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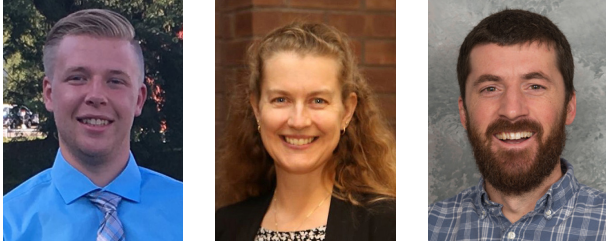
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Factors Influencing Increased Usage of Cash Rent Leases in Illinois



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Abstract

In recent years, cash rent leases have become increasingly popular among farm landowners in Illinois. Since 1995, acres operated under cash rent leases have increased 44%, 105%, and 117% in northern, southern, and central Illinois, respectively, for farms enrolled in the Illinois Farm Business Farm Management (FBFM) Association. Using data collected from the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS), Illinois FBFM Association, University of Illinois farmdoc, and Environmental Working Group (EWG), we examined the impact of multiple factors on farmland leasing choices. Results indicate that commodity prices, soybean revenue, government crop insurance

expenditures, and commodity payments have influenced the increasing use of cash rent leases.

INTRODUCTION

Over the past two decades, Illinois has experienced a dramatic increase in the use of cash rent leases. From 1995 to 2015, the proportion of acres operated under cash rent leases increased from 41% to 59% (a 44% rise) in northern Illinois, 18% to 39% (a 117% rise) in central Illinois, and 20% to 41% (a 105% rise) in southern Illinois, among farms enrolled in the Illinois Farm Business Farm Management (FBFM) Association. Share rent acres fell from 42% to 21% in northern Illinois, 68% to 46% in central Illinois, and 58% to 37% in southern Illinois, with the proportion of owner-operated acres remaining relatively consistent through the same time period (Lattz, 2016; Lattz and Zwilling, 2020; Schnitkey, 2002; Zwilling, Krapf, and Raab, 2013). These three regions are illustrated in Figure 1, with their respective changes shown in Figures 2–4. Following the trend toward greater cash rent lease usage, per-acre cash rent rates have also increased. From 1987 to 2014, per-acre cash rent rates increased by an average of 3.6% each year. Since 2006, per-acre cash rent prices have increased by 7.4% annually (Schnitkey, 2017).

According to the 2017 Census of Agriculture, just over 58% of farmland in Illinois is leased, while nearly 42% is owner-operated. Nationally, 39% of all farmland acres in the United States are rented, with 61% owner-operated (USDA NASS, 2017). This study aims to identify the factors that may influence the shift toward increased use of cash rent leases in Illinois.

BACKGROUND

Under a typical cash rent agreement, the farm operator pays the landowner a set annual fee per acre, furnishes all operating inputs for the crop, and receives the crop produced on the rented land. Share rent leases entail the landowner and operator splitting the

input costs, where the landowner receives a portion of the crop as “rent” for the farmland (Lattz, 2017a, 2017c). A 50-50 split is the most common crop share agreement in Illinois (Lattz, 2017b). A typical farmland lease in Illinois begins on March 1 and expires on the last day of February. The generally accepted deadline to terminate or make changes to a lease is four months prior to the expiration date, and most leases are written to automatically renew for another year without change if no notification is provided by either the owner or operator (Troendle, 2019). In addition, the lease type determines the distribution of government commodity subsidy payments between landowner and operator, based on who is “actively engaged in farming.” Being actively engaged in farming requires an individual to provide “significant contributions to the farming operation,” with “active personal labor and/or active management” required to meet the definition (USDA FSA, 2015, 1). Under a cash rent lease, the farm operator receives all government commodity subsidy payments associated with the farm (Lattz, 2017c). With a crop share lease, the landowner and the operator split the commodity payments according to how the shares are defined (e.g., 50-50, one-third to two-thirds) (Leibold, 2018). Cash rent leases provide autonomy to the farm operator, while shielding the landowner from production risk. Share rent leases provide opportunity for the landowner to participate in on-farm decision-making, while protecting farm operators from bearing all production risk.

Previous research has addressed factors that affect farmland values and per-acre cash rent rates, including corn and soybean prices, corn and soybean yields, government payments, and crop insurance (Barnard et al., 2001; Du, Hennessy, and Edwards, 2007; Goodwin, Mishra, and Ortalo-Magné, 2004; Helmers, Shaik, and Johnson, 2005; Ibendahl and Griffin, 2013; Kirwan, 2009; Lambert and Griffin, 2004; Lence and Mishra, 2003; Roberts, Kirwan, and Hopkins, 2003; Ryan et al., 2001; Zhang, Zhang, and Hart, 2018). However, the literature is scarce on factors influencing the use of cash rent leases (Allen and Lueck, 1992; Hauger and Burton, 2015; Sotomayor, Ellinger, and Barry, 2000). In addition to identifying factors that influence farmland values and per-acre cash rent, Sotomayor, Ellinger, and Barry (2000) specifically examined the contract choice between cash rent and crop share leases. They found that soil productivity, tract size, non-farm income, length of business relationship between landowner and operator, debt-to-asset ratio, net worth, number of landowners on the farm, and changes in revenue were significant in choosing between cash rent and crop share.

