



# Opportunities and barriers to certified organic grain production on rented farmland in the U.S. Midwest state of Indiana

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## ABSTRACT

Organic certification provides an opportunity for crop farmers to improve their viability and reduce the environmental impacts of commodity grain production, yet farmers have only transitioned to organic certification on less than five percent of US farmland. We focus on land tenure as a barrier to wider adoption of organic certification in the Midwest state of Indiana, where 50 % of farmland is rented. Addressing the lack of research on the relationship between tenant farmers and their non-operating landowners, we show how these relationships affect the adoption of conservation practices. Presenting findings from a survey and 30 in-depth interviews with conventional, transitioning, and organic farmers in Indiana, we show significant differences in land tenure arrangements for farmers certified and transitioning to organic compared to farmers only using conventional practices. We contextualize tenant-landlord relationship dynamics across the spectrum of practice adoption, illustrating how land tenure arrangements shape conservation management decision making. Our findings illustrate the barriers and opportunities to adoption of organic certification, given the variability in landowners' interest in organic certification. While conventional tenant farmers described long-term rental relationships characterized by a sense of trust, the high level of competition for access to rented farmland exerted pressure on them to conform to perceived norms about farming practices and avoid consideration of more risky and less socially acceptable or familiar conservation practices, for fear of losing their landlord's confidence and trust.

## 1. Introduction and background

The commodity grain production system in the U.S. Midwest depends on synthetic nitrogen fertilizers and pesticides, and nutrient runoff from this system is a significant source of greenhouse gas emissions, groundwater pollution, and a major contributor to hypoxic zones in Lake Erie and the Gulf of Mexico (David et al., 2010; Sebilio et al., 2013; Van Meter et al., 2018). Farmers using organic production practices can promote biological nitrogen fixation, better manage excess

nutrients, support biodiversity, enhance microbial communities in the soil, eliminate pesticide run-off and increase carbon sequestration by building organic matter in the soil (Gomiero et al., 2011; Gattinger et al., 2012; Skinner et al., 2014; Sacco et al., 2015; Reganold and Wachter, 2016; Khatri and Sharma, 2021), although organic production systems vary widely, resulting in variable environmental impacts (Tully & McAskill, 2020; Crystal-Ornelas et al., 2021). Organically grown crops perform better in both drought and excessive rain conditions (Scialabba and Müller-Lindenlauf, 2010; Lynch et al., 2011), which is increasingly

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important as crop farmers face more variable and extreme precipitation patterns brought on by climate change (Angel et al., 2018; Bowling et al., 2018).

Demand for certified organic grain has grown along with broader consumer demand for organic products, which has consistently grown between five and twelve percent since 2011 (Organic Trade Association, 2021). Organic grain production increased by twenty percent between 2008 and 2016, with the amount of U.S. farmland devoted to the production of organic corn, soybeans, wheat, oats, and barley growing from 626,000 acres to 765,000. However, organic production has not kept pace with market demand, and the inadequate supply of organic grain has been one of the greatest barriers to growth of the sector (Reaves et al., 2019). Consequently, the U.S. imports a significant portion of its certified organic grain to make up for the domestic production shortfall (Dimitri and Oberholtzer, 2009; Mercaris: <https://mercaris.com>). In addition to the substantial market demand, crop farmers who transition to certified organic grains report higher per-acre returns and enhanced economic stability (Uematsu and Mishra, 2012; Crowder and Reganold, 2015; Khanal et al., 2018; Han et al., 2021). In a 2016 study, researchers found that the average net margins for organic grains were 36 % points higher than conventional (Reaves et al., 2019), and an analysis of per bushel prices for food grade and feed grade organic soybeans in 2015 showed that the average was 28.98 USD and 23.79 USD respectively, while conventional soybeans averaged 9.19 USD in the same period (Hartman et al., 2016). Taken together, there is an opportunity for crop farmers to improve their profitability and market access and reduce the environmental impacts of commodity grain production through organic certification.

Despite the benefits, U.S. farmers are still reluctant to consider organic certification.

There are several interrelated barriers to wider adoption of certified organic grain production, including technical limitations and risks with managing higher weed and pest pressure during the transition years, higher labor requirements, financial constraints and lack of adequate incentives, and compatibility issues with existing farming systems (Constance and Choi, 2010; Sahn et al., 2013; Farmer et al., 2014). Farmers' education levels, commitment to environmental values, as well as farm size and market access also play important roles (Darnhofer et al., 2005; Cranfield et al., 2010; Lloyd and Stephenson, 2020; Han et al., 2021). Research on farmers' management decisions in general has identified a farmer's cultural identity in a farming community, farmers' relationships with family members, sources of information they rely on and their social networks and organizational ties as influencing their management decisions (Baumgart-Getz et al., 2012; Burton et al., 2020; Prokopy et al., 2019).

Another important barrier to transitioning to more sustainable agricultural systems in general (including organic certification and other conservation practices such as cover crops and no-till) that has received less attention until recently is land tenure. In the U.S., 46 % of cropland is owned by non-operating landowners, and over 50 % of farmland is rented in the Midwest state of Indiana, where this study was conducted (Ulrich-Schad et al., 2016; Petzelka et al., 2021). Land tenure arrangements in the US Midwest tend to be long-term and relationship-based. While 70 % of U.S. farm leases are one-year contracts, annual renewal is common and many parcels are rented to the same tenant for over three years (Bigelow et al., 2016). In a recent survey across five Midwestern states, researchers found that non-operating landowners held lease agreements with current renters for an average of seventeen years, and with some up to 67 years (Barnett et al., 2020). Despite the long-term nature of these relationships, there are a number of significant barriers to conservation adoption on rented land (Soule et al., 2000; Masuda et al., 2021; Ranjan et al., 2022).

Because of the substantial portion of rented farmland in the US, there has been an increased focus on land tenure and the role of non-operating landowners in the conservation research literature (Petzelka et al., 2012, 2013; Ranjan et al., 2019a,b; Barnett et al., 2020). Non-operating

landowners are an important stakeholder given how much farmland they control. Therefore the adoption of conservation practices will likely be limited without greater engagement with these landowners by extension, government agencies and other organizations such as nonprofit organizations and Soil & Water Conservation Districts leading efforts to encourage conservation practices (Soule et al., 2000; Petzelka and Armstrong, 2015; Bond et al., 2018). This emerging body of research is focused on non-operating landowners, to understand the motivations and other factors shaping their preferences for how their land is managed, and their interest and support for conservation programs (Carolan, 2005; Ulrich-Schad et al., 2016; Petzelka et al., 2012, 2021). These studies have found considerable variability in landowners' support for conservation and preferences for how their land is managed, and this can be related to landowners' farming experience, proximity to their land, gender, and relative income generated from the land (Petzelka et al., 2013, 2018; Ulrich-Schad et al., 2016; Barnett et al., 2020). Some studies found significant differences between non-operating landowners who live a greater distance from their land (Bond et al., 2018; Barnett et al., 2020), while others did not (Ulrich-Schad et al., 2016). Overall, one of the most important findings from the research on non-operating landowners is that they generally rely on their tenant farmers to make most management decisions on their land (Constance et al., 1996; Petzelka and Marquart-Pyatt, 2011; Petzelka et al., 2013, 2021). Tenant farmers are the main conduit of information about conservation practices and programs, and they are the ones who maintain contact with extension and local conservation agencies (Petzelka et al., 2012, 2013; Ulrich-Schad et al., 2016; Masuda et al., ). Just eighteen percent of non-operating landowners are involved in conservation management decisions on their land (Bigelow et al., 2016).

