Multifunctional Policy Measures: Farmers' Choice

Kyösti Arovuori & Jukka Kola

Department of Economics and Management
University of Helsinki
P.O. box 27 (Latokartanonkaari 9)
FI-00014 University of Helsinki
Email: kyosti.arovuori@helsinki.fi; jukka.kola@helsinki.fi.

Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006

Multifunctional Policy Measures: Farmers' Choice

Abstract

The elements of multifunctional agriculture are strongly related to national, regional and local conditions. This indicates that it is hard to find common measures, which could efficiently enhance multifunctionality in different areas with different agricultural conditions. In order to really enhance the multifunctional role of agriculture, there is a need for newly designed measures. A need exists to have information from the groups involved in agricultural policy. To respond to this need we apply the stated choice method to find out, which measures Finnish farmers prefer when the measures introduced include multifunctionality enhancing elements. We introduced to farmers 12 different measures involving different levels of targeting, contracting and monetary compensation. We estimated a multinomial logit model to explain farmers' first choice with respect to policy options introduced. The results show that farmers are willing to accept multifunctionality enhancing elements and complementary terms of support as a basis for agricultural policy. To ensure the fulfilment of these terms a need exists for a large enough compensation. In practice, this compensation needs to cover all the costs for farmers of fulfilling the terms introduced in any particular support scheme.

Key words: agricultural policy, stated choice method, Finland

JEL: Q18

Introduction

Since the early 1990s, there has been a shift in agricultural policy schemes from coupled price support measures towards direct decoupled support. The main force behind this shift has been the growing international pressure against the use of trade distorting agricultural support measures, such as price support and export subsidies. This pressure has led the European Union among others to lower its border protection and, consequently, its administrative prices and to compensate these price cuts with a direct acreage based support (see i.e., Koester, and El-Agraa 2004). The principles set at the WTO negotiations for agricultural support indicate that acceptable policy measures have no, or only minimal, trade distorting effects and effects on production. These measures are divided under Blue and Green box measures. Measures under Blue box criteria include measures to control production, or measures totally decoupled on production. For Green box measures, there are no or only minimal trade distorting effects, but they can be targeted to take the non-trade concerns of agriculture into account (WTO, 2004).

According to the OECD (2002, 9), governments can use national agricultural policy measures to reach national objectives set for agricultural policy. The EU seeks to define these objectives via the multifunctional role of agricultural production and thus to reason its agricultural support and the measures used in the Common Agricultural Policy (CAP) based on three functions. These functions are the food production function, rural function and environmental function (EC, 1999a, 1999b)[1]. According to the EC, food production

[1] While there are other and also stronger, definitions on multifunctional agriculture (see i.e., OECD 2001, 2003a; Cairol et al 2005, appendix) we will introduce the EU's definition to reason our point that the

function includes the adequate supply of food at reasonable prices, high quality and safety. The outputs of food production are mainly private in nature and thus market forces should play an important role. The environmental function includes agricultural landscapes, biodiversity and cultural and natural values. The environmental function should be taken care of through 'good agricultural practices', guaranteed by public intervention. The rural function refers to the maintenance of agricultural activities in remote or peripheral areas where only few opportunities for other gainful employment exist. More generally, agricultural activities and on- and off-farm diversification can contribute to the economic and social viability of rural areas, and thus to balanced territorial development. Regionally and locally targeted measures are design to sustain agricultural production in these areas, and thus maintain their viability.

Despite the implementation of three major policy reforms in 1992, 1999 and 2003, the Common Agricultural Policy is still tied to historical production and support levels. Until the CAP reform agreed on 2003, the CAP support[2] served as compensation payment for losses to farmers due to lower administrative prices in the EU. After the latest CAP reform, however, the CAP support is decoupled from production and it includes cross-compliance. Cross-compliance includes measures targeted to environmental concerns, animal and occupational health, food safety and quality, with the requirement of keeping the agricultural land in good farming conditions (EC 1782/2003). The measures used,

current Common Agricultural Policy does not respond to the EU's view on multifunctionality and thus, there is a need for newly designed policy measures.

[2] Although there are several other forms of support in the EU's Common Agricultural Policy, the basic CAP support is the most important form of support in most of the EU countries.

however, remain mainly with the same nature as in the former CAP, and thus the shortcomings of the CAP with respect to multifunctionality still remain[3].

Yet, it can be argued that CAP reforms have been implemented in order to maintain the internal status quo within the EU more than to actually enhance the multifunctional role of agriculture. Moreover, the main force behind these reforms has been the changing political climate in favour of more market oriented agricultural sectors. This argument is supported by Harvey (2004, 268), who states that 'the typical response to pressures for policy reforms is for the existing policies to become infested with immunising stratagems, by with reform pressures are absorbed through the modification of existing policies rather than their wholesale replacements.' In addition, Koester and El-Agraa (2004) supports this view by arguing that the CAP has become a very complicated system while it has developed by building new systems on the top of the old instead of designing totally new ones.

This discussion indicates that despite the reformed policies, a need exists for newly designed policy measures in order to respond to newly considered agricultural policy objectives. Given that, enhancing the multifunctional role of agricultural production is a stated objective in the EU's Common Agricultural Policy and, it includes elements somewhat accepted in the WTO, we can argue that the ability to enhance multifunctionality on the basis of local, regional and national agricultural conditions is a major challenge for future agricultural policies and policy measures.

