditional economic cost-benefit analysis – the net contribution of a policy change to society's welfare is analysed, regardless of distributional effects. The performance of payment differentiation is evaluated with respect to its impact on economic efficiency.

Table 1: Objectives for payment differentiation

Main objective	**Specific objective for payment differentiation**
Comply with WTO green box requirements	Reduce overcompensation
Optimise programme benefits under budget restrictions	Increase budgetary efficiency
Optimise Social Welfare	Increase economic efficiency

3. Data and Methodology

3.1 Evaluation Framework

Depending on the objective for payment differentiation, different sets of indicators suited for the comparison of different policies need to be identified. A key problem for the evaluation is that the performance of payment differentiation cannot be evaluated exclusively with regard to one of the three objectives identified above: Independent of the specific motivation for payment differentiation, in all cases the payments are made to pursue a rural development objective, e.g. an environmental benefit, and an comparison of the effect of a policy change needs to take into account the impact on both aims, e.g. reduction of overcompensation and provision of environmental public goods. If, for example, a differentiated payment reduces social costs as well as societal benefits, the corresponding objectives need to be weighted, or, as is often the case in economic analysis, the societal benefits of farmers' program participation need to be valued in monetary terms, which is notoriously difficult. As a solution to this problem, this study compares policies which are assumed to achieve the same result (i.e. same

[4] This study takes the decision on the general type of policy instrument (i.e. payment for adopting certain management practices which affect provision of public goods) as given.

outcome with respect to the rural development objective of the specific measure analysed).

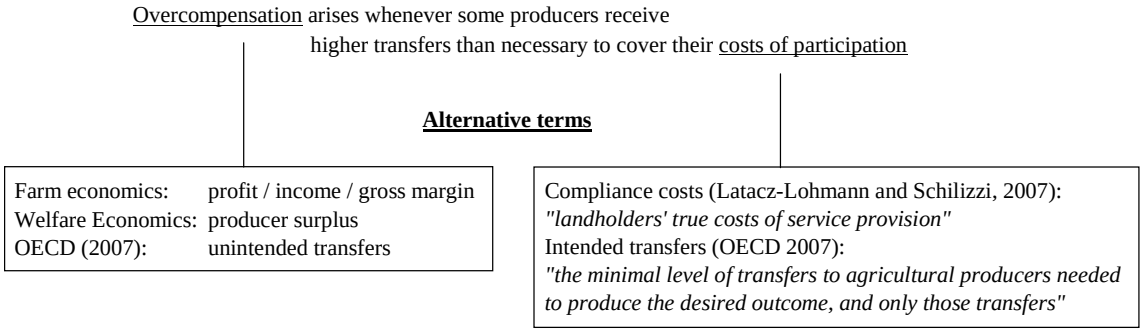
In the following section, firstly individual indicators for each objective will be presented, before moving on to the discussion of a common framework which allows to take into account several objectives at the same time.

3.1.1 Reduction of overcompensation

In the context of rural development measures, overcompensation refers to situations in which some producers receive higher transfers than necessary to cover their costs of participation. The term 'overcompensation' is pejorative and in public discussion often seems to imply that 'farmers get too much money'; other terms exist (Figure 2) which describe the same phenomenon but have a very different connotation: In farm economics, the part of payments exceeding costs is part of the profit, or farmers income, and seen as the remuneration of the farmers' resources for the provision of a public good. This point of view is quite similar to the understanding of the more neutral term of 'producer surplus' used in welfare economics. The OECD (2007a) uses the term 'unintended transfers', which also has a negative connotation, but, in contrast to the term overcompensation, seems to put the blame more strongly on policy makers for not using public funds efficiently.

The costs of participation are the farmers' net costs (i.e. balance of revenue and costs changes) from implementing the measures, and have in the literature also been termed 'compliance costs' (Figure 2). The OECD (2007a) in this context uses the term 'intended transfers', which is identical to the costs of participation under a first best policy.

Figure 2: Terminology



Indicators commonly used to measure the performance of a policy in this context are the overcompensation rate (e.g. Latacz-Lohmann and Schilizzi, 2007) and the targeting rate (OECD, 2007a):

$$\text{Overcompensation rate} = \frac{\text{Total transfers}}{\text{Compliance Costs}}$$

$$\text{Targeting rate} = \frac{\text{Intended transfers}}{\text{Total transfers}}$$

3.1.2 Increase of budgetary efficiency

In the case of the rural development measures, the most visible, though not necessarily main, part of the budget is resulting from the payments made to participating farmers.

However, economic analyses increasingly raise the issue of transaction costs arising from implementation of policies (e.g. ITAES; OECD 2007a). This aspect is of specific relevance also for this study, as differentiated payments may in many cases entail increased administrative efforts, the costs of which should also be reflected in budgetary considerations.[5]

Budget is thus defined as the sum of transfers and administrative costs

budget = transfers + administrative costs

Whereas budgetary efficiency generally is defined as budget expenditure in relation to achieved results (e.g. Euro spent per kg N abated), in our case, as we compare polices with the same result (see above), the indicator reduces to

$$\text{budgetary efficiency}_{\text{policy B}} = \frac{\text{budget}_{\text{policy B}}}{\text{budget}_{\text{policy A}}}$$

with policy A being our reference policy, i.e. the undifferentiated flat-rate payment.

