Environmental and Resource Economics **10:** 189–205, 1997.

© 1997 *Kluwer Academic Publishers. Printed in the Netherlands.*

Towards More Efficient Compensation Programmes for Tourists' Benefits From Agriculture in Europe

FRANZ HACKL and GERALD J. PRUCKNER
Department of Economics, Johannes Kepler University Linz, A-4040 Linz, Austria

Accepted 3 October 1996

Abstract. This paper covers nonmarket services provided by farmers for recreational purposes in several Central European regions. A regionally specified general equilibrium model is used to derive the efficiency conditions for a competitive equilibrium to guarantee a Pareto optimal outcome. Moreover, we present green agricultural compensation programmes in Europe and their assessment from an economic perspective. The empirical analysis focuses on tourists' willingness to pay (WTP) for the provision of agricultural landscape-enhancing services in Austria. A comparison of these measures with current voluntary compensation payments made to farmers for the preservation of an agricultural countryside in several Austrian tourism communities suggests that the hypothetical contingent valuation (CV) results represent a valid order of magnitude for the value of recreation-related agricultural services. As far as agricultural policy is concerned, environmental improvement, the stabilization of agricultural income levels, diminishing intrasectoral income differences, and the development of economically disadvantaged rural regions can be expected from directly subsidizing farmers for the provision of countryside amenities.

Key words: landscape-enhancing agricultural activities, nonmarket services, contingent valuation (CV), agricultural compensation programmes

1. Introduction

Economists have dealt with externalities for a long time. The most prominent area of research in externalities has been about environmental pollution caused by industrial production. Another important area of research on externalities has been agriculture. The ecological degradation from high pesticide and fertilizer applications and from concentrated livestock production in the absence of sufficient pastureland are typical examples of the external costs of agriculture.

On the other hand, with respect to the external benefits of the agricultural sector, there are only a few examples highlighted in economic textbooks or scientific articles, such as the increased productivity of an orchard that is brought about by the activities of a nearby beekeeper. However, there exist other external benefits of agriculture, and their importance is growing over time. Some forms of agricultural production – such as the cultivation of mountainous regions by farmers in European countries like Austria, Switzerland, Germany, Norway, and Sweden – may contribute to the pleasure of individuals, either as residents or as tourists who spend their vacation in these areas.

The purpose of this paper is to show shortcomings of existing compensation programs for agricultural landscape-enhancing activities in Europe from an economic point of view. The criticism focuses on the fact that existing measures do not altogether reflect economic efficiency conditions. The subsidy payments are rather based on ecological reasons than on an attempt to reflect marginal benefits. Therefore, we argue that improving already developed compensation schemes requires the demand side to be taken into account. Contingent Valuation (CV) seems to be an appropriate tool to measure environmental benefits associated with landscape-enhancing activities provided by agriculture. We present empirical results from a CV study on tourists' WTP for landscape-enhancing services in Austria. The reliability of the CV results is tested comparing these hypothetical figures with compensation subsidies voluntarily paid to farmers by local tourist associations and municipalities. We found that the CV figures represent a valid approximation to the order of magnitude of the value of landscape-enhancing activities. Therefore, the conclusion is made that CV can be applied to measure environmental benefits of agricultural non-market services and thus contributes to develop economically more efficient compensation schemes. Greater effort ought to be undertaken to elucidate the economic consequences of ecology-based policy decisions.

2. External Benefits of Agriculture

In addition to the production of food, feed and other raw materials, which are sold in private markets, the agricultural sector of many countries provides non-market goods – both positive and negative externalities. External benefits of agricultural production comprise primarily components of what is called a recreational or protective function of agriculture.[1] In several European countries, agricultural production areas coincide with residential areas or even with recreation sites. Thus, it becomes obvious that interdependencies exist between the agricultural sector and the rest of society. For example, Austrian agriculture (including forestry) accounts for more than 80% of the national territory and therefore is in charge of creating an appropriate landscape across the nation. As far as recreation is concerned, the relevant farmer activities include mowing the alpine grassland, taking care of the rural trial and road network, preserving the wood along rivers and brooks, and caring for alpine pastures. Moreover, the diversified arrangement of groups of trees, hedgerows and brushwood contributes to the preservation of species. All of these activities exert a positive influence on the utility of those who spend their leisure time in these regions without providing any financial compensation in return.

Since environmental amenities are essential for the prosperity of tourism, the agricultural sector provides intermediate goods for the tourism sector, for which they are not always being compensated. The relevance of these activities for the tourism sector is generally acknowledged. On the one hand, there is empirical evi-

dence that a well-kept countryside is indeed the decisive factor for tourists spending their vacation in some central European countries. On the other hand, several European countries have been granting compensation payments to mountain farmers to continue their landscape-enhancing services which are primarily for the benefit of the tourist industry.

No more than these recreation-related agricultural activities are protective benefits considered in internal farm accounting and national accounts. Agricultural cultivation, or, in particular, forest activities, protect people, animals and the material infrastructure from avalanches, landslides, erosion and rockslides. Besides the maintenance of 'disaster averting forests', the preservation of the water-holding capacity of soil as a protection against floods and water pollution represents further external benefits of agricultural production. While the protective functions occur mainly in mountainous regions, recreation-related externalities apply to lowland areas also.

