



Cornhusker Economics

Conservation Decision Making and Agricultural Land Leasing - An Experimental Investigation of the Role of Gender

Introduction:

Adoption of conservation practices on agricultural land can generate significant private and public good benefits for society. However, most agricultural production occurs on rented land. The United States Department of Agriculture (USDA)'s 2014 Tenure, Ownership and Transition of Agricultural Land (TOTAL) survey documents that more than half of US farmland is leased, making conservation adoption dependent on both landowner and tenant preferences. Additionally, there is a demographic shift in agricultural landownership in the US, represented by more women becoming landowners. In states, like Iowa, 47% of all acres and 55% of all leased acres are owned by women. Findings from the 2017 Census of Agriculture indicate that 60% of farming operations have a female landowner (Census of Agriculture, 2017). This demographic shift must be considered in the context of the evolving role of women in agriculture, and their environmental attitudes and preferences. Specifically, how these factors influence the implementation of conservation land use practices on land rented to predominantly male tenants, who may not favor mandates from female landowners to implement these practices.

In this context, this research investigated the impact of landowner gender and of the different types of contract leases offered by them to a male tenant, on the conservation (or non-conservation) choice made by the tenant. Specifically, we investigate if a) female and male landowners offer different rental contracts and b) whether tenants choose different actions based on the landowner's gender. For this purpose, we implemented a controlled, gender-context-loaded economic experiment with university students, in which we tested contract and land use choice under different treatments for three types of rental contracts – fixed rent, fixed rent with penalty, and fixed rent with discount. The study has two treatment arms: one varies the salience of gender and the other examines the impact of communication between the landowner and tenant.

The experimental methodology is critical for this research for multiple reasons. First, the discounted rental contract is a mechanism with a limited real-world counterpart, meaning that we cannot turn to observational studies to understand what type of behaviors this type of contract promotes relative to other contracts. Second, examining landowner-tenant bargaining and its evolution over time in a non-experimental setting is challenging because bargaining may take different forms and occur at moments difficult to track. This would prevent the generation of data about the bargaining process and non-confounded isolation of treatment effects. Also, we conduct lab experiments because recruitment of agricultural

producers for research studies is quite challenging (Rosch et al., 2020; Weigel et al., 2021), given multiple demands on their time.

Experimental Design:

We implemented two primary treatments: priming participants' gender identity and enabling communication between landowners and tenants. This resulted in a two-by-two factorial design, yielding four treatment conditions, with priming treatments denoted by P and communication treatments denoted by C. Within each treatment, we varied the gender of the landowner (female or male) while the tenant was always male, as outlined in Table 1. Including a control condition in which gender was not revealed and no communication was allowed, there were nine treatments. In treatments with communication, participants could communicate for 1 minute 30 seconds before making choices.

Table 1: Experiment design

No Communication, Gender Not Revealed	Treatments	No Priming, Gender revealed		Priming, Gender revealed	
		Male-Male	Female-Male	Male-Male	Female-Male
Control	No Communication	M	F	MP	FP
	Communication	MC	FC	MPC	FPC

The priming intervention aimed to make gender identity salient. Female and Male participants read a text highlighting traditional feminine and masculine attributes respectively. After they read the text, we asked participants to state the degree to which they related to the passage on a four-point scale with *1 = Relate strongly*, *2 = Relate somewhat*, *3 = Relate very little*, and *4 = Do not relate*. Participants read the priming passage before being instructed about the decision task and the role that they would be assuming. In the control and non-priming treatments, participants moved to the decision task immediately. In all treatments except the control, participants' gender was revealed using gender icons on the computer screens. Tables 2 and 3 represent the payoff tables displayed to each landowner and tenant representing the financial payoff to each participant depending upon contract offered and land use action selected.

The between subject experiment design was implemented online using oTree (Chen et al., 2016) with instructions delivered through Zoom. Participants were recruited randomly from the University of Nebraska-Lincoln between Spring 2021-Summer 2022. They reported their gender when signing and were randomly assigned to treatments based on gender. In the Zoom meeting room, participants' names were anonymized as Participant 1, 2, etc. They were asked to keep their device microphones on mute and never to turn on their videos during the session. The instructions were shared via screen sharing in a presentation on Zoom. Participants also had access to detailed instructions through a link in the oTree interface that opened a Google document. The option to download or print this document was disabled.

