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Impacts of Lease and Tenure Arrangements  
on Landlords and Farm Operators

by

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#### ABSTRACT

Least squares analysis of variance is applied to cross-sectional and time-series farm data to provide insight on the impacts of different lease and tenure arrangements on earnings of operators and landlords. Tenure and lease arrangements significantly affected gross farm returns and margins of operators. Lease arrangements were significant for landlord margins in the late 1970's.

Impacts of Lease and Tenure Arrangements  
for Landlords and Farm Operators

In recent decades, the proportion of farmland in the United States being cultivated under various tenure arrangements has changed. The amount of farmland operated by full-owner operators declined from 37.1 percent in 1935 to 34.7 percent in 1982 (U.S.D.A.). The share of land farmed by part-owners increased from 25 percent to 54 percent while pure tenancy dropped from 32 percent to 12 percent during the same period. Recent growth in farm size appears to be occurring more through the use of leasing than land purchase.

The current financial condition of agriculture has contributed to renewed interest in developing innovative methods of financing which may help to alleviate present problems as well as preventing their reoccurrence. A significant amount of recent work has centered around the investment of external equity capital in the form of land purchase and subsequent lease-back to farm operators (Collins and Bourne; Fiske, Batte and Lee). The returns to investors come in the form of current returns (some form of rental income) and capital gains (losses) on land price appreciation (depreciation). The form of rental arrangement chosen could affect the risk-return characteristics of the land investment. The benefits of lowering debt levels are widely recognized (Barry and Baker). Moreover, farmers are concerned with the cost of alternative methods of obtaining control of assets and their overall impact on the business' risk-return characteristics.

Replacement of asset purchase with leasing may alter a farm businesses risk-return characteristics. Leases carry a unique form of risk not associated with ownership, namely the loss of control of an asset. By replacing owned land with leased land, the farmer increases risks associated with losing control of an asset (lease risk) while lowering risks associated with decline in asset value (ownership risk). Further, leases may change financial risks by altering annual cash commitments.

Leasing and tenure literature has developed along two different lines. One body of work has been focussed on explaining the existence of different lease and tenure arrangements. The second has related to the efficiency of resource allocation under different arrangements. The recent literature in agricultural economics has dealt with both areas (Sutinen, Braverman and Stiglitz) although empirical work has been most closely related to the latter (Apland, Barnes and Justus; Pederson).

The predominant lease types in commercial agriculture are crop share and cash rental. Share and cash rental arrangements display different risk-return characteristics. Share leases are characterized by a positive correlation between ability to pay and magnitude of rental costs. As such, they distribute production and market risks between the farmer and landlord. Cash rental traditionally provides little flexibility in financial commitment. Results from programming and simulation studies (Pederson; Pederson and Bertelsen) show that operators' expected returns and variability of returns are lower with share leases than with fixed cash leases. Share leases reduce expected returns because above average returns are shared with the landlord. The form of lease and tenure chosen may also affect tenant motives and production choices (Apland, Barnes and Justus).

Both farmers and investors should be interested in quantification of the relative impacts of different lease and tenure arrangements on farm profitability and risk. Programming and simulation studies provide useful information on the interrelationships between variables which affect the risk-return characteristics of different leasing and tenure forms.

Investors however, tend to rely heavily on past experience in the formation of their expectations for the future performance of potential investments. The analysis of the actual relative performance of different arrangements is quite important.

The impact of tenure arrangement and lease type on the behavior of managers and the performance of farm businesses is of interest to farmers and investors. To date, there has been little opportunity to conduct such an investigation. This paper presents the results of an analysis of cross-sectional and time-series firm level data to provide some insight on the actual impact of different tenure and lease arrangements. Specifically, the analysis reported here concentrates on the relative performance of different lease and tenure arrangements from the perspective of farm operators and landowners.

#### Data

A data sample derived from the Illinois Farm Business Farm Management (FBFM) records is employed in the following analysis. The data set contains continuous observations for a ten year period, 1976-1985, on a sample of 158 Illinois cash grain producers. All farms in the sample had more than 95 percent of their land base available for crop production and less than 5 percent of farm receipts came from livestock sales. Thus, these farms are fairly typical of commercial grain farms in Illinois.

Farms are classified according to tenure arrangement and predominant lease type. Tenure categories include all-owned (no rented land), all-rented (rented land represents at least 95 percent of tillable acres) and part-owned. Those farms with rented land are classified as either cash rent or crop share. The above classification produces a data set with a low of 148 farms in 1985 to a high of 156 in 1978. A further classification is made for the purpose of time-series analysis. Farms which maintained the same lease-tenure arrangement for at least 8 of the 10 years are included. The eight year requirement reduces the time-series sample to 118 farms.