The critical assessment of existing compensation programmes in Europe, which is the purpose of this paper, requires a normative analysis of the problem. The question to be answered is how an economically optimal subsidy scheme ought to be designed. Therefore, the following general equilibrium framework derives the conditions for a competitive equilibrium to coincide with a Pareto optimal allocation for a model, the utility and production functions of which include landscape-enhancing services. In Section 4 we scrutinize existing compensation models in Europe based on these theoretical efficiency conditions. Section 5 compares hypothetical and actual payments for landscape-enhancing agricultural non-market services. The paper finishes with agricultural policy conclusions in Section 6.

3. An Analytical Framework for the Provision of Tourism-related Agricultural Externalities

Our theoretical model is based on the general assumption that aggregate non-market services represent a regionally differentiable good. The individual utility results from the consumption of private goods and spending d vacation days in a specific region r where the regional externality S_r is consumed. In fact, both the vacation decision and these non-market services themselves exhibit a definite regional characteristic. For example, there is no production-based connection between the cultivation of an alpine pasture in a Tyrolean mountain valley and the shape of the countryside in other regions. Furthermore, the regions are distinguished by the provision of other non-agricultural tourist attractions. Consumers' preferences for these attractions are reflected through different individual utility functions u^j. A simple general equilibrium model may be formulated as follows.

Production function:

$$f^k(y_{1k}, \ldots, y_{Nk}, s_{rk}) \leq 0$$

Utility function:

$$u^j(x_{1j}, \ldots, x_{Nj}, d_{1j}S_1, \ldots, d_{Rj}S_R)$$

Goods market:

$$\sum_{j=1}^{J} x_{ij} - \sum_{k=1}^{K} y_{ik} \leq b_i$$

Vacation constraint:

$$\sum_{r=1}^{R} d_{rj} \leq D_j$$

where

x_{ij}	=	consumption of commodity i by consumer j
y_{ik}	=	production of commodity i by producer k
b_i	=	stock of commodity i
d_{rj}	=	vacation days spent by consumer j in region r
D_j	=	maximum number of possible vacation days for consumer j
s_{rk}	=	non-market services provided by producer k in region r
K_r	=	set of producers in region r
S_r	=	sum of agricultural non-market services in region r $(S_r = \sum_{k \in K_r} s_{rk})$
j	=	$(1 \ldots J)$ with J = number of consumers
i	=	$(1 \ldots N)$ with N = number of commodities
r	=	$(1 \ldots R)$ with R = number of regions
k	=	$(1 \ldots K)$ with K = number of firms and $K = \sum_{r=1}^{R} K_r$

The production vector of firm k contains both private input and output goods y_{ik}, and external benefits s_{rk} as a joint product of agricultural production, with the provision of non-market services differing regionally. We assume different production functions for each firm because the ability of farmers to provide externalities depends on topographical characteristics. For example, caring for alpine pastures requires the existence of mountains. To complete the model setting, we need three more definition equations, namely the market clearance condition for private goods, the adding up condition for aggregate externalities in a region r and the restriction for the maximum number of vacation days.

3.1. THE SOCIAL PLANNER

Starting off from a given endowment, a social planner chooses consumption bundles of private goods x_{ij}, output of private goods y_{ik}, the optimal level of externalities

s_{rk} and the days d_{rj} to be chosen by consumers to spend their vacation given the knowledge of the utility and production functions. Utility maximization of one individual under the assumption that nobody else is worse off ($u^j(\cdot) \geq u^{*j}, \forall j = 2, \ldots, J$) guarantees a Pareto efficient social optimum. The Lagrangian of this maximization problem becomes

$$
\begin{aligned}
L \;=\; & u^1(x_{11}, \ldots, x_{N1}, d_{11}S_1, \ldots, d_{R1}S_R) + \sum_{j=2}^{J} \lambda_j \left[u^j(\cdot) - u^{*j}\right] \\
& + \sum_{j=1}^{J} \gamma_j \left[D_j - \sum_{r=1}^{R} d_{rj}\right] - \sum_{k=1}^{K} \mu_k f^k(y_{1k}, \ldots, y_{Nk}, s_{rk}) \\
& + \sum_{i=1}^{N} \omega_i \left[\sum_{k=1}^{K} y_{ik} + b_i - \sum_{j=1}^{J} x_{ij}\right].
\end{aligned}
$$

Table I contains the Kuhn-Tucker conditions for this optimization.[2]

3.2. THE COMPETITIVE MARKET EQUILIBRIUM

Introducing prices for private goods p_i, the competitive market solution results from the maximization of consumers' utility and firms' profits.