[3] For the discussion of multifunctional elements of the other Common Agricultural Policy support schemes see e.g. Arovuori and Kola 2005, pp. 25-30.

The aim of our study is to guide this policy design by providing information on Finnish farmers' preferred policies and thus, to identify policy measures for future agricultural policies. We apply the stated choice method (SCM) to find out farmers' preferences towards multifunctionality enhancing policy options. The options introduced include different levels of targeting, regulatory terms of support and different levels of monetary compensation. Farmers were asked to state their preferences by choosing a measure they considered as the best option among all the measures introduced. We explain farmers' first choice by estimating a multinomial logit model. In the model, farmers are expected to maximize their utility through their stated choice. This utility maximization is then explained by some vector of individual specific variables. These variables include some socio-economic characteristics as well as some attitude revealing variables.

In the next section, we discuss demands for future agricultural policy measures and the lessons learned from the previous studies. The third section introduces the methodological framework used in this study and describes the contents and design of the farmer survey. Our results are represented and analysed in section four. The last section concludes major findings and discusses on policy implications.

Demands for Future Policy Measures

Some general suggestions for the design of future multifunctionality enhancing agricultural policy measures can be derived from the WTO's definition for Green box measures, and its statement that measures decoupled on production and with none or only minimal trade distorting effects can be used. These measures are not, however, described

or defined in any particular manner. Yet, according to the OECD (2003a, 76) 'targeted payments are likely to be the most desirable option' for multifunctionality enhancing agricultural policies, especially in the view of policy efficiency. Production linked measures are seen unlikely to deliver precisely the desired level of a particular non-commodity output in different areas and under different agricultural conditions[4]. If coupled support measures are seen inevitable to secure the provision of non-commodity outputs, in example due to the degree of jointness in production[5], there is a need for regulatory, cross-compliance or accompanying measures to improve their efficiency (OECD 2003a, 72).

Support to favour these arguments can be found from various studies that have analysed currently used policy measures with respect to their ability to enhance the multifunctional role of agriculture and/or their ability to respond to international demands. While there are studies analysing and discussing on multifunctionality with respect to WTO negotiations (see i.e., Anderson 2000, Prestegård 2004) and its consequences on agricultural trade and trade policies (see i.e., Vatn 2002, Peterson et al. 2002, Guyomard et al. 2004), we now turn our focus on those analysing different policy measures based on their ability to enhance different elements of multifunctionality and the effects of these policies on society's social optimum. Most of these studies focus on the agri-environmental aspects of multifunctionality and analyse currently used measures. We can

[4] Vatn (2002) argues that price support might be the most efficient measure to ensure the provision of public goods, because the transaction costs remains relatively lower compared to those from targeted direct support measures. This result is, however, dependent on the nature of jointness between commodity and non-commodity output. Thus, it does not hold for negative externalities or outputs that are substitutes in production.

[5] See Boisvert 2001 for a thorough analysis on the concept of jointness in production.

found several suggestions for the design of efficient multifunctionality enhancing policy measures.

Lankoski and Ollikainen (2003) found that to enhance agri-environmental multifunctionality, a need exists for targeted measures, which take the heterogeneous agricultural conditions into account. Moreover, there is a need for combinations of measures with co-ordinately set levels. Yet, the former CAP support, while serving as compensation payment for price cuts, does not enhance agri-environmental multifunctionality. Its efficiency can be improved by including measures of cross-compliance. In addition, Ollikainen and Lankoski (2005) extended their model to include rural viability representing a non-market commodity (e.g. the employment in agriculture in rural areas) rising from agricultural production. The results show that when including rural viability in the analysis, the measures used need to be set lower than the society's first-best level.

Besides measuring the trade effects of multifunctionality, Peterson et al. (2002) derived an efficient set of measures for the agri-environmental multifunctionality to reach the level of a social optimum in society. They found that the social optimum is not reached using single policy instruments, regardless of, whether these instruments are coupled or decoupled on production. Instead, a need exists for combinations of policy measures to respond to different aspects of multifunctionality. The results by Guyomard et al. (2004) support these findings. According to their results, to reach several multifunctionality related policy objectives, a need exists to have complementary policy instruments, targeted directly on those different objectives. In other words, multiple objectives can

rarely be reached with single policy instruments, but instead reaching one objective may require several instruments.

Arovuori and Kola (2005) found that Finnish experts see neither the current national nor the EU's common agricultural policy measures efficient in enhancing multifunctionality, the environmental support scheme being an exception. In addition, their results suggest that there is a need for differentiated and targeted measures to enhance the provision of the multifunctional elements of agriculture. These differentiated measures introduced by the experts ranged from farm territorial contracts or other contract based provision of public goods to regionally differentiated direct decoupled support measures with cross-compliance.

A major conclusion to draw from these previous studies is that currently used measures in the EU's CAP are rarely efficient at the provision of multifunctionality. Yet, to truly enhance multifunctionality a need exists for targeted and differentiated measures, which take different agricultural conditions and demands into account. Yet, the question remains; what we mean with targeting, and how these targeted policy measures should be implemented to truly enhance multifunctionality.