### Analysis

Four variables are selected for analysis. A description of these variables follows.

1. Farm size - measured by tillable acres.
2. Production levels - per acre corn and soybean yields.
3. Gross Farm Returns - per acre crop receipts and government payments adjusted for changes in inventory.
4. Gross Margins (per tillable acre) - return above variable operating expenses (Gross Farm Returns - Variable Operating Expenses). Expenses included are fertilizer, seed, pesticide, drying and storage, power and equipment, hired labor, and cash rent and settlements.

Economic variables are adjusted to constant 1982 dollars using the GNP deflator.

All variables are analyzed by least squares analysis of variance (Harvey). Sources of variation are lease type (N=3), tenure (N=3), and their interactions. Those sources of variation with significant ( $P < 0.05$ )

F values are subjected to means separation using the Tukey-Kramer Studentized Range Test (Dunnett). Results of these analyses are discussed in the following section.

### Results and Discussion

Very little variation is found between groups in terms of physical production variables. The increase in number of part-owned farms at the expense of all-rented farms reflects the desirability of land purchase due to large positive gross margins and land price appreciation in the late 1970's. Farms with rented land averaged 600 acres, with a standard deviation of 295, and tended to be larger than all-owned farms which averaged 369 acres in size and a standard deviation of 211. Differences in farm size, for the two groups, is not statistically significant due to the large standard deviations. No differences in crop yield or variability were found.

### Cross-Sectional Analysis

Results from the cross-sectional analysis on operator and landlord gross margins are presented in Table 1. Significant sources of variation are identified in the tables by letter superscripts next to lease and tenure codes. For example, in Table 1 lease type is significant in 1978. The different letters denote that in the means comparison share rent is significantly different from cash rent. Identical superscripts, as in 1976, denote a significant overall F, but no significant differences in the means comparison.

Gross farm returns (not shown in Table 1) for operators were significantly higher for cash rent farms than for share rent farms. Share



rent operators receive some fraction (generally 1/2 to 2/3) of the gross farm returns, whereas pure cash rental operators receive all of the gross returns from the farm. Cash rent is an expense subtracted from gross returns in the calculation of gross margin. Results suggest that all-owned farms had the highest gross returns, part-owned farms were second, while all-rented farms had the lowest gross returns. Lower returns for all rented farms were due to the sharing of revenue discussed above, since the majority of renters were using predominantly share leases.

Operator gross margins did not vary significantly between groups in most years although in the first 4 years returns for cash renters tended to be larger than for share renters. This result could be due in part to conditions in commodity markets. Strong commodity prices (Illinois Department of Agriculture) in the late 1970's made it relatively more profitable for those producers who could sell a higher proportion of their production. At the same time, cash rents based on earlier less profitable years represented a less expensive form of rental (Reiss; Scott). By 1980, commodity markets softened somewhat and sufficient time had elapsed for cash rents to be adjusted upwards, reducing the cost advantage of cash renting. This explanation is supported by the analysis of landlord gross margins which were greater for share leases during the first 5 years of the study.

Comparison of tenure groups reveals fewer differences among operators than landlords. Operator gross margins tended to be higher as the proportion of ownership increased, although resulting in significant differences only in 3 of 10 years. Greater gross margins are due in part to differences in the cost of land acquisition. All-owned farms had no land related expenses in our calculations of gross margin while rented farms paid

for land either through reduced revenues (crop shares) or direct cash payments. Therefore, higher operator gross margins for owned land, indicates returns to land and investment risk. By including interest payments in the calculation of gross margin, the net returns to increased ownership are reduced dramatically, the difference between various levels of ownership being significant only 1 year in 10.

Landlords' gross margins were not significantly affected by tenure. These results suggest two points. First, there is no difference between full-tenants and part-owners in terms of their willingness to pay for control of land. The potential loss of land represents relatively greater risk to the full-tenant who relies entirely on leasing. One might expect that if operators perceive this type of lease risk to be important, full-tenants might be willing to pay higher rents as a form of insurance against lease loss. Our results do not support this idea. The second point of interest relates to the influence of tenure on manager motives. Earlier works have suggested that tenure may in fact alter manager motives in terms of crop selection and allocation of resources during key production periods (Apland, Barnes and Justus). Our results indicate that there was not a sufficient difference in performance between tenure types to affect landlord returns. These results could be investigated more fully if farms with more heterogeneous cropping plans or significant resource restrictions during key production periods were included in the analysis (ie. regions with greater climatic restrictions on the timing of field operations).

The relative variability of operator and landlord gross margins is summarized in Table 1 by the coefficient of variation. Gross margins for both operators and landlords are more variable than gross farm returns in

all cases except full rental cash lease farms which exhibited less variability. No other clear trends exist. A note of caution should be expressed about placing too much emphasis on the coefficients of variation for the all-owned and cash rental groups due to the small numbers of observations.

