The Effects of Experience on Landowner Preferences over Bioenergy Feedstocks

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This study examines how landowners' prior experience with bioenergy feedstock crops affects their intentions to lease land to produce those crops, and how attitudes and concerns about bioenergy affect intentions differently for landowners with differing levels of experience. I analyze stated preference data from a representative sample of landowners in Northern Michigan and Wisconsin. Landowners were asked whether they would provide cropland or farmable noncropland to produce three different bioenergy feedstocks: corn stover, switchgrass, and poplar. I develop measures of landowner attitudes and concerns through confirmatory factor analysis and use the resulting measures along with a proxy for experience as covariates in probit models with intention to provide land as the dependent variable. The results indicate that experience has a significant effect on landowners' decisions for switchgrass and poplar, but less of an impact on the decisions for corn stover. Experience also activates pro-bioenergy attitudes while nullifying concerns about rental and process disamenities. However, experience can increase the impact of concerns about environmental disamenities created by poplar. These findings suggest that targeted outreach can significantly increase the supply of land to produce bioenergy feedstocks.

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Abstract

This study examines how landowners' prior experience with bioenergy feedstock crops affects their intentions to lease land to produce those crops, and how attitudes and concerns about bioenergy affect intentions differently for landowners with differing levels of experience. I analyze stated preference data from a representative sample of landowners in Northern Michigan and Wisconsin. Landowners were asked whether they would provide cropland or farmable non-cropland to produce three different bioenergy feedstocks: corn stover, switchgrass, and poplar. I develop measures of landowner attitudes and concerns through confirmatory factor analysis and use the resulting measures along with a proxy for experience as covariates in probit models with intention to provide land as the dependent variable. The results indicate that experience has a significant effect on landowners' decisions for switchgrass and poplar, but less of an impact on the decisions for corn stover. Experience also activates pro-bioenergy attitudes while nullifying concerns about rental and process disamenities. However, experience can increase the impact of concerns about environmental disamenities created by poplar. These findings suggest that targeted outreach can significantly increase the supply of land to produce bioenergy feedstocks.

1. Introduction

In this paper, I explore how landowner experience with a bioenergy feedstock affects their willingness to supply land for its production. Determining the potential supply of land for the production cellulosic biomass has been a highly active area of research since the passage of

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the Energy Independence and Security Act of 2007 by the United States Congress. This act calls for a dramatic increase in the production of cellulosic biofuels, which has led many scholars to conduct stated preference surveys asking: who will provide the land to produce bioenergy feedstock crops (Altman et al. 2015, Altman and Sanders 2012, Bergtold et al. 2014, Fewell et al. 2016, Jensen et al. 2007, Mooney et al. 2015, Qualls et al. 2012, Skevas et al. 2014, Skevas et al. 2016, Skevas et al. 2017, Swinton et al. 2017, Tyndall et al. 2011, Villamil et al. 2008)? The conclusion of much of this work is that farmers and private landowners are largely uninterested in committing land for bioenergy feedstock production, even at high rates of return (Barham et al. 2016). If sustainable markets for cellulosic bioenergy are to develop, it will be important to understand why the supply of land for feedstocks appears to be so price inelastic and to identify non-price means of increasing supply.

In the course of this research, it has become clear that taste factors, such as concerns about environmental disamenities and a positive disposition towards bioenergy as an alternative fuel, are important drivers of willingness to supply land (Jensen et al. 2007, Mooney et al. 2015, Swinton et al. 2017, Skevas et al. 2014, Skevas et al. 2016, Tyndall et al. 2011). Studies also suggest that landowners have been largely unfamiliar with bioenergy feedstock crop production, and that this may be a barrier to their willingness to supply land for feedstock production (Mooney et al. 2015, Tyndall et al. 2011, Villamil et al. 2008). My goal in this paper is to determine how these two important non-price factors interact when landowners consider committing their land to bioenergy feedstock production. As landowners learn more about this potential land use, will they find that these crops are consistent with their land use preferences? If so, potential land supply should increase over time as landowners become more familiar with the crops.

This paper proceeds as follows. First, I use a simple Bayesian updating model to derive hypotheses for how landowners process information on novel potential land uses. Then to address these hypotheses, I analyze stated preference data from a sample of landowners in Northern Michigan and Wisconsin. I find that when deciding on whether to supply land, landowners who have seen bioenergy feedstock crops in production are influenced by their concerns and attitudes about bioenergy in very different ways than those who have not seen the crop. These results have implications for how outreach to landowners about these crops should be conducted and for how such outreach might affect the supply of land.

2. Methods and Data

Conceptual framework

In this paper, I examine how the effects of attitudes and concerns on willingness to provide land for biomass production vary over different levels of information, which suggests a model of Bayesian updating. In a Bayesian updating model, decisionmakers begin with imperfect knowledge of their “true” preferences. Additional information provides a signal from which decisionmakers update their prior knowledge of their preferences to create posterior beliefs. Similar Bayesian updating models have been used in the choice modeling literature to examine how decisionmakers with different levels of knowledge or experience choose. For example, Ackerberg (2001) examines the differential effect of advertising on consumers who have consumed a product and those who have not. More recently, LaRiviere et al. (2014) and Czajkowski et al. (2015) examine the effects of knowledge and experience on preferences for a public good. I assume that landowners rely on such a Bayesian updating process when considering their preferences for how their land is used.

I extend the idea of Bayesian updating by assuming that landowners also hold a set of general tastes for bioenergy and land use that they know with certainty (at least at the timescale of this model). Call this set of tastes δ. This set includes parameters representing a landowner's belief that bioenergy is a feasible source of energy, their preferences for environmental quality of their land, their preferences for an outdoors lifestyle, and preferences for privacy. A landowner is assumed to select a land use portfolio L^* consistent with these known parameters: one that maximizes their utility:

$$L^* = \underset{L}{\operatorname{argmax}}\, U(L; \delta). \tag{1}$$

At this stage, a landowner is considered to be in what I call an "information equilibrium". That is to say $L^*$is the best they can do with their available information about the alternatives and will remain so without an exogenous shock, such as the introduction of a new land use option.

When a novel land use becomes available, a landowner considers their (subjective) beliefs about that land use, denoted by μ. These beliefs are distributions over how the characteristics of the new land use relate to their tastes. Because they are formed through a Bayesian updating process, beliefs can be viewed as a function of the prior experience and information set of the landowner, denoted by I. The magnitude of the influence of changes in I on μ can be interpreted as the strength of a landowner's prior beliefs. For example, if a new land use is very similar to one a landowner is already familiar with, then new information is unlikely to dramatically change their beliefs. But if the new land use is unusual, then beliefs are more susceptible to change in response to new information.

If, in expectation, the utility from a land use portfolio with the novel land use, denoted by L', exceeds the utility they receive from a landowner's current arrangement, they will seek to incorporate the new land use into their portfolio:

$$E[U(L';\delta)|\mu(I)] > U(L^*;\delta). \quad (2)$$

This simple model illustrates how prior experience and information form beliefs from which landowners evaluate novel land uses. It also allows landowners with differing levels of information but the same tastes to come to different decisions. For example, a landowner with little information may believe a land use is detrimental to biodiversity, an environmental amenity which they greatly value. However, a different landowner with more information and the same taste for biodiversity may conclude that the novel land use is in fact no worse for biodiversity than their current land use arrangement and therefore may choose to incorporate that land use into their portfolio.