DATA

To identify potential factors influencing the shift toward cash rent leases that has occurred throughout Illinois over the past two decades, we divided the state into three regions (northern, central, and southern) based on standard reporting regions used by the University of Illinois *farmdoc* (Figure 1). There are 22 counties in the northern region, 44 counties in the central region, and 36 counties in the southern region. We collected secondary data of potential factors affecting cash rent usage in Illinois from the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS), Illinois FBFM Association, University of Illinois *farmdoc*, and Environmental Working Group (EWG). Land tenure data, which includes percent usage of cash rent leases, share rent leases, and owner-operated acres, was collected from the University of Illinois *farmdoc* for the years 1995–2015. This data is representative of farms enrolled in FBFM, which provides “a cooperative educational-service program designed to assist farmers with management decision-making” (Illinois FBFM Association, n.d.) and currently includes more than 5,500 Illinois farms (Lattz and Zwilling, 2020). All farms in this dataset are 260 acres or more and receive the majority of their income from grain farming. While this does not include all Illinois farms, it does provide a good framework for land tenure in the state (Lattz and Zwilling, 2020).

Potential factors influencing the shift toward cash rent leases examined in this study include commodity prices and crop yields for both corn and soybeans (USDA NASS, n.d.), government commodity subsidy payments (EWG, n.d.), and government expenses on crop insurance (EWG, n.d.). With the exception of commodity prices, all factors were collected at the county level in Illinois from 1995 to 2015. Yearly per-acre corn and soybean yields for each region were calculated by averaging the annual yields across all counties within each region. Similarly, commodity subsidy payments and government expenditures on crop insurance were calculated by averaging the annual payment and expenditures across all counties within each region. Commodity prices were collected from the University of Illinois *farmdoc* and reflect the average price that was received statewide in each calendar year. There was one annual observation for each variable within each region between the years 1995–2015.

ANALYSIS

Based on the panel nature of the dataset (i.e., multiple number of observations over time for a given number of variables), a fixed-effect regression model was employed to examine potential factors influencing cash rent usage on Illinois farms (Wooldridge, 2002). Contradictory to cross-sectional data, panel datasets include two types of variation that must be accounted for: “within” and “between” variation. In this dataset, between-region variation refers to the annual variation of cash rent usage across the three regions. Within-region variation refers to the variation of cash rent usage occurring within each region over time. Because unobservable factors not captured in the data could influence the between-region variation in the dataset, there may be omitted variable bias present if a simple linear regression were run. Accounting for potential omitted variable bias, regional dummy variables were created for each of the three regions. Selecting a “base” region to compare the remaining regions against allows for the differences that occur between regions to be observed without issue. This removes any between-region variation and omitted variable bias from time-invariant variables (Greene, 2003; Kennedy, 2003). Explanatory variables were lagged one year due to timing differences, specifically the time between when cash rent leases are signed and when receipts are received. To avoid multicollinearity issues, the southern region was used as the base region, to which the northern and central region will be compared. Analysis was conducted with IBM SPSS Statistics 24, using the generalized linear model (GLM) function with the univariate option to run the fixed-effects regression model. As described in the following sections, we ran two versions of the model. In the first, we included corn and soybean yields and prices as separate explanatory variables. Yields and prices were replaced with crop revenues in the second model. Each version of the model included commodity subsidy payments and government expenditures on crop insurance as explanatory variables.

MODELS

In each model, the dependent variable $r_{i,t}$ represents the percent of acres operated under cash rent in region i in year t where:

$$i = 1, 2, 3 \text{ (1 = northern, 2 = central, and 3 = southern)}$$

$$t = 1, 2, \dots, 21 \text{ (1 = 1995...21 = 2015)}$$

Model 1: Crop yields and prices:

$$\begin{aligned} r_{i,t} = & \beta_0 + \beta_{\text{CornYield}} \text{CornYield}_{i,t-1} + \beta_{\text{SoybeanYield}} \text{SoybeanYield}_{i,t-1} + \\ & \beta_{\text{CornPrice}} \text{CornPrice}_{i,t-1} + \beta_{\text{SoybeanPrice}} \text{SoybeanPrice}_{i,t-1} + \\ & \beta_{\text{CommodityPayments}} \text{CommodityPayments}_{i,t-1} + \\ & \beta_{\text{CropInsurance}} \text{CropInsurance}_{i,t-1} + \gamma_{\text{Northern}} \text{Northern} + \gamma_{\text{Central}} \text{Central} + \\ & u_{it} \end{aligned}$$

