



Power dynamics of the non-operating landowner-renter relationship and conservation decision-making in the Midwestern United States

Matthew J. Barnett ^{a,*}, Kaitlyn Spangler ^b, Peggy Petzelka ^a, Jennifer Filipiak ^c

^a Department of Sociology, Social Work and Anthropology, 0730 Old Main Hill, Utah State University, Logan, UT, 84322-0730, USA

^b Department of Environment and Society, 5200 Old Main Hill, Utah State University, Logan, UT, 84322-5200, USA

^c Driftless Area Land Conservancy, 206 S Iowa St, Dodgeville, WI, 53533, USA



ARTICLE INFO

Keywords:

Agricultural conservation
Gender
Land management
Non-operating landowner
Power dynamics
Renter

ABSTRACT

A significant share of farmland in the United States is managed through a landlord-renter system, whereby a non-operating landowner (NOL) rents land to a farm operator. This relationship remains underexplored in the social science literature despite the critical social and ecological ramifications of management dynamics. We used data from a recent survey of NOLs leasing out farmland across five states in the Midwestern United States (Iowa, Illinois, Indiana, Ohio, and Kansas) to explore the power dynamics of NOL-renter relationships. Our analysis included two measurements of power: 1) a dichotomous measurement of whether the respondent identified themselves as the primary decision-maker for land management decisions; and 2) a dichotomous measure capturing whether conservation practices were mandated in the lease agreement. Binary logistic regression models indicated that female NOLs are less likely than male NOLs to identify themselves as the primary decision-maker for land management, with unmarried women in our sample being more likely to identify themselves as the primary decision-maker than married women. Women in our sample were also less likely to have conservation practices included in their lease agreements than men. Further, knowledge about farming was an important indicator of power in NOL-operator relationships; those lacking farming knowledge were less likely to identify themselves as the primary decision-maker and also less likely to include conservation practices in their lease agreements. These findings emphasize the empirical and practical implications of the nuanced power dynamics within landowner-renter relationships, as enacted by control over rented agricultural land.

1. Introduction

The United States (US) agri-food system has become increasingly industrialized at the cost of agricultural diversity, raising concerns about the sustainability of current land use outcomes and the dissemination and adoption of agricultural conservation practices (Aguilar et al., 2015; Brown and Schulte, 2011; Nassauer, 2010). Meanwhile, approximately 40% of the farmland in the US is managed through a landowner-renter system, whereby a non-operating landowner (NOL) rents land to a farm operator (United States Department of Agriculture (USDA), 2014). Despite the critical social and ecological ramifications associated with the ongoing management of US agricultural land, there is a relative dearth of research regarding the power dynamics associated with NOL-renter relationships and how these power dynamics relate to land use outcomes (Petzelka et al., 2013; Petzelka and Marquart-Pyatt, 2011). We use data from a recent survey of non-operating landowners

across five Midwestern US states to assess how characteristics of NOLs vary in relation to the use of power in their landowner-renter relationships.

Our primary goal for this study is to more fully understand the factors that contribute to the power dynamics of NOL-renter relationships. We begin with a discussion of the relationship between the NOLs and their renters, as well as the ways that these relationships are connected to decision-making about conservation practices. We then detail our research methodology and describe the concepts and measurements which underlie our empirical models. We present the results and findings from our analysis and discuss the implications of our research.

2. Non-operating landowners: A need for deeper understanding

Data collection on land ownership and tenure has been sparse. Aside from limited questions within the USDA Census of Agriculture, the only

* Corresponding author.

E-mail address: matthew.barnett@aggiemail.usu.edu (M.J. Barnett).

national surveys in the US, to collect robust data on farmland ownership include the 1946 and 1978 Agricultural Land Ownership Survey, the 1988 and 1999 Agricultural Economics and Land Ownership Surveys (AELOS), and the 2014 Tenure, Ownership and Transition of Agricultural Land (TOTAL) survey (Effland et al., 1993; Janssen, 1993; Horst and Marion, 2019; Petzelka et al., 2018). This paucity of formal large-scale data collection has limited the scope of research aimed at understanding the characteristics of NOLs as well as the power dynamics of their landowner-renter relationships. Several studies have addressed these dynamics within smaller regions or states (Petzelka, 2012; Ulrich-Schad et al., 2016), and qualitative studies have contributed to a deeper, contextual understanding of NOLs as they interact with their renters in localized areas (Petzelka et al., 2018; Carolan, 2005; Carter, 2017). Nonetheless, there remains a need to explore power within these relationships at a broader scale (Constance et al., 1996; Carter, 2017; Gilbert and Beckley, 1993).

Based on previous research, gender, in particular, has been discussed as a significant factor associated with landowner-renter power dynamics (Petzelka and Marquart-Pyatt, 2011; Rogers and Vandeman, 1993; Petzelka et al., 2018). Nevertheless, women non-operating landowners (WNOLs) remain a particularly overlooked group of decision-makers in federal data collection and targeted conservation policy (Eells, 2008; Petzelka et al., 2018; Ulrich-Schad et al., 2016). WNOLs own 25% of acres rented across the US (USDA, 2014), but they (particularly married women, women of color, and other marginalized groups) have been historically alienated, dismissed, and undervalued in renter decisions regarding sustainable agricultural practices on their farmland, outreach and extension efforts, and in federal data collection. Previous research indicates that (1) it has historically been more difficult for women to own farmland (Carolan, 2005; Horst and Marion, 2019; Petzelka and Marquart-Pyatt, 2011), (2) WNOLs may be less involved in land management decisions than their male counterparts (Petzelka and Marquart-Pyatt, 2011), (3) WNOLs may have less influence over how renters use their land than men (Effland et al., 1993; Eells, 2008), (4) WNOLs often do not feel welcomed or entitled to farmland decision-making (Eells and Soulis, 2013), and (5) WNOLs are less likely than their male counterparts to consider themselves “true farmers”, even when they have an extensive agricultural background (Carter, 2017). While some women are finding ways to engage more actively with land use decisions, others may lack the social support and opportunities to challenge gendered cultural norms of landowner involvement (Carter, 2017, 2019). Furthermore, other factors may mediate or interact with these gender dynamics. For example, a landlord’s marital status may drive or constrain their ability (or perceived ability) to actively participate in the management of their farmland, and this ability may differ based upon gender as well as whether the respondent is single (never married), married, widowed, or divorced/separated (Effland et al., 1993; Salomon and Keim, 1979; Petzelka and Marquart-Pyatt, 2011). Men who are married may have more primary decision-making power in land use decisions as landowners than their female counterparts or widows who inherited the land (Petzelka and Marquart-Pyatt, 2011).