3.1.3 Increase of economic cost-effectiveness

For the analysis of the impact of differentiated approaches for determining payment levels of rural development measures on welfare, the following components of welfare changes are taken into account in this study:

- deadweight losses (welfare triangles): this study focuses on deadweight losses on the production side, as we assume that the changes to payment levels of the rural development measures do not have any impacts on prices
- policy-related transaction costs (PRTCs): the costs of setting-up, maintaining, changing and implementing policies (e.g. information gathering, planning, monitoring) for the administration as well as for the farmers (OECD, 2007a)
- external effects: this study assumes that external effects are limited to the intended provision of societal benefits from farmers' programme participation

Deadweight losses and PRTCs are part of the resource costs to society (OECD, 2007a). Whereas economic cost-effectiveness generally is defined as resource costs in relation to achieved results (e.g. resource costs per kg N abated), in our case, as we compare polices with the same result (see above), the indicator reduces to

$$\text{economic cost-effectiveness}_{\text{policy B}} = \frac{\text{resource costs}_{\text{policy B}}}{\text{resource costs}_{\text{policy A}}}$$

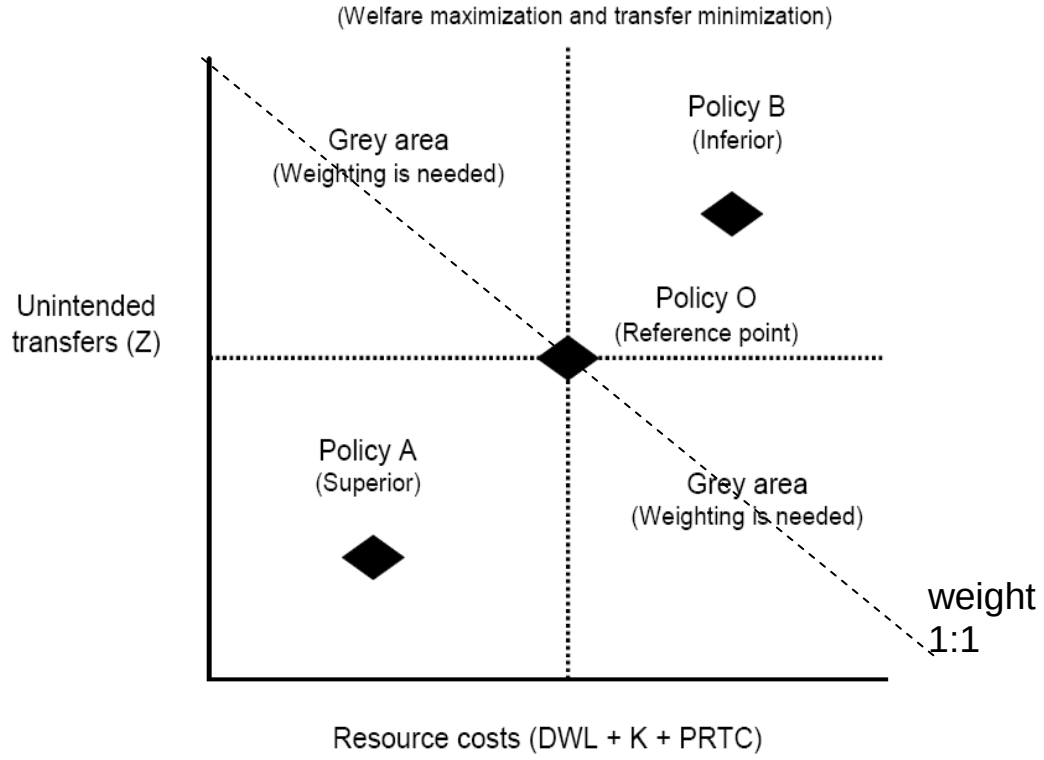
3.1.4 The OECD framework for evaluating implementation costs of agricultural policies

The performance and relative ranking of differentiated policies is likely to differ depending on the objective pursued. Simultaneously taking into account the different views raises the usual problems faced in applied multi-objective decision making, e.g. questions of acceptability of trade-offs or appropriate weighting. The OECD in its work on implementation costs of agricultural policies (OECD, 2007a) has focused on

[5] In practice, faced with continuous slashing of administrative resources, administrations seem to weigh an increase in administrative costs much higher than a corresponding increase of overall budgetary efficiency.

the two objectives of minimizing resource costs and limiting unintended transfers. In the graphical representation of the problem (Figure 3), resource costs are represented on the X-Axis and unintended transfers on the Y-Axis. Whereas some policies can be unambiguously identified as either inferior (Policy B) or superior (Policy A), we cannot say whether any policy falling in the grey areas is inferior or superior to the reference policy (Policy O). When the choice is indeterminate, policy makers might want to weigh the two types of costs. The OECD suggests, in the absence of any plausible alternative, to assume that a dollar of welfare gain is equivalent to a dollar of transfer, whoever is affected. This would split the diagram along the dotted line, with policies located below the line being evaluated as 'superior' to the reference policy. Interestingly, for our case of payments made for the provision of public goods, and under the assumption that PRTCs arise for the administration only (and are zero for farmers), applying identical weights to the objectives of economic cost-effectiveness and reduction of unintended transfers results in the same ranking of polices as does evaluating by budgetary efficiency.