#### Time Series Analysis

The preceding cross-sectional analysis provides an indication of the year to year changes in gross returns and gross margins for different lease and tenure types. Analysis of 118 farms who maintained the same arrangements over the study period provides an indication of the long term performance of each lease and tenure type.

Over the 10 years in the sample, gross farm returns were greater for cash rent farms than for share farms and larger for operators with a higher proportions of ownership (Table 2). These results reflect the different payment methods in cash rent and share rent farms. Operator gross margins were not significantly affected by lease type but increased with proportion of land ownership, reflecting the lack of land ownership costs in calculation of gross margins. As was the case in the cross-sectional analysis, inclusion of interest charges in gross margin calculations removed the effect of tenure. Moreover, landlord returns and gross margins were unaffected by form of lease or tenure, consistent with the results of the cross-sectional study.

#### Conclusions

Least squares analysis of variance is used to identify effects of lease and tenure arrangements on farm size, productivity, gross returns, and gross

margins. Actual farm data is employed in the analysis to indicate impacts for landlords as well as operators. Data used in the study are from a fairly typical group of corn and soybean farms in central Illinois.

Production levels, production variability and farm size did not vary significantly by lease or tenure arrangement. Yield risk appears to be the same between types of ownership and lease arrangements.

Cross-sectional analysis indicates that operators with cash leases benefited from strong commodity markets during the late 1970's. These operators were willing to pay fixed rents while assuming all the production and cost risk, and earned additional returns to business risk. However, in the 1980's gross margins from crop share leases have been the same as for cash rents with no increase risk. Tenure effects indicate the returns to investment in land. Gross margins were higher for operators of all owned versus part-owned versus all rented farms.

From the landlord's perspective, tenure and lease arrangements did not influence returns significantly. There is no evidence that the tenure form influences rental rates and resource allocation by managers. Future analysis may be able to identify some of these effects more clearly.

Table 1: Mean Annual Operator Margins and Landlord Margins (continued)

Year	Observations	Lease <sup>1,4</sup>	Tenure <sup>2</sup>	Op Margin	C.V. <sup>3</sup>	Lease <sup>1</sup>	Tenure <sup>2</sup>	LL Margin	C.V. <sup>3</sup>
1981	4	NO	O <sup>a</sup>	208	35.5				
	82	SR	PO <sup>b</sup>	94	56.7	SR <sup>a</sup>	PO	123	32.5
	56	SR	AR <sup>c</sup>	72	51.8	SR <sup>a</sup>	AR	119	23.5
	4	CR	PO <sup>b</sup>	127	21.5	CR <sup>a</sup>	PO	101	31.2
	4	CR	AR <sup>c</sup>	80	36.4	CR <sup>a</sup>	AR	119	11.4
1982	4	NO	O	183	17.1				
	86	SR	PO	89	50.7	SR	PO	116	25.3
	51	SR	AR	63	72.2	SR	AR	112	24.7
	7	CR	PO	95	56.2	CR	PO	96	48.3
	3	CR	AR	76	42.2	CR	AR	117	13.3
1983	5	NO	O	237	36.5				
	84	SR	PO	102	64.0	SR	PO	125	32.9
	51	SR	AR	81	59.2	SR	AR	120	32.9
	6	CR	PO	120	14.9	CR	PO	91	35.5
	2	CR	AR	139	69.7	CR	AR	110	24.16
1984	4	NO	O	171	50.7				
	85	SR	PO	72	61.6	SR	PO	101	31.9
	51	SR	AR	63	56.2	SR	AR	105	24.7
	5	CR	PO	86	38.8	CR	PO	81	33.2
	4	CR	AR	55	66.8	CR	AR	106	17.5
1985	4	NO	O <sup>a</sup>	126	26.6				
	87	SR <sup>a</sup>	PO <sup>ab</sup>	98	49.0	SR <sup>a</sup>	PO	119	31.5
	48	SR <sup>a</sup>	AR <sup>ac</sup>	78	45.5	SR <sup>a</sup>	AR	112	24.1
	4	CR <sup>a</sup>	PO <sup>ab</sup>	151	22.2	CR <sup>a</sup>	PO	105	46.7
	5	CR <sup>a</sup>	AR <sup>ac</sup>	96	47.8	CR <sup>a</sup>	AR	129	9.2

1 - Lease Types NO=No Lease SR=Share Rent CR=Cash Rent

2 - Tenure Types O=Owned PO=Part-owned AR=All rented

3 - Coefficient of Variation

4 - Superscripts on lease and tenure categories denote significant overall F values

Different lettered superscripts (a, b or c) on lease or tenure type denotes statistically significant differences between means (P<0.05). i.e. a is significantly different than b which is significantly different than c.