The model therefore suggests three testable implications. First, landowners with more information make different decisions regarding novel land uses than those with less information, all else equal (H1). Second, the magnitude and direction of this information effect are dependent on landowners' established tastes (H2). Third, information effects will be smaller for novel land uses that are more similar to established land uses than those that are less similar (H3).

Case study and data

To test these implications, I use data from a contingent valuation survey of landowners in the Northern Tier of Wisconsin and Michigan conducted by mail in 2014 to elicit willingness to supply land to produce bioenergy feedstock crops (Swinton et al. 2017). This region's land is characterized by low quality soils on which forest, scrub grasses, hay, and some grain crops are grow (Kells and Swinton 2014). It has been argued that non-crop marginal lands, like those frequently found throughout the study region, have relatively high potential to produce bioenergy feedstocks because such crops can succeed on lower quality soils and sequester more carbon than existing plant cover on such soils, and because using marginal lands avoids disrupting existing provision of food and fiber via cropland (Gelfand et al. 2013).

However, recent research on landowner willingness to supply marginal lands for bioenergy feedstock production indicates that potential supply is low, both in the study region and regions nearby (Swinton et al. 2017, Swinton et al. 2011, Skevas et al. 2014, Skevas et al. 2016, Mooney et al. 2014). Previous research has indicated that the main drivers of low willingness to provide land include landowners' tastes, including their views on bioenergy as a viable energy source and their sensitivity to disamenities resulting from land use change (Swinton et al. 2017, Skevas et al. 2014). The novelty of bioenergy feedstock crops and the importance of tastes in determining their supply make this population and region an attractive setting to examine how differing levels of experience interact with tastes in land use decisions.

The novel land uses examined are the production of three potential bioenergy feedstocks, corn stover (residues left after grain harvest), switchgrass, and poplar, on two different land types, cropland and farmable non-cropland. These three crops vary in their similarity to current common land uses in the region. Using land for corn stover production is very similar to using land for grain production; corn is harvested and baled annually and agronomic practices are virtually the same from the landowner's perspective. On the other hand, switchgrass and poplar are both perennial crops which require less seasonal attention than corn and are harvested less frequently. While poplar is similar to other crop trees grown for pulp and timber, switchgrass has few analogous crops in the region. By examining all three crops, the effect of similarity to existing land uses can be elucidated.

Landowners owning more than ten acres of rural land in the 76 county Northern Lake States Forest and Forage Region defined by the USDA were eligible for the survey. A two-stage

Table 1: Descriptive statistics for model covariates (N = 677)

Variable	Description	Mean	St. Dev.
Land			
acres_crop	Acres owned of cropland	51.2	143.9
acres_farm	Acres owned of farmable non-cropland (e.g. pasture, scrub, grassland)	26.0	63.1
acres_forest	Acres owned of forest	136.7	418.5
acres_other	Acres owned of other land types	8.7	27.7
Prior land use			
rented	Dummy for rented out land in prior year	0.28	0.45
cons_program	Dummy for enrollment in a conservation program in prior year	0.51	0.50
crop_income	Dummy for income from cropland	0.27	0.44
farm_income	Dummy for income from farmable non-cropland	0.09	0.29
crop_personal	Dummy for personal use of cropland	0.48	0.50
farm_personal	Dummy for personal use of farmable non-cropland	0.43	0.50
Experience			
corn_seen	Dummy for having seen a pile or bale of corn residues	0.61	0.49
switch_seen	Dummy for having seen a field of switchgrass	0.28	0.45
poplar_seen	Dummy for having seen a row of poplar trees	0.48	0.50
Demographics			
age	Age in years	60.8	11.7
male	Dummy for male	0.85	0.35
farmer	Dummy for farmer	0.32	0.47
income	Annual household income scaled from 1 (less than $25k) to 6 ($200k and above)	3.27	1.34
education	Highest level of education scaled from 1 (less than 12 years) to 6 (graduate degree)	3.53	1.42

random sampling process was used to select the sampling frame. Eighteen counties were randomly selected, stratified by land cover classification, ensuring that counties with higher levels of crop and grassland were well represented. Half as many counties were selected in Wisconsin as were selected in Michigan, as Wisconsin counties are approximately twice as large as Michigan counties. Lists of landowners were created for selected counties using tax records.

Within each selected county, eligible landowners were split into four strata: small-scale landowners both enrolled and unenrolled in forest management programs and large-scale landowners both enrolled and unenrolled in forest management programs. Within each stratum, the addresses of 24 landowners were selected for Michigan counties and 48 landowners were selected for Wisconsin counties. The final sample frame consisted of 2,304 landowners. Of the 2,170 surveys which were validly delivered, 1,124 were returned complete for a 51.8% response rate. After screening for item non-response in relevant questions, 677 responses are used in the subsequent analysis.

The survey included five sections. First, respondents were asked about current uses for each land type they owned. Second, they were asked a series of yes or no questions about their familiarity with bioenergy production, including whether they had seen each of the bioenergy feedstock crops in production. Third, they were asked a series of contingent valuation questions (Cameron and James 1987, Carson and Hanemann 2005). Each landowner was asked whether they would rent out their land to produce corn stover, switchgrass, or poplar at a randomly selected rental rate ($15, $30, $60, or $90 per acre). Owners were asked to make this decision independently for multiple land types, including cropland and farmable non-cropland (defined as pasture, grassland, and scrub). Fourth, respondents were presented with a series of statements about bioenergy, energy policy, and how growing bioenergy feedstocks would affect their land, which respondents evaluated on a five-point Likert scale. Finally, respondents were asked to provide demographic data such as age, sex, income, and education. A more detailed discussion of the survey instrument and the main contingent valuation results are presented in Swinton et al. (2017). Descriptive statistics for the sample are presented in Table 1.

Empirical approach

I use two tools to test the implications of the conceptual model. Landowner tastes are modelled using confirmatory factor analysis, a latent variable approach. The decision to provide land for bioenergy feedstock production is then modelled using a probit model, with experience, taste scores, and their interactions as explanatory variables, along with a vector of demographic controls. To address the possible endogeneity of experience, I utilize a control function approach which employs experience with two of the feedstocks as instruments for experience with the third.

Confirmatory factor analysis (CFA) is a latent variable modeling technique which can be used to measure unobserved variables through correlation among several related variables. The basic idea is the unobserved latent variable, in this case the underlying taste parameter, is responsible for variation in several related observed indicator variables (Beaujean 2014). In this case, the observed indicator variables are statements presented to landowners, who then rated their level of agreement with those statements on a five-point Likert scale. Confirmatory factor analysis differs from other latent variable approaches such as exploratory factor analysis and principle component analysis in that the pattern of relationships among the latent variables and indicator variables is determined by the analyst and the model is then fit according to that structure.

Because previous research has suggested that pro-bioenergy attitudes and sensitivity to environmental disamenities are major drivers of willingness to provide land for bioenergy feedstock crops, I use CFA to model three underlying taste parameters: pro-bioenergy attitude (*probio*), nuisance concern (*nuisance*), and environmental concern (*enviro*). Pro-bioenergy attitude represents landowner tastes for bioenergy, in general rather than any particular source, as a source of fuel. Nuisance concern represents landowner sensitivity to disruptions on their land from the production process, including smell, noise, and privacy. Environmental concern represents landowner sensitivity to the damaging effects intensive crop production can have on the environment. The specific indicator statements associated with each latent variable can be found in Table 2, along with factor loadings and fit scores which will be discussed in the results section. The resulting factor loadings from the CFA model are then used to estimate normalized (to a mean of zero and standard deviation of one) factor scores for each latent variable.