Figure 3: Graphical illustration of the impact of resource costs and unintended transfers for policy evaluation



Source: Modified, based on OECD (2007a), Annex I.3

With respect to the design of payments for rural development measures, there is scope to argue that the objective of limiting unintended transfers has a high political relevance, as failure to do so might infringe WTO requirements and may endanger the provision of these measures in the longer run. The degree of attention paid to aspects of payment calculation in the EU framework regulation for rural development programmes is evident to this hypothesis. Therefore, a sensitivity analysis has been carried out for the empirical examples to identify the effect of a higher weighting of the objective of limiting unintended transfers.

3.2 Measures analysed

This case study is embedded into the EU research project *AGRIGRID*, which seeks to develop methodological grids for the calculation of payment levels in selected rural development measures. On the basis of a literature review and expert interviews in ministries and related institutions, all project partners generated a fairly detailed summary report on actual methods of payment calculations encompassing selected rural development measures (Hrabalova et al., 2007). On the basis of this report, several stylised examples are developed, reflecting selected voluntary rural development measures.

In Germany, a large number of agri-environmental measures are offered by the various German Laender (Hartmann et al., 2006). The majority of measures are offered region-wide, particularly those measures which are focused on agricultural production processes, while measures focussing on nature protection are often targeted to specific designated areas. We can differentiate between

- measures which affect the whole farm (e.g. organic farming, environmentally sound application of farm manure)
- measures which affect single enterprises (e.g. extensification of total pasture and meadow area, renunciation of herbicides on arable land, crop rotation diversity, conservation/buffer strips on arable land), and
- measures which target specific production activities (e.g. mulch/direct drilling, biological plant protection in fruit growing, cropping with underseeds in vineyards).

In addition, for our analysis it is helpful to distinguish between measures which

- do not (or only to a small extent) affect yields or revenues, and for which compliance costs result mainly from additional machinery, labour and/or seed costs (e.g. environmentally sound application of farm manure, soil analyses, cropping of intercrops). Generally, variances of compliance costs are comparatively small between participating farms for these measures.
- do affect yields or revenues, and for which compliance costs are to a large extent determined by a change in yields resulting from programme participation (e.g. conservation/buffer strips on arable land, conversion of arable land to extensively used permanent grassland, restrictions on agro-chemical inputs). For these measures, compliance costs largely depend on yield levels realised before participation.

Since variances in revenues are generally larger than variances in costs incurred by participation, this investigation focuses on variances in revenues. For the quantitative analysis, we developed stylised examples which reflect key characteristics of many existing measures influencing the potential and performance of differentiated payment schemes. Regarding the impact of agri-environmental measures on revenues, the stylised examples distinguish two cases:

- For measures targeting specific production activities, many of the payment calculations assume a reduction of revenues as a consequence of participation. Generally, in the calculation of agri-environmental payments affecting crop production this reduction is assumed to depend on yield levels (Hrabalova et. al, 2007), which implies that compliance costs will strongly vary depending on the yield level realised before participation. We have selected wheat and potato yields

as indicators of the level of participation costs for measures focussing on arable extensification (e.g. renunciation of growth inhibitors in cereal production; renunciation of synthetic plant protection in potato growing; conservation strips on cereal area). Wheat is the most important cereal in Germany, and potatoes have been chosen as an example for a crop with high yield differences between farms.

- For agri-environmental measures affecting all arable land (e.g. renunciation of synthetic fertilisers and plant protection products; flower strips on arable land), many of the payment calculations for German agri-environmental measures are based on the Standard Gross Margin (SGM) of an average crop rotation. We therefore analysed the impact of differences in the SGM of farm individual crop rotations.

Generally, yields cannot be observed on a farm individual level at reasonable administrative costs. Crop rotational information might be more readily available from the Integrated Administrative Control System (IACS). However, payment levels need to be calculated on a historical (i.e. pre-participation) basis, which would be difficult for farms which already participated in agri-environmental schemes in the past.[6] The challenge thus lies in approximating these indicators using available data from regional statistics or observable, time-invariant farm characteristics.

A crucial point for the analysis is the identification of the link between (ecological) benefits and participation costs. Outcome-based measures are almost non-existent in agri-environmental programmes in the EU, and action-related measures predominate. Depending on the specific measure, benefits per unit of land enrolled in the programme may more or less depend on individual farm characteristics. Very few studies exist which provide quantitative information on the benefits or ecological effectiveness of rural development measures depending on farm characteristics. Benefits will almost always depend on environmental states of the individual farms as well as of the total region before the implementation of agri-environmental programmes and targeting is essential. For this study, we assume that measures are targeted and focus on the issue of tailoring.[7] In the simplest case, each unit of land brought into the programme provides the same societal benefit. This relationship is also implied by the flat-rate per-ha payments of EU agri-environmental measures, and could be a plausible assumption for measures aiming to provide landscape elements like flower strips in a homogenous region. However, often, benefits may increase with the production intensity of participating farms and thus in many cases with participation costs[8], e.g. for measures aiming to reduce nitrate leaching.

Therefore, in this study all analyses have been carried out for two different assumptions on the link between (ecological) benefits and farm characteristics:

---

[6] In addition, this could induce an incentive to 'distort' rotations if farms plan to enter new measures.

[7] The OECD (2007b) distinguishes 'targeted policies', which aim at specific outcomes, populations or areas, and 'tailored policies' which provides transfers no greater than necessary. For this study, we assume measures are targeted and focus on the issue of tailoring.

[8] Though there may be cases where (initial) contribution may be higher for participation of extensive farms, e.g. for measures aiming at increased biodiversity as some rare species are exclusively connected to extensive land.