In the OECD's (2003a, 79) definition, targeting is referred as 'a multi-layered concept' that includes spatial or geographical targeting, or both, as well as targeting to specific non-commodity outputs. Yet, it may be necessary in some cases to target support on a production factor or an activity that is the source of the non-commodity output. In order to maintain the support totally decoupled on production, it needs to be implemented in a

way that secures the minimum production level required, but includes no incentives to adopt more intensive production practises or incentives to increase the level of production. Moreover, the OECD sets a particular emphasis on the importance of 'educational initiatives, regulation and monitoring to ensure that the non-commodity outputs are actually produced in the quantity, quality and location desired'. This is especially important the more distant a measure used is from a particular non-commodity output, a direct hectare based payment being an example.

While targeting as well as cross-compliance and regulatory measures can improve the policy efficiency, they may also lead to higher policy related transaction costs compared with simple, production linked, price support measures. Policy related transaction costs are defined as costs that are mainly due to delivering and gathering information, increased monitoring and evaluation and increased administration of policies, among some other things. According to OECD (2003b, 19-20) one way to reduce these policy related transaction costs is to take the views of all the groups involved in a particular policy into account already in the planning stage of that policy. In addition, this also reduces the costs incurred due to the lack of information. Naturally, farmers are one essential group involved in agricultural policy and thus, our aim is to obtain information from farmers to design new policy measures or reform existing ones.

Methodology and Data Collection

We apply the Stated Choice Method (or Choice Experiment) to find out Finnish farmers stated preferences on future multifunctionality enhancing agricultural policy measures.

The SCM is often used to collect information with respect to different policy options, when the actual effects of the changes in policies can not be measured in the markets. The basic assumption behind the SCM is that respondent's make their choice among the policy options introduced based on their beliefs on the ability of a particular measure to enhance their individual utility. In other words, the respondent is expected to maximize her utility with respect to attributes and combinations of attributes introduced in every choice. Options introduced to respondents are usually designed based on the policy objectives involved, and they include different levels of attributes that are expected to have greatest influence on respondents' choice. (Adamowicz et al. 1998, 65, Louviere 2001, 14.)

We try to explain farmers' first choice by estimating a multinomial logit model. The multinomial logit model is an application of the Random Utility Model (RUM). Random utility models are based on the assumption, that respondents maximize their utility in their decision making. The respondent is totally aware of all the factors affecting her choice. The researcher, however, can only observe some of these factors. In other words, a part of the respondents' utility remains unobservable from the researcher point of view (see i.e., McFadden 2001, 351-353, Hanemann and Kanninen 1999, 307). This can be represented more formally as follows.

Let's assume that the *i-th* respondent faces *J* options. Her unobservable utility *U* from choosing option *j* is $U_{ij} = \beta z_{ij} + \varepsilon_{ij}$, where U_{ij} for individual *i* is a vector of some number of observable individual factors z_{ij}, affecting her choice with some estimated vector of

coefficients β, and the random component ε_{ij}. The model can also be constructed to be choice specific, i.e. respondents' choice is explained by a vector of option specific attributes.

In both cases, however, it follows from the utility maximization that when choosing option *j* instead of any other option *k* available, then $\Pr(U_{ij} > U_{ik})$ for all $k \neq j$. To express the random component, we can rewrite $U(j) = \Pr\{u_j + \varepsilon_j \geq u_k + \varepsilon_k; \forall j \in C\}$, where *C* is a set of the policy measures available (see i.e., Louviere 2001, Adamowicz et al. 1998, 10, Boxall et al. 1996).

The probabilities can now be represented as (1) and (2):

$$(1) \qquad \Pr(Y = j) = \frac{e^{\beta_j z_i}}{1 + \sum_{k=1}^{J} e^{\beta_k z_i}} \text{ for all } j=1,2,\ldots, J,$$

$$(2) \qquad \Pr(Y = 0) = \frac{1}{1 + \sum_{k=1}^{J} e^{\beta_k z_i}}.$$

Thus, we need to set $\beta_0 = 0$ to obtain independent probabilities for all the *j* options. When the data used are based on the frequencies, e.g. how many times a particular option *j* is chosen from the set of options *J*, we can derive logarithmic probability for the model by setting $d_{ij} = j$ when respondent *i* chooses option *j* and $d_{ij} \neq j$ for all the other

options (when there is only two options this means $d_{ij} = 1$ and $d_{ij} = 0$). Thus, for every respondent, we have $d_{ij} = 1$ only once. Following Greene (1997, 918), we can present this as follows:

$$\ln L = \sum_{i=1}^{n} \sum_{j=1}^{J} d_{ij} \ln \Pr(Y_i = j) \quad (3)$$

For the estimated model, the logarithmic probability is now the sum over all the probabilities that person *i* chooses option *j*, when *i = 1…n* and *j=1…J*. To get the probabilities and the coefficients for every *j* we need to take the derivative from (3) to obtain

$$\frac{\partial \ln L}{\partial \beta_j} = \sum_i \left[d_{ij} - P_{ij} \right] w_i , \; j = 1...J . \quad (4)$$

Farmer Survey

Based on the results of Arovuori and Kola (2005) we designed a farmer survey. The survey was carried out in June 2004 by a private marketing research company. The total sample consisted of 1410 Finnish farms. We received responses from 876 farms in total, e.g. the response rate was 62.1. We set three main objectives for the survey. First, what are farmers' attitudes towards different elements of multifunctionality. Second, which policy measures Finnish farmers prefer when the objective is to improve multifunctionality. Third, are farmers willing to accept new and complementary terms for agricultural support.