CornYield and *SoybeanYield* represent the average corn and soybean yields, measured in bushels per acre for region i in year $t-1$, respectively. *CornPrice* and *SoybeanPrice* are the average per-bushel price for each crop in year $t-1$. *CommodityPayments* and *CropInsurance* represent the average amount of government commodity subsidy payments and government crop insurance expenditures per county in region i in year $t-1$. *Northern* and *Central* are dummy variables representing the northern and central region of the state. The error term for region i in year t is denoted as u . As previously discussed, all explanatory variables are lagged by one year to more accurately reflect the influence those variables have on contract choice.

Model 2: Crop revenues:

$$\begin{aligned} r_{i,t} = & \beta_{\text{CornRevenue}} \text{CornRevenue}_{i,t-1} + \beta_{\text{SoybeanRevenue}} \text{SoybeanRevenue}_{i,t-1} + \\ & \beta_{\text{CommodityPayments}} \text{CommodityPayments}_{i,t-1} + \\ & \beta_{\text{CropInsurance}} \text{CropInsurance}_{i,t-1} + \gamma_{\text{Northern}} \text{Northern} + \gamma_{\text{Central}} \text{Central} + \\ & u_{it} \end{aligned}$$

Model 2 includes the same lagged variables as Model 1, with one change: *CornRevenue* and *SoybeanRevenue* replace the separate crop price and yield variables to reflect the influence that per-acre revenue has on decision-making. These variables were created by multiplying the annual price and county average yield for each crop. From there, an average annual county revenue was determined for each crop within each region.

RESULTS

Tables 1–4 provide descriptive statistics of the dataset. Each table includes the minimum, maximum, mean, and standard deviation of the dependent and explanatory variables. Table 1 provides a description for all of Illinois, while the remaining tables show the northern (Table 2), central (Table 3), and southern

(Table 4) regions. It is noted that the central region had the highest averages for each of the explanatory variables, aside from commodity prices that reflected statewide averages, while the northern region averaged the highest percentage of cash rent usage. Tables 5 and 6 present the results for each model. A more in-depth discussion of the model results is included in the following sections.

Model 1 Results

Model 1 produced an R^2 of 0.934, indicating that 93% of the variation in cash rent usage is explained by the variation in the explanatory factors used in the model. It was found that corn price, soybean price, government commodity subsidy payments, and government crop insurance expenditures were all significant predictors of the usage of cash rent leases.

Government expenditures on crop insurance were found to be highly significant ($p < 0.001$), with every \$10,000 increase in expenditures leading to a 0.039% rise in cash rent lease usage. For example, an additional \$250,000 in government expenditures is expected to increase cash rent usage by 1%. Putting this result in context, the average annual per-county government expenditure on crop insurance between 1995 and 2015 was approximately \$2.2 million with a range of \$330,000 to nearly \$6 million (Table 1), suggesting that a \$250,000 increase in this variable from one year to another is not an unreasonable expectation.

The price of corn was found to be significant at the 5% level ($p < 0.05$). However, there was an inverse relationship between corn price and cash rent usage. This suggests that for every dollar increase in corn price, a drop of just over 3% in cash rent usage can be expected. The positive relationship between soybean price ($p < 0.05$) and cash rent usage indicated that for every dollar increase in soybean price, a 1.3% rise in cash rent usage will occur in Illinois. The per-bushel corn price varied from \$1.90 to \$6.72, with the soybean price ranging from \$4.53 to \$14.25 (Table 1), indicating that a \$1 increase in these commodity prices is realistic.

The positive relationship between government commodity subsidy payments and cash rent usage ($p < 0.10$) indicates that a \$10,000 increase in payments will lead to a 0.002% increase in cash rent lease usage. For every \$5 million of commodity payments paid out, a 1% rise in cash rent usage is expected to occur. The average level of per-county government payments during the years of this study was approximately \$7.16 million, with a range of \$1.8 million to nearly \$24 million

(Table 1), suggesting that fluctuations of \$5 million are quite plausible. The northern region was found to have around 15% more cash rented land ($\beta = 15.23$) when compared to the southern region, with cash rent usage in the central region approximately 7% lower ($\beta = -7.34$) than in the southern region. Table 5 shows the complete results of Model 1.