E1: Each unit of land brought into the programme provides the same benefit (reflecting, e.g., the impact of agri-environmental measures like flower strips in a homogenous landscape)

E2: Benefits of programme participation are linearly linked to the level of participation costs (reflecting, e.g., the impact of agri-environmental measures requiring a reduction of production intensity, as effects on nutrient balances or biodiversity will depend on production intensity before participation)

As a reference, payment levels are calculated on basis of a simple standard cost approach, i.e. the payment level equals (assumed) average participation costs within one federal state of Germany, reflecting current practice. This reference payment level thus provides a financial incentive for approximately 50% of the eligible area. Analysed differentiated standard cost approaches comprise

A) payment levels determined on lower administrative or geographical levels, i.e. the payment levels equal (assumed) average participation costs orientated on average revenues within

   A1) regions defined on NUTS II level

   A2) regions defined on county / rural district level (NUTS III)

B) payment levels determined on individual farm level. For a farm individual differentiation, an indicator is needed which serves as a proxy for costs of participation and is easily accessible (i.e. observable at low costs). In Germany, an example for such an indicator is the LVZ (*landwirtschaftliche Vergleichszahl 'agricultural comparison figure'*), which relates to yield potentials based on soil indices with some corrections for location and climate. The LVZ is easily available for each farm as it is the basis of the agricultural tax system, and it is an accepted indicator for payment differentiation and has in the past already been used in some regions as basis for differentiation of less favoured area payments.

The stylised examples assume that the hypothetical measures offered require farmers to comply with the specified obligations on one hectare of their arable land. Depending on the type of measure, participation costs depend on the revenues of a) one ha of wheat production, b) one hectare of potato production, or c) one hectare of arable land which is part of a typical crop rotation (all crops considered are substituted according to their corresponding ratio within the crop rotation).

3.3 Data

The analysis is based on information from the German Farm Accountancy Data Network (FADN), which covers approximately 11 000 farm accounts. Data is available on a yearly basis, however the sample is an unbalanced, rotating panel, and on average 8 % of the sample farms are replaced each year. To avoid yearly fluctuations of variables to distort results, the analyses focus on 5-year averages, matching the contract period of many rural development measures. For this analysis, data refers to the years 2001-2005, and only farms present in the sample in all five years have been included. Since there might be an impact on analysed variables, farms have been excluded which do already participate in respective rural development measures. With the exception of organic farming, there is no code in the FADN which allows to identify participation in specific rural development measures. However, hardly any measures for extensification affecting arable cropping were offered in the case-study regions in the corresponding period, and for the few measures available,

participation rates were low. Therefore, we excluded only organic and in-conversion farms from the sample, and assume that remaining farms are non-participants in agri-environmental measures for arable land.

Table 2 gives an overview of the sample data and the detail of differentiation. For the reference, payment levels are determined based on average values for all sample farms within a single federal state, as this is the administrative level on which rural development programmes are designed in Germany. The descriptive analysis of the empirical data already indicates that both the regional and the farm individual approach to payment calculation may be limited in their scope to improve on the simple standard cost approach:

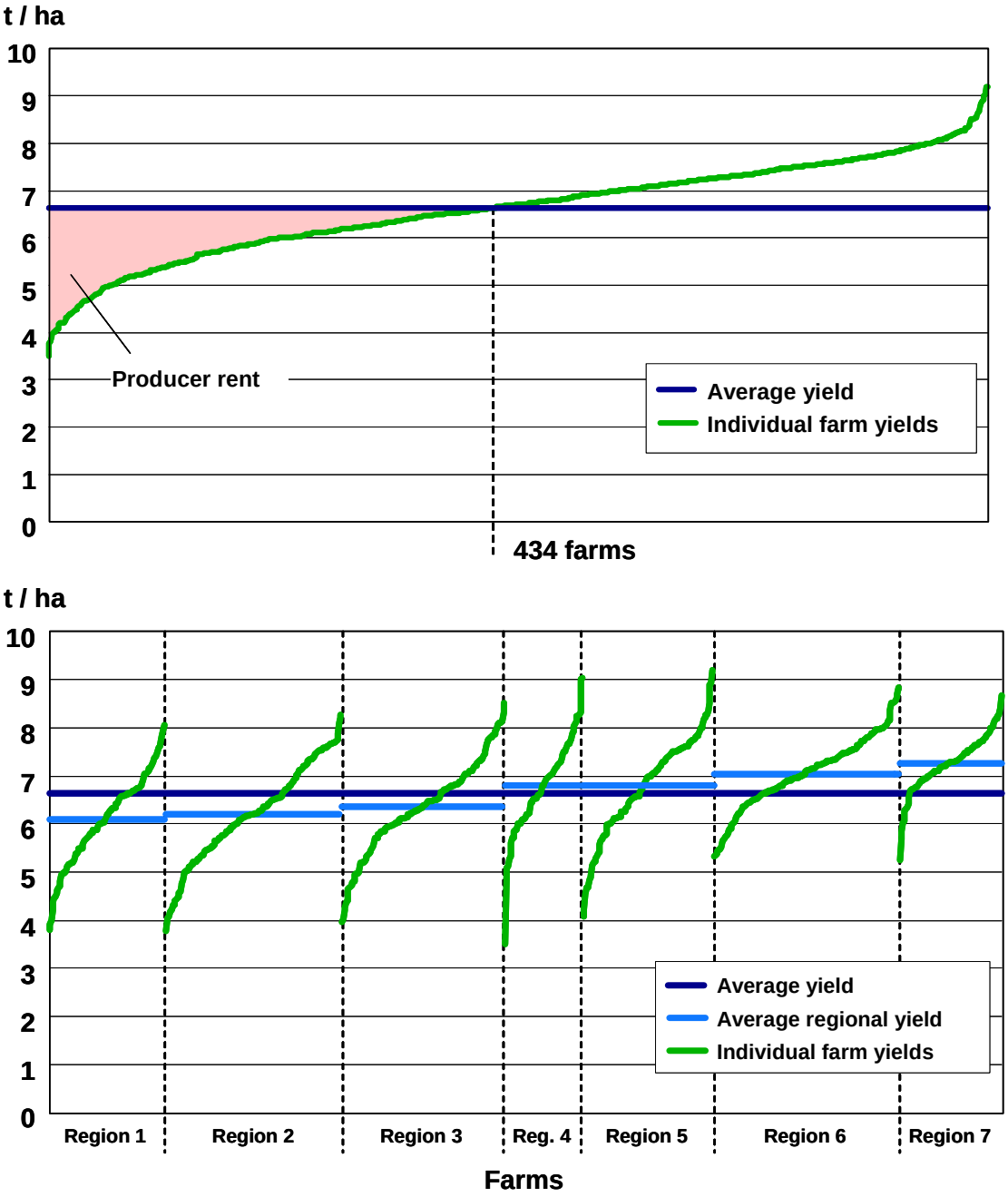
- While there are differences in regional average yields, yield variances within the sub-regions remain large. As an example, Figure 4 illustrates the distribution of wheat yields of the sample farms in Bavaria.
- The correlation coefficients between yields or SGM of crop rotation and the soil-climate indicator for yield potential (LVZ) range from 0.2 (potato yields in North-Rhine-Westphalia) to 0.6 (wheat yields in Lower Saxony). Reasons for the comparatively low correlation coefficients are seen in the fact that the LVZ is based on estimations from the 1930s, and while soil qualities may be assumed to be rather constant, technical progress, new crop variants and possibly climate change seem to have reduced correlation of LVZ and yields. In addition, yield levels are influenced by farm manager abilities and economic considerations (maximum yield generally is not equal to optimum yield), which reduces the correlation between yields and LVZ.