Despite the critical role played by tenant farmers on rented farmland, there is a lack of research on the relationship between non-operating landowners and their operators, and how these relationships may affect land conservation efforts (Constance et al., 1996; Carolan et al., 2004; Ranjan et al., 2019a,b). Earlier research found that tenant farmers may avoid discussing long-term conservation practices with their landlords for fear of threatening their tenure security, and that the competitive pressures on accessing rented farmland are a barrier to long-term conservation (Carolan et al., 2004; Constance et al., 1996). Researchers have called for more attention to the central role tenant operators play in conservation on land owned by non-operating landlords (Petzelka et al., 2013), more research on land tenure relationships in the context of conservation management and decision-making (Ranjan et al., 2019a,b; Masuda et al., 2021), and for research characterizing the landowner-renter relationship from the tenant farmer perspective (Barnett et al., 2020).

In this paper, we provide an in-depth understanding of how land tenure shapes farmers' management decisions and their consideration of certified organic grain production. We present findings from our survey of conventional, transitioning, and certified organic grain farmers in Indiana, including the rate of ownership compared to leasing land, the average number of landlords farmers work with, and typical lease agreements, focusing on the differences between the conventional versus transitioning and organic farmers in terms of land tenure and their relationships with the landowners they lease land from. We present an analysis of the survey data to contextualize the qualitative data analysis that is the focus of this paper. We draw on in-depth interviews to explore farmers' experiences with their land tenure arrangements, describing farmers' relationships with their landlords and how those relationships impact their land management decisions. Their experiences provide insights into how land tenure arrangements shape farmers' ability to transition to certified organic grain production systems in Indiana.

## 2. Methods and materials

The analysis in this paper is part of a larger research and extension

project that was designed to facilitate Indiana farmers' access to the organic grain market and inform education and outreach programs to support farmers considering or in the process of obtaining organic certification. The study was conducted by an interdisciplinary team of researchers and extension educators, and each phase of the project was developed in consultation with a farmer advisory board that included conventional, transitioning, and certified organic farmers, as well as representatives from the two prominent organic certifying organizations operating in Indiana. The mixed methods study included a survey of Indiana grain farmers and follow up interviews with a subset of those farmers, to identify the most important barriers and facilitators to organic certification.

### 2.1. Study site

Indiana is a Corn Belt state in the midwestern U.S., ranking fifth in the country for both corn and soybean production. In terms of organic certification, Indiana has increased its production of certified organic field crops but still has the lowest level of organic field crop production in the Midwest. Indiana farmers produced approximately 35,565 acres of certified organic grain and forage crops in 2019 (US Census of Agriculture, 2019). The Indiana farmers included in our study produce grain crops, including corn, soybean, wheat, rye, triticale, oats, and hay.

### 2.2. Data collection and analysis

The findings presented here come from the survey of Indiana grain farmers and 30 phone interviews with a subset of the farmers that responded to the survey. The interdisciplinary research team developed the survey and interview protocols in conversation with the extension educators and the farmer advisory board, along with a review of the research literature. The survey is included as Appendix A, and included farm level and farm operator questions, and Likert scale questions to understand motives, values, barriers, and facilitators associated with transitioning to organic systems, and demographic questions.

The research team used a strategic, convenience sampling strategy to solicit responses from farmers across the spectrum of interest and experience with organic grain production. There is no database containing contact information for such a range of farmers, especially for those transitioning to organic, for which no public records exist. We employed special strategies to reach particular types of farmers, as explained below (Avemegah et al., 2021). To solicit responses to the survey from conventional farmers that had no interest in organic certification, the team distributed the survey at the 2017 Indiana Farm Bureau's annual meeting in December. To increase our participation rate for conventional farmers, the team also collaborated with Purdue University Cooperative Extension Services to distribute the survey at pesticide applicator training sessions around the state. To reach farmers in the process of transitioning to organic certification, the team collaborated with the two most widely used organic certifying organizations in Indiana, the Ohio Ecological Food and Farm Association (OEFFA) and Eco-Cert. The certifying organizations shared information about the study and a link to the survey in Qualtrics with their private list of farmers in the process of transitioning to organic grain production, suggesting they consider participating. The team distributed the survey to farmers who already farm certified organic acreage by sending a paper survey to all Indiana grain farmers listed in the USDA Organic Integrity Database (<https://organic.ams.usda.gov/integrity/>). A \$5 cash incentive was used across all groups.

We recognize that mixing survey modes in this way (web and paper, with some paper administered via mail and some in person in a group setting) may not be ideal because different modes are associated with different kinds of survey error (de Leeuw, 2018; Tourangeau, 2017). However, this approach was necessitated by our various sampling strategies. For example, many of the conventional farmers we met at the public, in person events were not comfortable with taking the survey

electronically, so we shifted to paper copies. In addition, we could not obtain mailing addresses from those in transition to organic in order to maintain confidentiality between clients and certification institutions.

The team used Qualtrics to create a separate, structured form for entering paper survey data in an effort to minimize data entry errors and then double checked, cleaned and organized the data for analysis in SPSS 25. We had a total of 383 survey responses that were deemed usable for analysis. First, we present general demographic characteristics, including descriptive statistics and bivariate analyses (Mann-Whitney and chi-squared tests) comparing conventional with organic and transitioning farmers. The bivariate analyses compare differences between the two farmer groups in terms of the number of acres they farm, the number of acres owned and leased, the length of their lease agreements, number of landlords they work with, and the ratio of owned to leased land.

We conducted 30 semi-structured interviews with a subset of the farmers that participated in the survey and indicated that they were willing to participate in follow up interviews. One third of the farmers selected for the interviews were conventional-only farmers, another third were farmers in the process of transitioning some or all their land to organic, and the remaining third were certified organic farmers. The interviews were conducted by the lead author by phone and lasted for 30–60 min, and all participants were offered a \$50 gift card as an incentive for their participation. The interviews were transcribed verbatim and coded and analyzed using NVivo qualitative analysis software (<https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>). The coding scheme was developed by the lead author following an initial read to identify general themes and drawing from the interview guide. The codebook was further developed with a second reading and initial coding for important themes and topics, refining the initial coding categories into general categories and subcategories, based on emerging themes (Creswell and Poth, 2016; Huberman and Miles, 2002). A second individual completed the qualitative data coding, following the codebook developed by the lead author. The codebook was further developed and refined as new themes were identified through the coding process and discussions between the two individuals coding the data. The analysis of the interview data was focused on understanding how land tenure arrangements and farmers' relationships with their landlords shaped their management decisions. Because most of the farmers who participated in our study farmed land that they owned as well as land that they leased, we use the general term farmer rather than tenant farmer or owner-operator in our analysis and discuss the implications of our study for those terms in the discussion.