The consumer. Maximizing the utility function given a budget constraint, we get for consumer j:

$$
\begin{aligned}
& \max u^j(x_{1j}, \ldots, x_{Nj}, d_{1j}S_1, \ldots, d_{Rj}S_R) \quad \text{s.t.} \sum_{i=1}^{N} p_i x_{ij} \\
& + \sum_{r=1}^{R} t_{rj}(d_{rj}, x_{1j}, \ldots, x_{Nj}) \leq V_j, \text{ and } D_j \geq \sum_{r=1}^{R} d_{rj},
\end{aligned}
$$

with V_j representing j's wealth.

The variable t_{rj} denotes a tax for the consumption of the external benefits S_r, the sum of individual non-market services produced by the farmers in region r. To what extent consumers should be taxed for the utilization of the cultivated landscape to guarantee a social optimum is shown below. To keep the model general we assume at this point that a possible tax may depend either on the number of vacation days or on the private consumption bundle. The Lagrangian for this problem becomes

$$L = u^j(x_{1j}, \ldots, x_{Nj}, d_{1j}S_1, \ldots, d_{Rj}S_R) + \alpha_j \left[V_j - \sum_{i=1}^{N} p_i x_{ij} - \sum_{r=1}^{R} t_{rj}(d_{rj}, x_{1j}, \ldots, x_{Nj}) \right] + \varepsilon_j \left[D_j - \sum_{r=1}^{R} d_{rj} \right],$$

with Kuhn-Tucker conditions again in Table I.

The producer. Firm k maximizes profits subject to its production function:

$$\max \sum_{i=1}^{N} p_i y_{ik} + t_{rk}(s_{rk}, y_{1k}, \ldots, y_{Nk}) \text{ s.t.} \quad f^k(\cdot) \leq 0.$$

The term t_{rk} can be interpreted as direct subsidies to the farmers for the provision of external benefits. These subsidies, the Pareto efficient level of which is shown below, may depend on the extent of produced externalities s_{rk} or on the amount of private production y_{ik} and vary across different regions. Solving for optimal y_{ik} and s_{rk} requires the maximization of the following Lagrangian.

$$L = \sum_{i=1}^{N} p_i y_{ik} + t_{rk}(s_{rk}, y_{1k}, \ldots, y_{Nk}) - \beta_k f^k(y_{1k}, \ldots, y_{Nk}, s_{rk}).$$

In comparing the first order conditions characterizing the optimal decision of a social planner and the competitive market equilibrium, the question arises as to whether a system of taxes and subsidies exists that guarantees a Pareto efficient outcome through market mechanisms. In other words, what is the optimum subsidy payment t_{rk} and 'recreation tax' t_{rj}?

The first order conditions in Table I yield following relations for the market equilibrium being Pareto efficient.

$$\sum_{r=1}^{R} \frac{\partial t_{rj}}{\partial x_{ij}} = 0, \quad \frac{\partial t_{rk}}{\partial y_{ik}} = 0, \quad \frac{\partial t_{rk}}{\partial s_{rk}} = \sum_{j=1}^{J} \lambda_j \frac{\partial u^j}{\partial v_{rj}} d_{rj}, \quad \frac{\partial t_{rj}}{\partial d_{rj}} = 0.$$

Substituting these conditions into the market solution results in an identical system of first order conditions as that of a Pareto efficient social optimum, and the following conditions will hold if the Pareto equilibrium is indeed unique (see Baumol and Oates 1988: 43).

$$\lambda_j = \frac{1}{\alpha_j}, \quad \beta_k = \mu_k, \quad \omega_i = p_i, \quad \gamma_j = \frac{\varepsilon_j}{\alpha_j}.$$

Table I. First order conditions of the Lagrangian.[a]

	Social planner	Competitive market equilibrium
$\frac{\partial L}{\partial x_{ij}}$:	$\lambda_j \frac{\partial u^j}{\partial x_{ij}} = \omega_i$	$\frac{1}{\alpha_j} \frac{\partial u^j}{\partial x_{ij}} - \sum_{r=1}^{R} \frac{\partial t_{rj}}{\partial x_{ij}} = p_i$
$\frac{\partial L}{\partial y_{ik}}$:	$\mu_k \frac{\partial f^k}{\partial y_{ik}} = \omega_i$	$\beta_k \frac{\partial f^k}{\partial y_{ik}} = p_i + \frac{\partial t_{rk}}{\partial y_{ik}}$
$\frac{\partial L}{\partial d_{rj}}$:	$\lambda_j \frac{\partial u^j}{\partial v_{rj}} S_r = \gamma_j$	$\frac{1}{\alpha_j} \frac{\partial u^j}{\partial v_{rj}} S_r - \frac{\partial t_{rj}}{\partial d_{rj}} = \frac{\varepsilon_j}{\alpha_j}$
$\frac{\partial L}{\partial s_{rk}}$:	$\sum_{j=1}^{J} \lambda_j \frac{\partial u^j}{\partial v_{rj}} d_{rj} - \mu_k \frac{\partial f^k}{\partial s_{rk}} = 0$	$\frac{\partial t_{rk}}{\partial s_{rk}} - \beta_k \frac{\partial f^k}{\partial s_{rk}} = 0$

[a] with $\lambda_1 = 1$ and $v_{rj} = d_{rj} S_r$.