Table 2: Sample data and the detail of differentiation

Federal state	**NUTS II regions**	**NUTS III regions**	**revenue depending on**	**number of farms**
Bavaria	7	66	wheat yield	934
			potato yield	254
			SGM of crop rotation	1475
Lower Saxony	4	28	wheat yield	472
			potato yield	209
			SGM of crop rotation	1080
North-Rhine-Westphalia	4	34	wheat yield	512
			potato yield	75
			SGM of crop rotation	773

Few information on administration costs of environmentally measures exists, and the empirical studies highlight a large variation between measures and regions (OECD, 2007a). For this study, we calculated all examples with zero and with additional administration costs amounting to 3% of transfers, and in addition calculated break-even points, that is the level of administration costs above which differentiation becomes unfavourable.

Figure 4: Distribution of wheat yields (average 2001-2005) in sample farms in Bavaria



4. Results

In the following sections, the performance of payment differentiation is presented with a view to the single objectives identified above, encompassing a sensitivity analysis with respect to the level of administration costs. Subsequently, trade-offs between the reduction of unintended transfers and economic cost-effectiveness are illustrated by applying the framework of the OECD, highlighting the impact of assigning different weights to the objectives as wells as of different levels of administration costs.

4.1 Impact of differentiated payment levels on overcompensation, budget and economic efficiency

Based on the results (Table 3, Annex) the following tendencies can be formulated with respect to the performances of differentiated payments:

- The rate of overcompensation is reduced in almost all cases. Exceptions occur in some instances for the farm individual differentiation, which is a consequence of the comparatively low correlation of the proxy used for participation costs and true yield levels. Generally, the extent of the reduction of overcompensation is often limited also for the regional differentiation, as the variances of participation costs are high even within small regions. The best performances are observed for the differentiation of payment levels on NUTS III level, with reductions of the overcompensation rate by up to 11% in the case of measures targeting potato growing in North-Rhine-Westphalia and measures targeting the complete crop rotation in Lower Saxony.
- If additional administrative costs of differentiated approaches are negligible, budgetary expenditures can be reduced in the majority of cases, particularly if ecological benefits rise with participation costs.
- Resource costs increase, especially if ecological benefits are assumed to be constant per ha of land contracted. In many cases, differentiation on NUTS III level significantly reduces economic cost-efficiency.
- In case differentiation causes additional PRTCs, performance is significantly reduced. Budgetary effectiveness is improved by differentiation of payments in only two cases if assumed additional PRTCs amount to 3% of transfers.

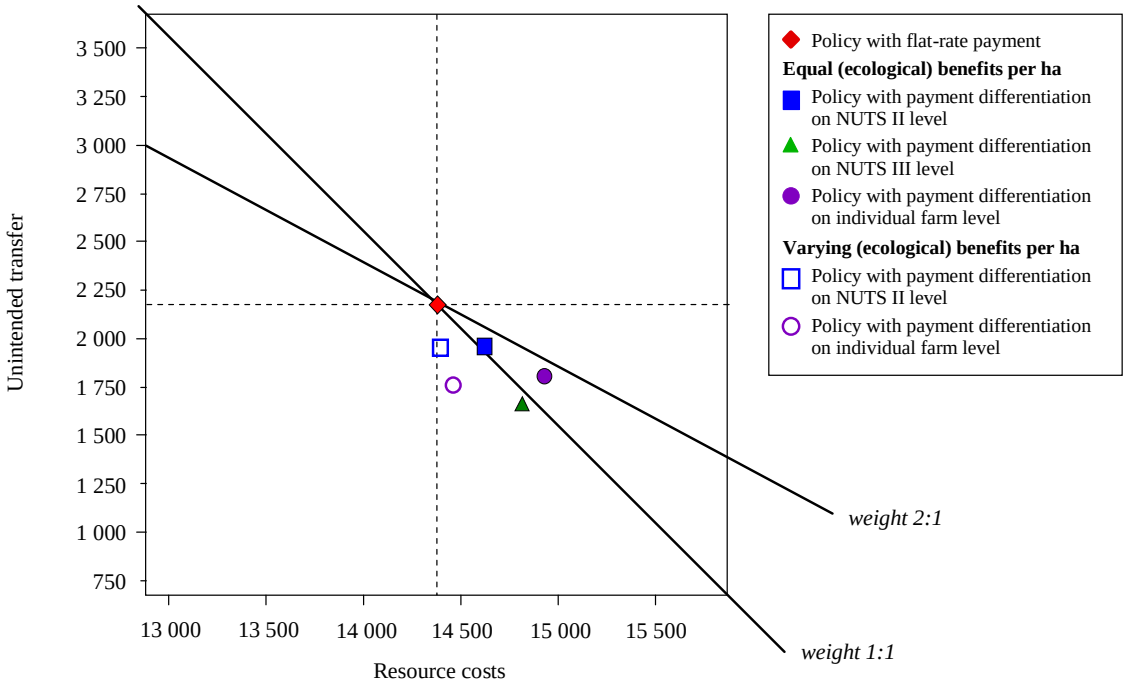
4.2 Performance of differentiated payment levels with a view to unintended transfers and economic cost-effectiveness

The following section investigates the performance of policies with differentiated payment levels on resource costs and unintended transfers, using the graphical illustration of the OECD framework to highlight the trade-off between the two objectives.

Figure 5 provides an overview of the performance of differentiated payments in relation to flat-rate payments of a hypothetical agri-environmental measure for wheat areas in Lower Saxony (excluding additional PRTCs).

- For this example, in general all variants of payment differentiation reduce unintended transfers at higher resource costs, and without weighting the considered objectives no clear ranking of policies can be established. This becomes specifically evident for payment differentiations at NUTS III level, where transfers are often significantly reduced while involving the highest resource costs, which can be observed also for most of the other case-studies.
- Weighting both objectives equally highlights the potential of differentiation, particularly if ecological benefits increase with participation costs. Three out of the five differentiated approaches perform better than the flat-rate policy.
- Allocating a higher weight to the objective of reducing unintended transfers (weighting ratio of 2:1) improves the performance of all differentiation approaches in comparison to a flat-rate policy.

Figure 5: Unintended transfers and resource costs for different approaches to payment differentiation, for an agri-environmental measure targeting wheat areas in Lower Saxony



While this example highlights some important tendencies, the performance of differentiation often depends on region and measure characteristics:

- For measures targeting potato areas, the performance of differentiated approaches is often poor, as variances in farm individual yields are poorly captured by regional classification or the soil-climate index. Assigning both objectives equal weights, differentiation is evaluated inferior to a flat-rate policy in more than half of respective cases.
- In one quarter of all considered cases even a 2:1 weighting in favour of the objective ‘reducing unintended transfers’ does not lead to a favourable evaluation of differentiated approaches. This becomes specifically evident for a differentiation on farm and NUTS II levels. Unfavourable evaluations are predominantly observed for measures targeting potato areas (5 cases).

The level of additional administrative costs incurred by the implementation of differentiated policies proves to be crucial for the evaluation of the performance (Table 4). We calculated the maximum level of administrative costs (as a percentage of total transfers) at which a payment differentiation is still superior to a flat-rate policy. In several cases, differentiated payments are already inferior to flat-rate payments even if no PRTCs are considered. In most cases with a 1:1 weighting of objectives, PRTCs for measures targeting wheat or potato areas have to be lower than 1 % of transfers for differentiated approaches to be recommendable. For measures targeting crop rotations, administration costs can often be higher (4-5%).

Higher PRTCs for the implementation of differentiated approaches can be accepted if a weighting ratio of 2:1 on unintended transfers versus resource costs is applied. Particularly for differentiations on NUTS III level, PRTCs may amount to up to 18% of transfers and still be superior to a flat-rate policy.

5. Conclusions

Preliminary results show that though overcompensation can be reduced by payment differentiation in most cases, savings in budget expenditures are often small and are even offset by increasing PRTCs. The evaluation of the overall performance of payment differentiation strongly depends on the weights attached to the objective of reducing unintended transfers. Generally, the scope for effective and efficient differentiation depends on specific measure characteristics. Potential benefits of differentiated approaches are higher if

- variances of participation costs in the universe of farms are high
- discriminatory nature of differentiation is significant
  - for regional differentiation, differences between subregions need to be high while variances within sub regions should be low
  - for farm individual differentiation, the correlation between actual farm individual costs of participation and selected indicators for payment determination must be high
- correlation between costs of participation and environmental benefits are strong
- administration costs for differentiation approaches are low

For considered hypothetical agri-environmental measures it has been assumed that measure participation is causing participation costs to all farmers. However, there are specific measures, for example ‘diversifications of crop rotations’ or ‘extensive grassland usage’ where some farmers already respect measure requirements and do not face any adaptation costs but obtain pure windfall profits. In the following research period it is planned to extend our analysis to respective measures. Further, it is planned to analyse a hypothetical agri-environmental measure with nonlinear correlations between yield and ecological benefits as relevant for many nature conservation measures. Incorporating theses aspects might change outcomes considerably.

