Amber Waves

Land Tenure and the Adoption of Conservation Practices: Do Renters Make Operating Decisions Like Owners?

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Feature Land Use, Land Value & Tenure

Highlights

- About 40 percent of farmland in the 48 contiguous States is rented, and tenants may operate farms differently than owner-operators because they may be less

likely to see the long-term effects of management decisions such as adoption of conservation practices.

- An examination of tillage practices between 2011 and 2021 as measured by the Soil Tillage Intensity Rating (STIR) values for five major crops (corn, soybeans, cotton, barley, and sorghum) showed owner-operators and renters both generally showed reductions in STIR values.
- While cover crop adoption remained low from 2011 to 2021, adoption rates increased for owner-operators and tenant farms for corn and cotton. Some farm resource regions experienced differences in adoption rates between owners and tenants.

Agricultural land is a primary asset in a farm operation, and whether operators own or rent may affect their decisions to adopt conservation practices. For example, operators on rented fields might approach soil conservation differently because the lease might be terminated before they see the long-term effects and benefits of those practices on soil health.

About 40 percent of farmland in the 48 contiguous States is rented, so understanding farmland tenants' motivations and behaviors has implications for overall conservation practices adoption on the landscape. Researchers at USDA, Economic Research Service (ERS) have published a report that documents the rates of conservation practice adoption among five major crops—corn, soybeans, cotton, barley, and sorghum—based on whether fields were operated by owners or tenants. The researchers used nationally representative Agricultural Resource Management Survey (ARMS) data for specific years between 2011 and 2021, observing conservation practices in each crop twice in the sample period. They found that at the national level for most surveyed crop-years one practice—conservation tillage systems—had been adopted on cash- and share-rented fields as often as on owner-operated fields. When it came to planting cover crops, however, the analysis was more mixed.

The researchers focused on fields under three groups:

- Owner-operated fields.
- Cash-rented fields, which are rented for a fixed or flexible amount of cash. The tenant covers all inputs used to produce crops.
- Share-rented fields, which are rented for a share of the field's crop yield. The landlord and share-tenant share outputs and often input costs as well.

Cash- and share-rental agreements cover the vast majority of rented U.S. cropland.

The incentives to adopt conservation practices might also vary according to individual lease agreements. In share-rental agreements, landlords and tenants typically split the cost of inputs—such as fertilizer, pesticides, or seed—when there is a clear connection between the management practice and crop output. Share renters may be more inclined to adopt conservation practices than cash renters if they split implementation costs with their landlords. However, the effect of conservation practices on crop output in the short term is often less clear than the effects of other farm management practices such as fertilizer application. This uncertain benefit may deter share tenants from adopting conservation practices.

Cash- and Share-Rented Fields Are on Par With Owner-Operated Fields in Soil Tillage Intensity

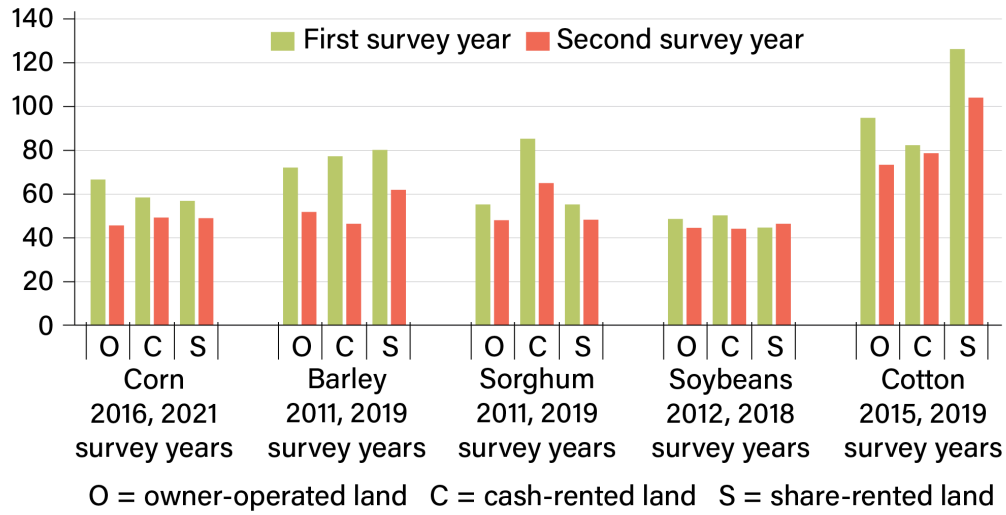
Two popular conservation practices are the use of conservation tillage systems and the adoption of cover crops. Conservation tillage systems decrease soil disturbance and retain crop residue on the soil surface thereby reducing soil losses compared to more intensely tilled land. Reducing tillage intensity often requires substantial upfront investment, such as buying new machinery or modifying existing machines. Reducing tillage intensity can benefit the operator immediately through reduced labor costs and time and fuel savings. In the medium to long term, benefits to production and the environment include reducing the likelihood of soil erosion, increasing the amount of soil organic matter, improving water infiltration, and cutting soil carbon losses.

Tillage intensity can be measured by the Soil Tillage Intensity Rating (STIR), an index defined by USDA's Natural Resources Conservation Service (NRCS) as a way to evaluate the kind, severity, and number of ground-disturbing passes on soil quality. STIR index values range from 0 to 200, with lower values indicating less soil disturbance. Conservation tillage systems are defined as operations that achieve a STIR value of 80 or less, while conventional tillage corresponds to a value higher than 80.

Soil Tillage Intensity Rating values generally declined from the first survey year to the most recent survey year for all five crops. There were no systemic differences in STIR index values at the national level between observed cash- and share-rented fields compared with owner-operated fields. Researchers found cotton fields to be the only instance in which rented fields exhibited higher soil disturbance than owner-operated fields. The economics of tillage—namely the immediate fuel and labor savings—can explain the STIR value parity between

rented and owner-operated fields. In addition, many operators rent land as well as operate on their own land. If operators buy conservation tillage equipment and use it on their owned land, they may be inclined to use it on the rented land as well.

Across three land tenancy types, Soil Tillage Intensity Rating (STIR) values fall over time for five major crops



Note: Responses are weighted by USDA, National Agricultural Statistics Service's Agricultural Research Management Survey (ARMS) Phase 2 field-level survey weights for each crop. STIR values are determined by the operational speed of tillage equipment, tillage type, depth of the tillage operation, and degree of tillage of the soil surface. STIR values range from zero to 200, with lower values indicating less soil disturbance.

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service Agricultural Resource Management Survey (ARMS) Phase 2.

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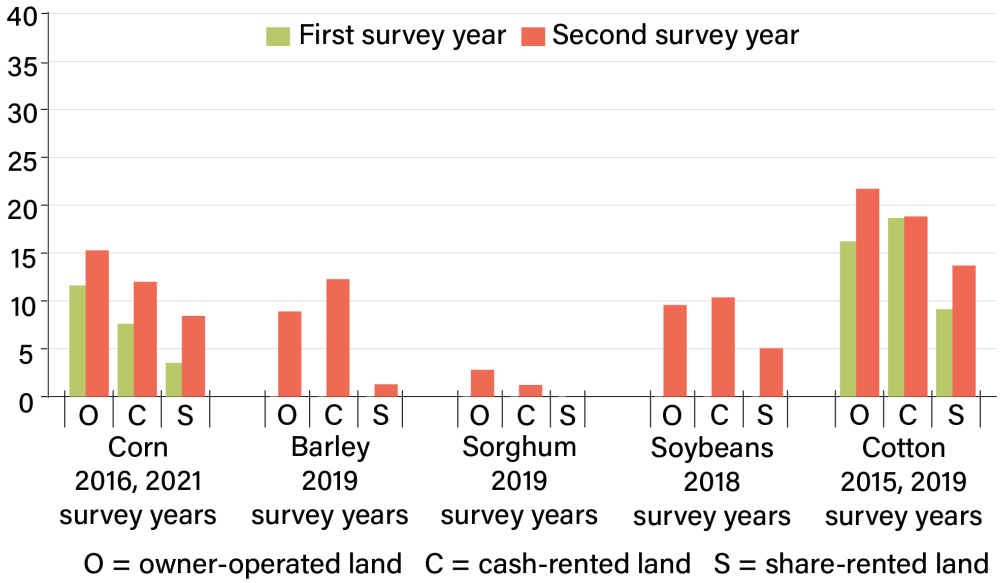
Share-Rented Fields Trail Owner-Operated Fields in Cover Crop Adoption

Cover crops are plantings that occur between two commodity or forage crop plantings and generally consist of cereal rye, oats, winter wheat, clover, or other seed mixes. Cover crops require upfront seed costs, labor costs for planting, and possibly termination costs after the growing season, in addition to new management knowledge. In many farming systems, cover crops can improve soil health, prevent water and wind erosion, prevent nutrient leaching, improve the availability of soil water, or suppress weeds, among other benefits.

While cover crop adoption on surveyed fields remained low (less than 25 percent) from 2015 to 2021, adoption rates increased for all three operator groups for corn and cotton. Cover crop adoption-related questions for soybeans, barley, and sorghum were asked only in the second

survey round, so there is no comparison for those crops with previous survey years. Rates of cover crop adoption on cash-rented fields were generally even with rates on owner-operator fields. Share-rented fields, however, trailed owner-operator fields across all five of the surveyed crops.

Cover crop adoption rates on owner-operated and cash-rented fields higher than on share-rented land across commodity type, 2015–21



Note: The Agricultural Resource Management Survey (ARMS) did not pose an explicit question about cover crop adoption in the 2011 through 2013 surveys, so those years are omitted for barley, sorghum, and soybeans.

Source: USDA, Economic Research Service and USDA, National Agricultural Statistics Service Agricultural Resource Management Survey (ARMS) Phase 2.

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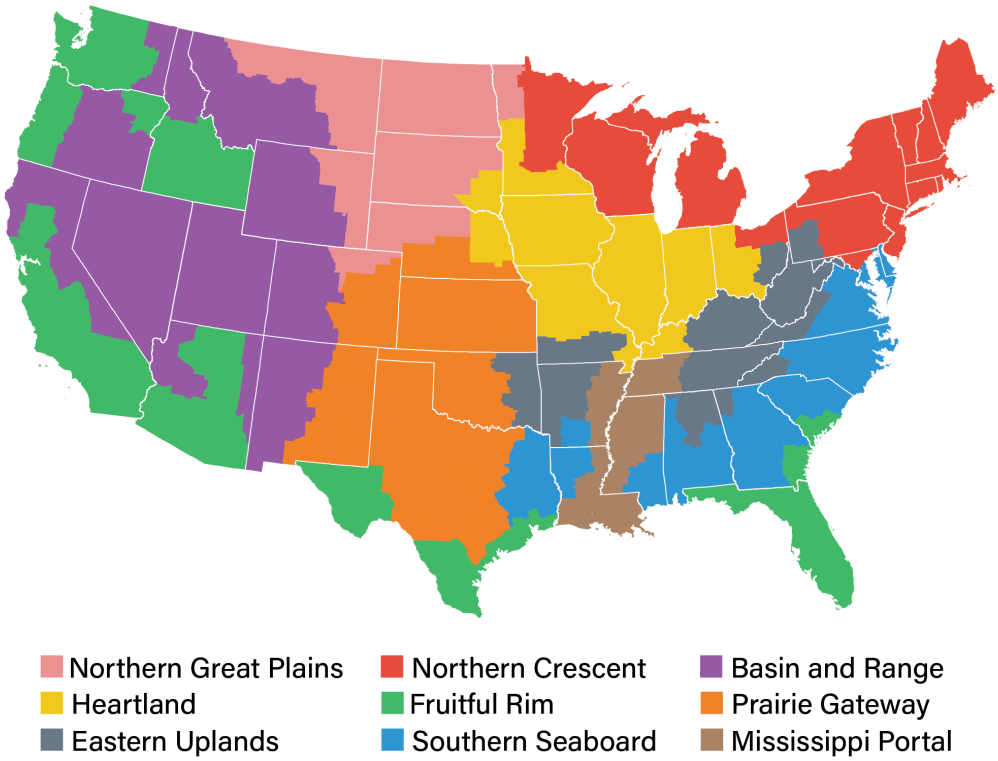
National-Level Adoption Statistics Mask Differences Across U.S. Regions

The difference across owner-operated fields and share-rented fields in cover crop adoption may not be a universal feature of the incentive structure presented by share contracts but might be driven by social norms and production practices within regions. In addition, cash- or share-rented fields might exhibit different rates of soil disturbance through tillage in specific regions. Researchers examined patterns of practice adoption across USDA's Farm Resource Regions (see map below).

USDA, Economic Research Service groups its nine Farm Resource Regions according to geographical commodity specializations



Note: USDA, Economic Research Service (ERS) Farm Resource Regions do not include Alaska and Hawaii because they are not included in ERS and USDA, National Agricultural Statistics Service's Agricultural Management Resource Survey (ARMS).

Source: USDA, Economic Research Service.

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Regional patterns in conservation adoption rates for soybean production, 2018

	Owner-operated fields	Cash-rented fields	Share-rented fields
Heartland region (61 percent of total U.S. soybean production, measured in thousands of bushels)			

Note: **STIR** = Soil Tillage Intensity Rating. **S** = estimates cannot be disclosed because of insufficient sample size, exceedingly low adoption rates, or other disclosure concerns. Groups are selected based on approximate production shares, as calculated using USDA, National Agricultural Statistics Service county-level statistics.

Source: USDA, Economic Research Service (ERS) using data from ERS and USDA, National Agricultural Statistics Service (NASS) 2018 Agricultural Resource Management Survey Phase 2 and NASS county-level crop production statistics.

	Owner-operated fields	**Cash-rented fields**	**Share-rented fields**
STIR value	43.36	49.14	40.55
Cover crop adoption rate (percent)	7.30	7.46	5.24
Number of observations	468	279	121
Northern Great Plains and Prairie Gateway regions (17 percent of total U.S. soybean production, measured in thousands of bushels)			
STIR value	41.73	37.15	36.58
Cover crop adoption rate (percent)	1.53	5.93	S
Number of observations	173	124	54
Mississippi Portal region (9 percent of total U.S. soybean production, measured in thousands of bushels)			
STIR value	58.26	61.04	83.85
Cover crop adoption rate (percent)	6.66	9.26	S
Number of observations	151	205	149
Rest of the country (13 percent of total U.S. soybean production, measured in thousands of bushels)			
STIR value	46.18	36.35	24.98
Note: **STIR** = Soil Tillage Intensity Rating. **S** = estimates cannot be disclosed because of insufficient sample size, exceedingly low adoption rates, or other disclosure concerns. Groups are selected based on approximate production shares, as calculated using USDA, National Agricultural Statistics Service county-level statistics. Source: USDA, Economic Research Service (ERS) using data from ERS and USDA, National Agricultural Statistics Service (NASS) 2018 Agricultural Resource Management Survey Phase 2 and NASS county-level crop production statistics.			

	Owner-operated fields	Cash-rented fields	Share-rented fields
Cover crop adoption rate (percent)	19.01	15.49	19.65
Number of observations	267	259	25

Note: **STIR** = Soil Tillage Intensity Rating. **S** = estimates cannot be disclosed because of insufficient sample size, exceedingly low adoption rates, or other disclosure concerns. Groups are selected based on approximate production shares, as calculated using USDA, National Agricultural Statistics Service county-level statistics.
Source: USDA, Economic Research Service (ERS) using data from ERS and USDA, National Agricultural Statistics Service (NASS) 2018 Agricultural Resource Management Survey Phase 2 and NASS county-level crop production statistics.

Looking at cover crop adoption rates by regions reveals that the national-level differences between owner-operated and share-rented fields are usually not driven by fields in the main production regions for the surveyed crop. For example, the Heartland region covers much of the Midwest and generated 61 percent of total soybean production in 2018. Nationally, cover crop rates for share-rented fields trailed those of owner-operated fields for soybean fields in 2018 by nearly 10 percentage points. However, cover crop adoption rates of share-rented soybean fields in the Heartland region were not statistically different from adoption rates of owner-operated fields.

As noted previously, cotton fields were the only instance in which rented fields exhibited systemically higher soil disturbance than owner-operated fields at the national level. However, differences between tenure groups in tillage intensity exist for other surveyed crops in particular regions. For example, while STIR values on share-rented soybean fields were about even with owner-operated fields nationally and in most soybean-producing regions, share-rented fields exhibited much higher STIR values than owner-operated fields in the Mississippi Portal region, where almost 10 percent of soybean production occurred in 2018.

This article is drawn from:

- Burnett, J.W., Szmurlo, D. & Callahan, S. (2024). *Farmland Rental and Conservation Practice Adoption*. U.S. Department of Agriculture, Economic Research Service. EIB-270.

You may also like:

- Bowman, M. & Wallander, S. (2021, July 6). *Grass Cover Crops, Such as Rye and Winter Wheat, Are the Most Common Cover Crops Used Before Planting Corn, Soybeans, and Cotton*. Amber Waves, U.S. Department of Agriculture, Economic Research Service.
- Callahan, S. (2021, April 2). *Incidence of Absent Landlords Has Little Effect on U.S. Agriculture Real Estate Values, Research Shows*. Amber Waves, U.S. Department of Agriculture, Economic Research Service.
- Bigelow, D. & Hubbs, T. (2016, August 25). *Land Acquisition and Transfer in U.S. Agriculture*. Amber Waves, U.S. Department of Agriculture, Economic Research Service.

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