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Public preferences for cultivated land protection in Wenling City, China: A choice experiment study

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ABSTRACT

This study measures the public preferences for cultivated land protection as a case study of Wenling City, China, using the choice experiment (CE) approach. The estimation results indicate that the most important attribute for cultivated land protection in Wenling City was land facility, followed by land fertility and then by landscape improvement. The monthly willingness-to-pay of a typical household for the cultivated land protection from the status quo to the highest attribute level is calculated as RMB23.79 (US$3.66), and the total annual willingness-to-pay for the entire population of the study area is RMB232 million (US$35.7 million). This study allows us to provide policymakers with quantitative information related to cultivated land protection programs. The study concludes that CE is a reliable tool in the analysis of respondent preferences for the development of suitable cultivated land protection schemes in China.

Introduction

The rapid economic development in China following the 1978 reforms has resulted in significant economic, social and environmental changes. One consequence of this change has been the accelerated trend of cultivated land loss and degradation (Bradbury et al., 1996). The rapid development of urbanization and industrialization onto cultivated land has placed immense pressure on already limited agricultural land resources (Yang and Li, 2000; Wu, 2006). The integrated effects of the population stress, economic development, scarcely available land and national food self-sufficiency have promoted the increasing demands for cultivated land protection. Indeed, the protection of cultivated land resources has been one of the most important issues of land administration (Li et al., 2009). However, the interpretation and implementation of land-use policy at the local levels of government continues to tradeoff the loss and degradation of cultivated land (and the attendant environmental costs) against the increasing economic growth (Skinner et al., 2001). The situation in coastal areas is more serious.

There are various factors that affect the protection of cultivated land, including economic, legal, political, and administrative factors (Wu and Tan, 2002). Some research has demonstrated that one fundamental reason for poor cultivated land protection in China is the insignificant value of agriculture relative to other land uses (Bergstrom and Ready, 2009; Cai et al., 2006; Cai and Huo, 2006).

In truth, agricultural land use not only provides income for farmers but also may confer benefits on society not captured by commodity prices. For example, the public can benefit from open-space services, such as aesthetic and heritage values, groundwater and soil conservation, wildlife habitat and biological diversity. These benefits are direct, positive influences on the quality of life of the population, but they are often not reflected in the market values of land. The decision-makers of agricultural policy and, more generally, of land management, need to know the complete benefits (including those nonmarket benefits) they can expect from their policy. Such knowledge could help them to define the policy orientation and consequently the social and environmental functions assigned to agriculture (Turner, 2007; Bergstrom and Ready, 2009; Duke and Johnston, 2009; Jeanne and Tina, 2012). Thus, the challenge for policymakers is to find a way to quantify the true value of cultivated land protection to the local residents and to incorporate these values into land-use and protection decisions (Johnston and Duke, 2007).

Because there is no existing market for some benefits gained from cultivated land protection, the benefits that people derive from cultivated land protection cannot be feasibly measured with a typical economic analysis. In the absence of market prices, the stated preference methods, such as the contingent valuation method (CVM) and choice experiment (CE), can be used to create hypothetical markets and to observe the preference behaviors for nonmarket goods and services (Bateman et al., 2002).

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Fig. 1. Location of Wenling City in China.

The CVM has been the most widely used stated preference method for nonmarket valuation (Mitchell and Carson, 1989). All of the early farmland valuation studies conducted in the 1980s and 1990s used the CVM to estimate the willingness to pay (WTP) for the amenity values and some environmental benefits of farmland protection (Tsai, 1993; Hackl and Pruckner, 1997; Chang and Ying, 2005; Hideo et al., 2006; Bergstrom and Ready, 2009). However, the policy measures of cultivated land protection may contribute to various attributes (Campbell et al., 2005). The specific attributes of a cultivated land protection program are very important to policymakers and can be potentially important for garnering public support (Boyle and Özdemir, 2009). The use of the CVM in situations where multiple options and several attributes are being considered is generally problematic (Streever et al., 1998).