## 3. Results

In this section we first present survey data and then the interview data, describing the terms of farmers' lease agreements, relationships with landlords, obstacles, and opportunities for transitioning to organic, and landlords' acceptance of organic certification.

### 3.1. Relationships between land tenure arrangements and farm type

We analyzed our survey data by comparing farmers that only farm conventionally to a group of farmers that are either transitioning to organic on some or all of the acres they manage or are certified organic on some or all of the acres they manage. In Table 1 below, we present demographic differences between the two groups of farmers, showing differences between the two groups in terms of educational attainment, household size, and attendance at organized religious services. These differences reflect the fact that a high percentage of our respondents who are completely certified organic are Amish, while the conventional farmers in the process of transitioning include non-Amish farmers.

The survey data provides a picture of the significant differences in the scale of farmland managed by each group, as well as significant differences in the land ownership and tenure arrangements between

**Table 1**  
Demographics.

	Conventional only		Not conventional only		Chi-square P-value
	(n = 95)		n = (288)		
	N	Column %	N	Column %	
Gender					< 0.01
Male	83	91.21	281	97.91	
Female	8	8.79	6	2.09	
Education					< 0.001
Less than high school diploma/High school diploma/GED	21	22.34	256	90.46	
Some college/2-year/Technical degree	33	35.11	8	2.83	
4-year college degree/Graduate degree (MS, MD, PhD, etc.)	40	42.55	19	6.71	
Age Range					< 0.001
Under 35 years	6	7.50	45	16.01	
35–44 years	13	16.25	111	39.50	
45–54 years	16	20.00	74	26.33	
55–64 years	23	28.75	35	12.46	
65 years and over	22	27.50	16	5.69	
Number of people in your Household					< 0.001
1–5 people	85	91.40	107	37.81	
6–10 people	8	8.60	149	52.65	
10 +	0	0.00	27	9.54	
Retire/quit from farming in the next 5 years					0.496
Yes	12	13.04	29	10.47	
No	80	86.96	248	89.53	
How often you attend organized religious services					< 0.001
Never/1–2 times a year/Once a month or less	20	21.28	14	4.98	
2–3 times a month/At least every week	74	78.72	267	95.02	

\*P-values are reported from Chi-square test where sample sizes are at least five in every cell, and Fisher's exact test is used where cell sizes are less than five.

conventional farmers and farmers that are transitioning to organic or certified organic. As illustrated in [Table 2](#), conventional-only farmers generally operate medium and large farms, with a median of 850 total acres, whereas the transitioning and organic farmers operate much smaller farms, with a median of 88 total acres farmed ([Table 2](#)). The majority (73.42 %) of conventional-only farmers have short-term lease agreements of between one and three years, in comparison to organic and transitioning farmers, where almost half (49.04 %) have lease agreements spanning four to eight years and beyond ([Table 2](#)).

The farmers also differ significantly in their land tenure arrangements, with conventional-only farmers leasing or renting more of the land they manage (450 median acres leased), compared to organic and transitioning farmers that lease a median of 5 acres ([Table 3](#)). Relatedly, organic and transitioning farmers own a higher ratio of the land they farm (0.92 of total acres farmed are owned, compared to .43 for conventional-only farmers) ([Table 3](#)). Because of the prevalence of rented farmland in the U.S. Corn Belt states, conventional farmers typically work with several landlords to farm enough acres to stay in business. Conventional-only farmers that responded to our survey reported working with a median of four landlords, compared to a median of just one landlord for the organic and transitioning group ([Table 3](#)). It was not uncommon for conventional farmers to report working with more than ten landlords, in cases where property was passed to multiple heirs.

The significant differences we found between conventional-only farmers and the combined group of farmers who were transitioning to

**Table 2**  
Farming Approach, size, scale, and land use agreements.

	Conventional only		Not conventional only		Chi-square P-value
	(n = 95)		n = (288)		
	N	Column %	N	Column %	
Farm Size (Total Acres)					< 0.001
Small ( $\leq 100$ Acres)	11	11.58	177	61.89	
Median (101–1000 Acres)	42	44.21	101	35.31	
Large (1000 + Acres)	42	44.21	8	2.80	
Percentage of income from farming in 2017					0.338
< 50 %	25	28.41	64	23.27	
50 %– 99 %	44	50.00	131	47.64	
100%	19	21.59	80	29.09	
Gross revenue from farming operation in 2017					< 0.001
Less than \$50,000	17	19.32	72	25.35	
\$50,000–\$349,999	32	36.36	194	68.31	
\$350,000–\$999,999	17	19.32	10	3.52	
\$1,000,000 +	22	25.00	8	2.82	
Land Use Agreement					< 0.001
1 year	22	27.85	46	29.30	
2–3 years	36	45.57	34	21.66	
4–7 years	8	10.13	38	24.20	
8 + years	13	16.46	39	24.84	
Off Farm Job					0.330
No	32	34.41	115	40.07	
Yes	61	65.59	172	59.93	

\* P-values are reported from Chi-square test where sample sizes are at least five in every cell, and Fisher's exact test is used where cell sizes are less than five.

organic and certified organic illustrate distinct systems of farming. Conventional farmers have scaled up their operations to farm more land, relying on short-term rental agreements with multiple landlords. The survey data shows that both conventional farmers transitioning to organic and farmers that are certified organic secure longer lease agreements on farmland that they rent. Our survey data suggests that conventional farmers are operating in a context defined by a short-term orientation with less secure land tenure, while organic and transitioning farmers are operating in a context of greater tenure security and a longer-term orientation. Our cooperative partners and the interviews also confirm some of these findings: the farmers who had certified all their land organic were mostly Amish farmers who have much smaller farms and are much more likely to own most of the acres they farm. In the next section, we present our analysis of qualitative data to provide context and greater depth of understanding how these land tenure arrangements shape farm management decisions. We focus on the decision to transition to organic certification, which is a longer-term investment in soil and water conservation compared to other conservation practices, because of the three-year transition period required for organic certification.

### 3.2. Terms of typical lease agreements and relationships with landlords

It was common for a farmer to have a combination of different types of land tenure arrangements for the land they farmed, including cash rent, crop share agreements, and custom farming arrangements.<sup>5</sup> Based on our interviews, custom farming arrangements were uncommon and

<sup>5</sup> Custom farming arrangements are when farmers are hired to perform specific agricultural management services such as machine operations in exchange for a set fee, so a landowner does not have to invest in certain machinery or perform all management tasks, but the landowner pays for all seed, chemicals, and other inputs, and keeps all the crop and commodity payments (Iowa State University Extension, n.d.).