Model 2 Results

Model 2 produced an R^2 value of 0.917, indicating that 92% of the variation in cash rent usage is explained by the variation of the explanatory factors used in the model. The impact of commodity payments and crop insurance remains unchanged from Model 1. In addition, results from Model 2 indicate a significant positive relationship between per-acre soybean revenue and the usage of cash rent leases. A \$1 increase in per-acre soybean revenue is expected to bring a 0.015% increase in cash rent usage, with a \$67 revenue increase associated with a 1% rise in cash rented acres. Historical crop budgets produced by *farmdoc* (University of Illinois, n.d.) indicate that this type of revenue fluctuation is realistic from one crop year to another. Similar results to Model 1 were found for the northern and central regions. Table 6 shows the complete results of Model 2.

IMPLICATIONS AND CONCLUSIONS

In recent decades, a major shift in land rental practices has been taking place throughout Illinois. Since 1995, cash rent lease usage has risen dramatically, with a 44% increase in northern Illinois, a 105% increase in southern Illinois, and a 117% increase in central Illinois among farms enrolled in FBFM (Lattz, 2016; Lattz and Zwilling, 2020; Schnitkey, 2002; Zwilling, Krapf, and Raab, 2013). The results of this study indicate that government expenditures on crop insurance, corn price, soybean price, soybean revenue, and commodity payments all influence cash rent lease usage in Illinois. With prices, yields, and commodity payment levels continually changing, the effects of these fluctuations are reflected in cash rent usage. Increases in soybean price, soybean revenue, commodity payments, and crop insurance expenditures are associated with a greater proportion of farmland acres being operated under cash rent contracts. A rise in the value of these variables enables the farm operator to pay a higher per-acre cash rent, allowing the landowner to earn a greater return on his or her farmland. The cash rent contract then protects the landowner from production and financial risk associated with active engagement in farming, making this a “win-win” for the landowner.

However, it seems counterintuitive that increased corn prices are associated with a lower usage of cash rent acres. This may be explained in part by the correlation between high corn prices and high nitrogen fertilizer prices, which keeps farm operators' profit margins thin and increases their financial risk, perhaps making share rent leases a more attractive option than cash rent when the price of corn rises.

Changes in commodity payment structure or types could have a major effect on cash rent usage. Similarly, changes in the structure or type of government expenditures on crop insurance could possibly lead to large increases in cash rent usage. While only 5,500 Illinois farms were examined in this study, these findings are a starting point for understanding why the usage of cash rent leases is increasing in Illinois. With the majority of farmland in the state falling under some type of rental agreement, understanding what is driving the change toward a greater use of cash rent leases can help farm operators as well as farm landowners and the professional farm managers representing them in the process of negotiating rental contracts. Future studies could examine the impact of absentee landownership and changing preferences of those landowners on contract choice. Fluctuations in crop prices, yields, revenues, and government outlays for commodity payments and crop insurance may have major ramifications on the leasing market in the years to come.