The policy options introduced to farmers are presented in Table 1. We included different levels of monetary compensation and different types of terms and conditions for every option, ranging from simple decoupled support, without no complimentary terms and conditions, to highly differentiated and targeted farm territorial contracts.

Table 1. Policy options introduced to farmers and the coding[6].

Description for each option	Coding	
	survey	MLM
20 % additional investment support to adopt environmentally friendlier production technology (i.e. manure spreading machinery, no-till seed machines) and to cover the cost of environmental investments (riparian zones, improved manure storage conditions)	1	0
Tax relief for the cost of adopting environmentally friendly production technologies and environmental investments. Total effect would be annual 5 % increase on support.	2	1
Nationally set support levels with increased restrictions to reduce negative externalities (restrictions on fertilizer and pesticide use, wider border strips) and targeted measures to improve animal welfare (i.e. minimum size standards for animal lot). No regional differentiation. Support levels remain at the current level.	3	2
Regionally differentiated instruments and support levels, which are implemented to take care of the heterogeneous production and environmental conditions (leaching areas, areas beside large water areas) in different areas. Increase in support on average 5 %.	4	3
National support and nationally implemented measures to replace commonly financed agricultural support. This would mean a 30 % reduction in total support.	5	-
Totally decoupled support with an increase of 10 % in total support.	6	4
Support remains coupled, but there will be a 20 % decrease in support.	7	-
Totally decoupled support with the current support levels.	8	5
Restrictions on farm size (i.e. maximum number of animals per farm, support ceilings) with restricted legislation and norms (labour/animal, animal lot size/animal). Support levels remain at the current level.	9	6
Support targeted to enhanced animal welfare and more extensive production practices (requirement of crop rotation, pasturing, border strips and animal units/ha, number of animals per worker). If succeeds to fulfil these terms, increase in support by 10 %.	10	7
Farm Territorial Contracts based on every farms willingness and ability to produce different non-commodity outputs and services in the rural areas. Includes compensation from landscapes, reduction of environmental load, enhancing biodiversity and rural employment. Farm based support levels with an average increase of 10 %.	11	8
Acreage and headage based payments, with equal national levels. 10 % decrease on support.	12	-

We used a frequency based multinomial logit model, e.g. how many times each option is chosen as the first choice of each individual respondent. The choice made is then

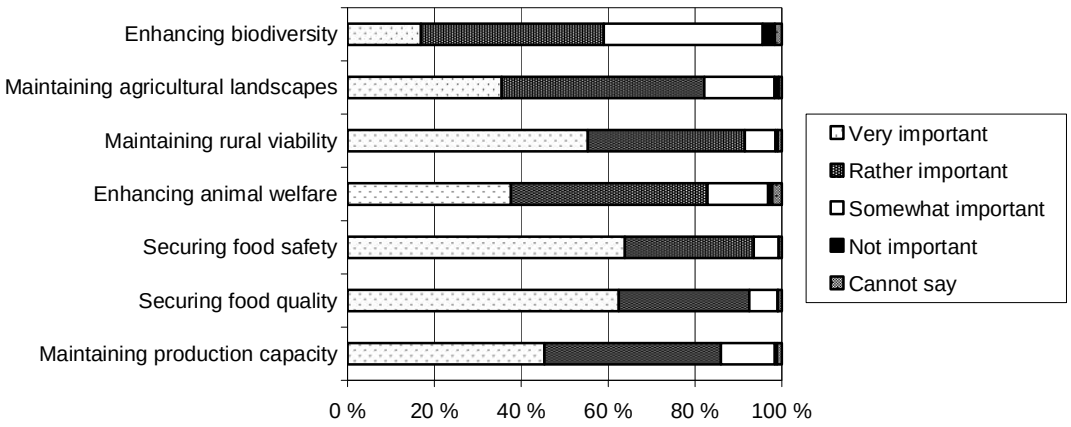
[6] We were forced to left options numbered 5, 7, and 8 in the questionnaire out from the estimated model because of two complementary reasons: First, these options were least often chosen as first best option and; second, we were not able to include negative changes in support levels to our estimation. This gives, however, some weak evidence that farmers prefer more support over less.

explained by some individual and farm specific variables as well as attitude revealing variables.

Results

First, we asked respondents to evaluate the importance of different elements of multifunctional agriculture. Our results, represented in Figure 1, shows that farmers like to emphasise the elements of multifunctionality which are related to food production and rural functions over those included in the environmental function. In other words, although the Finnish farmers saw the elements of multifunctionality overall important they emphasised securing the food safety and quality as well maintaining the rural viability slightly over the other elements.

Figure 1. Farmers' opinions on the importance of different elements of multifunctionality.