The CE is a type of stated preference technique for establishing the importance of different 'attributes' in the provision of a good as well as marginal rate of substitution between these attributes (Adamowicz et al., 1994, 1998; Boxall et al., 1996). The inclusion of cost as an argument in the discrete CE permits the estimation of welfare changes from one scenario to another (McIntosh and Ryan, 2002). Starting in the early 2000s, the economists using stated preference methods to value farmland benefits turned their attention more toward the CE to analyze the relationships between WTP for farmland protection and specific farmland attributes (Bergstrom and Ready, 2009). However, to the best of our knowledge, the applications of the CE to the cultivated land protection decisions are mainly in the U.S. and in European countries (Özdemir, 2003; Duke and Thomas, 2004; Johnston and Duke, 2007, 2008, 2009; Campbell, 2007; Boyle and Özdemir, 2009). In this context, the present paper examines the use of a CE methodology to assess the public preferences for cultivated land protection as a case study of Wenling City, China, where the protection of cultivated land has been a very important policy issue, with the aim of helping policymakers to target the protection programs according to the public preferences in a developing country.

The next section provides a brief description of the cultivated land protection problem in the study area. "Methodology" section outlines the basic CE method, the survey design and the operational aspects of the study. "Results and discussion" section presents the empirical results and discussion. Some concluding remarks are made at the end of the paper.

The setting

In the last three decades, Zhejiang Province has experienced extraordinary economic growth. The loss and degradation of cultivated land is the most notable feature of the rural development in Zhejiang Province (Skinner et al., 2001). Wenling City, situated on the southeast coast of Zhejiang Province (Fig. 1), is one of the most densely populated counties in China. The total area of Wenling City is approximately 920 km^2. According to the latest census, Wenling had a population of 1,184,510 in 2009 with an average population density 1288 inhabitants per km^2 (Statistics and Census Bureau of Wenling City, 2009). In the last two decades, Wenling has experienced rapid economic growth. From 1999 to 2009, its average annual per capita GDP growth rate was more than 15%. In 2009, the city per capita GDP reached US$6187, ranking as one of the top 15 counties in China.

With the implementation of the strategy "building an economic and cultural prosperity city" in Wenling, the rate of urbanization and industrialization has been increasing. Thus, land was reallocated from agricultural to nonagricultural uses. The trend of cultivated land loss and degradation has accelerated. On the basis of the data from the Survey of Land-Use Change in Wenling, the total area of available cultivated land in Wenling City in 2009 was 32,479 hectares, which was 4500 ha (13%) less than in 1996. The loss rate of the cultivated land was much greater than the national average. In 2009, the per capita cultivated land area in Wenling was only 0.027 ha, which is substantially less than the national per capita average of 0.092 ha. Moreover, the quality of the land production capacity has continued to deteriorate. Under the policy of the total dynamic balance of the cultivated land, those losses for development were counterbalanced by the addition of arable land from reclamation activity. However, the additional arable land was of poorer quality and was located in areas with less favorable cultivated conditions (Lichtenberg and Ding, 2008). The persistent loss and degradation of cultivated land has raised concerns about the sustainability of development. According to senior government officials from the Wenling Land Management Bureau (pers. Comm. 2009), the protection of cultivated land resources is an important component of planning and development in Wenling City. Compiling information on how much people are willing to pay for cultivated land protection, as well as what types of the land attributes they are willing to protect, will help to guide the development of effective cultivated land protection programs.

Methodology

The choice experiment method

The CE is a nonmarket valuation method that provides respondents with multiple choice sets, in which each choice set usually contains two or more management options. The options in each choice set contain common attributes, which can be at various levels. The respondents are asked to choose their most preferred option. This method allows researchers to evaluate the impacts of different attributes on the welfare of the respondents.