Several other demographic and attitudinal factors have been shown to underlie the landowner-renter relationship. NOLs are a notably older population, with a national average age of 66.5 among principal landlords in 2014 (USDA 2014), and variation in age has been shown to relate to interest in and likelihood of adopting conservation practices (Perry-Hill and Prokopy, 2014; Prokopy et al., 2008). Further, larger farms are more often associated with conservation practices given that the benefits of such practices increase with farm size (Daloğlu et al., 2014; Prokopy et al., 2008, 2019); thus, we could expect the same with acres rented, whereby larger amounts of acres rented are associated with conservation practices. The physical proximity of NOLs to their rented

farmland may relate to how much investment or interest landlords have in the use and success of their land (Baldwin et al., 2017), as can their reliance on the rental agreement as a source of income (Petzelka et al., 2012; Ulrich-Schad et al., 2016). Similarly, a NOL’s personal background in agriculture helps determine their land-management interests and is associated with the extent and composition of their agricultural information networks (Petzelka and Marquart-Pyatt, 2011; Petzelka, 2012). Levels of formal education have also been associated with more positive attitudes towards conservation practices among NOLs, as well as increased adoption of these practices (Lambert et al., 2007; Prokopy et al., 2008, 2019; Ulrich-Schad et al., 2016).

3. Power dynamics of decision-making about conservation practices

The outcomes associated with the power dynamics between landlords and renters over rented agricultural land management remain a matter of debate. Power, in this context, has been defined as decision-making and control over the use of land (Gilbert and Beckley, 1993; Harvey, 1982); this definition has been operationalized and updated over recent years. Previous research asserts that renters maintain considerable control over land use decision-making as compared to their landlords, asserting power in their landowner-renter relationships (Constance et al., 1996; Gilbert and Beckley, 1993; Petzelka et al., 2013; Petzelka and Marquart-Pyatt, 2011). These relationships can vary by local and absentee landlords (Constance et al., 1996), age, background with farming, income gained from rented land, size of farm, and conservation objectives (Petzelka and Marquart-Pyatt, 2011; Ulrich-Schad et al., 2016). Further, the landowner may not know enough about conservation practices and their implementation to encourage them on the land, so they may defer to the renter or detach themselves from these decision-making processes (Ranjan et al., 2019). In other cases, the renter may exercise authority by manipulating information regarding conservation practices, particularly to a woman landowner (Eells, 2008).

Other research has indicated that NOLs hold significant power in their renter relationships, stipulating barriers or creating incentives to implement conservation practices (Harris, 1974; Mooney, 1983; Ranjan et al., 2019). NOLs may exert control over the way their farm is managed through provisions in the lease agreement and increased cash rent, making it increasingly difficult for the operator to prioritize conservation over profit (Ranjan et al., 2019). Additionally, adoption of conservation practices varies by type of practice, based on who is in charge of implementation. Renters are more likely to adopt short-term, profitable practices such as conservation tillage, whereby non-operating landowners are more likely to implement long-term practices with a higher investment (e.g. implementing filter strips to reduce surface water contamination) (Daloğlu et al., 2014; Soule et al., 2000). Federal programs, such as the Conservation Reserve Program (CRP) that pays farmers to take erodible land out of production, can add a financial incentive for both renter and landowner to enforce conservation practices on their land, yet this incentive is contextually varied across the US (Daniels, 1988; Isik and Yang, 2004; Lubowski et al., 2008).

This study builds upon the findings of previous research in several ways. First, we expand the geographic scope of recent research on NOLs (Ulrich-Schad et al., 2016) by including five states in the Midwestern region of the US, as compared to a cluster of counties in a smaller geographic region. Furthermore, the larger sample size of the survey allows for a quantitative point of triangulation and comparison with several qualitative studies which have provided insight into the NOL-renter relationship (see Carolan, 2005); such triangulation is especially important in understanding the complexity of rural land use

(Madsen and Adriansen, 2004). We utilize this large-scale statistical approach to explore a wide range of key characteristics associated with indicators of power in the NOL-renter relationship.

4. Methodology

This research is underpinned by two main research questions: (1) *How do power dynamics vary across NOL-renter relationships*; and (2) *How are these power differentials associated with land-use and conservation preferences and decisions?* These questions serve as a basis for digging deeper into the nuance of NOL decision-making with a statistically representative sample from five Midwestern US states.

We used data from the American Farmland Trust Non-Operator Landowner Survey, a mail survey conducted in 2018–2019, for five Midwestern states (Iowa, Illinois, Indiana, Ohio, and Kansas). Landowners who own land in these states, no matter where they may live, were included in the survey. While these five midwestern states do not represent the entirety of the region, as shown in Fig. 1, they do represent states with a large percentage of farmland rented from NOLs to operators (between 50 and 60%) engaged in intensive commodity production (USDA 2014).

The survey consisted of a stratified random sample of a minimum of 1500 NOLs from each state drawn from non-operator landowner lists purchased from the Farm Market iD database. Given there is no study population of non-operating landowners, a representative sample could not be drawn.¹ However, because females are generally underrepresented in surveys of agricultural landowners (Ells, 2008; Petzelka et al., 2018), the sampling intentionally focused on a 50/50 gender split (750 male and 750 female). Respondents owning more than one piece of farmland were asked to think of the largest parcel of land that they lease out when answering the survey.²

Respondents received a letter in the mail several weeks before the first mail survey was sent to them, explaining the research project. Approximately one week after the first survey was sent, a reminder postcard was sent to all respondents. Ten days after the reminder postcard was sent, a second survey was sent to all those who had not yet responded (Dillman et al., 2014). The overall response rate for the survey across the five states was 27.8%, ranging from 21.7% in Ohio to 39.2% in Iowa.