The condition $\sum_{r=1}^{R} \frac{\partial t_{rj}}{\partial x_{ij}} = 0$ illustrates that a tax which depends on consumers' demand for goods causes efficiency losses. Thus, direct subsidies should be financed by lump-sum taxes.

That the individual tax for a particular region being paid by consumer j must not depend on the number of days d_{rj} spent in region r is captured by the expression $\frac{\partial t_{rj}}{\partial d_{rj}} = 0$. The intuition behind this refers to the above-mentioned lump-sum tax argument that the tax rate should not be influenced by consumers' behavior. Although this condition seems insuitive in the case of negative externalities[3] (victims should not be compensated), this result is not quite obvious for the provision of agricultural landscape-enhancing activities at first glance. For a second-best solution, we refer to the comprehensive literature on optimal taxation.

The expression $\frac{\partial t_{rk}}{\partial s_{rk}} = \sum_{j=1}^{J} \lambda_j \frac{\partial u^j}{\partial v_{rj}} d_{rj}$ stresses the argument that the farmers in region r should be compensated for the provision of tourism-related services by an amount which is equal to the sum of consumers' marginal utilities generated by a change in s_{rk}. This result refers to a very important political issue. From an efficiency point of view, farmers should be paid direct subsidies if, and only if, there is a positive marginal utility from increasing agricultural non-market services.

It is obvious that the subsidies t_{rk} may vary between different regions depending on aggregate marginal utility. However, there is one more restriction. The term $\frac{\partial t_{rk}}{\partial y_{ik}} = 0$ suggests that the received subsidies of farmer k ought to be independent of the production of private goods. Thus, one firm cannot increase its subsidy payments by switching to a more intensive agricultural production with greater amounts of private goods and less externalities. This is exactly the decoupling argument which stresses the notion of production-independent direct subsidies.

Whether already developed compensation schemes in Europe meet these theoretical requirements is discussed in the next section.

4. Environment-based Subsidies for Agriculture in Europe

There are a few programs for the compensation of agricultural landscape-enhancing activities already in use in Europe. It seems obvious, given the discussions on European integration, that decisions on compensation models for external benefits cannot be made solely on a national basis. To prevent competitive disadvantages from an ecologically-oriented treatment of the countryside, the various nations must coordinate their subsidies. For this reason, the European Union (EU) passed regulations that take environmental aspects of agricultural production into account. The Community established additional supporting measures on environmentally friendly agricultural production within the scope of the Common Agricultural Policy (EU regulation no. 2078/92). Therewith, the role of farmers as conservators of the landscape and protectors of natural resources has been officially acknowledged at the EU level for the first time. These resolutions enable member states to grant subsidies to reduce environmental degradation caused by agricultural production and to make compensation payments for agricultural functions that serve the public interest.

Within this framework, which may be adapted to regional specifications, EU member states are authorized to work out national compensation models in line with local environmental requirements. In this connection, there are three examples in Germany and Austria: The Bavarian Landscape Program (BLP), the Market-Relief and Landscape-Compensation Program in Baden-Württemberg (MLCP), and the Austrian Environmental Program for Agriculture (AEPA).

The MLCP of 1992 assigns acreage-bound subsidies to those farmers applying measures for preserving an agricultural landscape, achieving a more extensive production and protecting biodiversity. Farmers can decide on a voluntary basis whether and to what extent they would like to participate in this programme for five years. They may choose landscape-enhancing activities from a comprehensive list of different measures which they believe fit best with their individual production structure. Each measure is given a particular score, the total of which determines the compensation payments. The upper bound is 550 DM (293 ECU) per hectare of agricultural acreage. Due to the broad acceptance of this programme amongst the farmers, it is supposed to be extended in the future. The province of Baden-Württemberg allocated 75 million ECU for the programme that was continued in 1993 and 1994. A similar model with an aggregate subsidy level of 175 million ECU per year was passed in Bavaria in 1988 (BLP).

The Austrian variant (AEPA) serves as another interesting example. It offers payments to the farmers for cultivating mountainous regions (e.g. mowing the alpine grassland, tending alpine pastures and areas set aside from forestry). The catalogue of measures deserving promotion from this programme, which was passed in 1995, is more comprehensive than all other comparable EU programmes. Austrian farmers receive 400 million ECU from the European Union, the Austrian federal government, and the nine provinces.

The design of these subsidy programmes does not reflect our efficiency conditions derived in Section 4.[4] First, the decoupling condition is violated in all programmes since most payments are connected to production-related factors. The most important objection to be raised is the disregard of the demand side which means that the payments are based on ecological reasons (e.g. biodiversity), rather than attempting to reflect marginal benefits. Marginal utility of those who use the landscape for recreational purposes is completely neglected. Since there is no comprehensive empirical study on the valuation of non-market agricultural services, existing marginal benefits could not have been taken adequately into account. This argument is supported by the observation that all payments in the programmes are independent of the number of people benefitting from agricultural externalities. Referring to the same demand side argument, regional differences are not sufficiently considered in the programmes already in use. Looking at the compensation schemes, we miss any 'market-driven' subsidy payments.