**Table 3**  
Farmer reported acreage owned and leased, and number of landlords.

	Conventional Only		Some Organic/Transition		Mann Whitney Test		
	Median	SE	Median	SE	Diff	Z	p-value
Total Acres	850	117.58	88	27	762.00	10.76	<0.01
Acres Owned	220	52.1	72	10.5	148.00	7.57	<0.01
Acres Leased	450	94.15	5	20.06	445.00	9.16	<0.01
Landlord	4	1.28	1	0.8	3.00	7.73	<0.01
Ratio of Leased/total acres farmed	0.58	0.04	0.08	0.02	0.50	6.93	<0.01
Ratio of Owned/total acres farmed	0.43	0.04	0.92	0.02	-0.49	-6.83	<0.01

cash rent and crop share arrangements were the norm, which is consistent with a recent survey in which Indiana non-operating landowners reported 49 % crop share and 46 % cash rent lease agreements (Petrzelka et al., 2021). In a typical scenario described in our interviews, a farmer might have lease agreements that are cash rent on some parcels and a crop share arrangement on another parcel of land that they farm, all on one-year leases. The farmers we interviewed explained that they typically lease land from multiple landowners who all have different situations and preferences themselves. This is consistent with our survey findings that the conventional farmers rent more than half the land they farm and work with a median of four landlords. While the combined group of organic and transitioning farmers relied much less on rented land, many of them, particularly the conventional farmers who are transitioning some of their acreage to organic, worked with at least one landowner. In sum, the conventional farmers and to a much lesser extent the organic and transitioning farmers operated with a combination of different land tenure arrangements and relationships with landowners that varied from one landlord to the next.

The farmers we interviewed emphasized having long-term relationships with the landowners they leased from, that were often family-based. A farmer described a typical arrangement: “Yeah, the majority of our landlords are either family or people that we’ve rented for, you know, probably 20 + years”. He described an informal understanding with a formal year-to-year lease. Another farmer described their long-lasting relationship with their landlords:

On the ground we farm on shares, that was a family that I’ve rented from since ’71 and she was raised here, they moved to [large city]. It’s just always been whatever I thought should be done, that’s what they do. And now they’re off – their kids have it in a trust and they just rely on me to tell them what needs to be done and I do it. (Conventional farmer).

As these quotes illustrate, farmers emphasized long-term relationships and a common scenario of farming for the heirs that inherit land passed down from the landlord they first worked with. In many of these cases, particularly when the heirs did not have farming experience or live in the area, farmers described their landlords relying on them for land management decisions.

While short-term leases may introduce competition and create a short-term orientation, the farmers we interviewed indicated that short-term leases do not necessarily equate to a short-term relationship. A farmer describes how annual lease renewals are perceived as more of a formality in what is understood to be a long-term relationship:

We’ve developed relationships with those people over time, so it’s almost like it’s not – like it’s a long-term relationship. I don’t know, but if it were longer-term, it might actually make things worse. When it’s an annual renewal, that’s just kind of makes it more of a handshake-type relationship and that’s probably the way I’d rather do business (Conventional farmer).

As noted above, while they may technically have a year-to-year lease, those lease agreements are often informal and handled with a handshake agreement, and there was a shared understanding of a long-term arrangement. For instance, another farmer says: “No, with the people we deal with, I’m okay on the year to year because it’s just all like

dealing with family and friends. I can see the merit of long-term and if I were to rent additional ground, new ground now, I probably would try to do that” (conventional farmer). Another farmer explains how the short-term, annual lease agreements are understood as a long-term relationship:

I’ve been leasing this land since ’95, and I’m not seeing any changes in the near future. We never really sat down and said, “Now, we’re gonna have a contract for five years.” Every year, we just pay the rent and whatever. Most times once a year, or even sometimes we just skip one year and pay two years in one year or something like that. But yeah, basically every year (conventional and organic farmer).

While they typically check in on an annual basis, these relationship-based lease agreements are characterized by a shared understanding of a long-term relationship that may last 20 years or more. Thus, farmers emphasized that the arrangement could change at any time, but generally does not. Many noted that they were comfortable with a one-year lease because they had longstanding relationships with the landowner, who in many cases were family members, family friends, or families who they had been working with for decades.

In contrast, the organic farmers we interviewed more often described longer-term lease agreements. When asked about the length of their lease agreements, a farmer described:

Some of them are kind of year to year. I’d say probably pretty much what I’ve got organic is long-term, five years at least. The rest of them [conventional acres] are probably – they’re either year to year or just kind of a handshake agreement, you keep doing it and I mean there’s no real security for them or me, but you know I’ve been farming some of this ground for long-term (Conventional and organic farmer).

Many farmers said they wouldn’t transition without a formal longer-term lease, but some farmers said they would consider transitioning rented land on a short-term or informal lease agreement if there was a longstanding relationship behind it. For example:

Some of them [leases] have been in place for about 10 years. We’ve been certified organic for five years. As far as – we have no written leases. So, I suppose it’s very possible that any of these could be terminated at any time. But we feel like we have a pretty good relationship with each of these landlords. And it’s probably not going to be jumped suddenly and without communication (organic farmer).

In this case the farmer was comfortable with certifying the land organic without formalized, written leases because of the long-term relationship they had with the landlord. They described farming the land on a lease arrangement that is technically short-term, but because it has not been formalized with a written lease, it is in practice a long-term arrangement, albeit with no formal security and dependent on their relationship with the landowner.

Both conventional and organic farmers described a range of engagement in management by their landlords. Some landlords are actively involved in making management decisions about the land, some landowners were generally supportive and engaged but deferred to the farmers managing their land for management decisions, and others just want their rent checks and to leave the farming entirely to their farmers. For example, one farmer explained:

It really depends on the relationship with the landlord. Also, that relationship is a little bit different when you’re dealing with landlords

who have farmed and when they live close or if you're dealing with landlords who are maybe the children of the farmers who live hours away (conventional farmer).

The variability in arrangements between landlords and farmers was relationship based: some farmers and landlords had longstanding relationships built on trust, while others were more short-term and utilitarian. The formality of the lease agreement wasn't necessarily a deciding factor in the nature of the arrangement; farmers emphasized that the existence of a long-term relationship and level of trust was more important. Thus, while crop share and cash rent lease agreements were the norm, they ranged from informal arrangements based on long-term relationships that were understood as semi-permanent until there was a change in circumstances, informal handshake agreements that were made on an annual basis, to more formal, written agreements that were renewed each year, or multi-year lease agreements that were more common for organic farmers.