With measures of landowner tastes in hand, I then model the decision to provide land for bioenergy crops using a binary probit model, with these taste measures, a measure of the landowners' experience with the crop, and the offered rental price as covariates. As a measure of experience, I use a dummy variable equal to one if the landowner reports having seen each crop in person prior to responding to the survey (*seen*). To distinguish separate taste effects for experienced and inexperienced landowners, I include interaction terms between the *seen* variable the taste variables in a manner similar to Ackerberg (2001) and LaRiviere et al. (2014). I also include a set of control variables, including all demographic variables, the landowner's acres of the land type in question, the landowner's acres of other land types, measures of how the landowner currently uses the land type, and whether the landowner currently rents out land or participates in conservation programs (see Table 1 for a complete list). This model is estimated, with probability weights, separately for each crop for each land type, for a total of six models.

However, experience with a feedstock is likely to exhibit endogeneity in the probit choice model. One might think that landowners with a high willingness to provide land for a bioenergy feedstock crop would also be likely to actively seek opportunities to see that crop in production. Some previous stated preference choice experiments that seek to control for or test the effects of prior information and experience account for this possible endogeneity through an instrumental variable approach (Cameron and Englin 1997, Berrens et al. 2004). Others do not, arguing their proxies are exogenous or presenting their results as descriptive rather than causal (Kniivilla 2006, Holmes et al. 2013, LaRiviere et al. 2014).

In the present paper, I utilize a control function approach proposed by Terza et al. (2008) called “two-stage residual inclusion” to test for endogeneity. This method utilizes a first-stage, reduced-form probit model for the binary variable suspected to be endogenous, which includes one or more instruments as explanatory variables. Estimated residuals from this first-stage model are included in the second-stage choice model as an explanatory variable, effectively controlling and testing for endogeneity between experience and land-use preferences while relying on the usual instrumental variables assumption that the instrument(s) utilized in the first-stage are uncorrelated with land-use preferences (Wooldridge 2014).

I follow Malone and Lusk (2018) in utilizing as instruments for a landowner’s experience with one feedstock the same landowner’s experience with the other two. In Malone and Lusk (2018), the authors instrument for a consumer’s perceived taste for one product using perceived tastes for distinct branded substitutes. In the present paper, I instrument for landowners’ experience with one feedstock using their experience with the other two feedstocks. The idea is that experience with other feedstocks is likely to be correlated with experience with a particular feedstock of interest, but unlikely to be correlated with preferences for that feedstock. That is, there may be some underlying exogenous factor influencing experience with all feedstocks, such as a general curiosity about new land uses or the presence of bioenergy field stations in a region, that are uncorrelated with the “residual preference” for a particular feedstock.

Formally, the first-stage probit model for landowner i’s experience with feedstock j is specified as

$$\Pr(seen_{ij} = 1) = \Phi(\boldsymbol{seen_{i,-j}\alpha_{j1}} + \boldsymbol{z_{i1}\beta_{j1}})$$

where $\boldsymbol{seen_{i,-j}}$ is a vector with dummies for experience with the remaining two feedstocks (the instruments) and $\boldsymbol{z_i}$ is a vector of demographic and taste controls with an intercept (all variables described in Table 1 as well as taste scores derived from confirmatory factor analysis described above). Estimated residuals, $\hat{v}_{ij}$, are then calculated as

$$\hat{v}_{ij} = seen_{ij} - \Phi(\boldsymbol{seen_{i,-j}\hat{\alpha}_{j1}} + \boldsymbol{z_{i1}\hat{\beta}_{j1}})$$

where hats indicate estimated parameters from the first-stage model. These are then included in the final choice model, written as

$$Pr(choice_{ij} = 1) = \Phi(rent_{i,j}\gamma + seen_{i,j}\boldsymbol{taste_i\alpha_{j2}} + \hat{v}_{ij}\boldsymbol{taste_i\lambda} + \boldsymbol{z_{i2}\beta_{j2}})$$

where $\boldsymbol{taste_i}$ is a vector of the three taste measures and an intercept, so that $seen_{i,j}$ and $\hat{v}_{ij}$ both interact with each taste measure and appear on their own. As above, the vector $\boldsymbol{z_{i2}}$ includes all demographic controls described in Table 1 and an intercept.

The vector of estimated coefficients on the experience residuals and its interactions, $\boldsymbol{\hat{\lambda}}$, serves as second purpose as test for the null that $seen_{i,j}$ is exogenous (Wooldridge 2015). If the elements of $\boldsymbol{\hat{\lambda}}$ are jointly insignificant, then I fail to reject that $seen_{i,j}$ is exogenous and can proceed with interpretation of the restricted model.

The three implications (H1-H3) of the conceptual model can be tested through these probit models. The first implication, that landowners with more information make decisions differently than those with less, can be tested by examining the estimated coefficients on experience and its interactions (the $\widehat{\boldsymbol{\alpha_{j2}}}$'s). The second, that these effects' sizes and directions vary depending on tastes, can be tested by examining the interaction effects. The third, that these effects are smaller when the proposed novel land use change is similar to existing land uses, can be tested by comparing effect sizes between crops, where corn stover is the most similar and

Table 2. Factor loadings from confirmatory factor analysis.

Indicator	**Loading**
Pro-bioenergy *(probio*)	
Bioenergy should be prioritized over other forms of renewable energy such as wind or solar power.	1.000
Substituting bioenergy feedstocks for fossil fuels will help mitigate climate change.	1.629
Liquid biofuels are a promising alternative energy technology that will be successful in the future.	2.712
Nuisance concern (*nuisance*)	
When I think about renting out my land for bioenergy feedstocks I am concerned about the potential smell.	1.000
When I think about renting out my land for bioenergy feedstocks I am concerned about noise from harvesting, planting, or other activities.	1.210
When I think about renting out my land for bioenergy feedstocks I am concerned about having other people on my land.	0.720
Environmental concern (*enviro*)	
When I think about renting out my land for bioenergy feedstocks I am concerned about the use of pesticide and fertilizer on my land.	1.000
When I think about renting out my land for bioenergy feedstocks I am concerned about the loss of biodiversity on my land.	1.255
When I think about renting out my land for bioenergy feedstocks I am concerned about the risk of lower soil and water quality.	1.237

Notes: Comparative Fit Index = 0.944; Tucker-Lewis Index = 0.916; Root Mean Square Error of Approx. = 0.073. All factor loading estimates statistically significant at the $p<0.05$ level.

switchgrass the least. Once statistical significance of coefficients is established, these hypotheses are tested using graphical representations of the resulting models, a method suggested by Greene (2010).

3. Results

In this section, I present the results of the CFA model and the six probit models described above. In the process, I will relate these results to the implications of the conceptual model. First, I discuss the factor loadings and model fit statistics from the CFA model. I then proceed to discuss the probit model coefficients and how they relate to the hypothesized relationship

Table 3. First-stage model instrument results.