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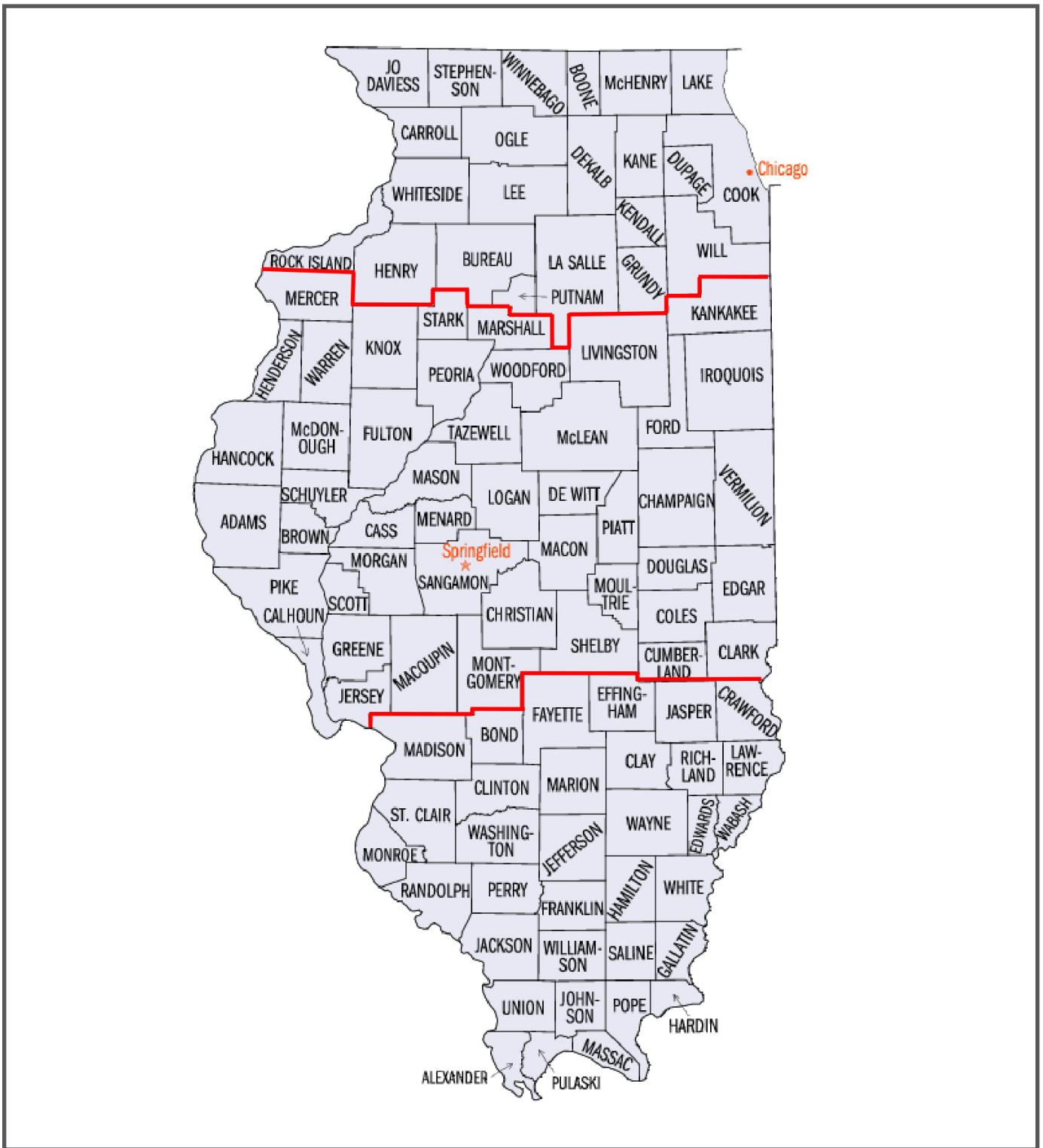


Figure 1. Map showing the northern, central, and southern regions of Illinois used in this study. The standard *farmdoc* reporting regions were overlaid onto a county map of Illinois (Wikimedia Commons, n.d.). The northern region contains 22 counties, the central region contains 44 counties, and the southern region contains the remaining 36 counties.