References

EU-Commission (2005) Agri-environment Measures - Overview on General Principles, Types of Measures, and Application (EAFRD).

Hartmann, E., Schekahn, A., Luick, R., Frieder, T. (2006). Kurzfassungen der Agrarumwelt- und Naturschutzprogramme, BfN-Skripten 161, Bonn: Bundesamt für Naturschutz.

Latacz-Lohmann, U. and Schilizzi, R. (2005): Auctions for conservation contracts. A review of the theoretical and empirical literature. Report to the Scottish Executive and Rural Affairs Department. (Project no: UKL/001/05)

Latacz-Lohmann, U. and Schilizzi, R. (2007): Quantifying the benefits of conservation auctions. EuroChoices, Vol. 6, No. 3: 32-38.

OECD (2007a): The implementation costs of agricultural policies.

OECD (2007b): Policy design characteristics for effective targeting.

Annex

Table 3: Impact of differentiated payment levels on overcompensation, budget and economic efficiency

Measure application in federal	Differentiation level	Rate of over compensation	Budgetary cost effectiveness	Economic cost effectiveness	Including additional PRTC's: Budgetary cost effectiveness	Including additional PRTC's: Economic cost effectiveness
		flat-rate = 100 %			flat-rate = 100 %	
Wheat North-Rhine-Westphalia	**Equal benefits per ha**					
	NUTS II level	98.8	101.2	102.4	104.2	105.8
	NUTS III level	98.3	99.7	101.4	102.7	104.7
	Farm level	100.2	100.4	100.1	103.4	103.5
	Varying benefits per ha					
	NUTS II level	98.8	99.3	100.5	102.3	103.8
	Farm level	100.3	99.9	99.7 [a)]	102.9	103.0
Lower Saxony	**Equal benefits per ha**					
	NUTS II level	98.6	100.2	101.7	103.2	105.2
	NUTS III level	96.6	99.5	103.0	102.5	106.5
	Farm level	97.4	101.1	103.8	104.2	107.3
	Varying benefits per ha					
	NUTS II level	98.7	98.8	100.1	101.8	103.5
	Farm level	97.4	98.0	100.5	100.9	103.9
Bavaria	**Equal benefits per ha**					
	NUTS II level	98.0	99.4	101.5	102.4	104.9
	NUTS III level	96.5	99.8	103.4	102.8	106.9
	Farm level	97.8	99.7	101.9	102.7	105.3
	Varying benefits per ha					
	NUTS II level	98.0	97.9	99.8 [a)]	100.8	103.2
	Farm level	97.9	98.0	100.1	100.9	103.5
Potatoes North-Rhine-Westphalia	**Equal benefits per ha**					
	NUTS II level	97.6	105.0	107.6	108.1	111.8
	NUTS III level	89.0	106.2	119.2	109.3	123.5
	Farm level	99.1	99.6	100.5	102.6	104.5
	Varying benefits per ha					
	NUTS II level	95.3	98.5	103.4	101.5	107.3
	Farm level	99.1	99.6	100.5	102.6	104.5
Lower Saxony	**Equal benefits per ha**					
	NUTS II level	98.0	98.7	100.8	101.7	104.7
	NUTS III level	90.5	99.1	109.5	102.0	113.4
	Farm level	99.9	100.9	100.9	103.9	104.9
	Varying benefits per ha					
	NUTS II level	98.0	98.7	100.8	101.7	104.7
	Farm level	99.7	100.6	100.9	103.7	104.9
Bavaria	**Equal benefits per ha**					
	NUTS II level	96.8	101.4	104.8	104.4	108.8
	NUTS III level	90.6	101.0	111.6	104.1	115.5
	Farm level	99.9	101.4	101.5	104.4	105.5
	Varying benefits per ha					
	NUTS II level	96.3	96.3	100.0	99.2	103.8
	Farm level	100.2	100.0	99.8 [a)]	103.0	103.8

[a)] Less than 100 % due to integer number of contracts.

continued on next page

Table 3 (continued): Impact of differentiated payment levels on overcompensation, budget and economic efficiency