	First-stage models, selected coefficients		
	Corn Experience	Switchgrass Experience	Poplar Experience
	(1)	(2)	(3)
poplar_seen	0.891***	0.315	
	(0.198)	(0.213)	
switch_seen	1.027***		0.353
	(0.219)		(0.218)
corn_seen		0.974***	0.875***
		(0.219)	(0.196)
Observations	677	677	677
Log Likelihood	-310.475	-329.797	-365.239
Akaike Inf. Crit.	658.949	697.594	768.477

Notes: All models include controls. Complete regression results available in appendix.
Statistical significance denoted by: * p<0.01, ** p<0.05, * p<0.10.

between experience and tastes. Finally, I present a series of figures to analyze the empirical model implications.

The factor loadings and model fit statistics for the CFA model are presented in Table 2. Pro-bioenergy attitudes are most closely associated with landowners' beliefs that bioenergy is a promising technology. The indicator variables for nuisance concerns and environmental concerns are associated with their latent variables at roughly equal levels. With comparative fit index and Tucker-Lewis index close to one and a root-mean square error of approximation close to zero, this model reasonably fits the data (Beaujean 2014). The resulting factor loadings are then used to predict factor scores, each of which has mean zero and unitary variance. Therefore, a landowner with a pro-bioenergy score of one is one standard deviation more favorable to bioenergy than the mean landowner, who would have a pro-bioenergy score of zero.

The first-stage control function results are presented in Table 3 and the relevant choice model results for cropland models and farmable non-cropland models are presented in Table 4 and Table 5 respectively. The first-stage control function results suggest that experience with other crops is highly correlated with experience with a given crop, indicating a valid set of instruments. However, for all three cropland models and all three non-cropland models, F-tests of the joint significance of coefficients on residual terms fail to reject the null (Table 6).

Table 4. Choice model preference and experience results on cropland.

Cropland probit models, selected coefficients (s.e.)									
	Corn			Switchgrass			Poplar		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
price	0.012***	0.012***	0.012***	0.009**	0.010***	0.009**	0.010*	0.010**	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
probio	0.139	0.014	-0.046	0.269**	0.120	0.094	0.384**	0.271	0.024
	(0.099)	(0.185)	(0.251)	(0.128)	(0.132)	(0.186)	(0.149)	(0.188)	(0.287)
nuisance	-0.304**	-0.526**	-0.539	-0.267*	-0.545***	-0.668***	-0.063	-0.588**	-0.438
	(0.130)	(0.242)	(0.385)	(0.142)	(0.178)	(0.229)	(0.164)	(0.229)	(0.287)
enviro	-0.073	-0.034	-0.412	-0.041	-0.161	-0.150	-0.356**	0.065	-0.329
	(0.115)	(0.205)	(0.269)	(0.132)	(0.186)	(0.218)	(0.148)	(0.191)	(0.281)
seen		-0.175	0.318		0.571**	-0.059		0.124	-0.414
		(0.212)	(0.380)		(0.223)	(0.460)		(0.227)	(0.440)
seen:probio		0.175	0.249		0.265	0.423		0.181	0.656
		(0.209)	(0.338)		(0.226)	(0.459)		(0.293)	(0.467)
seen:nuisance		0.308	0.356		0.492*	0.829*		1.029***	0.610
		(0.289)	(0.535)		(0.253)	(0.452)		(0.303)	(0.481)
seen:enviro		-0.051	0.485		0.233	0.288		-0.800***	0.186
		(0.252)	(0.353)		(0.244)	(0.488)		(0.280)	(0.505)
resid			-0.021			0.026			0.027*
			(0.016)			(0.018)			(0.015)
resid:probio			-0.003			-0.007			-0.022
			(0.022)			(0.023)			(0.026)
resid:nuisance			-0.004			-0.015			0.025
			(0.023)			(0.018)			(0.021)
resid:enviro			-0.028			-0.006			-0.050*
			(0.021)			(0.021)			(0.026)
Observations	677	677	677	677	677	677	677	677	677
Log Likelihood	-210.464	-207.269	-205.213	-226.385	-208.762	-204.068	-133.748	-124.461	-118.721
Akaike Inf. Crit.	452.928	454.538	458.426	484.770	457.524	456.136	299.495	288.922	285.441

Notes: All models include controls in text. Complete regression results available in appendix. Statistical significance denoted by: *** p<0.01, ** p<0.05, * p<0.10.

Therefore, I fail to reject the null hypotheses of exogenous experience and proceed to analyze the restricted models.

Table 5. Choice model preference and experience results on non-cropland.

Farmable non-cropland probit models, selected coefficients (s.e.)									
	Corn			Switchgrass			Poplar		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
price	0.011***	0.011***	0.011***	0.007**	0.007**	0.007**	0.007*	0.007**	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
probio	0.320***	0.006	-0.078	0.509***	0.434***	0.373**	0.321**	0.064	0.275
	(0.118)	(0.216)	(0.322)	(0.137)	(0.149)	(0.162)	(0.151)	(0.188)	(0.268)
nuisance	-0.269**	-0.294	-0.371	-0.308**	-0.598***	-0.584**	-0.254**	-0.708***	-0.719***
	(0.131)	(0.260)	(0.374)	(0.124)	(0.192)	(0.256)	(0.121)	(0.172)	(0.243)
enviro	-0.157	-0.231	-0.340	0.084	0.134	-0.099	0.138	0.494**	0.420
	(0.139)	(0.238)	(0.349)	(0.145)	(0.223)	(0.259)	(0.138)	(0.191)	(0.268)
seen		-0.215	0.209		0.405*	-0.127		0.050	-0.149
		(0.215)	(0.407)		(0.214)	(0.469)		(0.213)	(0.417)
seen:probio		0.502*	0.624		0.167	0.419		0.489	0.044
		(0.263)	(0.435)		(0.250)	(0.442)		(0.308)	(0.512)
seen:nuisance		-0.002	0.177		0.606**	0.489		0.790***	0.750
		(0.311)	(0.510)		(0.258)	(0.563)		(0.248)	(0.458)
seen:enviro		0.099	0.235		-0.088	0.809		-0.635**	-0.412
		(0.312)	(0.444)		(0.276)	(0.548)		(0.259)	(0.528)
resid			-0.018			0.025			0.010
			(0.016)			(0.017)			(0.014)
resid:probio			-0.007			-0.010			0.022
			(0.024)			(0.020)			(0.022)
resid:nuisance			-0.010			0.005			0.002
			(0.022)			(0.021)			(0.022)
resid:enviro			-0.005			-0.044**			-0.012
			(0.025)			(0.021)			(0.025)
Observations	677	677	677	677	677	677	677	677	677
Log Likelihood	-163.617	-159.175	-158.111	-225.175	-213.345	-209.348	-201.087	-186.884	-185.418
Akaike Inf. Crit.	359.233	358.349	364.223	482.350	466.690	466.696	434.174	413.768	418.836

Notes: All models include controls described in text. Complete regression results available in appendix. Statistical significance denoted by: *** p<0.01, ** p<0.05, * p<0.10.

Of the 24 coefficients on experience and its interactions across the six models, nine are statistically significant (p<0.10). This suggests that having seen a bioenergy feedstock crop in

Table 6. Chi-square values for F-tests of joint significance of residual terms in choice models, with p-values in parentheses. (Df = 4 for all tests.)

	Cropland	Farmable non-cropland
Corn	3.064 (0.547)	1.618 (0.806)
Switchgrass	3.158 (0.532)	6.916 (0.140)
Poplar	7.224 (0.125)	2.894 (0.576)

Table 7. Chi-square values for F-tests of joint significance of experience terms in choice models, with p-values in parentheses. (Df = 4 for all tests.)

	Cropland	Farmable non-cropland
Corn	2.623 (0.623)	4.654 (0.325)
Switchgrass	16.115 (0.003)	8.263 (0.082)
Poplar	14.204 (0.007)	17.916 (0.001)

production influences the decision-making of the landowner, confirming the first implication of the conceptual model (H1). Examination of the coefficients on *seen* interactions reveals evidence supporting the second implication. In all models except for corn on cropland, experience interacted with taste measures have statistically significant coefficients, implying that tastes influence how experience is incorporated into the decision to change land use (H2).

Examination of the coefficients on *seen* and its interactions reveals evidence supporting the third implication (H3). Table 7 presents Chi-square values for F-tests of the joint significance for coefficients on experience and its interactions. For corn stover, experience coefficients are jointly insignificant for both land types. For the remaining two feedstocks, the test rejects the null hypotheses of joint insignificance, indicating that experience does have an effect on preferences over these two feedstocks. This is consistent with the third implication (H3); the novel land uses that most diverge from existing options are the ones for which additional information influences land use preferences.

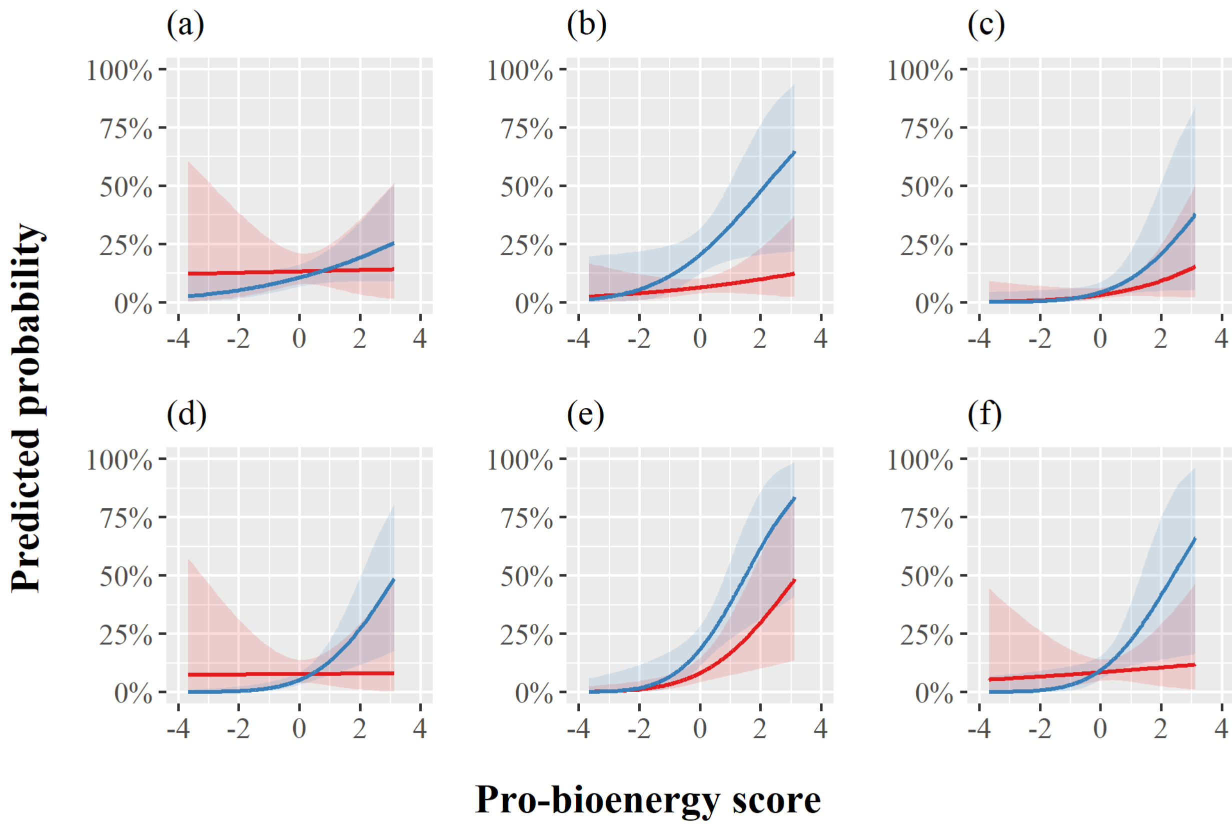

Figure 1. The effects of pro-bioenergy attitudes on predicted probability of leasing (a) cropland for corn stover, (b) cropland for switchgrass, (c) cropland for poplar, (d) non-cropland for corn stover, (e) non-cropland for switchgrass, and (f) non-cropland for poplar. Blue lines represent predictions when landowners have seen the production process while red lines represesent predictions when they have not. Shaded regions indicate 95-percent confidence intervals, computed with delta method standard errors. All other covariates held at their means.

How each taste interacts with experience is further clarified by plotting predicted probabilities against taste scores at different levels of experience. Figure 1 shows how the predicted probability of leasing each land type for each crop varies with pro-bioenergy scores for landowners with differing experience levels when all other covariates are held at their means. The curve for inexperienced landowners is essentially flat for all models except switchgrass on non-cropland, implying that pro-bioenergy attitudes has little influence on the decision to lease when landowners have not seen the crop. However, in all cases, the curve for experienced landowners is steeper, indicating that landowners with stronger pro-bioenergy attitudes are more

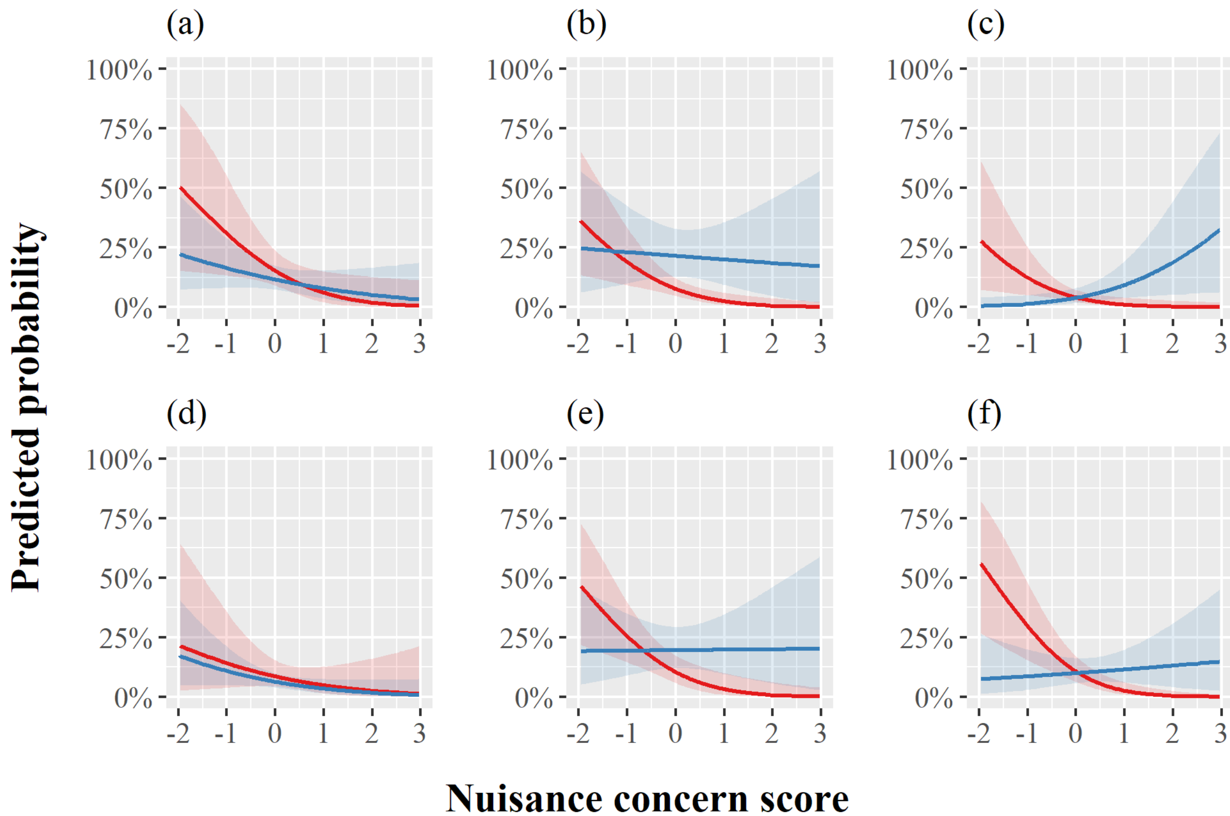

Figure 2. The effects of nuisance concerns on predicted probability of leasing (a) cropland for corn stover, (b) cropland for switchgrass, (c) cropland for poplar, (d) non-cropland for corn stover, (e) non-cropland for switchgrass, and (f) non-cropland for poplar. Blue lines represent predictions when landowners have seen the production process while red lines represesent predictions when they have not. Shaded regions indicate 95-percent confidence intervals, computed with delta method standard errors. All other covariates held at their means.

likely to lease land only when they have seen the crop in question. This has an intuitive interpretation: inexperienced landowners with pro-bioenergy attitudes do not perceive the crop as a feasible contributor to a bioenergy fueled future while those with experience do.

Figure 2 shows how predicted probability of leasing each land type for each crop varies with nuisance concern scores for different experience levels. For landowners who have not seen switchgrass and poplar in production, higher nuisance concerns are associated with lower probabilities of leasing land. But for those who have seen these feedstocks produced, the effect of nuisance concerns is reduced, or in the case of poplar even reversed. This suggests that seeing

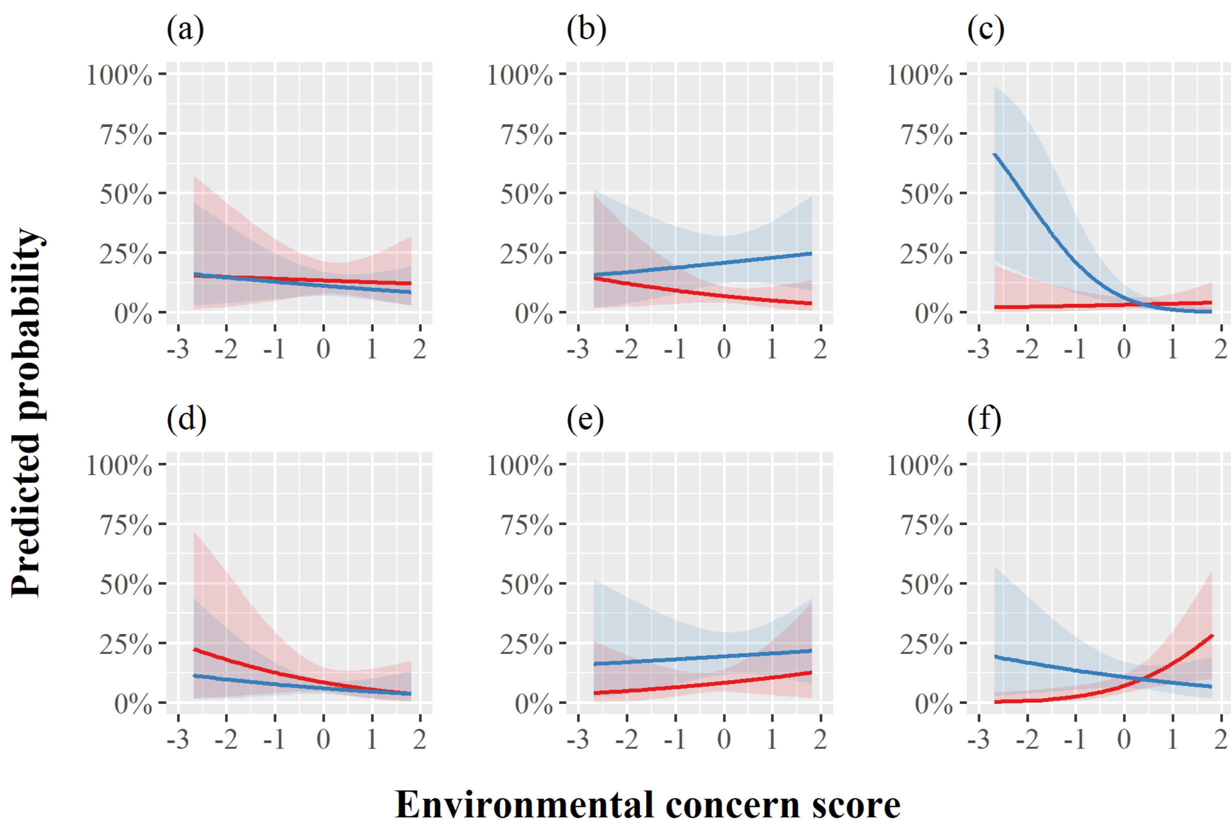

Figure 3. The effects of environmental concerns on predicted probability of leasing (a) cropland for corn stover, (b) cropland for switchgrass, (c) cropland for poplar, (d) non-cropland for corn stover, (e) non-cropland for switchgrass, and (f) non-cropland for poplar. Blue lines represent predictions when landowners have seen the production process while red lines represesent predictions when they have not. Shaded regions indicate 95-percent confidence intervals, computed with delta method standard errors. All other covariates held at their means.

the crop in person can effectively nullify concerns that landowners may have about how switchgrass and poplar production might disturb their privacy and comfort. On the other hand, this pattern is absent in the corn stover panels, where the curves move essentially in tandem. This suggests that seeing corn stover production fails to alleviate nuisance concerns for that feedstock.

Finally, Figure 3 shows how predicted probability of leasing each land type for each crop varies with environmental concern scores for landowners with differing experience levels. For corn stover, both pairs of curves slope slightly downward, indicating little change in the effect of environmental concerns associated with experience. For switchgrass on farmable non-cropland, the curves move together, but upward, indicating that switchgrass is perceived as environmentally friendly relative to alternative land uses for farmable non-cropland, but this perception is not dependent on experience. However, for switchgrass on cropland, landowners who have not seen the crop have downward sloping curve while those who have seen the crop have an upward sloping curve. This indicates that landowners who have not seen switchgrass perceive the crop as relatively environmentally unfriendly, while those who have seen it hold the opposite view. The environmental concern curve for landowners who have not seen poplar is slightly increasing for cropland and increasing more quickly for farmable non-cropland, indicating that these landowners hold positive views of the crop. However, for both land types, the curves for landowners who have seen the crop are downward sloping, indicating that experience with poplar nullifies these positive views.

4. Discussion and Conclusion

The results of the probit models are consistent with the implications of the conceptual model. Landowners with more experience with bioenergy feedstocks make decisions about committing their land for their production differently than those without, and how tastes drive these decisions varies with experience as well. For corn stover, the land use change most similar with existing land use options, this difference was mostly absent. These results are consistent between cropland and farmable non-cropland. In this section I discuss reservations about these results and the implications of these results for future research and the bioenergy sector.

First, it is important to note that the population studied in this paper is not representative of the national landowning population which could potentially produce bioenergy feedstocks. Indeed, Swinton et al. (2017) notes that the landowning population in Northern Michigan and Wisconsin places more weight on tastes than price when considering leasing land for bioenergy crops than landowners in Southern Michigan. This study is also limited to three potential feedstocks: corn stover, switchgrass, and poplar. The patterns that hold for these crops in this region may not extend to other regions or other crops.

In this paper I use a control function approach to test for potential endogeneity between land use preferences and experience. While there is no evidence of endogenous experience in this context, concerns about the endogeneity of experience suggest promising avenues for future research. First, future studies of willingness to provide land for novel land uses should explicitly consider prior landowner experiences and knowledge of that land use. Doing so can help elucidate how landowners' decisions, and hence the supply of land for that purpose, might change in response to future experiences or outreach. Second, future studies should consider information and experience treatments to truly establish a causal effect of experience on willingness to change land uses. These methods have been applied to choice experiments in other contexts, but should be applied specifically in contexts where landowners are asked to change their land use to something new.

The results in this paper are especially relevant to those in the bioenergy sector interested in leasing land to produce bioenergy feedstocks. For switchgrass and poplar, outreach events where landowners see the crops can significantly increase the proportion of landowners who will be willing to provide land for their production. This effect will be especially pronounced if landowners with pro-bioenergy attitudes, rental concerns, or concerns about smell and noise can be specifically targeted. Given how unresponsive landowners appear to be to rental rate for these land uses, such a targeted outreach strategy may be a cost-effective way to increase the land supply for bioenergy feedstock crops. For corn stover, experience has a far less pronounced effect, and therefore an outreach strategy will likely be ineffective.

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Table A1: Full results from first-stage models.

	First-stage models		
	Corn Experience	Switchgrass Experience	Poplar Experience
	(1)	(2)	(3)
acres_farm	-0.0004	0.0004	0.003^{*}
	(0.002)	(0.002)	(0.002)
acres_crop	0.001	0.001	-0.0002
	(0.001)	(0.0005)	(0.001)
rented	0.150	-0.153	0.200
	(0.263)	(0.286)	(0.233)
cons_program	0.242	-0.102	-0.139
	(0.190)	(0.201)	(0.181)
farm_income	0.017	0.049	0.429
	(0.327)	(0.324)	(0.282)
farm_personal	0.187	-0.256	-0.130
	(0.223)	(0.257)	(0.213)
crop_income	0.102	-0.215	-0.325
	(0.306)	(0.311)	(0.263)
crop_personal	-0.246	0.433^{*}	-0.010
	(0.220)	(0.242)	(0.203)
probio	-0.086	-0.006	0.021
	(0.103)	(0.108)	(0.093)
nuisance	-0.057	-0.092	-0.049
	(0.117)	(0.126)	(0.115)
enviro	-0.145	0.075	0.106
	(0.132)	(0.135)	(0.122)
age	0.005	-0.030^{***}	-0.005
	(0.009)	(0.009)	(0.008)
male	0.258	-0.068	0.550^{**}
	(0.231)	(0.239)	(0.238)
farmer	0.464^{*}	-0.249	-0.407^{**}
	(0.243)	(0.222)	(0.202)
income	-0.014	-0.045	-0.046
	(0.076)	(0.081)	(0.076)
education	0.050	0.104	-0.048
	(0.066)	(0.076)	(0.067)
poplar_seen	0.891^{***}	0.315	

	(0.198)	(0.213)	
switch_seen	1.027***		0.353
	(0.219)		(0.218)
corn_seen		0.974***	0.875***
		(0.219)	(0.196)
Constant	-1.020	0.202	-0.468
	(0.642)	(0.733)	(0.576)
Observations	677	677	677
Log Likelihood	-310.475	-329.797	-365.239
Akaike Inf. Crit.	658.949	697.594	768.477

Note: Statistical significance denoted by: *** p<0.01, ** p<0.05, * p<0.10.

Table A2: Full results from second-stage choice models on cropland.

	Cropland probit models								
	Corn			Switchgrass			Poplar		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
price	0.012***	0.012***	0.012***	0.009**	0.010***	0.009**	0.010*	0.010**	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
acres_crop	-0.003***	-0.003***	-0.003***	0.0001	-0.0001	-0.00003	0.0004	0.0002	0.0003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.0005)	(0.0004)
acres_crop_else	-0.0002	-0.0001	-0.0003	-0.0003	-0.0004	-0.0004	0.0002	0.0002	0.0003**
	(0.0002)	(0.0002)	(0.0003)	(0.0004)	(0.001)	(0.001)	(0.0002)	(0.0002)	(0.0002)
rented	1.209***	1.203***	1.236***	0.795**	0.775**	0.822***	0.661**	0.615**	0.534*
	(0.341)	(0.343)	(0.344)	(0.310)	(0.310)	(0.310)	(0.303)	(0.282)	(0.281)
cons_program	-0.163	-0.160	-0.131	-0.440**	-0.452*	-0.434*	-0.174	-0.197	-0.185
	(0.205)	(0.205)	(0.202)	(0.220)	(0.239)	(0.229)	(0.225)	(0.221)	(0.211)
crop_income	0.057	0.045	-0.005	0.188	0.294	0.217	-0.018	-0.054	-0.073
	(0.350)	(0.353)	(0.350)	(0.331)	(0.312)	(0.305)	(0.291)	(0.280)	(0.281)
crop_personal	0.154	0.175	0.165	0.382	0.425*	0.418*	0.600**	0.657***	0.695***
	(0.229)	(0.231)	(0.238)	(0.235)	(0.236)	(0.230)	(0.256)	(0.254)	(0.240)
probio	0.139	0.014	-0.046	0.269**	0.120	0.094	0.384**	0.271	0.024
	(0.099)	(0.185)	(0.251)	(0.128)	(0.132)	(0.186)	(0.149)	(0.188)	(0.287)
nuisance	-0.304**	-0.526**	-0.539	-0.267*	-0.545***	-0.668***	-0.063	-0.588**	-0.438
	(0.130)	(0.242)	(0.385)	(0.142)	(0.178)	(0.229)	(0.164)	(0.229)	(0.287)
enviro	-0.073	-0.034	-0.412	-0.041	-0.161	-0.150	-0.356**	0.065	-0.329
	(0.115)	(0.205)	(0.269)	(0.132)	(0.186)	(0.218)	(0.148)	(0.191)	(0.281)
age	0.001	0.0005	0.003	-0.011	-0.003	-0.004	-0.020*	-0.018*	-0.020**
	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.010)	(0.011)	(0.009)	(0.010)
male	-0.160	-0.155	-0.204	-0.206	-0.179	-0.204	-0.742**	-0.679**	-0.652**
	(0.282)	(0.290)	(0.304)	(0.287)	(0.293)	(0.292)	(0.288)	(0.290)	(0.282)
farmer	0.123	0.161	0.138	0.040	0.118	0.095	-0.211	-0.203	-0.188
	(0.242)	(0.263)	(0.267)	(0.233)	(0.230)	(0.228)	(0.262)	(0.248)	(0.236)
income	-0.112	-0.097	-0.098	-0.079	-0.086	-0.068	0.120	0.156	0.188**
	(0.126)	(0.128)	(0.132)	(0.121)	(0.136)	(0.130)	(0.100)	(0.095)	(0.089)
education	0.037	0.030	0.039	0.109	0.100	0.109	-0.040	-0.054	-0.041
	(0.097)	(0.096)	(0.099)	(0.102)	(0.104)	(0.101)	(0.078)	(0.074)	(0.070)
seen		-0.175	0.318		0.571**	-0.059		0.124	-0.414
		(0.212)	(0.380)		(0.223)	(0.460)		(0.227)	(0.440)
resid			-0.021			0.026			0.027*

			(0.016)			(0.018)			(0.015)
seen:probio		0.175	0.249		0.265	0.423		0.181	0.656
		(0.209)	(0.338)		(0.226)	(0.459)		(0.293)	(0.467)
seen:nuisance		0.308	0.356		0.492*	0.829*		1.029***	0.610
		(0.289)	(0.535)		(0.253)	(0.452)		(0.303)	(0.481)
seen:enviro		-0.051	0.485		0.233	0.288		-0.800***	0.186
		(0.252)	(0.353)		(0.244)	(0.488)		(0.280)	(0.505)
resid:probio			-0.003			-0.007			-0.022
			(0.022)			(0.023)			(0.026)
resid:nuisance			-0.004			-0.015			0.025
			(0.023)			(0.018)			(0.021)
resid:enviro			-0.028			-0.006			-0.050*
			(0.021)			(0.021)			(0.026)
Constant	-1.684**	-1.574*	-1.998**	-1.164	-1.993**	-1.786**	-1.097	-1.463**	-1.237
	(0.815)	(0.833)	(0.792)	(0.808)	(0.782)	(0.825)	(0.943)	(0.740)	(0.804)
Observations	677	677	677	677	677	677	677	677	677
Log Likelihood	-210.464	-207.269	-205.213	-226.385	-208.762	-204.068	-133.748	-124.461	-118.721
Akaike Inf. Crit.	452.928	454.538	458.426	484.770	457.524	456.136	299.495	288.922	285.441

Note: Statistical significance denoted by: *** p<0.01, ** p<0.05, * p<0.10.

Table A3: Full results from second-stage choice models on farmable non-cropland.

Farmable non-cropland probit models									
	Corn			Switchgrass			Poplar		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
price	0.011***	0.011***	0.011***	0.007**	0.007**	0.007**	0.007*	0.007**	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
acres_farm	0.004***	0.005***	0.005***	0.002	0.002	0.002	0.0001	0.001	0.0005
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
acres_farm_else	-0.001	-0.001	-0.001	0.0001	0.00004	0.0001	0.0003	0.0003	0.0003
	(0.001)	(0.0004)	(0.0005)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
rented	0.627**	0.618**	0.620**	0.356	0.350	0.355	0.666***	0.640***	0.614***
	(0.247)	(0.249)	(0.248)	(0.241)	(0.242)	(0.235)	(0.232)	(0.232)	(0.232)
cons_program	-0.312	-0.370	-0.345	-0.462**	-0.514**	-0.518***	-0.052	-0.081	-0.084
	(0.235)	(0.232)	(0.225)	(0.212)	(0.209)	(0.199)	(0.205)	(0.202)	(0.201)
farm_income	-0.341	-0.318	-0.361	-0.082	-0.179	-0.170	0.455	0.453	0.508
	(0.382)	(0.387)	(0.386)	(0.352)	(0.394)	(0.386)	(0.319)	(0.318)	(0.314)
farm_personal	0.120	0.140	0.122	0.318	0.330	0.300	0.216	0.198	0.199
	(0.225)	(0.230)	(0.236)	(0.213)	(0.221)	(0.215)	(0.211)	(0.217)	(0.219)
probio	0.320***	0.006	-0.078	0.509***	0.434***	0.373**	0.321**	0.064	0.275
	(0.118)	(0.216)	(0.322)	(0.137)	(0.149)	(0.162)	(0.151)	(0.188)	(0.268)
nuisance	-0.269**	-0.294	-0.371	-0.308**	-0.598***	-0.584**	-0.254**	-0.708***	-0.719***
	(0.131)	(0.260)	(0.374)	(0.124)	(0.192)	(0.256)	(0.121)	(0.172)	(0.243)
enviro	-0.157	-0.231	-0.340	0.084	0.134	-0.099	0.138	0.494**	0.420
	(0.139)	(0.238)	(0.349)	(0.145)	(0.223)	(0.259)	(0.138)	(0.191)	(0.268)
age	-0.0004	-0.001	0.001	0.004	0.011	0.012	-0.014	-0.013	-0.013
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
male	-0.182	-0.157	-0.209	-0.073	-0.015	-0.106	-0.098	-0.033	0.013
	(0.292)	(0.297)	(0.322)	(0.295)	(0.302)	(0.301)	(0.244)	(0.241)	(0.247)
farmer	-0.428*	-0.487*	-0.484*	0.094	0.154	0.134	0.219	0.235	0.248
	(0.254)	(0.263)	(0.264)	(0.228)	(0.230)	(0.227)	(0.256)	(0.245)	(0.253)
income	0.012	0.031	0.032	-0.008	-0.004	0.011	-0.066	-0.050	-0.050
	(0.113)	(0.121)	(0.125)	(0.100)	(0.106)	(0.109)	(0.082)	(0.088)	(0.092)
education	-0.057	-0.067	-0.067	0.097	0.076	0.078	0.143**	0.135*	0.147**
	(0.093)	(0.098)	(0.100)	(0.084)	(0.086)	(0.084)	(0.067)	(0.070)	(0.070)
seen		-0.215	0.209		0.405*	-0.127		0.050	-0.149
		(0.215)	(0.407)		(0.214)	(0.469)		(0.213)	(0.417)
resid			-0.018			0.025			0.010

			(0.016)			(0.017)			(0.014)
seen:probio		0.502*	0.624		0.167	0.419		0.489	0.044
		(0.263)	(0.435)		(0.250)	(0.442)		(0.308)	(0.512)
seen:nuisance		-0.002	0.177		0.606**	0.489		0.790***	0.750
		(0.311)	(0.510)		(0.258)	(0.563)		(0.248)	(0.458)
seen:enviro		0.099	0.235		-0.088	0.809		-0.635**	-0.412
		(0.312)	(0.444)		(0.276)	(0.548)		(0.259)	(0.528)
resid:probio			-0.007			-0.010			0.022
			(0.024)			(0.020)			(0.022)
resid:nuisance			-0.010			0.005			0.002
			(0.022)			(0.021)			(0.022)
resid:enviro			-0.005			-0.044**			-0.012
			(0.025)			(0.021)			(0.025)
Constant	-1.638**	-1.548**	-1.839***	-2.108***	-2.694***	-2.569***	-1.372*	-1.625**	-1.590**
	(0.660)	(0.695)	(0.677)	(0.729)	(0.738)	(0.778)	(0.799)	(0.720)	(0.747)
Observations	677	677	677	677	677	677	677	677	677
Log Likelihood	-163.617	-159.175	-158.111	-225.175	-213.345	-209.348	-201.087	-186.884	-185.418
Akaike Inf. Crit.	359.233	358.349	364.223	482.350	466.690	466.696	434.174	413.768	418.836

Note: Statistical significance denoted by: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.