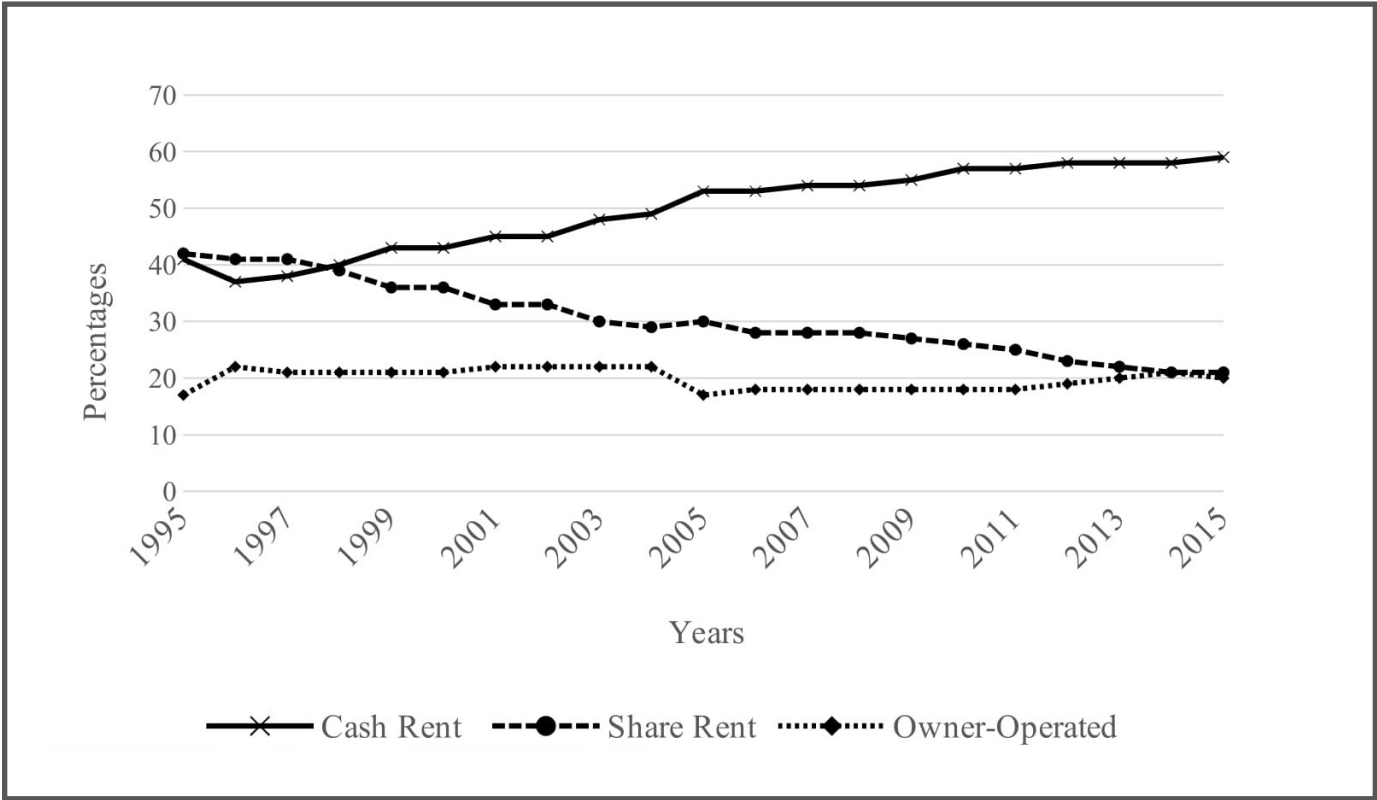


Figure 2. Land tenure in northern Illinois

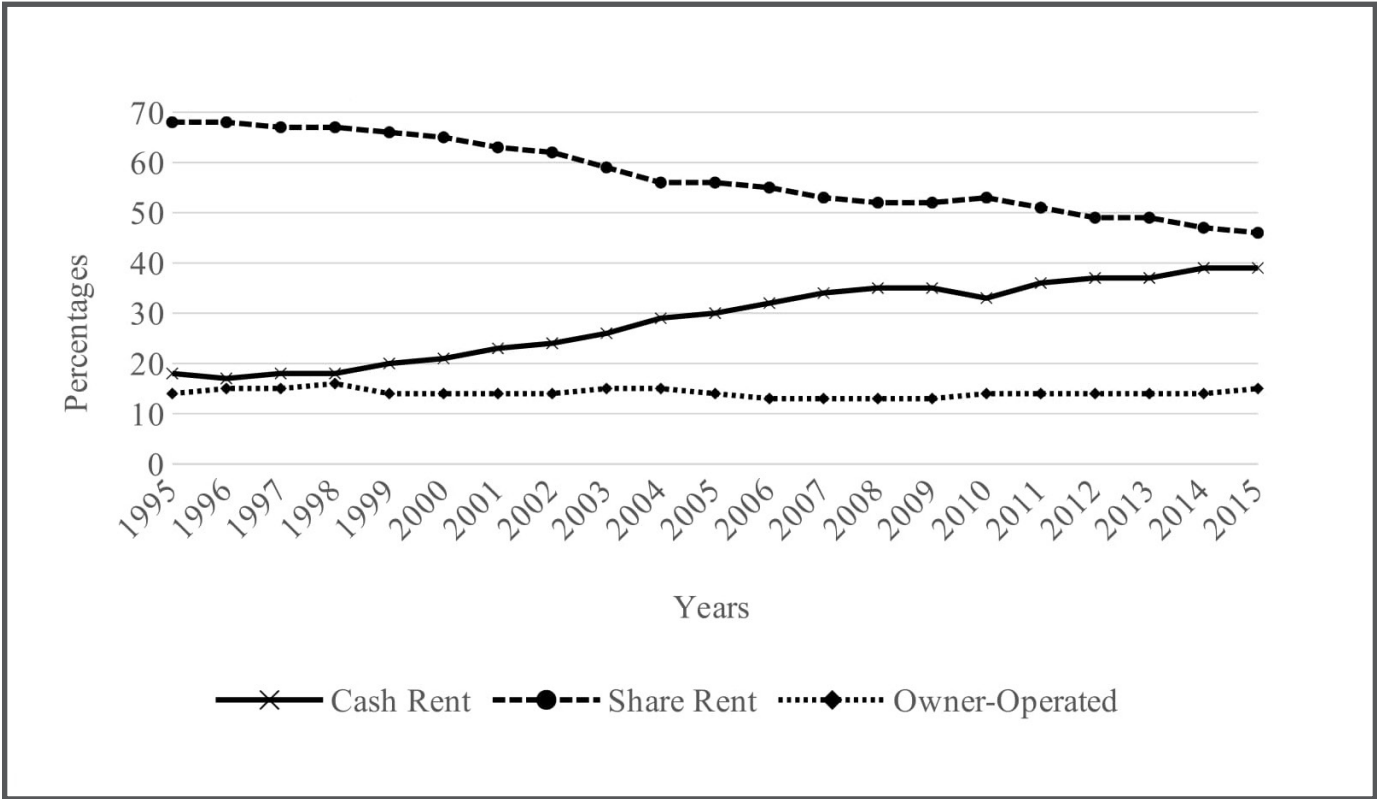


Figure 3. Land tenure in central Illinois

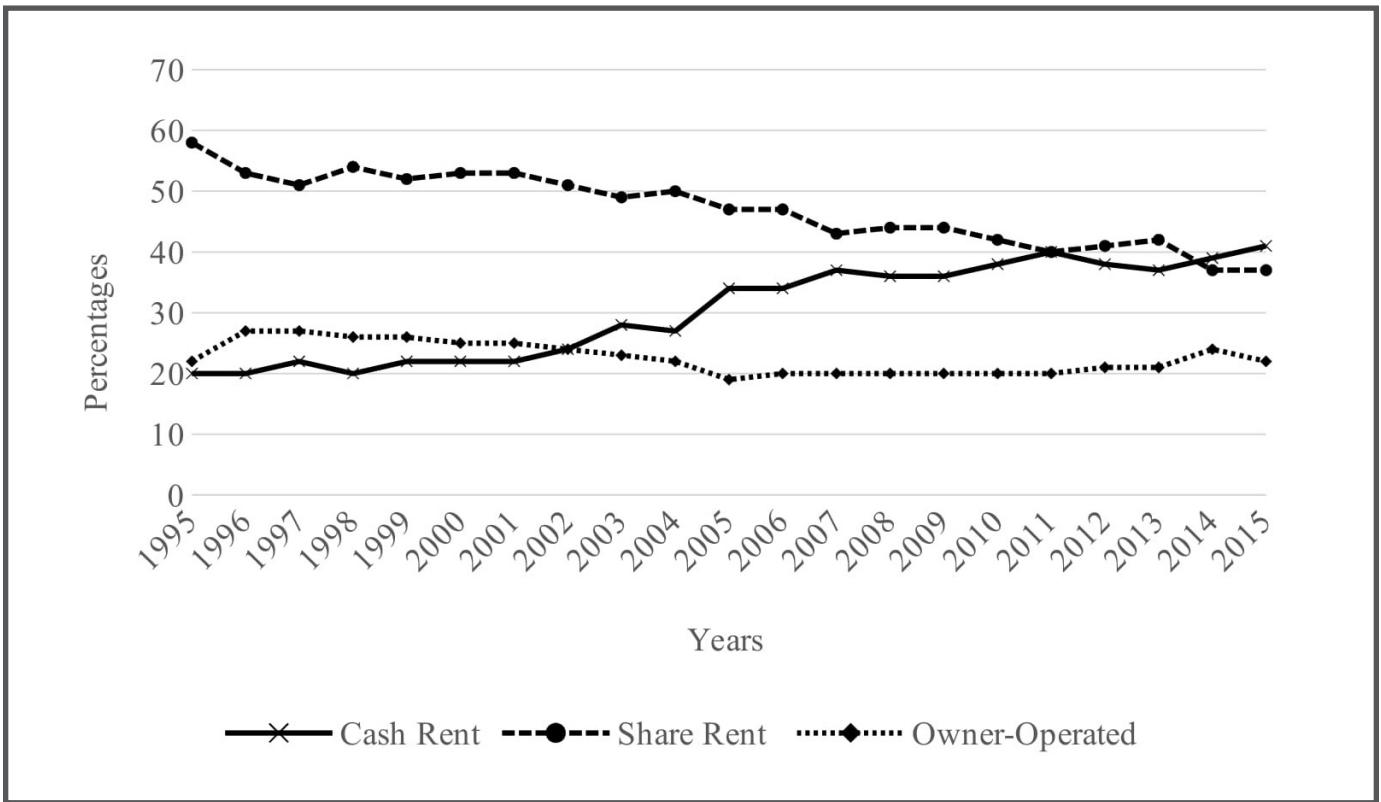


Figure 4. Land tenure in southern Illinois

Table 1. Descriptive Statistics of Illinois for All Counties, 1995-2015

Variables	Minimum	Maximum	Mean	Std. Deviation
Cash Rent Usage (%)	17	59	36.24	12.27
Corn Yield (bu/acre)	42.83	209.43	147.37	29.8
Soybean Yield (bu/acre)	29.36	58.57	44.7	7.31
Corn Price (\$/bu) ^a	1.9	6.72	3.39	1.46
Soybean Price (\$/bu) ^a	4.53	14.25	8.33	3.18
Corn Revenue (\$/acre)	183.11	1103.07	503.54	251.04
Soybean Revenue (\$/acre)	141.85	764.12	381.01	178.51
Commodity Payments (\$10,000)	182.94	2396.56	715.5	592.05
Crop Insurance (\$10,000)	33.31	596.22	218.1	170.15

^aCrop prices are average per-bushel prices statewide, 1995-2015.