The incorporation of efficiency conditions into the design of practical compensation programmes requires the empirical measurement of external benefits provided by agriculture. Therefore, Section 5 covers the discussion about preference revelation alternatives to evaluate the demand side of agricultural non-market services.

5. The Measurement of External Agricultural Benefits

The measurement of marginal benefits is accompanied by various problems. As was already pointed out, the public good characteristic makes private markets fail and consumers' preferences are not revealed directly. In regards to this public good issue, it is well known that there exist preference revelation methods which are either based on related private goods (indirect measures) or on respondents' stated willingness to pay by the application of survey techniques (direct methods).[5] Many studies recently have applied both direct and indirect methods to measure values of different national parks or regionally specific recreation.[6] However, only a few studies concentrate on enhancing the landscape. The following CV study serves as an example for the measurement of tourists' willingness to pay for agricultural landscape-enhancing activities in Austria. We argue that studies such as these ought to be used as the basis for designing economically more efficient compensation models.

5.1. A Contingent Valuation of tourists' benefits in Austria

Using the Contingent Valuation Method (CV) more than 4000 tourists were asked about their willingness to pay for the provision of agricultural landscape-enhancing activities in Austria in the summer of 1991 (Pruckner 1995). The respondents got a verbal description of these agricultural services, and their familiarity with the good in question was checked. Using an open-ended question format, they were

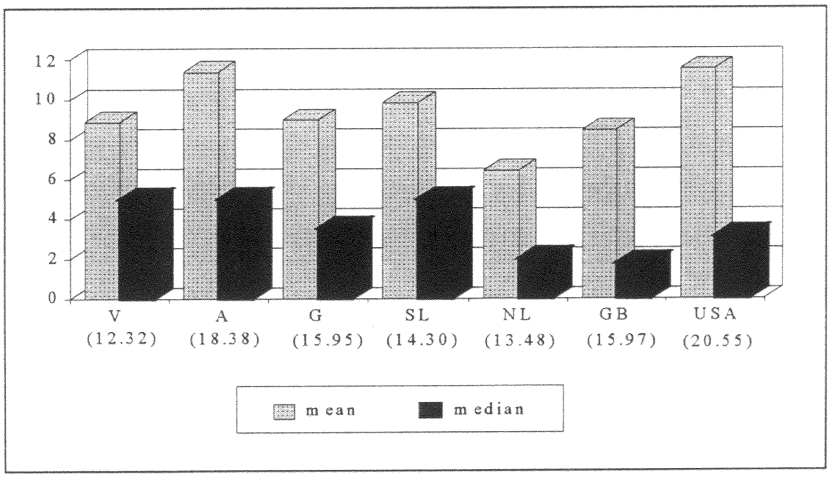

Figure 1. Willingness to pay for agricultural landscape-enhancing services in Austria (ATS per day per person).[a]

[a] Source: Pruckner (1995). V = Vienna; A = Austria without Vienna; G = Germany; SL = Switzerland; NL = Netherlands; GB = Great Britain; USA = United States of America. Standard deviations in parentheses.

asked to state the maximum amount of money they would be willing to pay for these services into an appropriate fund. The average WTP per person per day of vacation was 9.20 ATS (0.70 ECU). The median and the standard deviation of the distribution were 3.5 ATS and 15.95, respectively. About 40% of the respondents did not answer the question. Analyzing the means for vacationers of different nationalities (Figure 1) elucidates that the WTP measures for tourists from Austria were significantly higher than those of other nations, except the U.S.

The aggregation of individual WTP figures of all summer vacationers in Austria results in an overall mean and median of 720 million ATS (54.5 million ECU) and 280 million ATS (21.2 million ECU), respectively, if non-respondents are eliminated from the analysis. As can be seen in Table II, the largest portion of this sum is allotted to the province of Tyrol, followed by Carinthia and Salzburg. The comparison of these figures with the payments under the Austrian Environmental Programme for Agriculture (AEPA) highlights our above-mentioned conclusion about the lacking incorporation of the demand side into compensation models.

It is well known that CV is confronted with criticism.[7] Therefore, one might raise the question of whether the CV results presented above provide a reliable order of magnitude of tourists' benefit values and contribute to establishing workable models in practice. In trying to check for the reliability of our empirical results, the hypothetical values are compared with actual payments.

Table II. Regional distribution of summer tourists' total WTP and AEPA payments.