4.1. Variables and measures

4.1.1. Independent variables

Given the research findings about NOLs discussed previously, we expected to find significant differences in the power dynamics of the NOL-renter relationship based on a range of factors. We included age (in years; measured continuously), farm income (collapsed to a dichotomous measure comparing those making \$25,001 or greater to those making \$25,000 or less), gender (female vs. male), marital status (married vs. never married, widowed, or divorced/separated), and formal education (4-year degree or graduate/professional degree vs. associate/technical degree, some college (no degree), high school graduate (or equivalent), or less than high school). We also included several other factors: a continuous measure of farmland acres rented out by the respondent (with logarithmic transformation); how they acquired the land (i.e., purchased vs. inherited or through other means such as marriage/divorce); a continuous measure of how far away they lived

from the land (with square root transformation); and a continuous measure of the number of years that they had been renting their land to their current renter or lessee (with logarithmic transformation).³

Based on the findings of previous studies, we included an interaction term for gender and marital status to provide a more nuanced consideration of these dynamics among NOLs. Also based on prior research, we anticipated that NOLs with more formal education and higher farm incomes will be more likely to identify themselves as the key decision-maker and also be more likely to require conservation practices on their rented land (Lambert et al., 2007; Ulrich-Schad et al., 2016). Farm size (acres of farmland rented out) was included to account for how more land rented might be positively associated with the adoption of conservation practices (Lambert et al., 2007; Ulrich-Schad et al., 2016). Farmland acquisition (purchased vs. inherited/acquired through other means) was expected to indicate different values and experiences associated with land ownership and practices, as well as a more long-term commitment to the land. Relatedly, The distance that NOLs live from their rented land may be associated with interest and commitment to land through strong (in-person) and weak (virtual or distant) ties to the renter. Because of this, we expected to find the proximity of the NOLs place of residence to the rented land to be positively associated with interest in conservation practices due to stronger relationships with the renter and more frequent interaction with the land itself (Petzelka, 2012; Ulrich-Schad et al., 2016). We also expected to find that longer relationships with the current operator would be associated with an increased likelihood of the inclusion of conservation practices in lease agreements.

Further, we included two measures of NOLs' farm-related values and experiences in our analysis. The first was a "conservation orientation index" which combined five items capturing the extent to which respondents agree that they consider endangered species, wildlife habitats, biodiversity, water quality, and soil quality when making land management decisions (Cronbach's alpha = 0.848). This measure was included to control for the conservation-oriented values of NOLs in our models. The second was a measurement of farm knowledge, which was captured using a question from the survey indicating the extent to which the respondent agreed that they lacked adequate knowledge about farming to participate in many decisions regarding the management of their land. This item was measured on a 5-point Likert type scale (from "strongly disagree" to "strongly agree") and was considered as a pseudocontinuous covariate in the analysis. We included this measure to more fully consider how the background characteristics of NOLs, such as rural gender roles, may contribute to different types of rural knowledge and agricultural participation (see Carter, 2017). We also included regional indicators for each of the five states in order to control for unobserved heterogeneity at the state level.

4.1.2. Dependent variables

We used two measures of power as the dependent variables in our analysis. The first was a dichotomous measurement of whether the respondent identified themselves as the primary decision-maker for land management decisions made on the rented parcel of land. In addition to "myself", respondents could indicate "child(ren)," "sibling(s)," "spouse/partner," "parent(s)," "family corporation or partnership," "other relatives (cousin, niece/nephew, grandparent, aunt, uncle)," "non-relatives," "farm operation I/we rent land to," or "farm management company" as the primary decision-maker. The second dependent

¹ In a 2017 Land for Good conference held in Denver, CO, a top Farm Service Agency official erroneously noted, in a panel discussion about non-operating landowners that, "we know exactly who they are," referring to FSA lists. These lists only include NOLs who are involved in FSA programs. There is no study population list of non-operating landowners.

² For more information about the survey methodology, please visit www.farmland.org/nolssurvey.

³ In order to facilitate a meaningful comparison of NOLs who acquired their farmland through purchase and those who acquired it through inheritance, respondents who indicated both (i.e., checked "purchased" and "inherited" on the survey) were removed from the final sample (n of cases removed = 232). These respondents may have acquired their land through a combination of purchase or inheritance or may have responded to the survey prompt incorrectly.

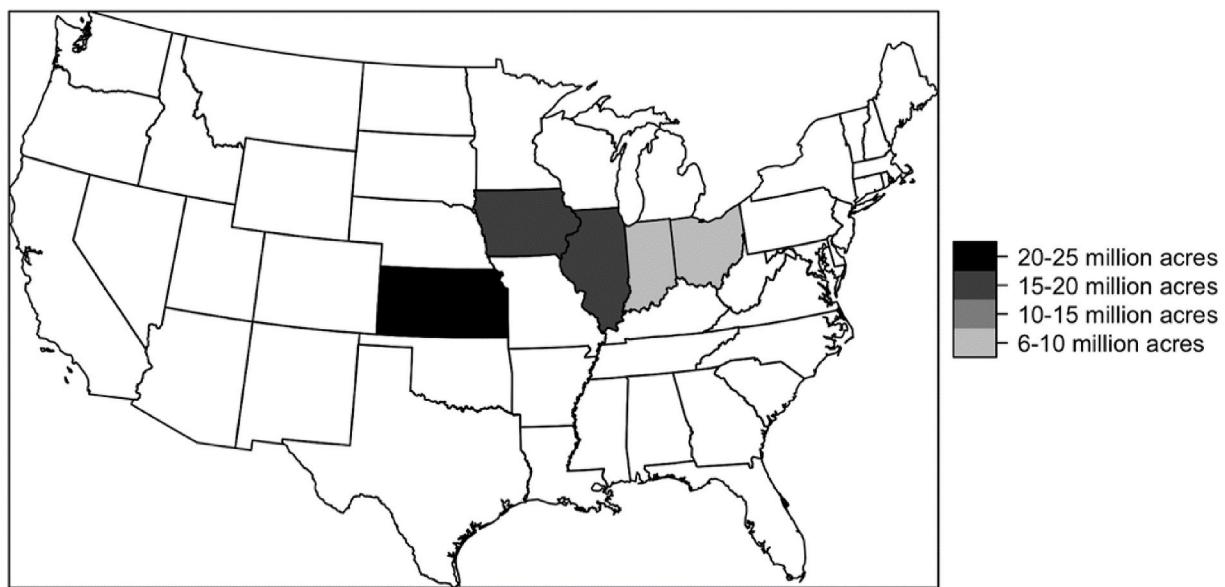


Fig. 1. Number of rented acres across study site states, based on the 2012 USDA Agricultural Census.

variable is drawn from a question asking respondents whether they had conservation practices included in their lease agreement, where “0” = no conservation practices included in the lease and “1” = conservation practices included in the lease.