The variability of landlord-farmer relationships was experienced as a complex mix of arrangements that farmers needed to manage, reflecting a spectrum of relationships with landowners ranging from landlords who were actively engaged and desired extensive involvement with the decision-making about how their land was farmed, to landlords that didn't care how the land was farmed, as long as they received their checks on time. As an example of this variability in landlord-renter relationships at the individual level, a farmer explains how they manage three different land tenure arrangements and relationships. They farm for a neighbor with an informal agreement where they discuss how they will manage the land on a yearly basis, while another neighbor wants their land farmed organically and they engage much more actively with how they want their land farmed. A third landowner was described as someone who "doesn't care. I'm just cash renting that. He just wants me to farm it, although he doesn't want livestock on it" (organic farmer).

In addition to working with multiple landlords and land tenure arrangements and relationships, farmers often managed rented land jointly with family members. For instance, when we asked farmers about who made farm management decisions, a common response was: "I'm financially tied with my brother. He farms part time with me, and then my uncle and I have operations together. We're separate financially but operationally farm together (Conventional farmer). This quote illustrates an additional layer of complexity that shaped farmers' management decisions, as they managed a combination of different land tenure arrangements and relationships as well as farm management relationships with family members.

### 3.3. Obstacles to transitioning to organic production on rented farmland

#### 3.3.1. Insecure tenure on rented farmland

Despite the confidence of most farmers that we interviewed about the long-term nature of their relationships with their landlords, when we asked them if they would consider transitioning to organic certification on rented land, most of the conventional and transitioning farmers said they would only consider it on land they owned, or land owned by a family member. The interviews revealed a tension between the long-term relationships they described, and their reluctance to consider long-term investments on the land when they didn't know that they would be farming it in the future. For instance, this farmer explained why they would not consider organic certification on a cash rented parcel of land:

Absolutely not for two reasons. The one reason is a lot of our landlords were farmers themselves before they rented out their land, and they kind of have this expectation of us stewarding the land. Two, most of our cash-rent leases are one-year leases so you're gonna take a risk of getting this land certified and then there're some opportunity cost there of being land certified and maybe not being able to capture that once that certification timeframe has been completed. I think those are probably the two biggest reasons, and then also the risk of if I have an absolute disaster, I prefer it be on my own ground than on a landlord's

ground where I have to call them and explain what happened. You know? (Conventional farmer).

This farmer refers to an important aspect of the landlord-farmer relationship in Indiana, referring to the fact that many of the landowners that farmers rent from were farmers themselves before they rented their land to another farmer. As a result, many landowners have strong views about how their land should be managed and may be less open to new or different ways of farming. Generally, farmers said they would only consider transitioning on their own land first, and cautiously consider broaching the subject with their landlord if they were successful on their own land. However, others were emphatic that they would never take the risk of even raising the subject with their landlords. They noted that it depended on their landlords and the relationships they had with their landlords, as well as their own comfort with the risk.

Conventional tenant farmers' reluctance to consider long-term investments like organic certification on rented land reflected uncertainty about land tenure as well as a lack of widespread acceptance and confidence in organic production systems in Indiana. For example, a farmer who is actively transitioning land owned by a family member explains why they would not consider transitioning to organic on the rented land they manage that's not owned by family:

Right now I'm not actually transitioning on – it's kind of confusing. I'm transitioning on grounds that my dad owns that I'm renting from him. The grounds that I'm renting from other people, I didn't want to transition because maybe they might want to sell it or something like that. And there again, I don't think they understand – they don't understand organic, you know the philosophy and everything like that. (farmer transitioning to organic).

When the interviewer asked what would make it possible for them to consider transitioning to organic on rented land they explained:

I would be willing to transition on rented ground. I think I've heard others say you need at least a six or seven-year lease, if not more. And I think that is very smart. Otherwise, you know the one landlord that I have is very business oriented. So, trying to talk to her about transitioning, I'm not sure if she fully would understand. You know maybe even – I don't know, maybe that's where I could make a business plan, I guess, and help her understand, but that's all things that might come in the future (farmer transitioning to organic).

Overall, farmers' confidence in the longevity of their relationships with their landlords did not negate the barriers to making long-term investments on rented land, given the lack of secure tenure as well as the lack of openness and confidence in organic systems and financial and competitive pressures discussed in section 3.4.3.

#### 3.3.2. Farmers' perceptions of their landlords' acceptance of organic certification

Landlords' interest in and support of conservation farming practices in general, and organic certification specifically, varied greatly, depending on the individual's level of engagement with how their land was farmed, their farming experience and knowledge, as well as their financial circumstances and interests, among other factors. Our interviewees described a wide range of perspectives and relative interest in organic management from their landlords. For instance:

Also, that relationship is a little bit different when you're dealing with landlords who have farmed and when they live close or if you're dealing with landlords who are maybe the children of the farmers who live hours away. It's interesting because sometimes the second-generation cares more about stewardship and the cover crop kind of thing. From an ideological standpoint they care about it more. Sometimes they don't care about it at all, and they just care about getting the check at the end of the year. (conventional farmer).

Overall, the conventional farmers we interviewed described their landowners as an obstacle to considering organic certification. They found it hard to ask about making long-term investments in the soil because their landlords were nearing retirement and more concerned about their financial circumstances than the long-term condition of their

land, while others just wanted the money and didn't care how the land was managed. A conventional farmer explains:

It's tough dealing with 30 people, whether they're your landlords or your relatives. But landlords vary. I have landlords that are over 90 years old and who I don't know what's going to happen to their land when they die and if I will have the opportunity to farm it when their heirs take the land. Most of my landlords are over 60 and over half would probably be over 70, so that's tough to have conversations about long term land management practices and how it will benefit their soil.

And especially cost sharing when we talk about cover crops and spending an extra \$40 an acre and not seeing benefits from that investment for three years, and farming ground on a year-to-year lease, the landlords don't want to contribute for the most part. They don't want to reduce your rent to help cover the cost, but they also don't want to sign a three- or four-year lease. If they are going to sign a four-year lease, they want some sort of a flex rent agreement that helps offset if economics of farming improve. (conventional farmer).

The conventional farmers explained that the landlords want them to assume all the risk of investing in conservation practices. Put simply, the challenge with rented land is the financial interest and expectations of consistent revenue from rented land. An organic farmer explains:

If it's been chemically farmed and mined for several years, you have the definite challenge of building the soil to a living organism that is somewhat self-sustaining. And those are definitely lean years. And then you have the financial side, for the landowner to consider as well. I would say that most of them, especially absentee landlords may not appreciate, may not care so much about their soils as much as they maybe feel the need for an income off of that investment or off of that inheritance, whatever it may be. So, that would be a challenge that you'd have to work with there (organic farmer).

Another obstacle to landlords' openness to organic production systems was the general lack of confidence in, widespread use of, and success with organic production systems in the state, accentuating farmers' lack of confidence and consideration of discussing organic certification as an option with their landlords. This conventional farmer describes the lack of successful models of organic production systems contributing to the barrier for farmers managing rented farmland:

There are just not a lot of people that have done it in this area that have had success. The ones that have, have lost ground because they did a poor job with it. I mean, yes, if you're doing a farming practice that they don't agree with, you know you might lose the ground. I mean I know how people can be funny...if they [landlords] drive by and see a bunch of weeds in their field, they're gonna get mad and want to look for a better farmer, I think (conventional farmer).

### 3.3.3. Competition for farmland

While the conventional farmers we interviewed described a long-term orientation in their relationships with their landlords, even if they didn't have long-term lease agreements on the land, when we asked about competitive pressures for renting land a different picture emerged. The conventional farmers described a highly competitive environment for access to farmland that shaped their management decisions in important ways. When describing the competition for farmland, one farmer described how "there are some big corporations that are moving in who they'll buy up most any farm that comes up for sale. There are just some pretty big farmers in our area, so the ground is very competitive in our area" (conventional farmer). Another conventional farmer explained:

Yeah. It's very competitive. Not a lot of land comes up for rent. Farmers are farming their own land longer than they ever used to and usually when ground comes up for rent, I would say about 50 % of the time it goes privately to somebody who is related, or a good friend, or a neighbor and the other 50% of the time when there may be a number of farmers who have an opportunity to rent it, it is pretty competitive to pick up that land. You've got to be pretty aggressive.

For context, other farmers described scenarios where they heard

farmers negotiating lease arrangements at funerals, or instances where family cemeteries had been planted over with corn and soybeans. When asked about competition for farmland they described how it intensified during the period when grain prices spiked:

[there was a lot less competition for land before] corn was \$7 a bushel. In 2013 we had farmers that came from 50 miles away and offered high cash rents and took ground away from local farmers. And in the four years after that, we've seen less and less pressure from people going out of their way to come farm and raise rents. But rents haven't been reduced significantly. Maybe 10 % from the high (conventional farmer).

This farmer explains how the volatility in the commodity grain markets heightened competitive pressures for farmland, with outsiders coming in and outcompeting local farmers. They also point out that even when commodity prices declined, the rental rates did not come down at the same level that grain prices did, putting economic pressure on their farm business.

We asked how the competition for farmland shapes farmers' management decisions, particularly regarding their consideration of conservation practices and organic certification. This farmer said that it does, and explains further:

I'm to a point where I feel comfortable with the ground that I rent. I feel like I don't have to worry about losing it. The folks that really don't care how I take care of the soil, I've already lost that ground. I don't have it, so I don't have to worry about it anymore (conventional farmer).

They note that they have lost some lease agreements because they were implementing conservation practices and the landlords were not supportive and ended their lease arrangement. Another farmer described how the competition shapes their management decisions, explaining:

There's always the tug-of-war between making the best long-term management decisions like keeping the fertility of your land high and not just mining all the nutrients out of it. Planting cover crops is something that is one year at a time, but you're hoping for a long-term benefit. You're conserving the soil hopefully for years to come and also, I don't think I'm gonna lose this contract next year, but I could. There's kind of always that competition with how you approach rented land if that makes any sense (conventional farmer).

This farmer explains that they experience an underlying pressure to conform to their landlord's preferences and expectations, knowing they could lose access to the land if the landlord isn't happy.

When asked about how the competition for farmland affects their relationships with their landlords, the farmers emphasized the ways that they invest in maintaining positive relationships and identifying their landlords' preferences and expectations to maintain their lease agreements. This farmer explains the importance of maintaining a relationship by having conversations with them about their management of the land:

And sometimes that's tough. A lot of guys, they don't want to bring it [transitioning to organic] up because they don't want to give their landlord any reason to kind of second guess what they're doing or maybe give them an option. You know because I mean we all kind of know landlords probably get a phone call every year from somebody else, at least, or a visit. You know? And so you kinda gotta be political when you deal with the landlords and you kinda gotta - I guess you gotta nurture their wants and desires and wishes and needs (conventional and organic farmer).

They explain that "we all kind of know" that most landlords they work with receive offers from other farmers attempting to replace them each year. They go on to explain how they know farmers that have lost their lease agreements just because they didn't maintain a social relationship with their aging landlords:

And I've known guys that have lost ground just simply for the fact that when they were at the farm, they didn't just come over to the house and say hi to the landlord. And it's kind of like I understand too, when you pull into the field, you're there to get it done. You know you want to

get across it, get the acre planted, and some of these landlords are getting older and they just want someone to come visit them and that takes time and those type of things. And the younger generation doesn't necessarily understand. They just kind of look at the dollar figure and – you know so there's insecurity there (conventional and organic farmer).

So, I think first you gotta kind of have the conversation with the landlord and see if they're on board. And I mean if you picked up the farm because the last guy had weeds, probably not a good farm to broach the subject on, transitioning to organic on them (conventional and organic farmer).

In addition to the pressure to conform to the landlord's expectations for land management and social interactions, another major aspect to the competitive pressures farmers experience is the appearance of the crops and landscape of the parcels they manage. A conventional farmer explains this phenomenon: "That is a huge barrier for a lot of guys is just the image and the landlord's image. You know they've kind of got peer pressure too from their coffee shop group or whatever." We asked directly about the appearance of crops as a potential barrier to transitioning to organic systems and all the farmers we interviewed described the same pattern, with strong norms about the appearance of the crops, fencerows and ditches they managed being very important measures of their success, and obstacles to considering organic production systems that might have more weed pressure.

And you know other farmers prey on that. It's no secret. A farmer sees a bad crop out there or late getting put in, late getting taken out, you know the guys will go around and prey on those landlords and kind of put questions in their mind of how good their tenant really is. And for a lot of guys, the ground they're farming is the only thing they have for income ...and I think having communication with your landlord is big. Letting them know what you're doing, kind of why you're doing it. And that's part of it. You know if your landlord is not on board with it, I wouldn't even transition because they don't understand. You know the next guy coming down the road will give them \$20 more an acre and they're gonna yank it from ya (conventional and organic farmer).

In addition to the competitive pressures to maintain rented land in a way that conforms to community norms, the farmers that were transitioning some land to organic described how the competition for farmland also created unfair economic pressures if they were able to successfully overcome other barriers to transitioning to organic production systems. Given that most conventional farmers rely on at least some rented land, they face the economic reality of paying high rent costs during the three-year transition period required for organic certification, adding considerable economic strain to a business with tight margins. One farmer explains: "the barrier is I'm going to be paying high cash rent for two years or three years of mostly lost production". On top of the pressure to pay high rent costs during the three-year period while farmers transitioning to organic systems are assuming all the risks of transitioning but not yet receiving the price premium, some face further economic pressure if they do achieve certification. A farmer that transitioned rented land explains:

And but you also don't want the landlord that, I mean I guess he's kind of the same guy, but he wants organic and then once you get it there, he's like, oh, I'm gonna jack your rent up \$80 an acre now. And I've had that. I mean I had a guy do that this – we're still talking, but I basically told him, you know what, you can have it for that, if that's what you're gonna do (conventional and organic farmer).

This landlord wanted the land managed organically but then increased the rent based on the organic premium earned by the tenant farmer: "You know he's saying like, well, you're making more money, I want more of it too" (conventional and organic farmer).

In contrast, an organic farmer described a different scenario once they transitioned to organic systems that helped them avoid the competitive pressures dominating the conventional leased farmland context:

We moved that direction, and I would say that we have been pleasantly surprised in making that transition [to organic]. And the biggest,

or one of the big advantages of the organic sustainable community is the lack of competition amongst the operators. The commercial commodity atmosphere is very competitive. You know, if the neighbors can reach around behind your back and jerk a farm away from you, they will gladly do it. The organic sustainable community is much more willing to help each other out and work together for the common good, for the building of the soils, to leave what we operate in a better condition than when we found it. And the pieces of property are small enough that our large operation neighbors are probably not overly interested in them. But then they have been very willing to transition to organic (organic farmer).

This organic farmer described less competitive and more cooperative norms among organic farmers and noted that because they are able to make it farming small parcels with the organic premium, they face less competitive pressure on the land that they lease.

#### 3.4. Opportunities for transitioning to organic production on rented land

In contrast to the conventional farmers, the organic farmers we interviewed described a range of experiences with their landlords, ranging from tolerance of organic based on interest in earning higher rent from their farmers to landlords who actively sought out someone that could manage their land organically. An organic farmer describes the open but neutral position of their landlord:

I would say that at least a couple of [my landlords] would prefer it that way now that they have seen what organic does and what conventional doesn't do. The one probably really doesn't care too much how it's managed. But as long as we're meeting the agreements with him, he's okay for us to farm it as we see fit. I'd like to transition more, but until I have more secure land agreements, I guess, I'm not – you know I'm not gonna go ahead and put in the time and the effort and the loss, frankly – to get it to where it needs to be. You know and I think there's some landlords on board with the organic system and there's interest there...(organic farmer).

The farmer went on to describe how he purchased some farmland that was already eligible for organic certification because of how it had been farmed previously, and how by word of mouth, people contacted him seeking out someone to manage their land organically (conventional and organic farmer).

Organic farmers described other landowners who are not farmers but more open to organic production systems and are very willing to have their properties transitioned to organic systems. Some farmers described how their landlords are partial to the way they farm organically and explain that some of the land they farm was already certified when they purchased it and the owners preferred that they continue farming organically. The landlord approached this farmer looking for someone to manage the land organically:

"The one said that I can have it, as far as he knows, as long as I want it, as long as I keep it organic. He said he don't have any intentions of farming it. It's just if he decides to sell it to one of his kids or whatever. He just wants it to stay organic." (organic farmer).

The transitioning and organic farmers we interviewed indicated a growing trend of landowners seeking out farmers who can manage their land organically.

A related and important aspect of this trend of greater interest by landowners recruiting farmers who can manage their land organically was the need for farmers with the capacity and equipment to manage larger parcels. The conventional farmers we interviewed who are transitioning to organic production systems described being recruited and sought out because they are mechanized and have the capacity to manage larger parcels of land organically. For example, a conventional farmer who was not Amish describes being sought out by landowners because they are able to manage certified organic systems at a larger scale than most organic farmers in their area:

I think that's the main reason they chose me to farm their farm. I'm one of the, there's a lot of Amish in that area that are organic and they



have a one-bottom plow and five-acre farm fields. But to get somebody with technology and larger size equipment that covers more ground, it's kind of a limited market. So, they actually seeked me out rather than, I didn't have to go knocking on doors, they just found me (transitioning and organic farmer).

These farmers are in high demand by landlords who are actively seeking out farmers that can manage their larger parcels of land with certified organic systems.

I really didn't seek out very many of them [opportunities for land] at all. I think I started out seeking out maybe three or four, five in the beginning and from there on it just went by word of mouth from there on. So I keep – I turn down properties every year. I just don't want to take on more properties... (organic farmer).

Because their landlords were generally open or supportive of organic production systems, the organic farmers we interviewed were not concerned about secure lease agreements and relied on long-term relationships and trust as they invested in organic certification.

In addition to the conventional, non-Amish farmers, Amish farmers also reported having an easy time finding rental agreements to manage land organically, but for different reasons. While conventional, non-Amish farmers were in demand for their capacity to manage land organically at a mechanized scale, Amish farmers who typically rented land from members of their community did not experience barriers to renting land for organic production because organic productive systems have become widely accepted in their communities. For instance, an Amish, organic farmer explained that they don't have any written agreements on any of the land they farm. The people who they farm for want it to be farmed organically, so they don't need to worry about not having a long-term lease. They described:

If we would rent some land now that wasn't organic, they would have to let us have it for at least six or seven years, like if we transitioned it. We're not gonna do that and then lose it right away, but we haven't had that problem yet because they wanted it farmed organic, so we never had any trouble with that (organic farmer).

Others wanted the assurance of a long-term agreement, even if it wasn't formalized with a lease, and the organic farmers generally held long-term land tenure agreements. A farmer explains:

When I started to farm my neighbors, he – we talked over it and I asked him, I'd like to have at least five years. You know if I'm gonna change it to organic, I'd like to at least have it five years (organic farmer).

Because organic production has become widespread and socially accepted in the Amish community, these longer-term rental arrangements were less of a hurdle for the Amish farmers, who made up most of our respondents that were completely organic. In sum, the transitioning and organic farmers we interviewed described increasing openness to organic management alongside a willingness to offer long-term lease agreements to facilitate the adoption of long-term conservation and organic production systems on their land.

#### 4. Discussion and conclusion

In this paper we addressed the call for more mixed methods research to understand the interconnections between factors that motivate and constrain the adoption of conservation practices on rented farmland (Ranjan et al., 2019b) with a focus on certified organic grain production systems. Drawing on a survey and interviews with conventional, transitioning, and organic farmers in Indiana, we contextualize the landlord-farmer relationship dynamics across the spectrum of practice adoption. Our survey findings show significant differences in land tenure arrangements for farmers transitioning to organic systems or who have certified all their land organic compared to farmers using conventional practices, including the ratio of land owned compared to rented, the number of landlords farmers work with, and the average length of lease agreements. Through in-depth interviews that shed light on the farmers' perspective, we show how the dynamics of land tenure

arrangements and relationships in Indiana shape conservation management decision making.