Moreover, enhancing biodiversity on and close to farm land was seen very or rather important by little less than 60 % and reducing the environmental load by approximately

64 % of the respondents, while all the other elements were seen very or rather important by over 80 % of the respondents.

The model

Our estimated model includes eight variables. These variables were chosen based on some preliminarily set assumptions and statistical efficiency. The description and coding for these variables is presented in Table 2.

We assumed that production line and support area[7] have impact on farmers' choice. That is, different production lines are unequally presented in different areas, and there is a difference between policy measures preferred in different production lines and in different areas.

[7] Finland is divided under seven geographical support areas. These areas differ in terms of reference yields, and thus the amount of direct CAP support per hectare, as well as with respect to different national support measures.

Table 2. Variable description and coding.

Variable	Description and coding	Average
bid	The change of support at the farm due to option chosen – Euro compared to current level	1676,4
p_line	Main production line 1=Dairy production 2=Meat production 3=Pig production 4=Egg and hog production 5=Crop production 6=Special crop production 7=Forestry 8=Other production	
eu	Support area 0 = A-area 1 = B-area 2 = C1-area 3 = C2-area 4 = C2P-C4-area	
age	Age of the respondent	50.1
continua	Continua 1 = certain 2 = possible 3 = none 4 = not relevant	
target	In the future, agricultural support should be targeted to reducing negative environmental affects from agriculture, to enhancing biodiversity on and close to farm land and to maintaining agricultural landscapes? 1=totally agree 2=somewhat agree 3=neither agree or disagree 4=somewhat disagree 5=totally disagree	
decoup	Decoupled support allows me to adjust production in response to market signals? 1=totally agree 2=somewhat agree 3=neither agree nor disagree 4=somewhat disagree 5=totally disagree	
apply	How much time different phases in the current agricultural support scheme takes your time?: application process 1=takes very much time 2=takes time 3=takes only a little time 4=does not take time at all	

Agricultural land and the number of animals per farm were left out from the model. While the agricultural support is almost totally acreage or headage based, or both, the parameter bid is expected to absorb the effects of these variables. Variables describing farmers' age and continuator on the farm were taken into the model by a statistical basis, or in other words, based on their ability to improve the model. Attitude based variables were also chosen based on their ability to improve the model. The estimated model is

(5) $$z_i = \beta_0 + \beta_1 bid + \beta_2 p\_line + \beta_3 eu + \beta_4 age + \beta_5 continua + \beta_6 target + \beta_7 decoup + \beta_8 apply + \varepsilon_i$$

The probabilities for options 1-8 are estimated

(6) $$\Pr(Y = 1 \mid j) = \frac{e^{z_i}}{1 + \sum_{j=0}^{8} e^{z_i}}.$$

The estimated coefficients are presented in Table 3. The model is statistically significant, with the significance level of 0.000. Pseudo-R^2 receives a value of 0.26[8]. Constant and age are statistically significant for all but one option, variable bid is statistically significant for five, support area for three and production line for two options. It is worth noting that the variable measuring the estimated time spent on application process is statistically significant for all the options.

The estimated probabilities are shown in Table 4. The model predicts those options most, which are most chosen also in reality. The highest frequency for first option, option 4 with a probability 0.354 to become chosen, is predicted correctly about two times out of three. Options 8 and 7, with probabilities 0.341 and 0.141, respectively, have the second highest frequencies for first choice. In these cases, the model predicts correctly 37 % for

[8] There is no commonly accepted range for these values. Higher values, however, are preferred to lower ones (see i.e. Greene 1997, 891-893, Hanemann and Kanninen 1999, 344).

option 8 and about 30 % for option 7. Overall, the model predicts correctly 40 % of all choices.

Table 3. Multinomial logit model for farmers' first choice[9].