The CE is based on two fundamental building blocks: Lancaster's characteristics theory (Lancaster, 1966) and random utility theory (Adamowicz et al., 1994; Boxall et al., 1996). Lancaster's theory posits that choices can be modeled as a function of attributes of the alternatives relevant to a given choice problem. The random utility theory assumes that the alternative with the greatest overall utility is selected. The utility function for a representative consumer can be decomposed into a systematic or observable component and a random or unobservable component by the analyst. The random utility function equation is:

$$U_{in} = V_{in} + \varepsilon_{in} \tag{1}$$

where U_{in} is the total utility of alternative i for individual n; V_{in} is the observable component; and ε_{in} is a stochastic or unobservable component.

In a random utility context, the probability that individual n will choose option i over another option j belonging to the complete choice set C is given by:

$$P_{in} = Pr(V_{in} + \varepsilon_{in} > V_{jn} + \varepsilon_{jn}); \quad i \neq j, \quad j \in C \tag{2}$$

Like McFadden (1974), the error term is assumed to be independently and identically distributed with a Gumbel distribution (a type 1 extreme value distribution). The probability P_{in} is:

$$P_{in} = \frac{\exp(\mu V_{in})}{\sum_{j \in C} \exp(\mu V_{jn})} \tag{3}$$

where μ is a scale parameter, which is inversely proportional to the standard deviation of the error distribution. This parameter cannot be separately identified and is therefore typically assumed to equal one (Hanley et al., 2006). V_{in} and V_{jn} are indirect utility functions assumed to be linear in parameters (Louviere et al., 2000):

$$V_{in} = \text{ASC}_i + \sum_k \beta_{ik} X_{ik} \tag{4}$$

where ASC_i is an alternative specific constant (ASC) for option i; X_{ik} is the k attribute value of the alternative i; and β_{ik} is the coefficient associated to the k attribute of alternative i.

Socioeconomic and/or attitudinal variables can be included into the utility functions by estimating the variables interactively with the ASC (Morrison et al., 1999; Colombo et al., 2006):

$$V_{in} = \text{ASC}_i + \sum_k \beta_k X_k + \sum_h \gamma_{ihn} (\text{ASC}_i \times S_{hn}) \tag{5}$$

where S_{hn} represents the socioeconomic or attitudinal variables of individual n; and γ_{ihn} is the vector of coefficients associated with the individual socioeconomic characteristics interactively with the ASC.

The parameters can be estimated using the maximum likelihood estimation method. Having estimated the parameters, the marginal value of a change within a single attribute using a linear-in-parameters utility function can be represented as a ratio of coefficients:

$$\text{MWTP} = -\frac{\beta_{\text{attribute}}}{\beta_M} \tag{6}$$

where β_M is the marginal utility of income (generally represented by the coefficient for the monetary cost attribute in an experiment). This part-worth formula effectively provides the marginal rate of substitution between the income change and the attribute in question (Rolfe et al., 2000).

In addition, the willingness to pay measures relative to different environmental scenarios can be obtained with Eq. (7), where V^0 and V^1 represent the indirect utility before and after the change under consideration (Boxall et al., 1996; Morrison et al., 1999):

$$\text{WTP} = -\frac{1}{\beta_M}(V^0 - V^1) \tag{7}$$

Table 1
Explanation of the attributes analyzed in the CE questions.

Cost	This attribute considers a monthly charge levied on each household. There are four levels: US$0, 1.56, 3.12, 7.81.
Landscape	This attribute considers the amenity values of cultivated land protection. There are two levels: current landscape or better amenity.
Facility	This attribute considers whether the government takes some measures to improve land field facilities such as road and water irrigation system. There are two levels: taking some measures or without taking any measures.
Fertility	This attribute considers whether the government takes some measures to improve land fertility. There are two levels: current fertility or better land fertility.

Survey and data collection

Attributes

The attributes included in this study were based on an extensive literature review, focus group discussions and pretest results. Finally, we selected four attributes – landscape, land fertility, land facility and cost – to keep the choice sets offered to the respondents as clear and simple as possible (Table 1).

The choice sets

The CE approach involves carefully designed choice tasks that help to reveal the factors influencing choice. Typically, respondents are presented with multiple choice sets that contain two or more options in a CE. In our study, each choice set has three main options: the fixed option (option A) represents the status quo scenario, and the two alternative options (option B and option C) represent improved scenarios. Then, based on the attributes and their levels, there are $(2 \times 2 \times 2 \times 3)^2 = 576$ possible combinations to form two alternative options. Because asking all combinations of respondents was impractical, a D-optimality criterion was used to optimize both the experimental design and the choice profile blocking (Scarpa and Rose, 2008). As a result, 21 versions of the choice sets were constructed from the design, and they were randomly divided into 3 blocks. An example choice set is provided in Table 2. Each respondent was presented with 7 choice sets and was asked to choose one between the status quo option (defined by the current attribute levels) and the two alternative options (defined by varying levels of the 4 attributes described in Table 1) for each choice set.

Questionnaire design

The questionnaire was developed with the results from three focus groups and one pretest and collaborated with a team of agricultural scientists. The focus groups and the pretest were necessary to test the appropriateness of the attributes (and their levels)

Table 2
A sample choice set in CE surveys.

Attribute	A (current)	B	C
Landscape			
Land facility			
Land fertility			
Cost (US$/household/month)	0	1.56	3.12
1. I would choose option A	———		
2. I would choose option B	———		
3. I would choose option C	———		

included in the CE questions and to refine the initial draft questionnaire. On the basis of results provided by focus group discussions and the pretest fieldwork, some modifications in the draft questionnaire were made. The pretest was conducted on 40 local residents in May 2010.

The final survey questionnaire consisted of three parts: (i) some knowledge and attitudinal questions to identify outliers, as well as to introduce the respondent to the problem; (ii) seven choice sets to record respondent preferences; and (iii) some socioeconomic questions about the respondents (e.g., age, sex, income).

Sample selection and survey method

In Wenling City, nine towns (districts) were randomly selected for the final survey. In each town, the respondents were selected by the stratified random sampling method based on the parameters of age, sex and population published by official statistics (Statistics and Census Bureau of Wenling City, 2009). This proportional stratification helped to reduce the potential sampling error and increased the likelihood of generating a representative sample of the Wenling population. The sampling frame was limited to the household heads (male or female) aged 18–65 years old. The head of the household was identified as the person in charge of the daily expenditures and other (younger) family members. The household members were referred to as persons of any age who ate, drank and slept in the identified house on a regular basis.

Personal interviews were used as the survey method to encourage more responses and to offer respondents the largest response scope for the detailed questions, pictures and answers. The professional interviewers were trained to effectively conduct face-to-face interviews.

Results and discussion

The final field survey was performed in July and August 2010. The survey randomly selected 420 households, and 120 households failed to answer the questionnaire because there was no one in the house or the persons were not the target respondents; 54 households rejected the opportunity to be involved in this survey. The entire questionnaire took approximately 20 min for the respondent to complete. The final number of respondents was 246, and the response rate was approximately 60.5%. After excluding inconsistent or problematic answers to key questions, 219 observations were left for further analysis.

Among the total 219 valid answers, 88 respondents displayed zero WTP in their CE responses by always choosing the status quo option for all seven choice sets. For the reason why they always chose the status quo option, 12 respondents stated that they had no extra money for cultivated land protection, and 41 respondents believed that the government should take the responsibility for cultivated land protection. Another 12 respondents thought that the money they contributed might not be directly used for cultivated land protection, and 9 respondents argued that people who destroyed the cultivated land should pay. To have a complete picture of the public preferences, all responses were included for further examination and yielded 1533 (219×7) usable items of data.

Demographic and socioeconomic characteristics of respondents

The descriptive statistics of the main demographic characteristics of respondents are presented in Table 3. Comparing the demographic profile of respondents with the Wenling census data, we found that our sample can be representative of the city population. Approximately 52% of respondents were male, which is similar to the city average (51%). The mean age of respondents was approximately 40 years old. Approximately one-third of respondents (31%) had college diplomas and a university degree or greater. The average family size was 3.98 people. The mean annual household income was RMB77,900 (Chinese currency, US$1.00 approximately = RMB6.50),and the mean yearly household income was approximately RMB19,475, which was quite similar to the city average of RBM19,480.

Multinomial logit model results

Two multinomial logit (MNL) models were estimated using the data derived from the survey with Stata 8.0. The first model, named model 1, is a basic specification that demonstrates the importance of the choice attributes in explaining respondent preferences of the different protection program options. The second model, named model 2, considers both the socioeconomic and knowledge variables in addition to the attributes in the choice set. The

Table 3
Main demographic and socioeconomic variables of respondents.

Variables	Descriptions	Mean	S.D.	Min	Max
Gender	1 = male, 0 = female	0.52	0.50	0	1
Age	Age of respondents	40.29	14.1	17	82
Education	Education of respondents (1 = above diploma level, 0 = below diploma level)	0.31	0.46	0	1
Holiving	Number of household members living together	3.98	1.49	1	13
Income	Total yearly household income (10,000 RMB)	7.79	6.87	0.10	40

Table 4
Definitions of variables included in MNL model 2 analysis.

Variables	Descriptions	Mean	Std. Dev.
C_1, C_2	Alternative specific constants for option B and C	–	–
Urban	1 = urban resident, 0 = rural resident	0.41	0.49
Income	Total yearly household income (10^4 RMB)	7.79	6.87
Young	Number of household members less than 12 years of age	0.41	0.60
Old	Number of household members older than 65 years of age	0.53	0.77
Knowledge	Knowledge on cultivated land protection (2 = good, 1 = average, 0 = poor)	1.23	0.55
Education	Education of respondents (1 = above diploma level, 0 = below diploma level)	0.31	0.46

definitions of the variables used in the models and their main statistics are presented in Table 4.

For model 1, there are three utility functions derived from the MNL model. Each represents the utility generated by one of the three options:

$$
\begin{aligned}
V_1 &= \beta_1 \times \text{Landscape} + \beta_2 \times \text{Facility} + \beta_3 \times \text{Fertility} + \beta_4 \times \text{Cost} \\
V_2 &= C_1 + \beta_1 \times \text{Landscape} + \beta_2 \times \text{Facility} + \beta_3 \times \text{Fertility} + \beta_4 \times \text{Cost} \\
V_3 &= C_2 + \beta_1 \times \text{Landscape} + \beta_2 \times \text{Facility} + \beta_3 \times \text{Fertility} + \beta_4 \times \text{Cost}
\end{aligned} \tag{8}
$$

Utility is determined by the levels of four attributes (Landscape, Facility, Fertility, and Cost) in the choice sets. Hence, the model provides an estimate of the effect of a change in any of these attributes on the probability that one of these options will be chosen. C_1 and C_2 are two alternative specific constants.

The specification for model 2 is:

$$
\begin{aligned}
V_1 &= \beta_1 \times \text{Landscape} + \beta_2 \times \text{Facility} + \beta_3 \times \text{Fertility} + \beta_4 \times \text{Cost} \\
V_2 &= C_1 + \beta_1 \times \text{Landscape} + \beta_2 \times \text{Facility} + \beta_3 \times \text{Fertility} + \beta_4 \times \text{Cost} + C_1 \times \text{Urban} + C_1 \times \text{Income} + C_1 \times \text{Young} + C_1 \times \text{Knowledge} + C_1 \times \text{Education} \\
V_3 &= C_2 + \beta_1 \times \text{Landscape} + \beta_2 \times \text{Facility} + \beta_3 \times \text{Fertility} + \beta_4 \times \text{Cost} + C_2 \times \text{Income} + C_2 \times \text{Old} + C_2 \times \text{Young} + C_2 \times \text{Knowledge} + C_2 \times \text{Education}
\end{aligned} \tag{9}
$$

Four socioeconomic variables (Income, Urban, Young, and Education) and one knowledge variable were included in the second utility function by interactions with the alternative specific constant. In the third utility function, four socioeconomic variables (Income, old, Young, and Education) and one knowledge variable were included by interactions with the alternative specific constant.

The estimation results of these two models are in Table 5. The coefficients for all attributes in both model 1 and model 2 have the expected signs and are significant at the 1% level. The positive signs of the coefficients for the Landscape, Facility and Fertility indicate that an improvement of these attributes can increase the utility of respondents. On the contrary, the coefficient on cost attribute is significantly negative, meaning that the greater a cost is, the less likely that person is to have choice probability. Using the Chi-squared statistic, all estimated equations are statistically significantly different from zero at the 1% level.

All of the socioeconomic and knowledge variables included in model 2 by interactions with the alternative specific constants are significant. The signs of these socioeconomic and knowledge variables are consistent with a priori expectations. The positive and significant coefficients of income support the hypothesis that respondents with more income would choose the new, improved cultivated land protection program more frequently. The coefficients of education are positive and significant at the 1% level, as respondents with more education would have more knowledge about social, political, economic and environmental issues as well as good comprehension about the existing cultivated land problems. The more-educated respondents would more prefer the improved cultivated land protection programs. The signs for the young are significantly positive, indicating respondents with more young household members would be more willing to choose the improved cultivated land protection program. The reason for this could be that the respondents had a bequest value on the cultivated land. As expected, the coefficients of knowledge are positive and significant at the 1% level, suggesting that a respondent with more knowledge of cultivated land protection would choose the improved cultivated land protection option more frequently.

Benefit estimation

Given our assumptions about a linear income effect, the marginal WTP for a certain attribute is the ratio of the attribute coefficient and the coefficient for the cost attribute (Morrison et al., 1999). The marginal WTPs for each nonmonetary attribute in the choice sets derived from the two models are presented in Table 6. The implicit prices for all of the attributes are positive, implying that the respondents have a positive WTP for an improvement in the attribute.

These implicit prices suggest that, for instance, in model 1 without covariates, respondents were willing to pay US$5.69 per household per month for an improvement in the attribute Facility, ceteris paribus They were also willing to pay US$2.52 per household per month for an improvement in the attribute Landscape, which is consistent with the results in other studies (Rambonilaza and Jeanne, 2007). The implicit prices can also be used to identify which attribute is more important to respondents, which can be used by policymakers to assign more resources in favor of the attributes that have more implicit prices.

For the simple model without covariates, the monthly WTP of a typical household for the cultivated land protection program from the status quo to the greatest attribute level was calculated as approximately RMB23.79 (US$3.66) by adding the WTP of each attribute. The total WTP for the protection program with the greatest attribute level was calculated to provide policymakers with quantitative information. As described earlier, a professional survey was implemented in the field to ensure the representative sample frame. Thus, the household WTP can reasonably be expanded to the population level. This expansion was performed

Table 5
The estimation results of model 1 and model 2.