Our study builds on recent research (Petzelka et al., 2018; 2021; Ranjan et al., 2019a,b,) by providing a more complete picture of the complex web of relationships that undergird farmers' access to farmland and their management decisions. A comprehensive review of qualitative and quantitative studies of land tenure and conservation adoption (Ranjan et al., 2022) found that the inconsistent and inconclusive results from quantitative studies may be a result of the lack of attention and measurement of the complexity of land tenure arrangements and relationships. Our analysis advances the research literature by directly addressing the complexity of land tenure arrangements and the variability and relational dynamics of land tenure. We provide both quantitative and qualitative analysis illustrating the formal and informal land tenure arrangements and relationships that operating farmers manage with landowners, who may be family members, long-time friends, or long and shorter-term business relations. While past studies conceptualize and focus on single relationships between landowner and tenant operators (Ranjan et al., 2022), we show that Indiana grain farmers typically manage a patchwork of land tenure arrangements, including some combination of owned and rented land, and a range of tenure arrangements that varied by type and the nature of their relationship with the landowner. An added layer of complexity captured in our interviews is that farmers often co-manage land jointly with family members. All this complexity is a barrier to organic certification and conservation adoption more generally. Farmers managing a combination of different rental arrangements and relationships with landlords and family members, some who may be supportive of organic and some not, would have to use different farming practices on different parcels, making land management decisions very complicated.

Consistent with the research literature on non-operating landowners in the context of conservation practices more broadly, our findings show that farmers' perceptions of their landlords' acceptance and openness to organic certification is an influential factor for shaping their consideration of the practice on rented land (Ranjan et al., 2019a,b). We also find support for the variability in landowners' level of involvement in decision-making on their land and their openness to implementing conservation practices and programs identified in survey research (Petzelka et al., 2012, 2013; Ulrich-Schad et al., 2016). In general, farmers in our study described trust and confidence in their rental relationships with non-operating landowners, but this confidence was not sufficient for them to consider discussing organic certification with their landlords. This hesitation is likely because of the broader rental market context and their perceptions of the lack of confidence and familiarity with organic production systems by their landlords. Farmers' perceptions are significant because a recent study found that at least 50 % of non-operating landowners who responded to a survey that included the state of Indiana, said that they would be supportive of and willing to extend and adjust their lease agreements to facilitate the adoption of conservation practices on their land (Petzelka et al., 2021). Considered together, this suggests that farmers' hesitation to approach their landlords about conservation practices may reflect a level of risk aversion that is not always warranted, although their openness to organic certification may be different than other conservation practices.

Our study suggests that the lack of widespread experience and familiarity with organic production systems likely poses an additional barrier. Landowners' knowledge and familiarity with specific conservation practices and programs has been identified as an important factor in their consideration of supporting their adoption (Ulrich-Schad et al., 2016; Petzelka et al., 2021). Therefore, farmers may be more willing to engage with their landlords about conservation practices such as cover cropping or no-till that are widely accepted and practiced and involve a shorter-term investment and risk with their landowners (Yoder et al., 2021). Because most studies on the barriers to adoption of conservation practices on rented land focused on relatively shorter-term and lower risk practices like cover crops and no-till that are more widely adopted in

Indiana (Prokopy et al., 2019), our study clarifies that the level of risk and social acceptability associated with a conservation practice plays an important role as well.

An important finding from our study is the high level of competition for cropland in Indiana that shapes land use decision-making and consideration of conservation practices, which is comparable to the context in other Corn Belt states as reported in recent studies (Enloe et al., 2017; Ranjan et al., 2019a) and earlier research (Carolan et al., 2004). Our interviews illustrate the ways this competitive environment shapes farmers' decision making, which pervades their consideration of conservation practices that involve higher risks. Our findings are consistent with previous studies showing how the highly competitive environment that farmers operate in creates a short-term financial orientation and higher level of risk aversion for farmers (Enloe et al., 2017; Ranjan et al., 2019a). Building on previous research finding that non-operating landowners strongly consider the appearance of the land in their choice of a renter (Ulrich-Schad et al., 2016), the highly competitive land rental market context exerted additional pressure on farmers to conform to farming practice norms and avoid riskier and less socially acceptable or familiar ways of farming, for fear of losing their landlord's confidence and trust.

#### 4.1. Research and policy implications

Our findings have implications for research and policy moving forward. First, they point to a need for a more nuanced conception of land tenure and the people who manage farmland in US Midwest states like Indiana. USDA programs often focus on owner-operators, and research studies use categories such as owner-operator and tenant farmer, as illustrated in recent assessments of USDA programs (Masuda et al., 2021) and reviews and synthesis of this scholarship (Ranjan et al., 2019b, 2022). However, our analysis shows that these categories do not reflect the way farming is currently practiced in US Midwest states like Indiana, where farmers are often owner-operators and tenant operators simultaneously. Accounting for this complexity will improve the outcomes of research and policy making for conservation on rented land.

Our findings also suggest a need for more research on organic grain production systems, particularly to address the compatibility of organic production systems with other conservation practices such as cover crops and no-till systems. This is because conservation-oriented farmers who are most likely to consider organic certification may already be using no-till systems that are more widely adopted in Indiana, and have legitimate concerns about the compatibility of organic certification with these other conservation practices (Bruce et al., 2019). In addition, increasing the financial incentives for organic certification is important for increasing adoption. Our findings support the conclusions of recent studies indicating that financial concerns are a barrier to conservation adoption on rented land (Masuda et al., 2021; Ranjan et al., 2022), and small financial incentives are often not sufficient to meet conservation goals. In this case in particular, the lack of adequate financial incentives and the costs associated with transitioning are known barriers to adoption of organic certification (Lloyd and Stephenson, 2020). The financial support for farmers in the three-year transition period emerging by the private sector should be examined as a promising avenue for increasing financial incentives for organic grain production (Dimitri and Baron, 2020). Ensuring that farmers considering transition to organic have information about these opportunities is important as well.

Additional outreach and education for non-operating landowners and farmers will be important for increasing knowledge and awareness about organic certification, given that farmers in our study reported widespread lack of familiarity with organic production systems. Our findings are consistent with previous research suggesting that lack of knowledge and engagement with conservation programs and practices is an important barrier to adoption (Petrzelka et al., 2021). Therefore, increasing awareness of the market demand and benefits of organic

production systems will lessen the burden on farmers to assume the full task of educating their landlords on the subject. There is also a need for greater extension education and support for organic production systems in Indiana, to address the lack of information on market opportunities, facilitate peer networking and mentorship, and provide technical support for conventional farmers interested or in the process of transitioning to organic production systems. Stronger extension programming to connect farmers with peer mentors and models, as well as technical support to lower the production risks of organic systems could lower the barriers to organic certification on rented land by gradually increasing the social acceptability and feasibility of organic grain production as an option.

In conclusion, expanded research and extension support and increased outreach to other agricultural service providers such as Natural Resources Conservation Service, Soil & Water Conservation Districts, and private industry-based consultants) and non-operating landowners is needed in Indiana. Wider awareness will increase the acceptability and ease of transitioning to organic systems over time, thus lowering the risks of adopting organic practices on rented land. As organic production systems become more developed, widely accepted, and practiced in the Midwest, programs for incentivizing long-term lease agreements along with higher financial incentives for transitioning to organic could play a role in facilitating the wider adoption of organic grain production.

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#### Data availability

The authors do not have permission to share data.

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#### Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.landusepol.2022.106346](https://doi.org/10.1016/j.landusepol.2022.106346).

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