Parameter N=560	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
constant	-9.74***	-2.78	-5.18**	-5.87***	-5.07**	-6.27***	-6.13***	-5.15***
	(2.46)	(2.74)	(2.18)	(1.71)	(-2.00)	(2.11)	(1.87)	(1.67)
p-value	0.0001	0.3104	0.0077	0.0006	0.0114	0.0030	0.0010	0.0020
bid	-0.03***	-0.022	0.008***	0.001***	-0.027	-0.027	0.001***	0.001***
	(0.01)	(0.034)	(0.0002)	(0.0002)	(0.022)	(0.021)	(0.002)	(0.0002)
p-value	0.0019	0.5092	0.0005	0.0000	0.2253	0.1925	0.0000	0.0000
p_line	0.150	-0.048	0.075	0.334***	0.064	0.183	0.145	0.253***
	(0.130)	(0.175)	(0.114)	(0.092)	(0.117)	(0.121)	(0.102)	(0.090)
p-value	0.2508	0.7857	0.5159	0.0003	0.5848	0.1304	0.1561	0.0051
EU	0.324	-0.140	0.226	0.274	0.213	0.561**	0.448**	0.369***
	(0.240)	(0.330)	(0.217)	(0.174)	(0.217)	(0.225)	(0.196)	(0.175)
p-value	0.1772	0.6712	0.2986	0.1177	0.3240	0.0127	0.0225	0.0232
age	0.120***	0.057	0.055**	0.078***	0.078***	0.082***	0.047*	0.599**
	(0.031)	(0.037)	(0.028)	(0.220)	(0.027)	(0.028)	(0.02)	(0.022)
p-value	0.0001	0.1214	0.0477	0.0004	0.0034	0.0035	0.0546	0.0058
continua	0.720**	0.190	0.414	0.466**	0.614**	0.337	0.475**	0.332
	(0.298)	(0.355)	(0.259)	(0.252)	(0.253)	(0.264)	(0.227)	(0.202)
p-value	0.0157	0.5915	0.1093	0.0232	0.0153	0.2015	0.0368	0.1013
target	-0.087	0.300	0.124	-0.063	0.203	0.173	-0.429**	-0.350**
	(0.225)	(0.274)	(0.183)	(0.147)	(0.189)	(0.203)	(0.168)	(0.149)
p-value	0.6979	0.2734	0.4960	0.6673	0.2820	0.3951	0.0106	0.0190
decoup	0.355	-0.254	0.067	-0.401**	-0.143	0.071	0.283	0.048
	(0.224)	(0.278)	(0.204)	(0.162)	(0.195)	(0.202)	(0.183)	(0.160)
p-value	0.1131	0.3602	0.7443	0.0133	0.4642	0.7266	0.1254	0.7665
apply	-1.22**	-1.70**	-1.26***	-1.05***	-1.06**	-1.24**	-0.900**	-0.775**
	(0.537)	(0.677)	(0.469)	(0.370)	(0.471)	(0.500)	(0.417)	(0.370)
p-value	0.0237	0.0122	0.0070	0.0043	0.0241	0.0129	0.0309	0.0363
Log likelihood				-812.836	***, **, * statistically significant at 99 %, 95 %			
Log likelihood (restricted)				-1102.247	and 90 % significance level			
Chi squared				578.8226				
Pseudo-R^2				0.26				
Significance level				0.00000				

[9] Prob(Y|0=0), standard errors are in the parenthesis.

Table 4. Estimated probabilities for options 0-8 to become chosen.

Probabilities for each option to be chosen	Predicted N	Actual N	Correct %
(0) = 0.073	52	56	30.4
(1) = 0.000	15	25	24.0
(2) = 0.000	1	14	0.0
(3) = 0.091	3	36	0.0
(4) = 0.354	195	148	66.2
(5) = 0.000	82	44	54.5
(6) = 0.000	38	35	28.6
(7) = 0.141	50	75	30.1
(8) = 0.341	124	127	37.0
Total	560	560	40.2

The actual effects of different variables and the signs of these effects can be analyzed through the estimated marginal effects, which are presented in Table 5. The estimated marginal effects are very small, namely zero, in options 2, 6 and 7. The common phenomenon for these options is that the proposed change in support level was neutral. The extremely small numbers can be explained by the dominant effect of variable bid. Proposed change in support level might dominate the farmers' predicted choice in the model. Thus, a neutral change in support level neutralizes the marginal effects of all the other variables included.

For other policy options the marginal effects are interpretable. According to our estimated model, large monetary change in the support level due to the option chosen directs farmers' choice towards options 0, 1 and 3. If the change in the support level is relatively small, farmers are likely to choose options 4, 7 and 8. Farms specialised in animal production are more likely to choose options 4 and 8. In addition, farms located in southern areas are likely to choose any other option except 4 and 8. Younger farmers are likely to choose options 0, 3 and 7.

Table 5. Estimated marginal effects on probabilities for options 0-8 (standard errors in the parantheses).

Parameter N=560	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
constant	0.381***	-0.001	0.0000	-0.0543	-0.224	0.0000	0.0000	-0.128	0.026
	(0.118)	(0.002)	(0.00000)	(0.153)	(0.253)	(0.00000)	(0.00000)	(0.157)	(0.239)
bid	-0.0009***	-0.00001	0.0000	-0.0003***	0.0005***	0.0000	0.0000	0.0004***	0.0004***
	(0.0001)	(0.00002)	(0.00000)	(0.0001)	(0.0001)	(0.00000)	(0.00000)	(0.00008)	(0.0001)
p_line	-0.017***	-0.0002	0.0000	-0.014**	0.036***	0.0000	0.0000	-0.012	0.007
	(0.006)	(0.0005)	(0.00000)	(0.0078)	(0.013)	(0.00000)	(0.00000)	(0.0084)	(0.012)
eu	-0.023**	0.00002	0.0000	-0.0082	-0.148	0.0000	0.0000	0.019	0.027
	(0.011)	(0.0006)	(0.00000)	(0.014)	(0.024)	(0.00000)	(0.00000)	(0.016)	(0.023)
age	-0.004***	0.0002	0.0000	-0.0042	0.0064***	0.0000	0.0000	-0.018	0.0001
	(0.0014)	(0.0003)	(0.00000)	(0.0019)	(0.003)	(0.00000)	(0.00000)	(0.020)	(0.003)
continua	-0.028**	0.0009	0.0000	0.0029	0.029	0.0000	0.0000	0.013	-0.017
	(0.013)	(0.002)	(0.00000)	(0.017)	(0.029)	(0.00000)	(0.00000)	(0.019)	(0.027)
target	0.014	0.0003	0.0000	0.0288***	0.045***	0.0000	0.0000	-0.034***	-0.054***
	(0.0094)	(0.0007)	(0.00000)	(0.012)	(0.021)	(0.00000)	(0.00000)	(0.013)	(0.020)
decoup	0.006	0.0011	0.0000	0.0133	-0.114***	0.0000	0.0000	0.051***	0.044***
	(0.010)	(0.002)	(0.00000)	(0.014)	(0.023)	(0.00000)	(0.00000)	(0.015)	(0.022)
apply	0.064***	-0.0009	0.0000	-0.035	-0.062	0.0000	0.0000	-0.0027	0.036
	(0.025)	(0.002)	(0.00000)	(0.031)	(0.051)	(0.00000)	(0.00000)	(0.034)	(0.050)

