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Agricultural Land use option preference of Farmers in Sidama Zone using Non-market valuation Techniques

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Abstract: Based on farmers' preferences this paper estimates the non-market values of agricultural environmental attributes and their changes within the study area. The analysis was carried out using a choice experiment technique of stated-preference to conduct investigations regarding different land use options within the agricultural land of Borecha Woreda of the Sidama Zone. The data set was constructed using a detailed household level survey amongst 150 representative farmers throughout the Woreda, including all agriculturally important settlements. Questionnaires, detailed focused group discussions and personal interviews approaches are selected as the appropriate surveying techniques. A random parameter logit model is estimated to account for heterogeneity in the preferences of the farmers for the various agricultural land use options. The results designate that there are positive and significant economic benefits allied with various land use option attributes of agricultural lands. Socio-economic characteristics of respondents have significant impacts on the choice of respondents. The number of workers and agricultural land productivity are the two greatest contributors to welfare. The results also reveal that there is sizeable preference heterogeneity across the farm households

Keywords: - *choice experiment method, random parameters logit model, agricultural Land use option, Borecha.*

I. INTRODUCTION

The most imperative challenge facing developing countries like Ethiopia these days is how to promote agricultural practices that provide necessary goods and services while conserving natural capital. To design appropriate policies and strategies that encourage sustainable land uses, it is important to recognize the economic value of environmental services and disservices generated by alternative agricultural practices. Policy makers often do not perceive and value these services due to lack of information in the form of market prices that reflect the monetary value they provide (Swinton et al. 2007; Nijkamp et al. 2008). Besides farmers in Ethiopia are primarily interested in their farms' wealth, whereas issues like natural resources upkeep are bypassed in most of the cases. This is mainly due to the limited knowledge that farmers possess on environmental matters. Although at a first glance the land use patterns amongst Ethiopian farmers appear to be different, whilst coming down to regions and locality levels, identical farming systems with the variation of a few types of crops are found. In most of the cases socio-economic factors are considered to be the main driving force for agricultural sector development. It is, however, another confirmation that environmental factors are omitted, which in sequence brings threat to ecological security as well as food security of the country. However, it is recognized that agriculture has more value than the value of goods produced within the sector alone. As a result, the supply of environmental services remains inadequate. Low productivity of agricultural production, malfunctioning of irrigation systems and the degradation of pastures amongst other factors were found to affect the biodiversity of agro ecosystems. Inefficient non-research based approaches for the formulation of appropriate policies for natural resources use in agriculture and poor land management knowledge resulting from the lack of familiarity with environmental issues, have been found to be predominantly responsible for the current decisive environmental situation in the country. It is, therefore, crucial to estimate the monetary value of alternative agricultural practices to facilitate the integration of environmental costs and benefits into policy making (Bräuer, 2003; Ninan&Sathyapalan, 2005; Swinton et al. 2007).In view of this situation, the current study estimates farmers preference for various land use options in Borecha woreda of Sidama zone using nonmarket valuation techniques, specifically choice experiment technique. Despite numerous analyses conducted focusing on land, one important research gap, where specific investigations regarding different land use options within the agricultural sector are tested, is still hardly filled. In this regard, an analysis that helps figure out which land use options can be best applied where (based on their suitability and benefits) with improvements on the environment is vitally important. The overall objective of the study is to estimate the non-market values of agricultural land use options and their changes within the study area based on farmer's preference and estimating individual's marginal willingness to pay for improvements in different specific land use options.