Table 2. Descriptive Statistics of the Counties in the Northern Region, 1995–2015

Variables	Minimum	Maximum	Mean	Std. Deviation
Cash Rent Usage (%)	37	59	49.76	7.39
Corn Yield (bu/acre)	114.59	188.47	156.2	22.34
Soybean Yield (bu/acre)	32.09	57.4	47.43	6.38
Corn Price (\$/bu) ^a	1.9	6.72	3.39	1.48
Soybean Price (\$/bu) ^a	4.53	14.25	8.33	3.23
Corn Revenue (\$/acre)	264.65	1101.84	539.51	267.03
Soybean Revenue (\$/acre)	197.03	764.12	406.3	193.75
Commodity Payments (\$10,000)	361.06	2005.41	830.78	563.44
Crop Insurance (\$10,000)	36.04	528.32	223.09	170.56

^aCrop prices are average per-bushel prices statewide, 1995–2015.

Table 3. Descriptive Statistics of the Counties in the Central Region, 1995–2015

Variables	Minimum	Maximum	Mean	Std. Deviation
Cash Rent Usage (%)	17	39	28.62	7.81
Corn Yield (bu/acre)	112.1	209.43	159.27	24.07
Soybean Yield (bu/acre)	40.64	58.57	48.53	4.76
Corn Price (\$/bu) ^a	1.9	6.72	3.39	1.48
Soybean Price (\$/bu) ^a	4.53	14.25	8.33	3.23
Corn Revenue (\$/acre)	286.36	1103.07	541.92	251.35
Soybean Revenue (\$/acre)	209.66	751.87	412.02	183.12
Commodity Payments (\$10,000)	387.19	2396.56	934.2	709.26
Crop Insurance (\$10,000)	42.02	596.22	254.46	191.9

^aCrop prices are average per-bushel prices statewide, 1995–2015.

Table 4. Descriptive Statistics of the Counties in the Southern Region, 1995–2015

Variables	Minimum	Maximum	Mean	Std. Deviation
Cash Rent Usage (%)	20	41	30.33	7.86
Corn Yield (bu/acre)	42.83	179.48	126.63	31.51
Soybean Yield (bu/acre)	29.36	48.92	38.14	5.82
Corn Price (\$/bu) ^a	1.9	6.72	3.39	1.48
Soybean Price (\$/bu) ^a	4.53	14.25	8.33	3.23
Corn Revenue (\$/acre)	183.11	994.68	429.18	228.41
Soybean Revenue (\$/acre)	141.85	612.97	324.7	150.67
Commodity Payments (\$10,000)	182.94	995.69	381.53	291.25
Crop Insurance (\$10,000)	33.31	414.9	176.74	143.62

^aCrop prices are average per-bushel prices statewide, 1995–2015.

Table 5. Effect of Crop Yields, Crop Prices, Commodity Payments, Crop Insurance, and Region on the Usage of Cash Rent Leases (Model 1)

Parameter	β	Std. Error	t
Intercept	17.916***	4.391	4.08
Corn Yield (bu/acre)	0.016	0.027	0.615
Soybean Yield (bu/acre)	0.075	0.126	0.598
Corn Price (\$/bu)	-3.076**	1.256	-2.45
Soybean Price (\$/bu)	1.345**	0.608	2.211
Commodity Payments (per \$10,000)	0.002*	0.001	1.824
Crop Insurance (per \$10,000)	0.039***	0.006	6.553
Northern Region ^a	15.229***	1.497	10.173
Central Region ^a	-7.337***	1.605	-4.571
R ²		0.934	
Degrees of Freedom		51	

^aThe southern region was selected as the base region.

*, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 6. Effect of Commodity Payments, Crop Insurance, Crop Revenues, and Region on the Usage of Cash Rent Leases (Model 2)

Parameter	β	Std. Error	t
Intercept	22.165***	1.741	12.731
Commodity Payments (per \$10,000)	0.002**	0.001	2.081
Crop Insurance (per \$10,000)	0.039***	0.006	6.498
Corn Revenue (\$/acre)	-0.009	0.006	-1.523
Soybean Revenue (\$/acre)	0.015*	0.008	1.895
Northern Region ^a	15.934***	1.373	11.607
Central Region ^a	-6.598***	1.452	-4.546
R ²		0.917	
Degrees of Freedom		53	

^aThe southern region was selected as the base region.

*, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively.