Do Farmers Value The Environment? Evidence from the Conservation Reserve Program Auctions

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Contributed paper prepared for presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18,2006.

1 Introduction

In this paper, we study the strategies of bidders in a sequence of auctions sponsored by the U.S. Department of Agriculture (USDA) to determine participants in the Conservation Reserve Program (CRP). The CRP pays farmers to remove land from production and put it to a conservation use. Farmers wishing to participate bid the price per acre they will receive if accepted into the program. In addition, an environmental score is calculated which attempts to measure the potential environmental benefits of idling the offered parcel. The score is the sum of six separate categories each expressing different environmental attributes such as wildlife habitat, water quality or soil erosion reduction. This score is then combined with the farmer's bid to obtain an index which provides the ranking used to decide program participants.

The main objective of this paper is to understand how farmers formulate optimal bidding strategies when competing in the CRP auctions. Since individual environmental scores measure different potential environmental benefits, some of which could affect long term farm profitability and land values whereas others are more of a public goods nature, exactly how farmers condition their bids on those individual categories should reveal information about farmers' preferences towards conservation and protection of the environment. Modelling this unique institution allows us to do two things: first, explain how bidders formulate bids given differences in the environmental characteristics of their land and second, uncover farmers' preferences towards different categories of environmental benefits. Extending the approach of Latacz-Lohman and Van der Hamsvoort (1997) by incorporating asymmetric beliefs, we develop a structural model which describes the unique solution for the optimal bid which separates the measurement of the farmer's valuation of the CRP environmental benefits from the strategic effect due to the program scoring rules. An increase in an individual environmental score has two effects on the optimal bid: it raises a farmer's total score which increases the probability a bid is accepted (a positive-strategic effect) and it raises a farmer's long run

profit/utility thereby lowering the opportunity cost of CRP participation (a negative-environmental effect). The model identifies these two effects even when the trade-off between environmental scores and bids is unknown.

The empirical analysis is carried out using the individual contract data from North Carolina for three CRP sign-ups following the major changes in the program structure. The results show that farmers do in fact condition bids on the strength of their environmental score and that farmers consistently value those environmental improvements which are concentrated locally such as reduced soil erosion, while they place less emphasis on those benefits which resemble public goods such as air quality and wildlife habitat.

2 Program Description and Data

The US Conservation Reserve Program was introduced in the Food Security Act of 1985 (the 1985 Farm Bill). According to the program, a farmer can bid qualified land into the program and, if the bid is accepted, contract to receive annual rental payments equal to the value of the submitted bid in exchange for removing the land from agricultural production and putting it to a conservation use. In addition to an annual per-acre rental payment, the farmer may request a one-time cost share payment to partially offset the cost of conservation practices she promised to install on her land. This contract is generally for 10 or 15 years. There are announced sign-up periods when farmers can offer bids to place land into the program.

The 1996 Federal Agricultural Improvement and Reform Act (the 1996 Farm Bill) made some fundamental changes to the CRP. It placed additional restrictions on qualifying land and the total acreage that could be accepted into the program (36.4 million acres nationally, 10% of each state's total cropland and 25% of the county's total cropland). It also required for the first time an upper limit on acceptable bids. The maximum acceptable bid (cap) was now equal to the average land rental rate for each soil type

in the county where the proposed CRP land is located, plus a $5 per acre maintenance allowance (USDA 1997). The Bill also provided for continuous sign-up periods for particular partial-field practices, such as riparian buffer strips, that involve a small amount of acreage, but provide a disproportionately large environmental benefit.

There have been 29 sign-up periods since the CRP's inception. Bids in sign-up periods 1-9 were not ranked according to the potential environmental benefits the parcel would provide. Beginning with the 10th sign-up period an Environmental Benefits Index (EBI) was calculated for each parcel offered but this information was not shared with farmers prior to the submission of bids. Finally, starting with the 15th sign-up period producers were made aware of most of the scoring rules making up the EBI before the sign-up period. The data used in this study cover the 15th, 16th and 18th sign-up periods in North Carolina. Both the 15th and 16th sign-up periods were held in 1997, the 17th sign-up period was a continuous sign-up, and the 18th sign-up period was held in late fall of 1998.

In order to rank bidders, the EBI combined the environmental scores (N1-N6) that measure the potential environmental benefits of an offered parcel with the cost factor (N7). Of the six environmental scores, N3 (on-farm benefits from reduced wind and water erosion) and N4 (long term benefits of cover beyond the contract period) measure benefits that are largely concentrated on the farm in the form of increased future productivity of land once the retired land comes back into agricultural service. In addition, the CRP provides environmental benefits that are spread across a larger area beyond the farm borders such as wildlife habitat (N1), water quality (N2) and air quality benefits (N5). Finally, score N6 (benefits from enrollment in conservation priority area) does not correspond to any plot-specific environmental potential. All parcels located in a given geographical area automatically earn 25 points regardless of their environmental characteristics. The cost factor (N7) is obtained by converting a farmer's dollar bid (rental rate offered) into EBI points using a particular transformation scheme. For example, if in the 15th sign-up a farmer submitted a bid of $40/acre and requested no

cost-share money, N7 equals 153.94 (143.94+10), if she submitted a bid of \$30, her N7 would increase to 165.45.

The empirical analysis in this paper is performed with the individual CRP contracts data that contains the following variables: acres offered, rental rate offered (bid), maximum pay rate (cap), total cost share, environmental scores (N1-N6), cost factor (N7) and the total EBI ($\sum_{k=1}^{7} Nk$). The composition of the EBI was changed slightly between the 15th and 16th sign-ups by shifting some of the weight from a cost factor to environmental factors. The maximum number of points for air quality benefits from reduced wind erosion (N5) increased from 25 to 35, the relative importance of the cost factor (N7) has decreased from 33% in the 15th sign-up to 27% in the 16th sign-up and the maximum total score decreased from 600 to 560.

3 An Optimal Bidding Model

We assume that farmers are risk neutral and each of them is endowed with a piece of land of a given size and fixed characteristics which can be either farmed or enrolled in the CRP in its entirety. Participation in the CRP generates a stream of conservation payments from the government, imposes certain costs caused by an immediate loss of farming income and creates non-stochastic on-farm and off-farm environmental benefits.

When placing a bid, each farmer holds private expectations about the stream of discounted future profits from farming y and environmental benefits caused by idling the land under the CRP contract e. Both y and e are measured relative to the *status quo* of leaving the land in agricultural production. The discounted future stream of government payments to program participants is denoted by b. From a farmer's point of view, the cost of program participation can be defined as the net agricultural cost of retired land (including both current costs and future benefits) $C = y - e > 0$, where both y and e are the functions of soil and other environmental characteristics of the plot. The net benefits of enrolling the land into the program are simply $b - C$.

Consider the problem of the farmer deciding on the bid b that she is going to submit to the program for a parcel with environmental score s.[2] Let β be the unknown largest possible bid that the farmer can submit and still win acceptance into the program. Assume that beliefs about β are given by a continuously differentiable conditional probability "density" f with full support on $[0, \bar{\beta})$ where $\bar{\beta}$ is the bid cap. There is also a probability that a bid of $\bar{\beta}$ will be accepted, so $F(\bar{\beta}) \leq 1$ where $F(b) = \int_0^b f(u)du$ is the cumulative density function of f. Hence, the probability that a bid is accepted is given by $P(b \leq \beta) = 1 - F(b)$. In the discussion that follows, we take the farmer's beliefs f as given, but will return to address beliefs in more detail at the end of this section.

The optimal bid b^* will be the one that maximizes the expected benefits of CRP participation over and above the benefits from farming and it is found by maximizing $\pi(b) = (b - C)[1 - F(b)]$ with respect to b. An interior solution is given by the first order condition:

$$1 - F(b) - f(b)(b - C) = 0 \tag{1}$$

which can be rewritten as:

$$b^* = \frac{1 - F(b^*)}{f(b^*)} + C. \tag{2}$$

The above solution is the unique maximum as long as the cost of program participation is less than $\bar{\beta} - \frac{1-F(\bar{\beta})}{f(\bar{\beta})}$ and the appropriate second-order condition is globally satisfied. The second order condition can be written as:

$$2f(b) + f'(b)(b - C) > 0 \tag{3}$$

Distributions that satisfy (3) are generally skewed towards the bid cap. Examples include the uniform distribution, the beta(r,s) distribution with parameters $s > r > 1$ and any distribution with a non-decreasing density.

[2]This is a simplification because the actual bids submitted by farmers are per acre annual rental rates B whereas $b = \sum_{t=0}^{T} \delta^t B$ is the present value of the stream of submitted bids (annual CRP payments) over the length of the contract period T.

When $\bar{\beta} - \frac{1-F(\bar{\beta})}{f(\bar{\beta})} \leq C \leq \bar{\beta}$, the optimal bid is to simply bid the cap. When the opportunity cost of program participation C exceeds the cap, the bidder has no motivation to participate. Hence while $\bar{\beta}$ is meant to measure the opportunity cost of land (if $C = \bar{\beta}$ the farmer collects no rents), in fact it simply sets an upper bound for land values in the population of farmers who participate in the auction, i.e. for those for whom $C < \bar{\beta}$.

The formula for the optimal bid (2) indicates that bidders mark-up their bids above the net agricultural cost by $\frac{1-F(b)}{f(b)} \geq 0$. The magnitude of the mark-up can be thought of as the information rent earned by the farmers due to their private information about the opportunity cost of participation. It is also apparent that given fixed beliefs f, the potential for environmental improvement (either through increased future productivity of land or a more pleasant environment) reduces the cost of program participation C and hence the bid.

3.1 Modelling Farmers' Beliefs

In the rest of the paper, we assume that farmers share common beliefs about CRP scoring rules and the bids and scores of their competitors, but differ systematically conditional on their own environmental scores, that is, the asymmetric beliefs across farmers stem from their environmental scores.

Let density f be conditioned on s such that:

$$s > s' \rightarrow F(b|s) < F(b|s') \forall b \in [0, \bar{\beta}), \tag{4}$$

That is, $s > s'$ implies $F|s$ first order stochastically dominates $F|s'$. While this condition implies that the probability of any bid being accepted increases as s increases, this is not the same as guaranteeing that the *bid* will increase as s increases. Notice that the first order condition for the farmer's maximization problem is the same as in (1) except that $F(b)$ and $f(b)$ are now replaced with $F(b|s)$ and $f(b|s)$. Applying the implicit function theorem to the first order condition holding C constant, we can show that the optimal

bid varies with s as follows:

$$\frac{db^*}{ds} = -\frac{\frac{\partial F(b^*|s)}{\partial s} + \frac{\partial f(b^*|s)}{\partial s}(b^* - C)}{2f(b^*|s) + f'(b^*|s)(b^* - C)} \tag{5}$$

The denominator is positive by the second order condition, hence $\frac{db^*}{ds}$ is going to be positive as long as the numerator is negative. Based on the first order stochastic dominance, $\frac{\partial F(b^*|s)}{\partial s} < 0$, so bids will always increase in scores s as long as:

$$\frac{\partial F(b^*|s)}{\partial s} < -\frac{\partial f(b^*|s)}{\partial s}\frac{[1 - F(b^*|s)]}{f(b^*|s)} \tag{6}$$

Given (3) and (6), there will continue to be a unique optimal bid given by (2) were the expressions for f are replaced with their conditional counterparts. Intuitively, (6) restricts the density from changing too fast as s changes. In order for $\frac{db^*}{ds}$ to be positive, the probability a bid is accepted must change at a bounded rate and the density can not increase dramatically in any region of the support.[3]

Applying the implicit function theorem to (1) with f replaced with $f|s$, we obtain another comparative statics result describing how the optimal bid varies with net agricultural costs of retired land:

$$\frac{db^*}{dC} = \frac{f(b^*|s)}{2f(b^*|s) + f'(b^*|s)(b^* - C)} \tag{7}$$

Since the denominator is positive by the second order condition and the numerator is positive by definition, the optimal bid is always increasing in the net agricultural costs C, no matter what the distribution $F(b|s)$. Since $C = y - e$ is decreasing in environmental benefits, it follows that the optimal bid must be decreasing in environmental benefits.

Notice, that under farmers' asymmetric beliefs about the probability of winning the contract, the optimal bidding formula is an increasing function of program participation cost (and therefore decreasing in environmental benefits potential) and the total environmental score s. A significant feature of the CRP auctions is that farmers do not know

[3]For example, a class of densities which satisfy both (3) and (6) is given by a non-decreasing density function where $\bar{\beta} = 1$, $F(1) = 1 - cs$ where $0 \leq c \leq 1$, $s \in (0, 1)$ and $\frac{\partial f}{\partial s} = c$.

the trade-off between bids and environmental scores. Ex post, the trade-offs have been linear, but ex ante, they are (and continue to be) unknown. Farmers are only told that higher scores improve their chances of acceptance, hence, the most that we can require is that the rule be monotonic as it is here.

4 An Econometric Model

Although the previously developed model does not provide a closed form solution for the optimal bid, it does establish a behavioral relationship between bids and measures in our data. When farmers share common beliefs, the optimal bid is increasing in the individual farmer's opportunity cost of program participation. While we can not measure the individual opportunity cost directly, we know that it has to be smaller than the bid cap (otherwise the farmer would not bother submitting the bid) and that it has to be decreasing in the environmental potential of the offered plot. Measurements of potential environmental benefits are given by the individual categories of the EBI score N1 through N6 received by the farm. When beliefs are asymmetric, f becomes conditioned on s and there is a second (strategic) effect on optimal bid through the total score s. Namely, bids are increasing in environmental scores based on the indirect effect of any Nk through the sum $s = \sum_{k=1}^{6} Nk$ on beliefs $f|s$. Overall, an increase in an individual environmental score has two effects on the optimal bid: first, it raises farmer's long run benefits either through increased future soil productivity or a more pleasant environment thus lowering the optimal bid (the direct environmental effect), and second, it raises a farmer's total score which increases the probability a bid is accepted thus increasing the optimal bid (the indirect strategic effect).

In the most general form, the optimal bid can be written as a function of the individual components of the farm's environmental score:

$$b^* = g_0(N1, \ldots, N6) \tag{8}$$

where g_0 is an unknown function in which the slopes are indeterminate. To capture the

dual effect of scores on farmer's optimal bidding strategy, we rewrite (8) as a separable function of individual environmental categories and the total environmental score:

$$b^* = g_1(s) + g_2(N1, \ldots, N6) = g(s, N1, \ldots, N6) \tag{9}$$

where now g is monotonic in all its arguments as per equation (2). While individual components of the environmental score $N1$ through $N6$ should predict bidding behavior through their measure of environmental factors affecting the farm, the *total* score $s = \sum_{k=1}^{6} Nk$ affects the probability that a bid is accepted. We expect g to be non-increasing in the individual components of the environmental score, but increasing in the total score s. Hence the marginal effect of an increase in any component Nk on bids is given by

$$\frac{\partial b^*}{\partial Nk} = \frac{\partial g}{\partial Nk} + \frac{\partial g}{\partial s} \tag{10}$$

representing two separate effects: a) the effect on future farmer's profit/utility given by the increased future productivity of the soil and better environment and b) the increase in payments accruing to the bidder as a result of her land being perceived by CRP as environmentally more valuable thereby commanding a higher environmental score. The former component represents the farmer's valuation of environmental benefits at the margin, whereas the latter component represents the marginal information rent.

Since the total score s is perfectly co-linear with its components, g is necessarily nonlinear in order to identify the model. This poses no conceptual difficulties however, since there is no reason to believe that any measure of benefits from an improved environment are linear in EBI components (which are imperfect, ad-hoc measures). In order to estimate (9) above, we specify a flexible Box-Cox model for the optimal bid as:

$$\frac{b^*}{\overline{\beta}} = \alpha + \beta_0 s^\lambda + \sum_{k=1}^{6} \beta_k (Nk + 1)^\lambda + \epsilon. \tag{11}$$

Here $x^\lambda = \frac{x^\lambda - 1}{\lambda}$ is the Box-Cox transformation which nests both a linear ($\lambda = 1$) and a logarithm specification ($\lambda = 0$); see Greene (1999, pp. 329-335). We anticipate the slope

parameters from (11) to correspond to the predictions of our model, i.e. $\beta_1, \ldots, \beta_6 \leq 0$ and $\beta_0 > 0$.[4]

Notice also that the bid interval $[0, \bar{\beta}]$ has been normalized to the unit interval which implicitly makes environmental gains proportional to land values. Recall that the bid cap is determined by the CRP administration as the average land rental rate for the corresponding soil type in the county where the land is located. Despite the fact that the cap varies across our sample, it does not capture farmers' idiosyncrasies but instead simply serves as an upper bound on the legally acceptable bids. Consequently, ϵ, treated here as a normal random variable, captures the deviation of individual farmers' land values (which are bidders' private information) from the county and soil type averages. In order to correct for the censoring which occurs at the bid cap (in each sign-up over 25% of bidders bid the maximum), we fit a right-censored tobit model to our bidding equation.[5]

5 Estimation Results

We estimate model (11) separately for each of the three sign-ups by maximum likelihood via grid search over values of λ between -2 and 2. Environmental categories $n1$ through $n6$ are measured as $(N1+1)$ through $(N6+1)$ to insure positive values. The results are summarized in Table 1. In order to provide a familiar baseline, the constrained linear model ($\lambda = 1, \beta_0 = 0$) is also reported. The log-likelihood ratio statistics for the linear restriction ($\lambda = 1$) and the logarithmic specification ($\lambda = 0$) are reported at the bottom of the table. While we strongly reject the linear specification in all sign-ups, we cannot reject the logarithmic specification for the 15th and 18th sign-ups. The estimated values

[4]The linearity in arguments assumption in (11) is not completely harmless. While our theoretical model imposes separability between the sum of scores s and the individual components N1,...,N6 as well as monotonicity of the bidding function with respect to its arguments, the true form of g cannot be identified except under strong conditions (see White 1980, and Inoue 2002).

[5]Results from OLS are qualitatively similar.

of λ in all three sign-ups are all less than unity implying decreasing marginal benefits of measured environmental attributes.

The obtained results clearly show that farmers condition their bids on their total environmental scores. The estimated coefficient for total score s is positive as predicted by the theory and significant in all three sign-ups. The importance of the strategic effect in the formulation of the equilibrium bid can be measured by evaluating the derivative of the optimal bid function with respect to s (the second term on the right hand side of (10)). Whereas farmers do not know the exact relationship between the monetary bid and the cost factor (i.e. the exact formula for N7) while submitting their bids, they implicitly establish the trade-off between the two. For each point increase in their total score farmers increased their bids by an average of 1.5 cents in the 15th sign-up, 48 cents in the 16th sign-up and 10 cents in the 18th sign-up. As a reference point, the true, *ex-ante* unknown, conversion formula shows that the implicit marginal trade-off between monetary bids and N7 was 87 cents per point in the 15th sign-up and 57 cents (within \$15 of the bid cap) in the 16th and 18th sign-ups.

The main point of interest in this paper is the estimation of the farmers' income-environment trade-off. The results indicate that in addition to direct monetary payoffs from the government, farmers are also interested in the long term environmental benefits stemming from the CRP participation. In all three sign-ups both parameters measuring the on-farm benefits (reduced erosion - N3 and long term benefits - N4) are negative and statistically significant thus confirming that farmers are willing to shade their bids if they anticipate future productivity gains and hence increased profits from the reduced soil erosion.[6] To the extent that dynamic inefficiencies associated with soil degradation

[6]This result differs from Miranda (1992) who found differences in the relationship between the bid and future on-farm productivity gains across regions. With the exception of the Corn Belt and Lake States, farmers either did not understand or were failing to act on the on-farm productivity effects caused by soil erosion. With minor exceptions, in all other areas (including Southeast where North Carolina belongs) landowners did not systematically take the soil productivity effects into consideration when formulating their land management strategies.

come from farmers' disregard for future soil productivity (myopic behavior), our results show that farmers do in fact behave as long term profit maximizers.

In the group of off-farm benefits, the results are a bit more ambiguous. The estimated coefficients for wildlife habitat (N1) are insignificant at the 5% level in the 15th and 18th sign-ups indicating that farmers may not value this environmental benefit. Another explanation may be free-riding. Insofar as N1 represents a true public good, farmers know that those benefits will be provided whether they enter the CRP or not. The same is true for air quality benefits N5 where the estimated coefficient is insignificant in all three sign-ups. However, this result can also be a consequence of very small values of N5 and little variation in potential air quality benefits across farms in North Carolina.

The values of the coefficients for water quality benefits from reduced water erosion, run-off and leaching (N2) in the 16th and 18th sign-ups are negative, along the lines with the coefficient estimates obtained for on-farm benefits. This is not surprising given that the definition of N2 covers some of the benefits which may be interpreted as *on-farm* similar to N3. The problem is that the sign of N2 in the 15th sign-up is positive (and significant) for which we have no convincing explanation.

Overall, our results clearly indicate that CRP bidders value the environmental effects of program participation. As a rough upper bound for this value, the difference in bids between a farm with the highest possible score and the lowest possible score ($N1 = \ldots = N6 = 0$), ignoring the strategic effect of s, is about \$10.48 per acre per year in the 15th sign-up. In comparison to an average submitted bid of \$43.42, this amounts to approximate 20 percent reduction in demanded government compensation. We also see evidence for bidders internalizing those benefits which directly affect future productivity such as reduced soil erosion (N3) and long-term benefits of cover (N4) more consistently than those benefits which focus on a large area or enhance the environment but not the productivity of their land such as wildlife habitat (N1), water quality (N2) and air quality (N5).

Similarly to the evaluation of the strategic effect, we can also compute the marginal

environmental benefits effect of a one point increase in any environmental category. As seen from (10), the total effect is then the sum of two effects: strategic and environmental benefits effects. The average direct and total marginal effects are given in Table 2. Most of the results clearly show that in response to a one point increase in any of the environmental benefits categories (except N5), farmers will increase their bids by *less* than the *dollar-equivalent* amounts.[7] In some of the categories, such as the long term benefits of cover (N4), the direct environmental benefits effect is so strong that it reverses the sign of the positive strategic effect so that the total effect is always negative. For example, a one point increase in N4 in the 18th sign-up will cause an average farmer to reduce her bid by almost 12 cents. In this case the strong direct environmental effect of 22 cents was partially offset by a positive strategic effect of 10 cents. In situations where farmers care less about environmental benefits, the positive strategic effect dominates and the overall effect is positive.

6 Conclusions

In this paper, we examine the behavior of bidders in an auction in which two criteria determine winners: a monetary bid and an environmental score. Modelling this unique institution allows us to explain how bidders formulate asymmetric strategies with respect to environmental criteria and to elicit farmers' preferences towards different types of environmental goods. Although our model predicts a bidding strategy which is similar to the symmetric, private value first price sealed bid auction in which bids are marked-up above cost, the model differs from traditional auction models in two important aspects. First, the CRP auctions off multiple objects simultaneously in the sense that all farmers whose index exceeds the cut-off point are awarded the contract. Second, whereas in the classic first price auction models, where the object is awarded to the lowest bidder,

[7] By dollar-equivalent amount we mean the amount a farmer can decrease her bid in order to maintain the total EBI score unchanged.

here all bidders are *not* equally preferred by the buyer. The CRP has preference over parcels of land represented by an environmental score. Identifying how farmers condition their bids based on particular environmental benefits their land can potentially generate allows us to uncover farmers' preferences towards various characteristics of non-market goods.

Our theory predicts that farmers should condition their bids positively on higher environmental score and negatively on the individual components of the score. The empirical findings, based on the three recent auctions in North Carolina, are generally supportive of the theoretical predictions of our model. In particular, we found that: a) farmers condition bids on their environmental score and b) farmers value those environmental benefits which directly affect the productivity of their land but do not value those benefits which resemble public goods.

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Table 1: Maximum Likelihood Tobit Estimates[a]

Variable	15th Sign-up		16th Sign-up		18th Sign-up	
constant	0.9183*	0.7047*	0.8091*	0.7413*	0.7582*	0.4453*
	(0.0082)	(0.0514)	(0.0136)	(0.0173)	(0.0156)	(0.0436)
n1	0.0001	-0.0040	0.0017*	-0.0173*	0.0022*	0.0012
	(1.6e-4)	(0.0046)	(1.9e-4)	(0.0028)	(2.2e-4)	(0.0038)
n2	0.0012*	0.0538*	3.4e-4	−0.0242*	8.4e-4*	-0.0154*
	(1.2e-4)	(0.0116)	(2.1e-4)	(0.0033)	(2.6e-4)	(0.0054)
n3	4.2e-5	-0.0322*	0.0013*	−0.0223*	9.4e-4*	−0.0159*
	(8.5e-5)	(0.0111)	(1.4e-4)	(0.0033)	(1.7e-4)	(0.0035)
n4	−0.0011*	−0.0212*	5.7e-5	−0.0196*	4.9e-4	-0.0159*
	(2.7e-4)	(0.0026)	(3.8e-4)	(0.0026)	(3.8e-4)	(0.0031)
n5	-0.0208	-0.0977	0.0649	0.0803	-0.0014	-0.0283
	(0.0116)	(0.0543)	(128.24)	(199.89)	(0.0273)	(0.0576)
n6	0.0032*	0.0168	0.0042*	-0.0196*	-4.6e-4	-0.0128*
	(0.0011)	(0.0104)	(0.0017)	(0.0047)	(4.8e-4)	(0.0026)
s		0.0654*		0.0318*		0.0692*
		(0.0286)		(0.0041)		(0.0093)
σ	0.1160	0.1145	0.1418	0.1392	0.1357	0.1330
	(0.0021)	(0.0021)	(0.0031)	(0.0041)	(0.0037)	(0.0036)
λ	1**	-0.11	1**	0.76	1**	0.28
log likelihood	373.34	404.15	199.82	225.54	223.39	239.73
LLR $\chi^2_1(\lambda = 0)$		0.98		15.34*		0.88
LLR $\chi^2_1(\lambda = 1)$		83.74*		33.52*		22.42*
sample size	2915		1631		999	
number censored	1175		488		241	

[a] Standard errors are in parenthesis.

* significant at the 5% level

** restricted

Table 2: Average Marginal Effects of Environmental Scores on Bid[a]

Sign-up		N1	N2	N3	N4	N5	N6	s^b
	Direct Effect	-0.020	0.039	-0.047	-0.245	-4.633	0.775	0.015
15	Total Effect	-0.005	0.054	-0.032	-0.230	-4.618	0.790	
	Direct Effect	-0.489	-0.461	-0.428	-0.596	3.853	-0.936	0.478
16	Total Effect	-0.011	0.016	0.050	-0.118	4.331	0.448	
	Direct Effect	0.011	-0.055	-0.140	-0.220	-1.411	-0.453	0.103
18	Total Effect	0.114	0.048	-0.037	-0.117	1.308	-0.350	

[a] Effects measured in dollars.

[b] This measures farmers' perceived trade-off between environmental points and money.