Variables	Model 1			Model 2		
	Coefficients	S.E.	p-Value	Coefficients	S.E.	p-Value
Landscape	0.2524**	0.0995	0.0110	0.2842***	0.1056	0.0070
Facility	0.5696***	0.0898	0.0000	0.6149***	0.0936	0.0000
Fertility	0.4540***	0.0861	0.0000	0.5092***	0.0908	0.0000
Cost	−0.0154***	0.0031	0.0000	−0.0162***	0.0032	0.0000
C_1	−0.9096***	0.1305	0.0000	−2.7477***	0.2707	0.0000
C_1_Urban				−0.2635*	0.1603	0.1000
C_1_Income				0.0324***	0.0106	0.0020
C_1_Young				0.4247***	0.1099	0.0000
C_1_Knowledge				0.4937***	0.1246	0.0000
C_1_Education				0.6434***	0.0599	0.0000
C_2	−0.9758***	0.1273	0.0000	−2.9383***	0.2838	0.0000
C_2_Income				0.0385***	0.0108	0.0000
C_2_Old				−0.1775*	0.0970	0.0670
C_2_Young				0.2301*	0.1186	0.0520
C_2_Knowledge				0.4906***	0.1304	0.0000
C_2_Education				0.5944***	0.0618	0.0000
Summary statistics						
Log-likelihood		−1585.04			−1418.16	
LR χ^2		196.06			529.83	
p-Value		0.000			0.000	
Pseudo-R^2		0.06			0.16	
Observations		4596			4596	

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

Table 6
Implicit prices for attributes in choice sets (US$/hh/month).

Attributes	Model 1		Model 2	
	MWTP	95% confidence intervals	MWTP	95% confidence intervals
Landscape	2.52	1.46–3.59	2.70	1.70–3.69
Facility	5.69	4.79–6.60	5.84	4.97–6.71
Fertility	4.54	3.69–5.38	4.84	4.02–5.65

by multiplying the household WTP estimate by the total number of households in 9 towns. As a result, the annual total WTP for the protection option with the greatest attribute level amounts to RMB232 million (US$35.7 million).

Conclusions and policy implications

The protection of cultivated land can bring significant economic benefits to the local population as well as provide a range of social and environmental benefits for individuals. To aid an optimal design of protection policy, policymakers need a proper means of accounting for all of these benefits on the public preferences for the policy intervention. This paper estimates the public preferences for cultivated land protection programs using the CE method as a case study of Wenling City, China.

For the purpose of policy, this study provides useful information to help policymakers resolve the problem of disaggregating policies into appropriate attributes and levels. The implicit price estimation results of this study demonstrate that the most important attribute for cultivated land protection in Wenling City was land facility, which was followed by land fertility. The results also indicate that an improvement in the landscape attribute can improve the utility of the public, although the landscape attribute has the least importance. At this point, one may conclude that both the sustainable agricultural management practices and the landscape preservation deliver benefits to the local residents. Some agricultural policy would expect more social benefits if it integrates not only agricultural landscape attributes but also other attributes supporting local agriculture and local development, such as the land facility and land fertility. These results suggest potential policy improvements, which can provide orientations to policymakers when they are confronted by local policy measures on land-use planning.

Our results indicate that, for the simple model without covariates, the monthly WTP of a typical household for the cultivated land protection program from the status quo to the largest attribute level was calculated at approximately RMB23.79 (US$3.66). The estimate of the total WTP for the protection program with the highest attribute level for the entire population of the study area was approximately RMB232 million (US$35.7 million) annually. Thus, the results demonstrate that there is a substantial WTP for cultivated land protection in Wenling City, and the respondents place different values on the changes from the status quo to the specific level for the different land protection attributes.

The second model with socioeconomic variables in this study indicates that the probability of choosing the improved cultivated land protection option varies with a number of explanatory variables in a reasonable and expected fashion, thereby offering some support for the construct validity of this CE application. For example, the respondents in relatively higher income groups, the more educated respondents and those with younger household members are more likely to choose the improved cultivated land protection option in Wenling City. Thus, the increased investments in public education and communication programs can enhance the knowledge, attitudes and perceptions of people about cultivated land protection. These results may contribute to better protection activity.

Finally, this paper has emphasized both the application of a CE approach for measuring public preferences for cultivated land protection in China and the methods of constructing the survey, in terms of attribute selections as well as of statistical designs. The robust predictive power and statistical reliability of the models in the present study demonstrate that reliable results can be successfully obtained from a carefully designed CE study in a developing country.

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