Table 1: Mean Annual Operator Margins (Op Margin) and Landlord Margins (LL Margin)  
By Lease and Tenure Type. 1976 - 1985.

Year	Observations	Lease <sup>1,4</sup>	Tenure <sup>2</sup>	Op Margin	C.V. <sup>3</sup>	Lease <sup>1</sup>	Tenure <sup>2</sup>	LL Margin	C.V. <sup>3</sup>
1976	2	NO	O	284	29.4				
	69	SR <sup>a</sup>	PO	183	37.5	SR <sup>a</sup>	PO	182	33.6
	70	SR <sup>a</sup>	AR	144	42.0	SR <sup>a</sup>	AR	182	27.8
	7	CR <sup>a</sup>	PO	192	33.6	CR <sup>a</sup>	PO	164	45.6
	4	CR <sup>a</sup>	AR	261	53.9	CR <sup>a</sup>	AR	105	24.8
1977	3	NO	O	259	22.2				
	68	SR	PO	120	48.8	SR	PO	127	30.0
	70	SR	AR	89	65.2	SR	AR	137	21.7
	7	CR	PO	139	16.3	CR	PO	118	31.3
	4	CR	AR	149	23.4	CR	AR	103	18.7
1978	3	NO	O	266	34.9				
	72	SR <sup>a</sup>	PO	150	38.8	SR <sup>a</sup>	PO	155	24.3
	70	SR <sup>a</sup>	AR	100	50.6	SR <sup>a</sup>	AR	153	23.3
	8	CR <sup>b</sup>	PO	183	19.2	CR <sup>b</sup>	PO	117	32.4
	3	CR <sup>b</sup>	AR	206	12.8	CR <sup>b</sup>	AR	113	30.2
1979	2	NO	O <sup>a</sup>	327	31.9				
	80	SR <sup>a</sup>	PO <sup>b</sup>	170	37.9	SR <sup>a</sup>	PO	167	27.7
	64	SR <sup>a</sup>	AR <sup>c</sup>	122	34.0	SR <sup>a</sup>	AR	173	20.2
	6	CR <sup>b</sup>	PO <sup>b</sup>	216	16.2	CR <sup>b</sup>	PO	97	34.3
	4	CR <sup>b</sup>	AR <sup>c</sup>	178	47.4	CR <sup>b</sup>	AR	136	36.3
1980	3	NO	O	246	26.6				
	84	SR	PO	131	58.8	SR	PO	145	33.0
	56	SR	AR	101	51.2	SR	AR	142	30.3
	6	CR	PO	118	89.7	CR	PO	101	34.9
	6	CR	AR	167	43.5	CR	AR	127	22.9

1 - Lease Types NO=No Lease SR=Share Rent CR=Cash Rent;

2 - Tenure Types O=Owned PO=Part-owned AR=All rented;

3 - Coefficient of Variation;

- Superscripts on lease and tenure categories denote significant overall F values;

Different lettered superscripts (a, b or c) on lease or tenure type denotes statistically significant differences between means (P<0.05); i.e. a significantly greater than b which is significantly greater than c.

Table 2: Mean Gross Farm Returns and Margins for Operators and Landlords by Lease and Tenure Type. 1976 - 1985.

	Observations	Lease <sup>1,4</sup>	Tenure <sup>2</sup>	Mean	C.V. <sup>3</sup>
Operator Return	2	NO	O <sup>a</sup>	317	28.3
	65	SR <sup>a</sup>	PO <sup>b</sup>	237	27.8
	49	SR <sup>a</sup>	AR <sup>c</sup>	195	24.9
	2	CR <sup>b</sup>	PO <sup>b</sup>	386	19.5
Operator Margin	2	NO	O <sup>a</sup>	199	35.9
	65	SR	PO <sup>b</sup>	119	58.1
	49	SR	AR <sup>c</sup>	91	57.9
	2	CR	PO <sup>b</sup>	173	32.8
Landlord Return	65	SR	PO	165	30.7
	49	SR	AR	169	26.9
	2	CR	PO	124	21.9
Landlord Margin	65	SR	PO	136	35.1
	49	SR	AR	135	31.1
	2	CR	PO	118	23.3

1 - Lease Types NO = no lease SR = share rent CR = cash rent

2 - Tenure Types O = all-owned PO = part-owned AR = all-rented

3 - Coefficient of Variation

4 - Superscripts on lease and tenure categories denote significant overall F values; Different lettered superscripts (a, b or c) on lease or tenure types denotes statistically significant differences between means ( $P < 0.05$ )

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