Measure application in federal	Differentiation level	Rate of over compensation	Budgetary cost effectiveness	Economic cost effectiveness	**Including additional PRTC's** Budgetary cost effectiveness	**Including additional PRTC's** Economic cost effectiveness
		flat-rate = 100 %			flat-rate = 100 %	
Crop rotation North-Rhine-Westphalia	**Equal benefits per ha**					
	NUTS II level	99.9	109.6	109.8	112.9	113.9
	NUTS III level	90.3	97.2	107.6	100.1	111.3
	Farm level	95.4	95.5	100.1	98.4	103.7
	Varying benefits per ha					
	NUTS II level	95.5	95.6	100.0	98.4	103.6
	Farm level	95.5	95.3	99.9 [a)]	98.2	103.5
Lower Saxony	**Equal benefits per ha**					
	NUTS II level	94.8	95.2	100.4	98.1	104.3
	NUTS III level	88.8	92.9	104.6	95.7	108.4
	Farm level	99.1	99.1	100.0	102.1	104.1
	Varying benefits per ha					
	NUTS II level	94.6	94.7	100.1	97.5	103.9
	Farm level	99.0	99.0	100.0	101.9	104.0
Bavaria	**Equal benefits per ha**					
	NUTS II level	101.4	101.8	100.4	104.9	104.1
	NUTS III level	95.3	97.6	102.5	100.6	106.0
	Farm level	99.8	99.8	100.0	102.8	103.6
	Varying benefits per ha					
	NUTS II level	101.2	101.1	99.9 [a)]	104.1	103.5
	Farm level	99.8	99.8	100.0	102.8	103.6

[a)] Less than 100 % due to integer number of contracts.

Table 4: Trade-offs between objectives ‘reducing unintended transfers’ and ‘reducing resource costs’ with different weightings and PRTCs

Measure appliction in federal state	Differentiation level	Evaluation with no additional PRTC's			Level of PRTC at break-even point % of transfers	
		without weighting	Weighting 1:1	Weighting 2:1	Weighting 1:1	Weighting 2:1
Wheat						
North-Rhine-Westphalia	**Equal benefits per ha**					
	NUTS II level	indeterminate	inferior	inferior	-	-
	NUTS III level	indeterminate	superior	superior	0.3	1.9
	Farm level	inferior	inferior	inferior	-	-
	Varying benefits per ha					
	NUTS II level	indeterminate	superior	superior	0.7	1.9
	Farm level	indeterminate	inferior	inferior	-	-
Lower Saxony	**Equal benefits per ha**					
	NUTS II level	indeterminate	inferior	superior	-	1.0
	NUTS III level	indeterminate	superior	superior	0.5	3.6
	Farm level	indeterminate	inferior	superior	-	1.1
	Varying benefits per ha					
	NUTS II level	indeterminate	superior	superior	1.2	2.5
	Farm level	indeterminate	superior	superior	2.1	4.6
Bavaria	**Equal benefits per ha**					
	NUTS II level	indeterminate	superior	superior	0.6	2.5
	NUTS III level	indeterminate	superior	superior	0.2	3.4
	Farm level	indeterminate	superior	superior	0.3	2.3
	Varying benefits per ha					
	NUTS II level	superior	superior	superior	2.2	4.2
	Farm level	indeterminate	superior	superior	2.1	4.2
Potatoes						
North-Rhine-Westphalia	**Equal benefits per ha**					
	NUTS II level	indeterminate	inferior	inferior	-	-
	NUTS III level	indeterminate	inferior	superior	-	2.0
	Farm level	indeterminate	superior	superior	0.4	1.3
	Varying benefits per ha					
	NUTS II level	indeterminate	superior	superior	1.5	5.6
	Farm level	indeterminate	superior	superior	0.4	1.3
Lower Saxony	**Equal benefits per ha**					
	NUTS II level	indeterminate	superior	superior	1.3	3.2
	NUTS III level	indeterminate	superior	superior	1.0	9.2
	Farm level	inferior	inferior	inferior	-	-
	Varying benefits per ha					
	NUTS II level	indeterminate	superior	superior	1.3	3.2
	Farm level	indeterminate	inferior	inferior	-	-
Bavaria	**Equal benefits per ha**					
	NUTS II level	indeterminate	inferior	superior	-	0.9
	NUTS III level	indeterminate	inferior	superior	-	6.7
	Farm level	inferior	inferior	inferior	-	-
	Varying benefits per ha					
	NUTS II level	superior	superior	superior	3.9	7.8
	Farm level	indeterminate	inferior	inferior	-	-

continued on next page

Table 4 (continued): Trade-offs between objectives 'reducing unintended transfers' and 'reducing resource costs' with different weightings and PRTCs

Measure appliction in federal state	Differentiation level	Evaluation with no additional PRTC's			Level of PRTC at break-even point % of transfers	
		without weighting	Weighting 1:1	Weighting 2:1	Weighting 1:1	Weighting 2:1
Crop rotation						
North-Rhine-Westphalia	**Equal benefits per ha**					
	NUTS II level	inferior	inferior	inferior	-	-
	NUTS III level	indeterminate	superior	superior	2.9	12.0
	Farm level	indeterminate	superior	superior	4.7	9.5
	Varying benefits per ha					
	NUTS II level	indeterminate	superior	superior	4.6	9.3
	Farm level	superior	superior	superior	4.9	9.7
Lower Saxony	**Equal benefits per ha**					
	NUTS II level	indeterminate	superior	superior	5.0	10.4
	NUTS III level	indeterminate	superior	superior	*7.6*	18.9
	Farm level	indeterminate	superior	superior	0.9	1.9
	Varying benefits per ha					
	NUTS II level	indeterminate	superior	superior	5.7	11.3
	Farm level	indeterminate	superior	superior	1.0	2.1
Bavaria	**Equal benefits per ha**					
	NUTS II level	inferior	inferior	inferior	-	-
	NUTS III level	indeterminate	superior	superior	2.4	6.9
	Farm level	indeterminate	superior	superior	0.2	*0.4*
	Varying benefits per ha					
	NUTS II level	indeterminate	inferior	inferior	-	-
	Farm level	indeterminate	superior	superior	0.2	*0.4*