Provinces	Percentage of	
	Total WTP	Total subsidies under AEPA
Burgenland	1.41	7.05
Carinthia	19.72	7.07
Lower Austria	8.45	36.22
Upper Austria	5.63	18.43
Salzburg	15.49	6.95
Styria	8.45	13.48
Tyrol	28.17	7.90
Vorarlberg	5.63	2.64
Vienna	7.04	0.25
Total	100.00	100.00

5.2. ACTUAL VERSUS HYPOTHETICAL PAYMENTS

The existence of discrepancies between hypothetical CV bids and actual payments was raised in several empirical studies. As an example, Seip and Strand (1992) compared CV outcomes with responses to an actual solicitation for membership in a Norwegian environmental protection organization. It was reported that only approximately 10% of those who stated a WTP greater than the membership fee accepted an offer of becoming a member and actually paid the fee. The study was criticized on the basis that the respondents might not have been evaluating the same good in both cases since the 'hypothetical good' could have been interpreted as a somewhat vague set of environmental goods (Navrud 1992, ch. 11). Fisher argues that strategic behaviour may account for the discrepancy and recommends further experiments in which people use real money and face the actual consequences of their decisions (Fisher 1994: 5). When they did this, Cummings et al. (1995) and Neill et al. (1994) found significant differences between hypothetical and actual WTP in experiments with various private goods.

Our approach is not based on experimental design, we rather compare hypothetical CV bids with compensation subsidies actually paid to farmers by local tourist associations (consisting of hotel-keepers) and communities in three heavily touristed Austrian provinces, namely Salzburg, Tyrol, and Vorarlberg. Even though positive agricultural externalities are not compensated at the community level in general, we found 48 exceptions of tourist communities which voluntarily compensate their farmers under very specific circumstances. These subsidies reflect the outcome of bargaining processes. Due to the relatively small number of negotiators involved, the payments may be interpreted as sort of a 'Coasian solution' as opposed to the general Pigouvian approach which is the normal case in the European countries. For that reason the possibility of bargaining is neglected in our

theoretical Section 3; we consider local subsidy payments only as a benchmark for the elicited hypothetical CV figures. We argue that these compensation payments at the community level reflect a lower bound for the non-observed true tourists' benefit value. The reasoning is as follows.

Whenever tourists are willing to pay for countryside amenities, hotel-keepers may be able to capture part of this consumer surplus by charging higher prices for private goods. In that case, it may be profitable for a few hoteliers or a small community to agree with farmers on compensation payments. This happens whenever a hotel-keeper's expected increase in profit – from tourists' WTP for more landscape-enhancing services – is greater than the voluntary payments to the farmers.[8] The degree to which hoteliers succeed in their rent-seeking efforts (= diverting part of the consumer surplus from landscape amenities to themselves) depends on their market power in the community. Whereas rent-seeking activities are not possible under competitive conditions, a hotel-keeper can absorb a considerable amount of consumer surplus in a monopoly situation (see the Appendix for an example). Assuming perfect price discrimination hotel-keepers are in the position to skim off tourists' WTP for countryside amenities completely, and true WTP coincides with the hotel-keeper's gain in profit.

The additional profits to hotel-keepers represent the maximum subsidy that can be offered to farmers for providing landscape-enhancing services. The minimum amount of compensation accepted by the farmers is the marginal cost of providing the services. The outcome of local compensation payments is therefore bounded between extra profits in the tourist industry and farmers' marginal cost for landscape cultivation and depends on the skills in negotiating. Thus, we interpret local compensation payments as the lower bound for tourists' non-observed benefit values and compare these subsidy payments with hypothetical WTP figures.

The weakness of this comparison results from our inability to know exactly how much additional profit was diverted to hotel-keepers from tourists' consumer surplus and to estimate the negotiating power of the parties involved. However, it becomes clear that tourists' true WTP for countryside amenities is higher than local subsidy payments. Therefore, even if hypothetical WTP equals true WTP, on theoretical grounds we expect the CV results to be higher than actual payments.

We are aware of further potential influences questioning our comparison of hypothetical and actual payments. Existing constraints on the local budgets and increasing transaction costs with a growing number of farmers and hoteliers will lower the bargaining outcome. Moreover, other agricultural subsidies, which are paid to farmers at the federal or province level, may influence the bargaining outcome in the communities. In other words, the local negotiators know that farmers get payments from other sources, too. We assume that these payments, which are offered for many different reasons (tourism may be one of amongst others) and are not altogether based on cost or benefit considerations, have an impact on the Coasian subsidies at the community level. These arguments provide

Table III. Subsidy payments and WTP per person per day in ATS (Source: own calculations; Pruckner (1995); Community reports).

Region	RPCSP	Number of tourist communities	RWTP		CV sample
			mean	median	
Salzburg north	1.20	2	8.14	2.50	146
Salzburg southeast	1.91	11	8.07	3.50	81
Salzburg southwest	1.99	16	8.79	2.50	169
Western Tyrol (east)	1.17	3	9.20	5.00	307
Western Tyrol (west)	3.38	10	6.02	2.50	72
Vorarlberg	3.97	6	9.90	5.00	291

further evidence that the local subsidy payments understate the non-observable correct value of non-market agricultural services.

On the contrary, there exist arguments for the Coasian subsidy payments being upward biased. Non-market agricultural services could be subsidized not only for tourist reasons but also because of the enjoyment of residents or for protecting biodiversity. Moreover, payments may be granted for political (e.g. pressure from interest groups) or distributional (e.g. socially motivated income support) reasons. Were these arguments true, we would not only expect compensation payments in tourism communities but also in areas where tourism does not play a major role. However, since we observe this type of voluntary compensation payment exclusively in heavily touristed communities, the arguments do not seem convincing and may be refuted. Thus, summarizing these considerations we still expect the CV results to be higher than actual payments.

We have data from 48 tourism communities that voluntarily subsidize farmers for their landscape-enhancing activities. These payments indicate the existence of imperfect markets and the fact that hotel-keepers can capture part of tourists' consumer surplus.

Comparing the hypothetical WTP figures with the subsidy payments per summer tourist at the community level (per capita subsidy payments) indicates various results. Several tourist sites have hypothetical values (both mean and median) that exceed the subsidies, but the opposite is true in others. Moreover, a third group of communities is characterized by a very good correspondence of hypothetical and actual payments (granted subsidies lie in between the median and mean of the survey). However, these results are not sufficiently reliable because the CV study sample was small in several communities. Thus, the local data were aggregated by geographical criteria which means that tourism communities form a so-called subregion if they are located close to one another and provide similar landscape-related services. The results of the comparison are presented in Table III with the numbers being calculated as follows.

We divided the subsidy payments at the community level by the number of summer vacation days in each community. Subsequently, the mean of these figures

is calculated across the communities being located in a specified region. This yields a regional per capital subsidy payment (RPCSP) which is directly comparable to the regional willingness to pay (RWTP). The regional hypothetical values are from all respondents who were interviewed in that region.

Since the outcome of the bargaining is determined by the median voter, we argue that the median WTP reflects the appropriate comparison measure. Table III shows that the hypothetical payments in Salzburg exceed the subsidy values. Except for Salzburg southwest, even the median WTP is twice the per capita local payments in these areas. The biggest difference can be observed in Western Tyrol (east) where the median is more than four times the community payments. On the other hand, the hypothetical medians are quite similar to the actual values in Vorarlberg, Western Tyrol (west) and also in Salzburg southwest.

The results from the comparison confirm our hypothesis that actual payments would be lower than hypothetical values. Recalling the weakness of this comparison, that we cannot say by how much the true WTP exceeds the subsidy payments, we cannot say exactly how well the CV figures coincide with unobserved welfare measures. However, based on the order of magnitude of the difference between actual and hypothetical payments we do not arrive at the conclusion that the CV results provide unreasonably high welfare estimates. On the contrary, we argue that the CV results in this paper represent a valid approximation of the value of these non-market services and might be applied as one basis for establishing compensation models. As an example, these WTP figures might be used within the framework of the Austrian Environmental Program for Agriculture to improve efficiency in the sense of Chapter 3. Regionally differentiated subsidy payments for taking care of the countryside could be granted in accordance with the level of elicited tourists' benefit values.

It seems obvious that the demand side does not only consist of tourists' values which are the subject of this paper. As was pointed out earlier, residents' WTP for recreational reasons or for the protection of their living space has to be taken into account as well. Referring to residential values, empirical evidence has been presented by Drake (1992) who elicited WTP of Swedish residents to preserve agricultural land that otherwise would be brought out of production.

6. Policy Conclusions

In this paper the claim was made to incorporate the demand side into the development of environmental programmes for agriculture. Designing economically more efficient compensation payments to agriculture for environmental reasons will have various effects.

Agricultural non-market services are often provided in areas where production is limited by topography and incomes are low ('disadvantaged regions'). Thus, compensation payments for environmental purposes may reduce intrasectoral income differentials.

Apart from these income effects in disadvantaged regions, one might expect a growing dualism of agriculture. Regions where tourists and residents are willing to pay for non-market services will concentrate on environmental amenities and on less intensive production because of ecological considerations. On the other hand, the favourable agricultural production areas, which are not used for recreational purposes, will focus on the efficient production of agricultural commodities. The industrial-style production of food in these regions is accompanied by environmental degradation which necessitates another kind of government intervention. Just as we have made a case for compensating the provision of non-market agricultural services, an analogous claim for internalizing the external costs associated with agricultural production can be supported.

Whatever programme to compensate farmers for the provision of non-market services is chosen, it should be implemented quickly. A lack of appropriate policy decisions today may result in severe irreversible environmental consequences tomorrow. If, for example, policy fails to keep mountain farmers up in alpine regions, a disadvantageous change in Austrian mountain landscape has to be expected. Similar irreversible developments may be occurring in many other countries.

Acknowledegment

We would like to thank Johann K. Brunner and three anonymous reviewers for helpful comments.

Notes

1. Depending on the production technology these services do not necessarily represent externalities, but might alternatively be provided as autonomous public goods without any characteristic of joint products.
2. Conventional convexity and concavity assumptions ensure the existence and uniqueness of the solution.
3. See Cropper and Oates (1992: 680).
4. Several constraints, such as distribution issues or the need to keep administrative costs low, illustrate that actual compensation models in general represent a second-best or even a third-best solution.
5. For a comprehensive methodological discussion, see Mitchell and Carson (1989); Braden and Kolstad (1991); Arrow et al. (1993); Hanemann (1994).
6. Navrud (1992) provides a comprehensive survey on existing countryside-related benefit valuation studies in Europe. For two outdoor recreation studies in Denmark and Italy, see Dubgaard (1994) and Merlo and Della Puppa (1994), respectively.
7. See Diamond and Hausman (1994).
8. It is important to notice that the hotel-keepers are confronted with an all-or-nothing situation in most alpine tourism communities. The relevant question is whether to keep the mountain farmers up in alpine regions (and have them provide landscape-enhancing services) or not. Due to the precarious income situation of Austrian mountain farmers, the leeway for marginal considerations is lost.

Appendix

Suppose the following monopolistic situation. A hotel-keeper in a community is confronted with constant marginal costs φ and a linear demand curve $p(x) = \alpha - \beta x$ for the number of overnight accommodations x. However, tourists benefit not only from the days spent in the hotel but also from the provision of landscape-enhancing activities of agriculture. We assume constant marginal utility γ per day of recreation in the enhanced landscape. Given this situation, the hotel-keeper is able to capture some of the consumer surplus from landscape amenities.

Equating marginal cost and revenues in the absence of any landscape-enhancing services the hotel-keeper produces $x = \frac{1}{2\beta}(\alpha - \varphi)$ which results in profits equal to $\frac{1}{4\beta}(\alpha^2 - 2\varphi\alpha + \varphi^2)$. If agriculture provides the above-mentioned external benefits, which can be added to the demand curve, this profit increases by $\frac{1}{4\beta}(\gamma^2 + 2\alpha\gamma - 2\varphi\gamma)$. Comparing this extra profit with total WTP for external benefits $\frac{1}{2\beta}(\gamma^2 + \alpha\gamma - \varphi\gamma)$ shows that the portion of $\frac{\gamma^2}{4\beta}$ cannot be captured from tourists by the hotel-keeper.

This example illustrates that the difference between true WTP and additional profits varies depending on the market structure and the parameters to be chosen. Only under perfect price discrimination can total WTP for external benefits be absorbed.

References

Arrow, K., R. Solow, P. R. Portney, E. E. Leamer, R. Radner and H. Schuman (1993), 'Report of the National Oceanic and Atmospheric Administration Panel on Contingent Valuation', *Federal Register* **58**(10).

Baumol, W. J. and W. E. Oates (1988), *The Theory of Environmental Policy*. Second edition, Cambridge University Press.

Braden J. B. and C. D. Kolstad (1991), *Measuring the Demand for Environmental Quality*. North Holland.

Cropper, M. L. and W. E. Oates (1992), 'Environmental Economics: A Survey', *Journal of Economic Literature* **30**, 675–740.

Cummings, R. G., G. W. Harrison and R. E. Rutstrom (1995), 'Homegrown Values and Hypothetical Surveys: Is the Dichotomous Choice Approach Incentive Compatible?', *American Economic Review* **85**, 260–266.

Diamond, P. A. and J. A. Hausman (1994), 'Contingent Valuation: Is Some Number Better than No Number', *Journal of Economic Perspectives* **4**/**8**, 55–64.

Drake, L. (1992), 'The Non-market Value of the Swedish Agricultural Landscape', *European Review of Agricultural Economics* **19**, 351–364.

Dubgaard, A. (1994), 'Valuing Recreation Benefits from the Mols Bjerge Area, Denmark', in A. Dubgaard, I. Bateman and M. Merlo, eds., *Identification and Valuation of Public Benefits from Farming and Countryside Stewardship*. Bruxelles, Belgium: Commission of the European Communities.

Fisher, A. C. (1994), *The Conceptual Underpinnings of the Contingent Valuation Method*. Paper presented at DOE/EPA Workshop on Using Contingent Valuation to Measure Non-Market Values, Herndon, Virginia 1994.

Hanemann, W. M. (1994), 'Contingent Valuation and Economics', *Journal of Economic Perspectives* **4**/**8**, 19–43.

Merlo, M. and F. Della Puppa (1994), 'Public Benefit Valuation in Italy. A Review of Forestry and Farming Applications', in A. Dubgaard, I. Bateman and M. Merlo, eds., *Identification and Valuation of Public Benefits from Farming and Countryside Stewardship*. Bruxelles, Belgium: Commission of the European Communities.

Mitchell, R. C. and R. T. Carson (1989), *Using Surveys to Value Public Goods*. Baltimore: John Hopkins University for Resources for the Future.
Navrud, S. (1992), *Pricing the European Environment*. Oslo: Scandinavian University Press; Oxford: Oxford University Press.
Neill, H. R., R. G. Cummings, P. T. Ganderton, G. W. Harrison and T. McGuckin (1994), 'Hypothetical Surveys and Real Economic Commitments', *Land Economics* **70**(2), 145–154.
Pruckner, G. J. (1995), 'Agricultural Landscape Cultivation in Austria. An Application of the CVM', *European Review of Agricultural Economics* **22**(2), 173–190.
Seip, K. and J. Strand (1992), 'Willingness to Pay for Environmental Goods in Norway: A Contingent Valuation Study with Real Payment', *Environmental and Resource Economics* **2**, 91–106.