II. METHDOLOGY

Description of the Study Area:

Sidama Zone is found in southern nations, nationalities and people of Ethiopia. It covers the area of 69818.8-meter square of land. Sidama zone share a border with Oromiya in south-west and northwest, Gedio and Oromiya again in south and Wolaita in west side (SNNPR profile 2001). Sidama Zone, situated approximately 275 km south of Addis Ababa, is one of the zones in SNNP Region. It is one of the highly populated areas in Ethiopia, having a total population of about 2.5 million people residing on 721,00 hectare of land. Sidama zone has three kinds of ecological zone "dega, woynadega and kola": the dry midlands/lowlands (20%), the midlands (48%) and the highlands (32%). For administrative purposes Sidama zone is divided into 10 woredas. Sidama is known for its diverse, intensive and well-established traditional agroforestry systems in which a diversity of perennial and annual crops is grown together. The main economic activity in the area is agriculture and cattle herding; the societies are a mixed farming society, in some amount artesian and traders are found, the main edible plants in the area is mainly false banana " enset", coffee, pepper, cabbage, onion, and cereal like maize, wheat, barley, teff, oats and other cereals and fruits, tuber plants as well as chat are found.
Although population pressure, land shortage, soil erosion (especially, in the dry midlands) are the main production problems, farmers are or used to be self-sufficient and food secure.

The Study design:

In this study, Choice modeling has been used to estimate farmers' utility related to different land use options, with artificially designed changes in areas under main crops and of course the varying levels of environmental and social attributes. The pilot choice experiment survey was implemented using face-to-face interviews with a total of 150randomly selected respondents. The choice experiment survey was administered to be representative of the sample population in terms of income, social status, and other socio-economic characteristics. The sample was drawn in two stages. In the first stage from a total agricultural land, which are found in the study area, two kebeles were selected randomly. In the second stage, randomly selected individuals were surveyed in both kebeles. A total sample of 150 respondents were drawn randomly and distributed between the kebeles proportionate to their population density.

The Choice experiment method:

The choice experiment method has its theoretical grounding in Lancaster's model of consumer choice. Lancaster proposed that consumers derive satisfaction not from goods themselves but from the attributes they provide. According to the characteristics theory of value, the probability of choosing a specific alternative is a function of the utility linked to the same alternative. Moreover, the utility derived from each alternative is assumed to be determined by the preferences over the levels of the attributes provided by that alternative. The assumption that individuals derive utility from the characteristics of a good rather than from the good itself, implies that a change in one of the characteristics (such as the price) may result in a discrete switch from one good to another will however affect the probability of choosing that specific commodity on the margin.

III. EMPERICAL RESULTS AND ANALYSIS

Attributes and levels

The attributes and levels used are identified with great care after consultations with development agencies in the study area and based on focused group discussions and key informant interview with the public. These agricultural land use option attributes and their corresponding levels used in the choice experiment are presented in the table below:

Table 3.1: Attributes and levels

Attributes	**Levels**
Agricultural land productivity	1. Current productivity 2. Increase agricultural productivity by 5% 3. Increase agricultural productivity by 10%
Number of workers in agriculture	1. No increase 2. Medium increase (10% increase) 3. Aggressive increase (20% increase)
Improved water supply provision	1. No 2. Yes
Payment attribute	1. No payment (current) 2. 10 birr 3. 20 birr

Econometric model specification of the farmer's different land use option choice experiment:

The model was specified in such a way that the probability of selecting a particular scenario alternative was a function of attributes of that scenario and of the alternative specific constant. Since both observed and unobserved heterogeneity of respondents on the preferences is likely to exist, instead of the basic conditional logit model which does not account for these heterogeneities, a more powerful random parameters logit model has been used in the study. The indirect utility from the proposed land use option would take the following form:

$V_i = ASC + \beta_{ALP} ALP + \beta_{NoW} NoW + \beta_{fWS} WS + \beta_{mp} mp \; ; i = 1,2,3$ ….……(1)

The β values are the coefficients associated with each of the attributes respectively. Here it has to be noted that the β coefficients are each confounded by a different scale parameter μ, and hence; cannot be interpreted as the contribution made to utility by each attribute in any absolute sense as they are. In other words, they are dependent on the variance of the error involved in the estimation process, (Swait and Louviere 1993).