***, **, * statistically significant at 99 %, 95 % and 90 % significance level

The attitude based variables seem to guide farmers' choices as follows. A positive attitude towards environmentally targeted support increases the probability that options 7 and 8 are chosen. Option 4 is likely to be chosen if respondents' attitude towards decoupling is positive and if negative, the probability for all the other options increases. If the application process in the current support scheme is seen time consuming the probability for options 0 and 8 to become chosen increases.

Some evidence about the factors affecting farmers' choice can also be found by looking at a few variables that were forced to be left out from the final estimation. A dummy-variable describing whether or not a farm implements any of the special measures included in the environmental support scheme explains farmers' choice almost perfectly. Those farmers implementing one or more special measures chose farm territorial contracts (option 7) as their first choice with only a few exceptions.

The same effect was found with a variable describing positive attitude towards the environmental elements of multifunctionality. This variable was formed by aggregating farmers' opinions towards different elements of multifunctionality to be comparable with the EU's three function-definition on multifunctionality. After aggregation, these variables were coded as three dummy-variables representing either positive or negative attitudes towards different functions of multifunctionality. The variable describing attitude towards the environmental function explained farmers' choice almost perfectly and was also highly correlated with the variable describing the implementation of the special measures. Also in this case, the respondents with a positive attitude towards the environmental elements of multifunctionality chose farm territorial contracts as their first

choice with only a few exceptions. Those variables describing the importance of rural and food production functions were not statistically significant, even if they were recoded differently.

Discussion

Our results show that Finnish farmers are willing to accept the multifunctional role of agricultural production. It seems, however, that farmers like to emphasise the elements of multifunctionality that are related to food production function over those included in the environmental function. Our results show that Finnish farmers are willing to accept the multifunctional role of agricultural production. Moreover, farmers saw that securing the elements included in the food production function is the most important function for multifunctional agriculture. In other words, farmers saw food security, food safety and food quality as the most important elements of multifunctionality. In addition, rural viability and employment effects of agriculture in the rural areas are also seen slightly more important than enhancing biodiversity and reducing the environmental load from agriculture.

Finnish farmers prefer decoupled support measures, as well as targeted and differentiated measures designed on the basis of local and regional agricultural conditions. Moreover, the farms specialised in dairy and animal production have somewhat different preferences than those specialised in crop production. The same is true for different geographical areas. In other words, farms located in southern Finland have somewhat different preferences than those located in northern parts of Finland.

Farmers are also willing to accept restrictions and cross-compliance measures as a basis for agricultural support as long as the compensation received on fulfilling these new terms is set high enough to cover the costs incurred. The most preferred policy option among farmers was a simple direct decoupled support, with a 10 % increase in support, when compared with the current level. This option was followed by farm territorial contracts, with locally designed and implemented measures. Regionally and locally differentiated and overall multifunctionality targeted support with cross-compliance and a requirement of a more extensive production practices was a third popular option. Both of these latter measures were introduced with an average of 10 % increase in support per farm.

When keeping in mind that 94 % of Finnish farms are participating in the environmental support scheme and 28 % in its special measures, these results are not surprising. It also indicates that farmers are willing to provide the elements of multifunctionality through contracting. Our results give support that an attempt should be made establishing this kind of contracting to include also other than the environmental elements of multifunctionality.

While the form of a simple direct decoupled support is somewhat self-explanatory, the other two most often chose options may need some more detailed description. The farm territorial contracts could be design to include some contract based provision of different services, public goods and other specified functions. The level and specific design of these contracts could be decided based on the different needs in particular rural areas. Thus, it could be targeted directly on the basis of local and regional multifunctionality.

On the other hand, regionally and locally targeted measures could be a slightly less detailed than farm territorial contracts. They could include same elements as the special measures in the EU's current agri-environmental support schemes, but also include requirements of crop rotation, wider buffer strips and so on. The main idea still is that the implementation of these levels would base on local and regional needs.

While the statistical efficiency of our model can be considered fair, especially in terms of correct predictions, the explanatory power of the model remains weak. This means that the marginal effects on probabilities for options with neutral change in support receive zero values. This indicates that there is a high correlation between the proposed change in support and farmers' choice. In addition, it also indicates that farmers' stated choice is, at least to some extent, affected by the amount of support. This means that farmers prefer more support to less, even if it were lead to an introduction of more restrictive agricultural practices. Yet, these restrictions need to be compensated to neutralise the effect of increased costs of production.

Acknowledgements

This research was funded by the Ministry of Agriculture and Forestry, Finland. This funding is gratefully acknowledged. Arovuori wants to thank Finnish Cultural Foundation, the Academy of Finland and Tiura Agricultural Research Foundation for personal research grants to continue this research.

References

Adamowicz, W., P. Boxall, M. Williams, and J. Louviere. 1998. "Stated Preference Approach for Measuring Passive Use Values: Choice Experiments and Contingent valuation." *American Journal of Agricultural Economics* 80:64-75.

Anderson, K. 2000. "Agriculture's 'multifunctionality' and the WTO." *The Australian Journal of Agricultural and Resource Economics* 44:475-494.

Arovuori, K., and J. Kola. 2005. "Policies and Measures for Multifunctional Agriculture: Experts' Insight." *International Food & Agribusiness Management Review* 8(3):21-51.

Boxall, P.C., W. Adamowicz, J. Swait, M. Williams, and J. Louviere. 1996. "A comparison of stated preference methods for environmental valuation." *Ecological Economics* 18: 243-253.

Boisvert, R.N. 2001. "A note on the concept of jointness in production". In: *Multifunctionality: Towards an Analytical Framework*. OECD. Paris. pp. 105-121.

Cairol, D., E. Coudel, D. Barthélémy, P. Caron, E. Cudlinova, P. Zander, H. Renting, J. Sumelius, and K. Knickel. 2005. "Multifunctionality of agriculture and rural areas: From trade negotiations to contributing to sustainable development. New challenges for research. Capitalisation of research results on the multifunctionality of agriculture and

rural areas. Summary of main results". 17 pp. Available: www.multagri.net. Referred: 12.02.2006.

European Commission. 1999a. "Contribution of the European Community on the Multifunctional Character of Agriculture". Info-Paper, October 1999. European Commission. Directorate General of Agriculture. Available: www.europa.eu.int/comm/agriculture/external/wto/archive/index_en.htm. Referred 17.5.2005.

_____. 1999b. "Safeguarding the multifunctional role of EU agriculture: which instruments?" Info-Paper, October 1999. European Commission. Directorate General of Agriculture. Available: www.europa.eu.int/comm/agriculture/external/wto/archive/index_en.htm. Referred 17.5.2005.

EC 1782/2003. Council Regulation on establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers. Brussels. 69 p.

Greene, W.H. 1997. *Econometric Analysis.* 3rd edition. Prentice-Hall. 1075 p.

Guyomard, H., C. Le Mouël, and A. Gohin. 2004. "Impacts of alternative agricultural income support schemes on multiple policy goals." *European Review of Agricultural Economics* 31:125-148.

Hanemann, M., and B. Kanninen, 1999. "The Statistical Analysis of Discrete-Response CV Data". In: Bateman, I. J. & Willis, K. G. (eds): *Valuing Environmental Preferences. Theory and Practise of the Contingent Valuation Method in the US, EU, and Developing Countries*. Oxford. pp. 302-441.

Harvey, D.R. 2004. "Policy dependency and reform: economic gains versus political gains." *Agricultural Economics* 31:265-275.

Koester, U., and M.A. El-Agraa. 2004. "The Common Agricultural Policy." In: El-Agraa, A, M. (ed.): *European Union. Economics & Policies*. 7th edition. Prentice Hall. 355-390.

Lankoski, J., and M. Ollikainen. 2003. "Agri-Environmental externalities: a framework for designing targeted policies." *European Review of Agricultural Economics* 30:51-75.

Louviere, J. J. 2001. "Choice Experiments: an Overview of Concepts and Issues." In: Bennet, J. & Blamey, R. (eds): *The Choice Modelling Approach to Environmental Valuation*. Edgar Elgar. pp. 13-36.

McFadden, D. 2001. "Economic Choices." *The American Economic Review* 91:351-378.

OECD. 2001. *Multifunctionality. Towards an Analytical Framework*. OECD. Paris. 159 p.

_____. 2002. *Agricultural Policies in OECD Countries: A Positive Reform Agenda.* OECD. Paris. 40 p.

_____. 2003a. *Multifunctionality: The Policy Implications*. OECD. Paris. 108 p.

_____. 2003b. *Policy-related transaction costs and policy choice: preliminary report*. AGR/CA/APM(2003)15. OECD. Paris. 47 p.

Ollikainen, M., and J. Lankoski. 2005. "Multifunctional agriculture: The effect of non-public goods on socially optimal policies." *MTT Discussion Papers* 1/2005. Agrifood Research Finland. 28 p.

Peterson, J.M., R.N. Boisvert, and H. de Gorter. 2002. "Environmental policies for a multifunctional agricultural sector in open economies." *European Review of Agricultural Economics* 29:423-443.

Prestegard, S.S. 2004. "Multifunctional Agriculture, Policy Measures and the WTO: the Norwegian Case." *Acta Agriculturae Scandinavica Section C - Food Economics* 1: 151-162.

Vatn, A. 2002. "Multifunctional agriculture: some consequences for international trade regimes." *European Review of Agricultural Economics* 29:309-327.

WTO. 2004. Doha Work Programme. Decision Adopted by the General Council on August 1, 2004. World Trade Organisation. Available: www.wto.org. Referred 30.11.2005.