4.2. Analytical strategy

Prior to the listwise deletion associated with our statistical modeling, we had a total sample size of 1549 NOLs. We used Stata version 15.1 to estimate a series of nested binary logistic regression models, allowing for the exploration of relationships between the covariates and dependent variables while controlling for potentially confounding factors. For each dependent variable, we considered our covariates in relevant blocks. The first block includes sociodemographic characteristics, which are the

primary covariates of interest in our analysis. The second block included characteristics capturing the relationships that the respondents share with their renter and the land. The third block included our attitudinal covariates. We used likelihood ratio chi-square tests to assess meaningful improvements in overall model fit as additional covariates were added through the nesting procedure. Nagelkerke pseudo- R^2 statistics are also provided for reference.

5. Results

5.1. Descriptive statistics

The descriptive characteristics of our full sample of survey respondents are provided in Table 1. As was expected, the sample tended

Table 1
Descriptive characteristics of NOLs sample.

	n	Mean	Std. Dev.	Min	Max
Independent variables					
Age (years; continuous)	1499	69.95	12.49	20	108
Farm income (\$25,001+ vs. \$25,000 or less)	1428	0.39	0.49	0	1
Female (vs. male)	1519	0.47	0.50	0	1
Married (vs. not married)	1513	0.68	0.47	0	1
4-year degree or grad/professional degree (vs. assoc/tech or less)	1515	0.44	0.50	0	1
Acres of farmland rented out (continuous; shown for reference)	1467	199.44	461.51	1	11200
Acres of farmland rented out (ln)	1467	4.62	1.11	0	9.32
Purchased land (vs. acquired through other means)	1520	0.43	0.50	0	1
Distance from land (continuous; shown for reference)	1492	116.42	327.16	0	3500
Distance from land (sqrt)	1492	5.89	9.04	0	59.16
Years renting to current renter (continuous; shown for reference)	1485	17.08	12.63	1	67
Year renting to current renter (ln)	1485	2.48	0.97	0	4.20
Conservation orientation index ($\alpha = 0.848$)	1349	18.62	3.63	5	25
Lack of knowledge about farming (1–5 scale)	1481	2.75	1.33	1	5
Dependent variables					
Respondent identifies self as primary decision-maker	1497	0.49	0.50	0	1
Conservation practices included in lease	1486	0.51	0.50	0	1
Regional indicators					
Iowa (reference)	273	0.18	0.38	0	1
Illinois	330	0.21	0.41	0	1
Indiana	322	0.21	0.41	0	1
Ohio	298	0.19	0.39	0	1
Kansas	326	0.21	0.41	0	1

to be older, with an average age of 70 years and a total range of 20–108 years. Approximately 39% of respondents had an annual farm income of \$25,001 or greater. The final sample is almost evenly split between women and men, with 47% of respondents being female, expected given the gender stratified sampling procedure used. Meanwhile, 68% of respondents reported being married, and 44% of respondents had a bachelor's degree or graduate/professional degree.

On average, the respondents in our sample rented out 199 acres of farmland (median = 100 acres), with a minimum of one acre and a maximum of 11,200 acres. While 43% of respondents acquired their land through purchase rather than inheritance, marriage/divorce, or other means, 35% of respondents reported living on their land. The average respondent lived 116 miles from the land (median = 6 miles), with the furthest distance being 3500 miles. Respondents reported having leased land to their current renter for an average of 17 years (median = 15 years), with a minimum of one year and a maximum of 67 years. Generally, respondents had high scores on the conservation orientation index, with a mean score of 18.62 (on a 20-point scale). A significant portion of respondents agreed or strongly agreed that they did not know enough about farming to participate in many decisions regarding the management of their land (with a mean score of 2.75 on the 5-point scale).

5.2. Identification of self as primary decision-maker

The first block of covariates (M1 = Model 1 in Table 2) included sociodemographic measures and represented a better fit to the data than random chance alone ($\chi^2 = 83.5, p \leq 0.001$). Older NOLs had lower odds of identifying themselves as the primary decision-maker for land management on their leased parcel of land. Meanwhile, females were much less likely to identify as the primary decision-maker than males:

Table 2

Odds ratios from binary logistic regression models predicting identification of self as primary decision-maker for land management.

	M1	M2	M3	M4
Age	0.989*	0.991	0.992	0.990 †
Farm income	1.156	1.241	1.154	1.161
Female	0.337	0.377	0.406	0.856
	***	***	***	
Married	0.817	0.874	0.882	1.606 *
4-year degree+	1.051	1.274 †	1.306 †	1.300 †
Acres of farmland rented out (ln)		0.892	0.882 †	0.874 †
Purchased land		1.517 **	1.426 *	1.394 *
Distance from land (sqrt)		0.979 *	0.983 *	0.983 †
Years renting to current renter (ln)		0.917	0.943	0.936
Conservation orientation index			1.032 †	1.035 †
Lack of knowledge about farming			0.797 ***	0.797 ***
Female × Married			0.345 ***	
Regional indicators				
Iowa (reference)	–	–	–	–
Illinois	0.805	0.899	0.936	0.975
Indiana	1.136	1.154	1.229	1.236
Ohio	0.904	0.959	0.977	1.012
Kansas	0.678 †	0.952	1.004	1.012
<i>n</i>	1091	1091	1091	1091
Deviance	1427.5	1399.2	1376.2	1364.6
Model χ^2	83.5 ***	111.9	134.8	146.41
	***	***	***	
χ^2 (vs. previous model)	–	28.4 ***	22.9 ***	11.6 ***
Nagelkerke R^2	0.098	0.130	0.155	0.168

Note: † $p \leq 0.1$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

controlling for the other covariates in the model, women had about 66% lower odds of identifying themselves as the primary decision-maker than men, on average. Farm income, marital status, and formal education were all nonsignificant in this model.