The RPL model:

Under the random parameters logit model, the alternatives are not independent, i.e. the model does not exhibit the IIA property, and there is an explicit account for unobserved heterogeneity. Thus, the RPL model relaxes the restrictions of the conditional logit model and is able to overcome limitations enumerated in the Conditional logit model. The random utility function in the random parameter logit model will take the following form (Birol et al., 2005):

$U_{ni} = V_{ni} + \varepsilon_{ni} \equiv Z_i(\beta + \mu_n) + e_{ni}$…….(2)

Where: respondent *n* receives utility U for choosing option *I* from a choice set C. Utility is decomposed into a non-random component (*V*) and a stochastic term (ε); and the indirect utility is assumed to be a function of the choice attributes Z (ALU, NW, WS and monetary payment) with parameters β, which due to preference heterogeneity may vary across respondents by a random component,μ_n. Socio-economic characteristics may or may not be included in the model.

Estimation and discussion of choice experiment results:

IV. RESULTS OF THE RPL:

The RPL model is estimated using LIMDEP 8.0 NLOGIT 3.0. Before estimating the parameters, the model requires an assumption about the distribution of the coefficients and make choices on what parameters to randomly distributed and what parameters that should be fixed. In many choice experiments, it has been common to assume that the cost parameter is fixed. One reason for this is that then the distribution of the marginal WTP is given by the distribution of the attribute. In principle any distribution could be used, but the most common ones have been the normal and the log-normal distribution. Thus in this CE study, all the parameters except the payment attribute were specified to be normally distributed (Carlsson et al. 2003). The results of the random parametric logit model are reported in table 3.2.

Table 3.2: Results of the RPL Model with attributes only.

Variables	**Coeff. (P-value)**	**Std. err.**
Random parameters in utility functions		
ASC	-1.152** (.0269)	.5203
ALU	2.091*** (.0000)	.3426
NoW	2.252*** (.0000)	.3377
WS	.9411* (.0863)	.5486
Nonrandom parameters in utility functions		
Payment attribute	-.1248*** (.0197)	.5352E-1
Derived standard deviations of parameter distributions		
ASC	.1515	.6265

	(.8090)	
ALP	.6181 (.1114)	.3883
NoW	1.896*** (.0000)	.3851
WS	.4104 (.4729)	.5718
Summary Statistics		
Log-likelihood	-630.800	
RsqAdj	.3588	
Iteration completed	24	
Number of Obs.	900	

***Significant at 1% level; **Significant at 5% level;*Significant at 10% level

The pseudo R^2 value, which is by far greater than 0.2, shows that the RPL model is appropriate for the analysis of the data set presented in this paper. As can be seen from the table, the signs of the coefficients of the attributes are the same as in the Conditional logit. However, there is some difference in the magnitude of the coefficients. The coefficients of ALU, NoW and the payment attributes are statistically significant at the 1% level and WS is significant at 10%. At this stage the parameters does not reveal that much information to us. The sign tells us whether the probability of choosing an alternative increases or decreases when the level of the attribute increases. It may be miss-leading to reveal the relative importance of the attributes in terms of the effects on the respondents' choices from the relative magnitudes of the parameters unless they are measured on the same scale. The three attributes have the expected positive signs. This implies that a change in the level of any of the above three attributes in an alternative from the status quo level increases the probability of choosing that alternative. The sign of the payment coefficient indicates that the effect on utility of choosing an alternative with a higher payment level is negative, which is consistent with the demand theory that "cheaper " alternatives or plans are preferred to 'more expensive' options after other characteristics are held constant. Overall, these results indicate that positive and significant economic values exist for the changes in the levels of various attributes of the agricultural land, but do not want to be charged higher prices.
Further, RPL model estimates reveal significant and large derived standard deviations for the Number of workers attribute, indicating that the data supports choice specific unconditional unobserved heterogeneity for this attribute and some respondents might prefer lower levels of this.

The Marginal willingness to pay:
Estimates of implicit prices (marginal willingness to pay) for each of the attributes in the choice sets associated with the RPL models are shown in table 3.3. The corresponding t-statistics and standard errors were calculated using the delta method (Green, 2000).