Table 2: Payoff Table- Fixed Rent without and with Penalty

		Option 1 Fixed Rent	Option 2 Fixed Rent with Penalty
What Owner Earns	Renter Chooses C	225	225
	Renter Chooses DC	100	100
What Renter earns	Renter Chooses C	100	100
	Renter Chooses DC	150	100

Table 3: Landowner’s view of the payoff tables – Fixed Rent with Discount

Option 3 Discounted Rent	Discount Values	10	20	30	40	50	60	70	80	90	100
What Owner Earns	Renter Chooses C	215	205	195	185	175	165	155	145	135	125
	Renter Chooses DC	100	100	100	100	100	100	100	100	100	100
What the Renter earns	Renter Chooses C	110	120	130	140	150	160	170	180	190	200
	Renter Chooses DC	150	150	150	150	150	150	150	150	150	150

The experimental design had multiple stages depending on the treatment. The decision task was common to all treatments. Participants answered a comprehension quiz and completed a practice session consisting of two rounds. Landowners were referred to as “Owners” and tenants as “Renters” to maintain a neutral context while preserving the hierarchical relationship. The conservation practice choice was Action C and no conservation choice was Action DC.

In the experiment, the contract choice was implemented in two steps. First, the landowner decided between fixed rent and fixed rent with discount. While making this choice, the payoff tables associated with these two contract choices were displayed on the computer screen. If the landowners chose fixed rent with discount, they selected the discount value. When making this choice, they saw the payoff table associated with the discount contract as presented in Table 3. If they chose a fixed rent contract, the next screen showed payoffs from both fixed rent and penalty contracts, and they had to make a contract choice.

Once the landowner made their choice, the tenant was informed about the contract choice and chose between C and DC. Participants’ payoffs were determined, and the next round began. The decision task was repeated for 15 rounds with fixed matching to see if interaction with the same person built reputation and impacted subsequent behaviors.

After completing the decision task, participants answered a demographic survey, including questions on whether they saw their counterpart as a collaborator or adversary. Payoffs from all rounds were converted into US dollars (US\$) at a rate of 211 points per dollar and added to a \$5 participation fee. Participants could also track their earnings and choices across rounds through a round history table. Non-communication treatments lasted for about an hour; communication treatments lasted for 1 hour 30 minutes. Average earnings per participant were \$15.35 including participation fee. We collected 20 observations per landowner-tenant pair for 15 rounds in each treatment, resulting in 600 observations per treatment. With 360 students across the nine treatments, we obtained a data set of 5400 observations for each agent type.

Results:

Focusing on landowner behavior, Table 4 shows that in the control treatment (no gender reveal, no communication), most landowners chose the discount contract (63%), with the penalty contracts selected 27% of the time. Across all treatments revealing gender information, discount contracts were most frequently chosen. Penalty contracts followed, except in the FPC treatment, where fixed rent contracts were more common than penalties. Overall, landowners preferred discount or penalty contracts.

Next, focusing on gender-based behaviors, Table 4 shows that discount contracts are the modal contract for both females and males in all treatments. Chi-square tests indicate significant gender differences in contract offers, except in F and M treatments. Thus, without communication and/or explicit gender priming, no gender-based behavior differences are

produced by only revealing landowner gender. These two manipulations allow landowners to consider their gender relative to their male tenants, influencing behavior during the landowner-tenant interaction.

Additionally, there are some key features to note in terms of the different types of contracts offered by each gender with and without priming. When participants can communicate but gender is not primed (FC vs. MC), female landowners offer more fixed rent contracts (8.0% vs 5.67%), fewer penalty contracts (15.7% vs 21.3%) and more discount contracts (76.3% vs 73.0%) than male landowners, showing a significant difference in contracts offered (chi square test p -value = 0.018). Essentially, female landowners are likely to either fall back on the status quo and offer a fixed rent contract (where they are essentially mandating no conservation thus acting as a “placeholder”) or adopt a softer approach via a discount contract to incentivize conservation, compared to their male counterparts. They are unlikely to use upfront punishment via a penalty contract to get to their desired outcome despite their higher payoffs when the tenant chooses C.

Table 4: Percentage Frequency of Landowner’s and Tenant’s Choices

Treatments		Non-Primed Sample							Primed Sample					
		No Communication			Communication				No Communication			Communication		
	Control	F	M	Difference	FC	MC	Difference	FP	MP	Difference	FPC	MPC	Difference	
Landowner’s Contract Type Choice														
Fixed Rent	10.00	7.33	8.00	-0.67	8.00	5.67	2.33	12.67	6.67	6.00	17.33	6.00	11.33	
Penalty	27.00	23.33	23.67	-0.34	15.67	21.33	-5.66	36.00	24.67	11.33	11.33	10.33	1.00	
Discount	63.00	69.33	68.33	1.00	76.33	73.00	3.33	51.33	68.67	-17.34	71.33	83.67	-12.34	
P-Value of Chi-Sq tests	0.001			0.891			0.018			0.000			0.000	
Tenant’s Choice of Conserve														
Conservation Choice	49.67	54.67 (0.49)	57.00 (0.49)	-2.33	81.33 (0.39)	76.00 (0.42)	5.33	44.33 (0.49)	57.33 (0.49)	-13.00	71.67 (0.45)	85.00 (0.35)	-13.33	
P-Value for t-tests	0.0000			0.5657			0.1112			0.001			0.000	

Note: P- Values for Control report the difference between number of observations of control and number of observations across all treatments.

Interestingly, with priming, females choose more penalty contracts and fewer discount contracts than males, especially without communication (36.0% penalty in FP vs. 24.7% in MP; 51.33% discount in FP vs. 68.67% in MP; p -value = 0.000). This outcome can be explained by the fact that women relate more strongly to the priming text and view tenants as more adversarial than male landowners do. Hence it is possible that identity priming otherizes the male tenants for their female landowners. Combined with the fact that they view their male tenants as adversaries, female landowners appear to penalize their male tenants to discourage a DC choice rather than offering a discount contract, which would reduce their own rental income. While this type of penalizing behavior is atypical in rural communities, it is not without precedent as it is consistent with female landowners who adopt a changemaker position and mandate conservation (thus going against the social norm of not requiring that the tenant behave in a particular way). Additionally, while there is still a significant difference in contract offers (p -value = 0.000 per chi-square test) with communication (FPC vs. MPC), differences in penalty and discount contracts offered by females and males are reduced (11.3% penalty in FPC vs. 10.3% in MPC; 71.3% discount in FPC and 83.7% vs. in MPC). Thus, communication likely reduces female landowners’ otherization of male tenants, ameliorating gender-driven adversarial perceptions and narrowing the gap in contract offers of female and male landowners. Table 4 shows that 49.67% of tenants conserved in control treatments. Similarly, pooled across all gender revealed treatments, conserve was chosen on average 65.91% of the time, a value significantly greater than that obtained in the control setting (p -value = 0.000). Thus, tenant’s behavior overall differs based on our

treatments. Additionally, we also find gender-based differences in tenant's behavior when gender is primed, both in the presence and absence of communication (p -value = 0.000).

Conclusion:

The role of gender identity and norms is critical in determining conservation outcomes on leased land. Our work examines behavior and associated gender-based differences through an induced value laboratory experiment with students. Our study provides evidence that even after removing information barriers between landowners and tenants (because our experiment has common knowledge), an interesting dynamic unfolds where behavior of male landowners and tenants are different from those of female landowners and their respective male tenant. This behavior echoes what has been observed in the field, and our study shows that it is a gender issue, not just a matter of bridging any potential knowledge gap that exists between landowners and tenants regarding benefits of conservation. However, communication between parties can help especially to mitigate some of the behavioral friction that emerges between male tenants and female landowners. Additionally, priming in our experiment serves to mimic traditional gendered expectations of each negotiating party- on the field, these norms although not stated as such dictate relationships because lease agreements are verbal, informal, and bound by mutual social expectations.

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