Model 2 (M2) included all of the covariates from the previous model as well as measures capturing the landowners' relationship with the renter and the land, and represented a significantly better fit overall ($\chi^2 = 28.4, p \leq 0.001$). While the effect of age became nonsignificant with the inclusion of land and renter characteristics, the gender effect remained identical. At the same time, formal education appeared as a marginally significant positive predictor of identifying oneself as the primary decision-maker. Respondents who purchased their land (as opposed to acquiring it through inheritance or other means) had significantly higher odds of identifying themselves as the primary decision-maker. Meanwhile, respondents who lived further away from the rented land had, on average, lower odds of identifying themselves as the primary decision-maker. The acres of farmland rented out and the number of years renting to the current renter were not significant predictors in this model.

The two attitudinal measures were added in Model 3 (M3), which further improved the overall model fit ($\chi^2 = 22.9, p \leq 0.001$). The gender effect remained substantively similar in this model, as did the effect of formal education. The effect of farmland acres rented out became a marginally positive predictor in this model, while the effect of purchasing the land was slightly reduced in significance and magnitude. Meanwhile, the distance of the respondent's residence from the rented land remained virtually unchanged. Higher scores on the conservation orientation index were associated with increased odds of identifying as the primary decision-maker but only at a marginal level of significance. Not surprisingly, respondents who more strongly agreed that they lacked sufficient farming knowledge to make land management decisions had decreased odds of identifying themselves as the primary decision-maker.

We estimated an additional model (M4 = Model 4) which included the interaction term for gender and marital status and fit the data better than Model 3 ($\chi^2 = 11.6, p \leq 0.001$). The significance of this interaction term indicates that while unmarried women had a higher probability of identifying themselves as the primary decision-maker than married women, there was not a significant difference in self-identifying as the primary decision-maker based upon marital status for men (Fig. 2).

5.3. Inclusion of conservation practices in lease or rental agreements

Farm income, gender, and marital status were all significantly associated with having conservation practices included in the rental agreement in Model 1 (Table 3), which represented a better fit to the data than random chance alone ($\chi^2 = 22.2, p \leq 0.01$). While those with farm incomes greater than \$25,000 had higher odds of indicating that conservation practices were included in their rental agreement, women were less likely than men to indicate the inclusion of conservation practices in their rental agreements, as were married respondents.

Model 2 (M2) added land and renter characteristics but did not represent a significant improvement in model fit over Model 1 ($\chi^2 = 5.83, p > 0.1$). However, the inclusion of the acres of rented-out land, whether the respondent purchased the land, the distance of the respondent's residence from the rented-out land, and the number of years renting to the current farm operator had several mediating effects on the sociodemographic covariates in the model. While the impact of farm income is pushed to non-significance, the effects of gender and marital status remain substantively the same. Meanwhile, the impact of farmland acres rented out is significant and positive in this model.

The inclusion of attitudinal characteristics in Model 3 was associated with a significant improvement in overall model fit ($\chi^2 = 24.3, p \leq 0.001$). While the effect of gender was pushed to marginal significance in this model, the effect of marital status remained substantively similar. Meanwhile, the effect of rented acres became more

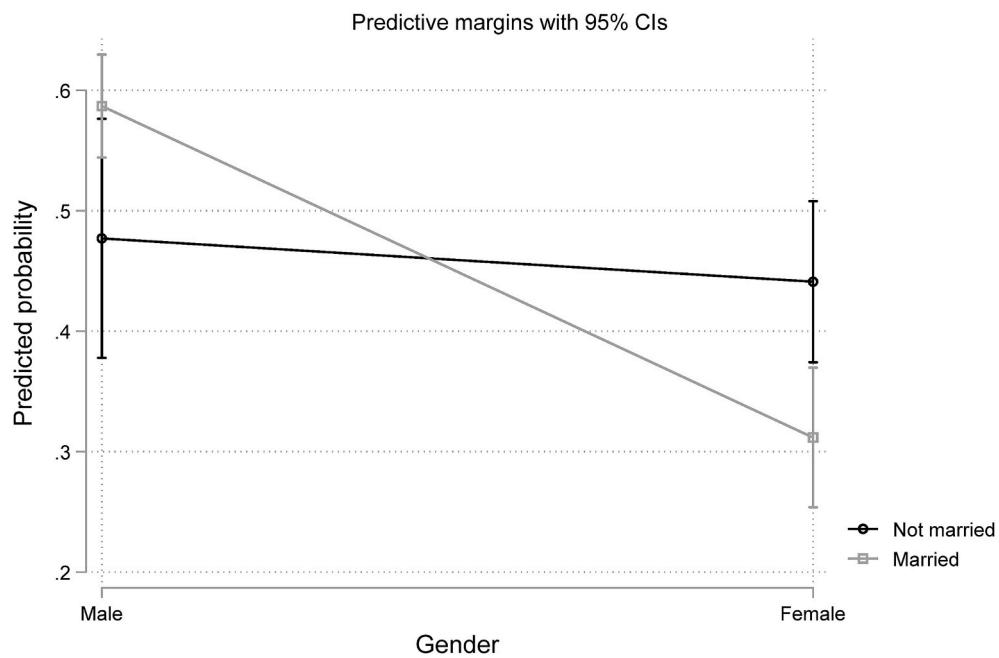


Fig. 2. Interaction effect for gender and marital status on identification of self as primary decision-maker (M4, Table 2).

Table 3

Odds ratios from binary logistic regression models predicting the inclusion of conservation practices in lease or rental agreements.

	M1	M2	M3
Age	0.997	0.995	0.996
Farm income	1.285 *	1.070	1.014
Female	0.722 *	0.740 *	0.778 †
Married	0.683 *	0.690 *	0.702 *
4-year degree+	1.160	1.173	1.162
Acres of farmland rented out (ln)		1.178 *	1.204 **
Purchased land		1.040	0.968
Distance from land (sqrt)		0.994	0.998
Years renting to current renter (ln)		0.984	1.012
Conservation orientation index			1.075 ***
Lack of knowledge about farming			0.887 *
Regional indicators			
Iowa (reference)	–	–	–
Illinois	0.832	0.866	0.916
Indiana	0.718	0.752	0.829
Ohio	0.972	1.011	1.052
Kansas	0.686 †	0.652 *	0.683 †
<i>n</i>	1098	1098	1098
Deviance	1499.5	1493.6	1469.4
Model χ^2	22.2 **	28.0 **	52.3 ***
χ^2 (vs. previous model)	–	5.83	24.3 ***
Nagelkerke R^2	0.027	0.034	0.062

Note: † $p \leq 0.1$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

significant. More conservation-oriented respondents had higher odds of having conservation practices included in their rental agreements, while respondents who more strongly agreed that they lacked sufficient knowledge about farming to make land management decisions had lower odds. A fourth model (not shown) included an interaction term between gender and marital status, which was not statistically

significant.⁴

6. Discussion

The present analysis supports our expectation that a suite of socio-demographic and NOL characteristics contribute to the power of landowners in conservation decision-making. The sociodemographic characteristics of NOLs varied in importance as determinants of power over rented land. Overall, age did not prove to be an essential factor other than being a marginally significant predictor of the respondent identifying as the primary decision-maker (where older NOLs were less likely to identify as the primary decision-maker). Similarly, farm income was only a marginally significant predictor of the inclusion of conservation provisions in the lease agreement, though it became nonsignificant when attitudinal characteristics were added to the model. Finally, NOLs with more formal education were more likely to identify as the primary decision-maker at a marginal significance level. This finding contrasts with work that did not find an association between educational attainment and conservation decision-making (Ulrich-Schad et al., 2016).

Gender added complexity to our models. We find support for findings of previous studies, which indicate that female NOLs tend to defer to their male renters to make decisions about land management (see Carolan, 2005; Carter, 2017; Petrelka and Marquart-Pyatt, 2011). We found that gender mattered significantly in the identification of who is primary decision-maker. The majority of unmarried women in our sample (72%) were widows. These widowed women are more likely to identify themselves as the primary decision-maker than married women, contrasting with findings from prior research that did not find marital

⁴ We also ran a version of Model 4 which included the dependent variable from the previous block of models (identification of self as primary decision-maker). This model is not shown in Table 3 because the covariate was not significant and did not substantially change the effects of the other covariates in the model.

status to be significant (Petrzelka and Marquart-Pyatt, 2011).⁵

In terms of having conservation provisions included in the lease agreement, there was a significant gender effect when considering only sociodemographic variables. However, this effect was reduced to marginal significance with the inclusion of farm and landowner attitudinal characteristics, such as conservation orientation. Previous research has identified that women NOLs are interested in learning more about and being more involved in conservation practices and decisions, but they have not felt explicitly included or capable of increased involvement (Eells and Soulis, 2013). Our results corroborate the findings from these studies.

Characteristics of rented land add further complexity to understanding conservation decision-making. NOLs renting out more acres of farmland were more likely to have conservation practices in their lease agreements, supporting a previously identified positive association between rented farm size and use of long-term conservation practices (Soule et al., 2000; Daloğlu et al., 2014). We also found that as NOLs rented out more land, they were less likely to identify as primary decision-maker at a marginal level of significance; meanwhile, landowners who purchased their land were more likely to identify as the primary decision-maker. Purchasing land is a systemic privilege, so those who are able to do so may already be more advantaged in other social, economic, or political ways than those who do not (Horst and Marion, 2019). However, prior research has found that while NOLs who purchase, (rather than inherit) their land are less engaged in conservation decision-making (Ranjan et al., 2019), land inheritance has also been associated with a decreased likelihood of the adoption of conservation practices (Ulrich-Schad et al., 2016). In our analysis, method of land acquisition was associated with the inclusion of conservation provisions in the lease agreement. In-depth qualitative inquiry on this topic may provide deeper understanding of who is purchasing (vs. inheriting) land and the values attached to this process may help uncover different incentives for land management across NOLs.

NOLs who live farther away from their land are less likely to identify as primary decision-maker, which is consistent with previous literature that distinguishes absentee and local landowners and emphasizes the frequency of contact between NOL and renter (Petrzelka et al., 2013; Ulrich-Schad et al., 2016). Distance from land may also limit landowners' ability to reinforce feelings of stewardship, community, and sense of place with their land (Baldwin et al., 2017), resulting in less decision-making interest and authority. However, this distance is not associated with the inclusion of conservation provisions in their lease.

The attitudinal characteristics of NOLs, namely the conservation orientation index and knowledge about farming, were consistently meaningful in our models; this significance indicates that, in addition to sociodemographic differences, the experiences, perceptions, and values of NOLs are important to understand. After controlling for landlord-renter relationships and attitudinal factors, women were less likely to have conservation practices required in their leases than men at a marginal level of significance. It should also be noted that women reported not knowing enough about farming to make many land management decisions at a much higher rate than men, which in turn was negatively associated with having conservation practices included in the lease. Therefore, we identify a relationship between perception of agricultural knowledge and the outcome of including conservation provisions in lease agreements, which seemingly operates independently of gender. This emphasizes the importance of NOL values and

attitudes, as well as the importance of factors associated with access to agricultural information and social barriers to participation within decision-making about conservation practices (Carter, 2017).

7. Conclusion

While our findings contribute insight into NOL decision-making, our analysis contains some limitations. First, we explore only one side of the NOL-renter dynamic. Attention should be given to expanding research efforts to explore NOL-renter power dynamics through the lens of both the landowner and their renter(s). There are several limitations of our dataset. First, it is a cross-sectional glimpse of NOLs, capturing data from respondents at a single point in time, rather than allowing us to look at trends over time. Also, given there were no non-respondent tests conducted, we cannot determine to what degree the NOL respondents in our sample are similar or different to the non-respondents. In addition, as noted by Horst and Marion (2019), 97% of landowners are white; the dataset does not capture race nor ethnicity, factors very much associated with systemic privilege and power. Finally, other attitudinal characteristics not captured in this survey, such as sense of place, could be important in understanding NOL-renter relationships and preferences over decisions about conservation practices.

Despite these limitations, our study makes several contributions to the emerging research on NOLs. First, we expand the geographic scope of recent research on NOLs (Ulrich-Schad et al., 2016) by including five states in the Midwestern region of the US, as compared to a cluster of counties in a smaller geographic region. The larger sample size of the survey allows for a quantitative point of triangulation and comparison with several qualitative studies that have provided insight into the NOL-renter relationship. (see Carolan, 2005; Petrzelka et al., 2018); such triangulation is especially important in understanding the complexity of rural land use (Madsen and Adriansen, 2004). Additionally, an increased understanding of the dynamics explored in this research can help unlock ways to prioritize conservation information across various landowner-renter relationships (Petrzelka, 2012; Ulrich-Schad et al., 2016). Finally, by incorporating and assessing several social factors associated with landowners as well as their rented farmland, we add increased specificity to the understanding of conservation outcomes on agricultural land.

We conclude with several recommendations. First, future research on this subject must begin to focus on other social identities, such as race and ethnicity. Consideration of the diversity of land owners needs to extend into relationships within and across owner-operators, renters, and farm laborers, considering the ways that these patterns of privilege and power relate to agricultural land use. Additionally, considering the overall household wealth of NOLs above and beyond their farm income will be useful in future research, as it may reveal important differences in NOL-renter power dynamics. A more fine-grained consideration of the variation in NOL-renter power dynamics in various geographic contexts could also be an important consideration in future research, given how the social origins of farm production vary across the US (Pfeffer, 1983). These suggestions for future research, along with our study findings, will help to further illuminate the nuanced power dynamics within landowner-renter relationships, as enacted by control over rented agricultural land.

Funding

This research was supported by American Farmland Trust, Rachel's Network, the Great Lakes Protection Fund, and the National Science Foundation under Grant No. 1633756.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

⁵ We conducted a sensitivity analysis which explored identifying oneself as the primary decision-maker for land management decisions excluding never married and divorced/separated respondents (i.e., only comparing widowed and married respondents). This analysis yielded similar results as the interaction effect for Model 4 shown in Table 2. There was not a significant difference in self-identifying as the primary decision-maker based upon marital status (married vs. widowed) for men.

the work reported in this paper.

Acknowledgments

We would like to extend our gratitude to the survey participants as well as the anonymous reviewers for their helpful suggestions. We would also like to thank Michael Briscoe, Kristen Koci, and Claudia Wright for their feedback and suggestions.

References

- Aguilar, J., Gramig, G.G., Hendrickson, J.R., Archer, D.W., Forcella, F., Liebig, M.A., 2015. Crop species diversity changes in the United States: 1978–2012. *PLoS One* 10 (8), e0136580. <https://doi.org/10.1371/journal.pone.0136580>.
- Baldwin, C., Smith, T., Jacobson, C., 2017. Love of the land: social-ecological connectivity of rural landholders. *J. Rural Stud.* 51 (April), 37–52. <https://doi.org/10.1016/j.jrurstud.2017.01.012>.
- Brown, P.W., Schulte, L.A., 2011. Agricultural landscape change (1937–2002) in three townships in Iowa, USA. *Landsc. Urban Plann.* 100 (3), 202–212. <https://doi.org/10.1016/j.landurbplan.2010.12.007>.
- Carolan, M.S., 2005. Barriers to the adoption of sustainable agriculture on rented land: an examination of contesting social fields. *Rural Sociol.* 70 (3), 387–413. <https://doi.org/10.1526/0036011054831233>.
- Carter, A., 2017. Placeholders and changemakers: women farmland owners navigating gendered expectations. *Rural Sociol.* 82 (3), 499–523. <https://doi.org/10.1111/ruso.12131>.
- Carter, A., 2019. 'We don't equal even just one man': gender and social control in conservation adoption. *Soc. Nat. Resour.* 32 (8), 893–910. <https://doi.org/10.1080/08941920.2019.1584657>.
- Constance, D., Rikoon, J.S., Ma, J.C., 1996. Landlord involvement in environmental decision-making on rented Missouri cropland: pesticide use and water quality issues. *Rural Sociol.* 61 (4), 577–605.
- Daloğlu, I., Nassauer, J.I., Riolo, R.L., Scavia, D., 2014. Development of a farmer typology of agricultural conservation behavior in the American corn belt. *Agric. Syst.* 129 (July), 93–102. <https://doi.org/10.1016/j.agsy.2014.05.007>.
- Daniels, T.L., 1988. America's Conservation Reserve Program: rural planning or just another subsidy? *J. Rural Stud.* 4 (4), 405–411. [https://doi.org/10.1016/0743-0167\(88\)90008-3](https://doi.org/10.1016/0743-0167(88)90008-3).
- Dillman, D.A., Smyth, J.D., Christian, L.M., 2014. Internet, Phone, Mail, and Mixed-Mode Surveys: the Tailored Design Method. John Wiley & Sons.
- Eells, J.C., 2008. The Land, It's Everything: Women Farmland Owners and the Institution of Agricultural Conservation in the U.S. Midwest. Dissertation. Iowa State University, Ames, Iowa.
- Eells, J.C., Soulis, J., 2013. Do women farmland owners count in agricultural conservation? A review of research on women farmland owners in the United States. *J. Soil Water Conserv.* 68 (5), 121A–123A. <https://doi.org/10.2489/jswc.68.5.121A>.
- Effland, A.B., Rogers, D.M., Grim, V., 1993. Women as agricultural landowners: what do we know about them? *Agric. Hist.* 67 (2), 235–261.
- Gilbert, J., Beckley, T.M., 1993. Ownership and control of farmland: landlord-tenant relations in Wisconsin. *Rural Sociol.* 58 (4), 569–579.
- Harris, M., 1974. Entrepreneurship in Agriculture. Agricultural Law Center Monograph, Iowa City, IA, 12.
- Harvey, D., 1982. The Limits to Capital. Basil Blackwell, Oxford, UK.
- Horst, M., Marion, A., 2019. Racial, ethnic and gender inequities in farmland ownership and farming in the U.S. *Agric. Hum. Val.* 36 (1), 1–16. <https://doi.org/10.1007/s10460-018-9883-3>.
- Isik, M., Yang, W., 2004. An analysis of the effects of uncertainty and irreversibility on farmer participation in the Conservation Reserve Program. *J. Agric. Resour. Econ.* 18.
- Janssen, L., 1993. Empirical analysis of tenure patterns and farm structure. In: Hallam, A. (Ed.), 1997. Size, Structure, and the Changing Face of American Agriculture. Westview Press, Inc, Boulder, CO.
- Lambert, D.M., Sullivan, P., Claassen, R., Foreman, L., 2007. Profiles of US farm households adopting conservation-compatible practices. *Land Use Pol.* 24 (1), 72–88. <https://doi.org/10.1016/j.landusepol.2005.12.002>.
- Lubowski, R.N., Plantinga, A.J., Stavins, R.N., 2008. What drives land-use change in the United States? A national analysis of landowner decisions. *Land Econ.* 22.
- Madsen, L.M., Adriansen, H.K., 2004. Understanding the use of rural space: the need for multi-methods. *J. Rural Stud.* 20 (4), 485–497. <https://doi.org/10.1016/j.jrurstud.2003.12.005>.
- Mooney, P.H., 1983. Toward a class Analysis of midwestern agriculture. *Rural Sociol.* 48 (4), 563–584.
- Nassauer, J.I., 2010. Rural landscape change as a product of US federal policy. In: Primdahl, J., Swaffield, S. (Eds.), 2010. Globalisation and Agricultural Landscapes, 185–200. Cambridge University Press, Cambridge. <https://doi.org/10.1017/CBO9780511844928.011>.
- Perry-Hill, R., Prokopy, L.S., 2014. Comparing different types of rural landowners: implications for conservation practice adoption. *J. Soil Water Conserv.* 69 (3), 266–278. <https://doi.org/10.2489/jswc.69.3.266>.
- Petrzelka, P., Sorensen, A., Filipiak, J., 2018. Women Agricultural Landowners—Past Time to Put Them 'on the Radar.' *Soc. Nat. Resour.* 31 (7), 853–864. <https://doi.org/10.1080/08941920.2017.1423435>.
- Petrzelka, P., 2012. Absentee Landowners in the Great Lakes Basin: Who They Are and Implications for Conservation Outreach. *Soc. Nat. Resour.* 25 (8), 821–832. <https://doi.org/10.1080/08941920.2011.626511>.
- Petrzelka, P., Ma, Z., Malin, S., 2013. The Elephant in the Room: Absentee Landowner Issues in Conservation and Land Management. *Land Use Pol.* 30 (1), 157–166. <https://doi.org/10.1016/j.landusepol.2012.03.015>.
- Petrzelka, P., Malin, S., Gentry, B., 2012. Absentee Landowners and Conservation Programs: Mind the Gap. *Land Use Pol.* 29 (1), 220–223. <https://doi.org/10.1016/j.landusepol.2011.06.009>.
- Petrzelka, P., Marquart-Pyatt, S., 2011. Land Tenure in the U.S.: Power, Gender, and Consequences for Conservation Decision Making. *Agric. Hum. Val.* 28 (4), 549–560. <https://doi.org/10.1007/s10460-011-9307-0>.
- Pfeffer, M.J., 1983. Social origins of three systems of farm production in the United States. *Rural Sociol.* 48 (4), 540–562.
- Prokopy, L.S., Floress, K., Arbuckle, J.G., Church, S.P., Eanes, F.R., Gao, Y., Gramig, B.M., Ranjan, P., Singh, A.S., 2019. Adoption of agricultural conservation practices in the United States: evidence from 35 years of quantitative literature. *J. Soil Water Conserv.* 74 (5), 520–534. <https://doi.org/10.2489/jswc.74.5.520>.
- Prokopy, L.S., Floress, K., Klother-Weinkauf, D., Baumgart-Getz, A., 2008. Determinants of agricultural best management practice adoption: evidence from the literature. *J. Soil Water Conserv.* 63 (5), 300–311.
- Ranjan, P., Wardrop, C.B., Eanes, F.R., Reddy, S.M.W., Harden, S.C., Masuda, Y.J., Prokopy, L.S., 2019. Understanding barriers and opportunities for adoption of conservation practices on rented farmland in the US. *Land Use Pol.* 80 (January), 214–223. <https://doi.org/10.1016/j.landusepol.2018.09.039>.
- Rogers, D.M., Vandeman, A.M., 1993. Women as farm landlords: does gender affect environmental decision-making on leased land? *Rural Sociol.* 58 (4), 500–568.
- Salamon, S., Keim, A.M., 1979. Land ownership and women's power in a midwestern farming community. *J. Marriage Fam.* 41 (1), 109. <https://doi.org/10.2307/351736>.
- Soule, M.J., Tegene, A., Wiebe, K.D., 2000. Land tenure and the adoption of conservation practices. *Am. J. Agric. Econ.* 82 (4), 993–1005. <https://doi.org/10.1111/0002-9092.00097>.
- Ulrich-Schad, J.D., Babin, N., Ma, Z., Prokopy, L.S., 2016. Out-of-State, out of mind? Non-operating farmland owners and conservation decision making. *Land Use Pol.* 54 (July), 602–613. <https://doi.org/10.1016/j.landusepol.2016.02.031>.
- United States Department of Agriculture (USDA), 2014. Census of Agriculture: 2014. Tenure, ownership, and transition of agricultural land survey (TOTAL). https://www.agcensus.usda.gov/Publications/2012/Online_Resources/TOTAL/index.php. (Accessed 13 February 2019).