Table 3.3: Estimates of Marginal WTP (in birr) for each attribute

Variables		
	Coeff. (P-value)	**Std. err.**
ALP	16.75** (.0101)	6.508
NoW	18.04** (.0170)	7.561
WS	7.54*** (.0001)	1.950

***Significant at 1% level; **Significant at 5% level;*Significant at 10% level

From table 3.3, we can observe that the implicit prices for all attributes are positive and significant at the 1 percent level, implying that respondents have a positive WTP for an increase in the quality or quantity of each attributes. Using the RPL model, which has a better fit; these implicit prices suggest that, for instance, the farm households are, on average, willing to pay 16.75 and 18.04 birr per month for an improvement in the agricultural land productivity and number of workers. The marginal willingness to pay is relatively low for the

water supply attribute compared to the other two attributes, i.e. they are willing to pay 7.54 birr per month for new improvement plans in the provision of water supply attribute.

V. CONCLUSIONS AND POLICY RECOMMENDATION

Conclusion

Overall, the analysis carried out in this study provides a remarkable picture as long as non-market valuation of agricultural land use options are concerned in the study area and in the country as well. The results indicate that there are positive and significant economic benefits associated with the agricultural land use option attributes. The analysis showed that the number of workers attribute proved to be generating a higher impact on the utility for the community than did the agricultural land productivity improvement and improved water supply provision attributes. This was reflected in a higher willingness to pay for the number of workers attribute. Further, there is considerable preference heterogeneity within the community, which should be taken into consideration when designing policies for public goods, such as agricultural lands.

There are heterogeneous preferences for the number of workers attribute, as the coefficient of the random attribute has significant standard deviation. A positive mean WTP was found for the three attributes *''agricultural land productivity'', ''number of workers'' and ''improved water supply provision''*. A natural extension of this survey is to estimate the marginal cost of providing the different attributes of the agricultural land use options which is of course beyond the scope of this study.

VI. POLICY RECOMMENDATIONS

Our survey results show that the communities are willing to pay for improvements in the agricultural land use options. This result has interesting implication in that if local government improves the productivity of the agricultural land, working towards increasing the employment opportunity of the resource and provide water supply for various purposes with some scientific and legal measures, there would be a sustainable and efficient utilization of the natural resource as well as the overall economic benefit that goes to the community will be enhanced. This will also play great role in mitigating the problem in the study area associated with degradation of agricultural land.

REFERENCES

[1] Aidarov, I. P., &Korolkov, A. I. (2003).Perspektivy Razvitiya Kompleksnyh Meropriyatiy V Rossi (Further outlooks for integrated land reclamation in Russia). Moscow, Russian.

[2] Azqueta, D. &Sotelsek, D. 2007. Valuing nature: from environmental impacts to natural capital. Ecological Economics 63(1):22–30.

[3] Ben-Akiva, M. and Lerman, S.R, 1985. Discrete choice analysis: Theory and Application to Travel Demand, MIT press, Cambridge.

[4] Bennett J, Blamey R., 2001.The Choice Modeling Approach to Environmental valuation New horizons in environmental valuation, Edward Elgar publishing limited, UK.

[5] Birol E., Karousakis K., and Koundouri P., 2005. Using a Choice Experiment to Estimate the Non-Use Values of Wetlands: The case of Cheimaditida wetland in Greece: Environmental Economy and Policy Research Discussion Paper Series, Department of Land Economy, University of Cambridge.

[6] Bräuer, I. 2003. Money as an indicator: to make use of economic evaluation for biodiversity conservation. Agriculture, Ecosystems and Environment 98(1–3):483–491.

[7] Bräuer, I. 2003. Money as an indicator: to make use of economic evaluation for biodiversity conservation. Agriculture, Ecosystems and Environment 98(1–3):483–491.

[8] Dale, V. &Polasky, S. 2007. Measures of the effects of agricultural practices on ecosystem services. Ecological Economics 64(2):286–296.

[9] Engel, S., Pagiola, S., &Wunder, S. 2007.Designing payments for environmental services in theory and practice: an overview of the issues. Ecological Economics 65(4):663–674.

[10] Ergasheva, M. A. (2009). Effektivnost' Ispol'zovaniya Prirodno-Resursnogo Potenciala V. Selskom Khozyaistve Efficacy of natural resource potential use in Agricultural sector, Thesis abstracts, Dushanbe, Russian.

[11] Garrod G. and Willis K.G., 1999. Economic Valuation of the Environment: methods and case studies: Edward Elgar Publishing, Inc., Cheltenham, UK.

[12] Hanley N., Wright R.E., Adamowicz V., 1998. Using Choice Experiments to Value the Environment: Design Issues, Current Experience and Future Prospects: Environmental and Resource Economics 11(3–4): 413–428, Kluwer Academic Publishers, Printed in the Netherlands.

[13] Huang, C. &Konrad, G. 2001.The cost of sequestering carbon on private forest lands. Forest Policy and Economics 2(2):133– 142.

[14] Jackson, L., Pascual, U., Brussaard, L., Ruiter, P., &Bawa, K. 2007. Biodiversity in agricultural landscapes: investing without losing interest. Agriculture, Ecosystems & Environment 121(3):193–195.
[15] Kremen, C., Niles, J., Dalton, M., Daily, G., Ehrlich, P., Fay, J. Grewal, D., &Guillery, R. 2000. Economic incentives for rain forest conservation across scales. Science 288 (5472):1828–1832. Lancaster, K J, 1966). A New Approach to Consumer Theory. Journal of Political Economy 74: 132-157.
[16] Louviere J.J, Hensher D.A and Swait J.D., 2000. Stated Choice Methods: Analysis and Application, Cambridge: Cambridge University Press.
[17] Madureira, L., Rambonilaza, T., &Karpinski, I. 2007. Review of methods and evidence for economic valuation of agricultural non-commodity outputs and suggestions to facilitate its application to broader decisional contexts. Agriculture, Ecosystem & Environment 120(1):5–21.
[18] Marta-Pedroso, C., Domingos, T., Freitas, H., & de Groot, R. 2007. Cost-benefit analysis of the Zonal Program of Castro Verde (Portugal): highlighting the trade-off between biodiversity and soil conservation. Soil & Tillage Research 97(1):79–90.
[19] McFadden, D., 1974. Conditional logit analysis of qualitative choice behavior', in Zarembka, P (ed.), Frontiers in econometrics, New York: Academic Press.
[20] Nijkamp, P., Vindigni, G., &Nunes, P. 2008. Economic valuation of biodiversity: a comparative study. Ecological Economics 67(2):217–231.
[21] Ninan, K. &Sathyapalan, J. 2005. The economics of biodiversity conservation: a study of a coffee growing region in the Western Ghats of India. Ecological Economics 55(1):61–72.
[22] Olschewski, R. &Beníez, P. 2005. Secondary forests as temporary carbon sinks: the economic impact of accounting methods on reforestation projects in the tropics. Ecological Economics 55(3):380–394.
[23] Rasul, G. &Thapa, G. 2006. Financial and economic suitability of agroforestry as an alternative to shifting cultivation: the case of the Chittagong Hill Tracts, Bangladesh. Agricultural Systems 91(1–2):29–50.
[24] Swinton, S., Lupia, F., Robertson, G., & Hamilton, S. 2007. Ecosystem services and agriculture: cultivating agricultural ecosystems for diverse benefits. Ecological Economics 64(2):245–252.
[25] Tschakert, P. 2007. Environmental services and poverty reduction: options for smallholders in the Sahel. Agricultural Systems 94(1):75–86.
[26] Zbinden, S. & Lee, D. 2005.Paying for environmental services: an analysis of participation in Costa Rica's PSA Program. World Development 33(2):255–272.
[27] Zhang, W., Ricketts, T., Kremen, C., Carney, K., &Swinton, S. 2007. Ecosystem services and dis-services to agriculture. *Ecological Economics* 64(2):253–260.