Farm Tenancy in the Antebellum Northern United States

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I. Introduction

Within the past decade, there has been a renewed interest by economists in agricultural tenancy.(1) Contributions include both theoretical construction of the cause and consequence of farm tenancy, and empirical tests against historical data. The sharecropping in the post Civil War southern United States has been given particular attention, as the economy of the postbellum South went through recent attempts of reinterpretation.(2)

In contrast, the research on tenant farming in the North was not revived with comparable strength. Cogswell(1975) and Winters(1978) dealt with the age-old debate between the "speculator thesis" and the "agricultural ladder thesis." The former thesis was that speculators and large estate-holders took advantage of the federal land policies, thus concentrated landholdings and exploited the tenants; the latter pronounced that the tenancy was a viable and efficient economic institution, and was a rationally chosen rung of the ladder

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(1) Some of the starters are Johnson(1950), Cheung(1969) and Reid(1973).

(2) See, among others, Higgs(1973, 1974, 1977), Reid(1973, 1979), Ransom and Sutch(1977), Alston(1981), Alston and Higgs(1982), and Wright(1979).

toward the farm ownership.[3] Their works in support of the ladder thesis are examples of refined economic analysis based on carefully collected micro-data, yet they lack the theoretical rigor that accompanied recent works on Southern tenancy. Both inquiries covered only one state, Iowa, and gave far less attention to the antebellum era.

This paper investigates the tenant farming in the Northern United States in 1860, thus fills the temporal and geographical gap in the study of tenancy. The objectives of the present research are: (i) to show in detail demographic and socio-economic characteristics of tenants in comparison to those of owner-operators, and the input-mix, output-mix, and productivity of tenant farming compared to owner-operated agriculture; (ii) to develop an economic model of rental market, and estimate the influence of each factor on the probability that a farm will be tenanted. This will help explain the spatial variation in the tenancy rate at the township level; (iii) to identify and explain productivity difference, if any, between tenants and owner-operators.

The principal findings can be summarized as follows. (i) The characteristics of tenants and the nature of tenant farms as opposed to those of owners and owner farms were distinctly different in the Northeast than in the Northcentral. In the Northcentral region, the tenants were generally younger than owner-operators, and had higher proportion of migrants from out of state. Among foregion borns, English speaking countries were less represented in the tenantry. Tenant farming was smaller in scale, and adopted more labor intensive method of production. Tenant farms produced relatively more corn than wheat or animal

(3) The tenure ladder thesis dates back to the 19th century, and almost uniformly espoused by studies done by the Department of Agriculture in the 1910s and the 1920s. For an early occasion of the opposing view, see William Kent, "Land Tenure and Public Policy," *American Economic Review*, 9 supplement (March 1919); however, see also papers by Spillman, and by Ely and Galpin, and the discussion of them by Stewart, Spillman, and Hibbard that appeared in the same place. During the Great Depression, the speculator thesis gained subscription, filling the pages of the *Report* of the Special Committee on Farm Tenancy in 1937. This view appears dominant in the works by, among others, Gates, *Frontier Landlords and Pioneer Tenants* (Itaca: Cornell University Press, 1945) and other essays contained in Gates (1973), and Shannon(1945); and the ladder hypothesis has been rejuvenated since Bogue (1963) and Danhof(1969).

products. Within the livestock husbandry, swine growing was more of tenants' practice than cattle raising or dairy farming. In the Northeast,on the contrary, none of the above except the age distribution appeared true.

(ii) Lease of a farm was largely determined by economic factors such as relative resource endowments, risk, and transaction costs, although in the Northeast the effect of resource endowments assumed less importance. A good part of the geographic variation in the tenancy rate can be explained by these forces. At the same time, the effect of speculation in the Northcentral region cannot be easily dismissed.

(iii) Tenants had lower labor productivity but approximately 6 percent higher total factor productivity than the owner-operators. However, after adjusted for characteristics of farm and farm operators, the superiority of the tenant production disappears. In other words, tenants appeared more productive because they located on productive farms. This is more prominent in the Northcentral, where the apparent 11 percent higher total factor productivity of tenants can be explained away by the characteristics of each farm. It seems that, other things equal, tenants may have been less productive(by about 7 percent). This suggests that although the institution of farm leasing on the whole functioned reasonably well, the higher productivity may have originated elsewhere. For the Northeast, the farm characteristics can explain away the apparent 4 percent lower total factor productivity of tenants. These regional differences in the working of the institution, tenancy, may have reflected different market environments where it operated.

The above set of objectives and findings occupy one section each in the rest of the paper. In addition, section II contains the description of the data employed, and section IV, the conclusion of the paper.

II. Characteristics of Tenant Farming

The data that this study is based on is a sample of 21,118 rural households

taken from the manuscript census of 1860 under the direction of Fred Bateman and James D. Foust. The sample covers all households in a single township from each of 102 randomly selected counties, scattered across 16 northern states.(4) It is extremely useful for my purpose because it contains agricultural production data linked with the demographic and economic information of the farm operators.

As discussed at length in Yang(1984a), one can identify tenant farmers from owner-operators in the sample,despite that the census enumerators were not asked to take the tenure status of farmers until 1880. Briefly, those farmers that were listed with full production data in the agricultural schedules but reported no real property in the population schedules are considered unquestionable tenants, while there may have existed other types of tenants who were not listed in the agricultural schedules. I confine my attention to the farmers reported in the agricultural achedules only, classifying them into tenants and owner-operators according to the status of the real property holding.(5)(See Appendix Tables A1, A2 and A3)

Out of 11,940 households with agricultural production information in the sample, 3,382 were excluded from the analysis for one or more of the following reasons: 1) they were in the slave states, Missouri and Maryland; 2) household heads had nonfarm occupation(6); 3) they had no information needed to estimate labor input—either due to inability to match the population schedule with the agricultural schedule in the sampling process or other errors; 4) the number of household members that appear in the population scheldule differs by more than one from the size of household enumerated as a separate variable; 5) they reported no improved acreage or the value of farm; 6) they did not report the

(4) Bateman and Foust(1974). Also See Yang(1986).

(5) These are type A and type B farmers, respectively, as defined in Yang(1984a), Table 1, which is reproduced as Table A1 below.

(6) This criterion was absent in Yang(1986), where the objective of the investigation was the agricultural production on the whole, whether the farm operator was owner-farmer, tenant, or non-farmer by occupation. Here, eliminating the nonfarmer headed farms will help distinguish clearly the tenant farming from the owner-operated agriculture.

value of implements; 7) they had no farm output; and 8) they had obvious recording errors for key variables. This left me with 7,740 owner operated farms and 818 tenant farms.

According to the method of sharing the input supplies and the distribution of products, tenant farms can be further classified as share cropping, share renting, cash renting, and so on.(7) However, these types of lease contracts are not identifiable from the census data of 1860, hence throughout the research tenants will be regarded as a single entity. The neglect of the composition of cash and various share renters within the tenantry may cause a systematic bias in the geographic comparison of tenancy rate and productivity, if the method of sharing had a tendency to vary with the principal crop of the area. A partial recognition of this problem would be the treatment of the Northeast and the Northcentral separately. On average, however, the terms of share contract did not differ very much over crop regions.(8)

Characteristic features of tenants and tenant farms are summarized in Tables 1, 2 and 3, in comparison with owner-operated farms. Sex and race composition of household heads are not reported because female headed households were minimal (about 4 percent), and colored farmers were practically nonexistent. In the North around 1860, farmers were virtually all white, bearing little

(7) Studies by the Department of Agriculture during the 1910s and 1920s reported variety of terms under which farms were leased. From the northwestern wheat belt at least six major classes of renting were indentified; for the dairy farms in Wisconsin and Illinois, two important types of tenure were described. These and other studies are summarized in, among others, E.A. Goldenweiser and Leon E. Truesdell, *Farm Tenancy in the United States*, U.S. Bureau of the Census, Census Monograph No. 4 (Washington, D.C.: Government Printing Office, 1924). Generally, cash renters were responsible for supply of labor and all working capital. The contribution of productive factors by landowner increased with the share of the crop he received.

(8) Based on the study of 258 lease contracts and the survey records of 2,907 tenant farms, a Department of Agriculture bulletin reported the pattern of renting farms according to crops. Although with considerable variation, the most frequent share of landlord was one half for corn, hay, and potato, and one third for wheat, peas and beans, when the work stock, machinery and labor were furnished by tenants. The products of breeding and milking dairy cattle, and of raising beef cattle and hogs, were divided half and half when the expenses for working capital were shared equally. E.V. Wilcox, *Lease Contracts used in Renting Farms on Shares*. U.S. Department of Agriculture Bulletin No. 650(Washington, D.C., Feb. 26, 1918).

Table 1. Age Distribution by Tenure and Nativity Rural North, 1860

Age	North		Northeast				Northcentral			
	Owner	Tenant	Owner	Tenant	Natives	Foreign	Owner	Tenant	Natives	Foreign
~29	11.3	27.3	8.8	26.9	10.1	7.9	12.9	27.4	15.7	10.2
30~39	27.4	35.2	22.9	28.7	23.0	27.5	30.2	37.5	31.2	30.6
40~49	25.9	21.3	24.9	26.4	25.0	25.3	26.5	19.4	24.9	28.4
50~59	21.2	11.2	23.8	13.0	23.2	20.8	19.5	10.6	17.8	21.0
60~69	10.9	4.9	13.9	5.1	13.3	12.9	9.0	4.8	8.5	8.9
70~	3.3	0.1	5.7	0.0	5.3	5.6	1.9	0.2	1.9	0.9
Number of Farms	7,740	818	2,959	216	2,997	178	4,781	602	4,170	1,213

Source: computed from Bateman-Foust sample.

Table 2. Tenancy Rate by Place of Birth Rural North, 1860.

Birth Place	North			Northeast			Northcentral		
	Owner	Tenant	Tenancy Rate	Owner	Tenant	Tenancy Rate	Owner	Tenant	Tenancy Rate
Total	7,740	818	9.56	2,959	216	6.80	4,781	602	11.18
Born In-state	3,075	290	8.62	2,364	185	7.26	711	105	12.87
Born Out-of-state	3,393	402	10.59	437	11	2.46	2,959	391	11.68
Foreign Born	1,267	124	8.91	158	20	11.24	1,109	104	8.57
English speaking	599	48	7.42	109	14	11.38	490	34	6.49
Bristish Isles	289	18	5.86	63	2	3.08	226	16	6.61
Ireland	274	24	8.05	40	9	18.37	234	15	6.02
Canada	35	6	14.63	6	3	33.33	29	3	9.38
Others	1	0	0.00	0	0	—	1	0	0.00
Low Countries	122	2	1.61	0	0	—	122	2	1.61
France	30	3	9.09	4	0	0.00	26	3	10.34
Germany	403	39	8.82	30	4	11.76	373	35	9.38
Switzerland	31	4	11.43	14	2	12.50	17	2	10.53
Northern Europe	75	27	26.47	0	0	—	75	27	26.47
Others	7	1	12.50	1	1	50.00	6	0	0.00
At Sea	1	0	—	0	0	—	1	0	—
Unknown	4	2	—	0	0	—	4	2	—

Source : computed from Bateman-Foust sample.

connection with racial problem, which was the focus of attention in the study of postbellum Southern tenancy.

Foreign borns were represented more on tenant farms in the Northeast, while the opposite was true for the Northcentral. As is shown in Table 1, the lower precentage of tenancy of foreign borns in the Northcentral than the natives was

partly due to the fact that the foreign born farmers as a group were considerably older than the native farmers. Among foreign borns, immigrants from English speaking countries had lower tenancy rates.

Table 1 reaffirms the time-old observation that the tenant farmers were younger in age than the owner-operators. This age gap was frequently interpreted in support of the agricultural ladder thesis.[9] It is more conspicuous in the already fully settled Northeast, but as will be discussed in the next section, age had more significant influence in the Northcentral, where probably the tenancy was more of a convenient way of approach to full ownership while the settlement was still in progress.

In Table 3, another measure that might have an implication on the agricultural ladder thesis is reported, that is, the length of in-state-residence. The census schedules did not include the question on the years of residency, but one can obtain a range of the length for which the farm operator could have resided in-state, from the age and birth place of the children of each household. If the household head was not born in the state of residence, then normally the age of the oldest child born in state sets a lower bound on the years of residency, and the age of the youngest child born out of state sets an upperbound.[10] If no children were born out of state, then the age of the household head is the maximum length of residence. If no children were born in state, then the minimum residency is zero. In case the household head was born in state, then both the maximum and the minimum length of residency are his age. The average of the maximum and the minimum was taken as the probable period of residency. Since the range between the two is fairly wide(averaging about 14 years), and the family relation had to be reconstructed(census did not collect the information on family relation), this measure is subject to a substantial measurement error.[11] It is clear, however, that the tenants had

(9) For recent examples, see Winters(1978) and Reid(1979).

(10) There are very few odd cases in the Bateman-Foust sample such as intermediate children born in state but first and last born out of state.

(11) Similar measure was employed by Cogswell(1975), ch. 6. The family relation was reconstr-

shorter period of residency than the owners.

The outputs, inputs and productivity as reported in Table 3 were measured following the procedure described in detail in Yang(1986). Physical units of crop outputs reported in the agricultural schedules were converted into dollar terms by adjusting for seed and feed allowances and weighting with 1860 national prices from Towne and Rasmussen(1960). Meat output was computed by multiplying the number of heads of meat animals by their respective slaughter-to-live ratio,their average live-weight,and their price per pound of live-weight. Capital was measured by the value of implements and machinery; land was measured by the value of farm. Both were taken directly from the agricultural schedules. The locational component of the land value was estimated as r_2 per acre from the regression of the land value as a linear function of improved acreage and unimproved acreage as below (see Fogel and Engerman, 1977).

$$F=r_1I+r_2U$$

The locational component($r_2(I+U)$) was removed from the farm value(F) to make an adjusted land input(T). The labor input was estimated in equivalent full hands using the information in the population schedules. In order to convert the farm population counts into equivalent hands, I used the same age/sex weights as those employed by Fogel and Engerman (1977, p. 277) for the Southern labor. These weights were obtained from slave earnings profile, and in turn multiplied by the assumed labor force participation rate of 1.0 for male and 0.25 for female. Labor input estimates are likely to be downwardly biased(as much as 25 percent) because hired hands were not counted, but it may not be very serious in comparison between the tenure categories.[12]

ucted essentially following the method of Easterlin et al. (1978), with some minor variations. Households were classified into three headships: husband-wife headed, other male headed, and female headed. The recognition that all the property holding members of household were listed before the non-property-holders saved many unnecessary steps such as identifying grandparents and stepchildren. Restriction on the age differentials between spouses and between mother and children were slightly loosened.

(12) If we choose to allocate the hired hands available outside farms proportionally to the improved acreage of each farm, the downward bias of the labor input measure is estimated to be

Table 3. Some Average Measures by Land Tenure Status Rural North, 1860

	North		Northeast		Northcentral	
	Owner	Tenant	Owner	Tenant	Owner	Tenant
Number of Farms	7,740	818	2,959	216	4,781	602
Age	44.7	37.6	47.4	38.4	43.1	37.3
% Born In State	39.7	35.5	79.9	85.6	14.9	17.4
% Born Out of State	43.9	49.3	14.8	5.1	61.9	65.3
Foreign	16.4	15.2	5.3	9.3	23.2	17.3
Length of Residency(year)	29.7	22.5	42.3	35.5	22.0	17.9
Real Property	$3,315	0	4,052	0	2,859	0
Personal Wealth	$941	497	1,260	864	744	365
Acreage Improved(I)	74.4	58.8	84.8	80.5	67.9	51.0
Unimproved(U)	55.5	53.0	33.9	41.4	68.9	57.2
Value of Farm(F)	$3,126	2,342	3,897	4,199	2,649	1,676
adjusted for location(T)	$2,746	2,039	3,277	3,562	2,418	1,493
Value of Machinery(K)	$117	85	142	141	102	64
Value of Livestock(V)	$481	344	555	514	434	283
Labor(L) Equivalent Hand	1.58	1.44	1.54	1.48	1.60	1.43
F/(I+U)	24.06	20.95	32.83	34.45	19.36	15.49
K/I	1.574	1.440	1.676	1.754	1.496	1.263
(K+V)/I	8.032	7.293	8.223	8.142	7.892	6.814
L/I	.0212	.0245	.0181	.0184	.0236	.0279
Output(Q)	$588	527	582	561	592	515
Q/I	7.907	8.966	6.867	6.973	8.719	10.098
Q/T	.2141	.2585	.1776	.1575	.2448	.3449
Q/K	5.025	6.226	4.099	3.975	5.827	7.997
Q/L	372.8	366.2	459.0	462.5	369.3	361.4
Total Factor Productivity Index (Owner=100)	100.0	106.2	106.3	102.6	104.5	116.9
Output(Q)	$588.3	527.2	582.3	561.3	592.0	515.0
($ Value)						
Beef	75.4	49.3	83.2	71.5	70.7	41.4
Dairy	117.2	78.8	200.6	183.4	65.5	41.3
Pork	114.5	98.7	53.6	81.6	152.2	104.9
Wool	8.1	3.1	12.9	7.0	5.1	1.7
Corn	161.4	231.2	53.0	73.7	228.6	287.7
Net Corn	88.4	162.2	49.9	41.5	112.2	205.5
Wheat	84.2	68.7	35.2	58.5	114.5	72.3
Rye	7.8	4.8	16.9	13.6	2.2	1.6
Oats	10.7	8.3	17.4	19.2	6.6	4.3

Tobacco	8.6	6.7	.3	.0	13.7	9.1
Peas and Beans	.9	.6	1.7	1.1	.4	.4
Irish Potato	18.6	12.4	27.9	21.3	12.8	9.2
Sweet Potato	.5	.6	.0	.1	.9	.6
Barley	3.1	2.3	6.7	6.3	1.0	.8
Buckwheat	5.1	4.0	10.2	10.6	1.9	1.7
Hay	22.4	14.1	31.4	22.3	16.9	11.1
Hops	4.6	2.0	11.9	7.5	.0	.0
Orchard Product	12.8	5.9	17.4	7.9	10.0	5.1
Home Manufacture	3.1	1.8	1.3	1.1	4.2	2.0
Market Garden Product	2.2	3.0	3.8	6.9	1.1	1.6
Corn/Q	.274	.439	.091	.131	.386	.559
Netcorn/Q	.150	.308	.086	.074	.190	.399
Wheat/Q	.143	.130	.060	.104	.193	.140
Animal Product/Q	.536	.436	.602	.612	.496	.368
Pork/Animal Pdt.	.373	.435	.159	.242	.528	.559

Note: Total factor productivity was computed by taking geometric average of Q/L, Q/K and Q/T with the weights of .63, .05, and .32, which were derived from the factor shares in total cost. See Yang (1986) for more detail.

Source: Computed from Bateman-Foust sample

Looking at the input-mix and output-mix by tenure in Table 3, one is startled by the difference between the Northeast and the Northcentral regions. The scale of farming (improved acreage) was smaller for tenants than owners in the Norhcentral but not in the Northeast; average value of tenant farms was greater than that of owner operated farms in the Northeast. Tenants' investment in machinery and livesteck was far less than owners' in the Northcentral but not in the Northeast. As a consequence, tenants had higher capital and land productivity and lower labor productivity than owners in the Northcentral but just the contrary in the Northeast. Tenants had 4 percent lower total factor productivity than owners in the Northeast but 11 percent *higher* in the Northcentral. Tenants had greater proportion of corn and smaller proportion of wheat and animal products in output than owners in the Northcentral

20 percent for owner farms, and 18 percent for tenant farms. The influence of this differential bias on the productivity comparison between owner and tenant turns out to be negligible.

(13) It is noteworthy that the Bateman-Foust sample does not cover urban townships, where the growth of the labor intensive market gardening led to an increase in tenancy, especially in the Northeast. "High land values in connection with ready markets produced tenancy near

but not as such in the Northeast.[13] These figures suggest that the institution of tenancy operated differently in the two regions.

Differential crop mix and the input composition by tenure status have been observed and given tentative explanations. Lower livestock investment, emphasis on swine within the livestock, and higher corn share on the part of tenants were often interpreted as rational, maximizing behavior of tenants.

> Since tenants were generally in a poorer capital position, they were unable to invest in livestock to the same extent as owner-operators. Moreover, meat production provided a slower turnover on investment than did grain production. It took two to three years to fatten a steer for a market and about half the time for a pig.... Renters were likewise reluctant to make investments in dairy cattle or sheep that would be difficult to liquidate if their leases were not renewed.[14]

The above statement is based on implicit assumptions with regard to the state of capital market, terms of lease contract, and the attitude toward risk. In any case, the Northeast showed a pattern almost contrary to what the above quote would predict. In order to sharpen our understanding, a more elaborate theoretical model needs to be developed and the farm level data needs to be given a closer look. The empirical part of the next two sections will deal with the Northeast and the Northcentral separately, in order to examine the regional differences in institutional setting within which the tenant farms were operated.

III. Economics of Rental Market

Economic Theory of farm tenancy was developed from various angles. Some writers emphasized relative resource endowment, others gave more weight to risk and transaction costs as determinants of contractual mix. They all assume that the contractual forms are determined by a market process of interacting

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the large cities, a condition of land tenure almost unknown elsewhere in the North. Many of the truck farms were leased by immigrants, who had learned gardening in Europe." Bidwell and Falconer(1925), p. 242.

(14) Winters(1978), p. 40.

demand and supply, and not by custom or unilateral forces of planters. Thus they are not competing, but complementary hypotheses explaining the tenure choice. However, most previous empirical tests were focused on a particular aspect of the market, that were singled out by each of the different theories.[15] In this paper, a market equilibrium model is developed and tested, which simultaneously incorporates as many of previously identified explanatory variables as is feasible.

The model below follows the spirit of Lucas(1979), Alston(1981), and Currie(1981). It is somewhat loosely constructed, but depending on the assumptions about the state of the market, one can generate formal demand and supply schedules from utility maximization of the interacting agents. Transactions in the rental market involve bilateral contracts whereby the landowner transfers to a tenant the right to use a unit of land in return for an agreed rental payment. We may assume, following Currie(1981), that each owner has some "reservation rent," defined as the minimum rent he is prepared to accept for leasing his unit, and that each prospective tenant farmer has some "limit rent," defined as the maximum rent he would be prepared to pay for an operating unit. The lower the reservation rent of the owner, and the higher the limit rent of the prospective tenant, the more transactions will take place in the rental market, and the precise contract rent will be set at market clearing level. In other words, the two equation system,

$$T^d = T^d(R_r - R)$$

$$T^s = T^s(R - R_l)$$

can be solved to a reduced form,

$$T = T(R_r, R_l),$$

where T denotes the extent of tenancy(probability if individual level), R_r reservation rent, R_l limit rent, R actual contract rent, and superscripts d and s

(15) For a survey of the literature, see for example Alston and Higgs(1982). The recent empirical tests are: Reid(1979), Wright(1979), Winters(1978) on tenure ladder; Higgs(1973, 1977) on risk sharing; Alston(1981), Alston and Higgs(1982), Alston et al.(1984) on enforcement and supervision costs; Hoffman(1984) on balance between transaction costs and risk premium.

denote demand for and supply of tenant farmers respectively, with $\partial T/\partial R_r<0$ and $\partial T/\partial R_l>0$.

Now the problem reduces to identifying the determinants of reservation rents and limit rents. The reservation rent of a landowner reflects his choice between leasing and hiring farm laborers. It will depend on his resource endowments, and on the specific nature of the farming unit he owned. The more human capital he has, holding land, etc. constant, the more likely the owner will operate the farm himself, when the capital is agriculture specific, with little transferability to nonfarm production. The reservation rent will be higher because he would want to compensate for the lower earnings of his nonland resources in the alternative employment. The accumulation of managerial expertise in farming, and of the work stock and tools, was the most frequently cited driving force of a farmer ascending the tenure ladder from wage hand to cropper to share tenant to fixed payment renter to owner-operator. The proxies for human capital chosen from the manuscript census data are age, literacy, nativity, and the constructed measure of the length of residency. (Sex and race were excluded for lack of dispersion; Northern farm operators in 1860 were virtually all white males.) Physical capital was measured by the personal property variable, since it mainly consisted of livestock and implements.

The nature of farming unit he owned influences the landlord's demand for tenant farmers through two major channels, that is, risk and transaction costs. Assuming risk aversion, the higher the risk attached to the operation of his farm, the lower his reservation rent will be. For, when he works his own farm, he should bear all the risk, whereas he bears only a part of the risk when he rents out the farm. Variance of yields and prices will be a good measure of the risk, but the cross-sectional measure of the variance of farm income is not yet readily available. Here, crop-mix may serve as a proxy. Corn growing was long regarded as a less risky business. While wheat was vulnerable to disease, insects and harsh weather, and demanded shorter harvest period, corn was a hardier crop. As early as 1843, an English pamphlet to emigrants

noted: "It is not like other grain easily injured; but once ripe, there it stands, setting at defiance rain, frost, snow, and avery[sic] vicissitude of climate, often through great part of winter."(16) While the price of corn fluctuated widely (usually along with the price of hog), it did no more than the wheat price; major drops in the corn price did not occur until 1861. Thus, the proportion of corn acreage in the total cropland can be taken as an index of risk (in opposite direction). The estimated value of corn product divided by the value of total farm output was employed instead, as the 1860 census did not collect the crop acreage information.(17)

The costs of hiring, enforcing and supervising wage labor grow disproportionately as the size of the workforce increases, since the supply of enforcement and supervision may be inelastic. Hence, the size of farm(improved acreage) provides a measure of the costs of using hired labor in operating a farm. "Tenant farming tends to increase where the average acreage per farm is large, and methods of cultivation relatively simple."(18)

To summarize, the reservation rent can be expressed as

$$R_r = R_r(\overset{+}{AGE},\ \overset{+}{LITERACY},\ \overset{?}{NATIVITY},\ \overset{+}{LENGTH\ OF\ RESIDENCY},$$
$$\overset{+}{PERSONAL\ PROPERTY};\ \overset{+}{CORN\ SHARE},\ \overset{-}{IMPROVED\ ACREAGE}),$$

where the first set of variables are personal characteristics of the landowner, and the second set are the characteristics of the farm. Expected direction of

(16) William Oliver, *Eight Months in Illinois: with Information to Emigrants* (New Castle upon Tyne, 1843), p. 85, cited in Bogue(1963), p. 129.

(17) Corn production may capture merely the animal feed raising. However, since the share of animal products in the total output will enter the regression equation, the estimated coefficient of the corn share variable will reflect the marketed corn crop only. Table 3 shows that the proportion of marketable corn in the gross corn output was higher in tenant farms than in owner farms. Alternatively, the corn product net of animal feed can be used instead of the gross value of the corn output, which would not make the result much different.

(18) Bizzell(1921), p. 175. This relation is discussed at some length in *ibid.*, ch. 14. Alston et al. (1984) suggests, however, that there may be economies of scale in supervision up to a point. Alston also pointed to me in a correspondence that the Mid-west was characterized by higher percentage of kin-tenants. This would surely affect supervision costs but it is not clear how or if it influenced contractual mix. It is hoped that regression by separate region may circumvent this issue.

influence is shown by a sign above each variable.

The limit rent of a prospective tenant is more difficult to analyze, since his choice alternative to the renting a farm unit includes both becoming a hired farm worker or working outside agriculture, and purchasing a farm for his own. I confine my attention to the choice between renting and buying a farm, because I work with the farm level data, comparing owners and tenants only. It is equivalent to assuming that the labor market condition is the same across geographic regions, which may casue a problem when explaining the spatial variation in tenancy rate. (See the discussion of Table 5 below.)

Relative resource endowments and the nature of farm again play their role in determing the limit rent. Those who had sufficient amount of managerial expertise, work stock and implements will have a lower limit rent, while those with less human capital will desire to receive advice and monitor from the landlord, and their willingness to pay for this will give them a higher limit rent. Assuming risk aversion, the limit rent will be lower for the farm that involves riskier operation. Therefore, all the variables representing resource endowments and risk enter as arguments influencing the limit rent.

Because of the limited length of the lease, the limit rent of a prospective tenant will be lower for the farm where the principal operation needs long-term investment, for example building and maintaining the barns, silos, cribs, and fences necessary for stock farming. I chose two variables to measure the impact of the short term lease, namely, the share in output of the value of beef product, and of the total animal products(beef, pork, and dairy). Beef share is supposed to capture the longer period of raising beef cattle than swine, and total animal products, the longer time of raising livestock than other food crops. (19)

Now the limit rent can be expressed as

$$R_l = R_l(\overset{-}{AGE},\ \overset{-}{LITERATY},\ \overset{?}{NATIVITY},\ \overset{-}{LENGTH\ OF\ RESIDENCY},$$

(19) When interpreting the estimated coefficients, these two variables should be considered together, since they are closely related each other.

$$\overset{-}{PERSONAL\ PROPERTY};\ \overset{+}{CORN\ SHARE},\ \overset{-}{BEEF\ SHARE},$$

$$\overset{-}{ANIMAL\ PRODUCTS}),$$

where the first set of variables are personal characteristics of the prospective tenant, and the second set are the characteristics of the rental farm in the market. The signs above the variables show the expected direction of influence.

There are other forces affecting the rental market that do not work directly through the demand or supply. Among those discussed for a long time are the price of land per acre and the availability of public lands. The relation between land price and the tenancy is somewhat complicated to analyze, although the positive correlation between the two has been long observed and discussed.(20)

To the extent that farm value capitalizes the productivity of the land and the proximity to market, and that the prospective tenants perceive as such, the limit rent will be higher. However, the reservation rent of the owner will be higher also. Thus, farm value per acre should enter both the limit rent and the reservation rent equations. These impacts cancel out if the subjective evaluation of the land productivity is the same from owner to tenant.

If, for speculative or other reasons, the price of a farm stays at above equilibrium level, the farm will not be purchased or maintained by a *bona fide* owner operator who will compare the land price to the prospective income stream. As far as the rental market is freer from capital gain motive or a prestige of landownership, one would expect higher tenancy rate on the overvalued farms. I took the farm value per acre to capture this relation.

(20) Early writers correctly identified the relationship, but their discussion frequently was limited to a single aspect. For example, Spillman and Goldenweiser (1916) tried to explain it with a different version of agricultural ladder hypothesis, stating that "where the value of farm land is high a longer time is required for the tenant to accumulate the capital necessary for making a first payment on a farm than where it is low."(p. 335) See also Goldenweiser and Truesdell(1924), ch. 6. Recently, Alston and Higgs(1982) contended that the more valuable the land, the more numerous would be the wage workers than the tenants. This is because, they argued, more valuable lands were given more efforts in supervision, with the decreasing marginal cost of supervising the wage labor. However, this influence, if existed, would have been dominated by other forces that are discussed below.

Availability of public lands is another factor widely discussed as influencing the tenancy. What might be called a version of Frederick Jackson Turner's frontier thesis has argued that where the settlement of desirable new land was in rapid progress, the opportunity of acquiring a land ownership was so wide that there was little room for the rental market to develop. On the other hand, there were speculators and large landholders who took advantage of the federal land policy, who in turn leased out their lands to tenants.[21] The direction of influence of the settlement level cannot be determined a priori, while the sign of the estimated coefficient may discriminate between the two opposing views. I took as the measure of farm settelment the proportion of farm land improved by 1860 in the ever-improved agricultural land in county.[22]

Solving demand and supply equations and adding the two variables considered separately, the reduced form equation becomes

$$T = T(\overset{-}{AGE},\ \overset{-}{LITERACY},\ \overset{?}{NATIVITY},\ \overset{-}{LENGTH\ OF\ RESIDENCY},\ \overset{--}{PERSONAL\ PROPERTY};\ \overset{?}{CORN\ SHARE},\ \overset{+}{IMPROVED\ ACREAGE},\ \overset{-}{BEEF\ SHARE},\ \overset{-}{ANIMAL\ PRODUCTS},\ \overset{+}{VALUE\ PER\ ACRE},\ \overset{?}{SETTLEMENT}),$$

where the expected direction of influence is again shown by a sign above each variable. The expected sign of corn share is ambiguous, since the risk factor decreases both the limit rent and the reservation rent. However, if it is the case that tenants were more risk averse than owners, for the reason that they were less wealthy and had less access to credit market, as Higgs(1974) argued, then the limit rent part would dominate and the positive sign is expected.

The result of farm level regressions is shown in Table 4. The equations were estimated by binary logit technique, with the dependent variable equal to zero

(21) See note 3 for a related discussion.

(22) This measure is à la Easterlin et al.(1978). The index was constructed from decennial census data by dividing the improved acreage in 1860 through the improved acreage of 1870, 1880, 1890, 1900, or 1910, whichever was the largest.

Table 4. Logit Regression of Farm Level Tenancy

Dependent Variable=0 if Owner
=1 if Tenant

	North	Northeast	Northcentral
Intercept	2.0390*	−0.8748	2.1903*
	(1.2230)	(6.1490)	(1.2602)
Log Age	−0.8752***	−2.9276	−0.8574**
	(0.3101)	(2.0814)	(0.3481)
Dummy for Literacy	−0.6198***	−1.0544***	−0.5290***
	(0.1347)	(0.4053)	(0.1472)
Dummy for In-state Born	0.0594	0.4766	−0.1642
	(0.1178)	(0.3777)	(0.1468)
Dummy for Foreign Born	−0.0066	1.2186**	−0.1769
	(0.1413)	(0.5583)	(0.1506)
Dummy for Born in English speaking countries	−0.3423*	−0.3372	−0.5087**
	(0.2000)	(0.5526)	(0.2272)
Log of Length of Residency	−0.4985***	0.6339	−0.4087***
	(0.0984)	(1.4825)	(0.1077)
Personal property	−0.001006***	−0.000345***	−0.002300***
	(0.000106)	(0.000109)	(0.000189)
Log Age times Settlement	−1.2415**	0.8589	−0.9284
	(0.5046)	(2.3272)	(0.6836)
Log Residency times Settlement	0.6158***	−0.6845	0.3860
	(0.2047)	(1.5821)	(0.2402)
Settlement	4.1890**	15.1011*	3.6939
	(1.8314)	(8.5417)	(2.5277)
Settlement squared	−1.3907**	−10.3441***	−1.7689**
	(0.5930)	(3.5747)	(0.7221)
Corn Share	1.2030***	2.4151***	1.4535***
	(0.1514)	(0.5516)	(0.1773)
Improved Acreage	0.001633**	0.003799***	0.001888**
	(0.000718)	(0.001435)	(0.000915)
Beef Share	−0.6018	−3.7532***	−0.1545
	(0.4438)	(1.1703)	(0.4470)
Animal Product Share	0.1982	1.2067***	0.0493
	(0.1373)	(0.3329)	(0.1513)
Value per Acre	0.005794***	0.003047*	0.012119***
	(0.001283)	(0.001663)	(0.003659)
N	8558	3175	5381
Log likelihood	−2406.76	−702.39	−1623.09

standard errors in parentheses
* significant at .10 level
** significant at .05 level
*** significant at .01 level

if owner and one if tenant. Human capital variables were specified in logarithms to allow for the diminishing influence. For the same reason settlement variable was entered with square term; not in logarithm because it is already a ratio

variable closed between zero and one. The interaction terms of age and residency with the settlement were entered to capture the possible differential effect of human capital over the settlement stage.

In the regression for the whole North, every variable is significant at the .05 level with the expected sign except the nativity variables and the variables for stock farming(beef share and the share of animal products). The sign of the interaction terms shows that age gained importance over the settlement stage, while length of residency, the contrary. The Northcentral region shows the same pattern as the North as a whole, except that the interaction terms between human capital and the settlement lose their significance. For the Northeast, however, results are generally poor. All the human capital variables except literacy are insignificant, and the size of the coefficient for the physical capital variable(personal property) is very small compared to that of the Northcentral. Share of animal products has positive sign,indicating that the livestock raising other than beef cattle(probably swine) had attracted tenants.

Lack of significance of the stock farming variables(beef share and animal product share) indicates that the limited length of lease contract may not have influenced very much the attraction of tenants to the rental farms. A Department of Agriculture bulletin published in 1918 observed:

> The landlord almost universally furnishes all materials needed in repairing buildings and fences, and in making other permanent improvements as required, while the tenants furnishes all labor except skilled labor necessary for making the required repairs and improvements. The tenant, however, is commonly paid wages for work on extensive improvements, such as ditching, tile draining, building silos, etc.... In the case of extensive improvements the landlord may supply all labor while the tenant is required to board the laborers.[23]

The same source reported that the annual lease contract was generally renewed repeatedly.[24]

(23) Wilcox (1918), p. 21.
(24) See also Bizzell (1921), pp. 195-196, and Spillman and Goldenweise (1917), pp. 343-346.

Except for the apparent differences in age distribution and the length of residency, the evidence of agricultural ladder does not seem to be revealed in the Northeast. Controlled for the farm characteristics, the relative resource endowment variables lose their explanatory power. One may suspect that the tenure ladder was meaningful only in the area where the settlement is still in progress, and that in the Northeastern region, where agriculture was already declining, the farmers in the lower rung of the ladder were constantly drawn out by the increasingly efficient industrial labor market, and by the lure of westward migration.(25) The age structure of farm operators in Table 1 shows that there were substantially less younger farmers in the Northeast than in the Northcentral.

The value of farm per acre has bigger and more significant coefficient in the Northcentral than in the Northeast. This may have captured the prevalence of land speculation in the newly settled area of the Northcentral. The square term of the settlement variable has a significant negative sign in the equation for the Northcentral, where rapid settlement was still in progess. This, together with the significant negative sign of the land price variable, indicate that the speculator thesis cannot be easily rejected.(26) It seems that the antebellum Northcentral tenancy is difficult to explain with only one side of the story, i.e., the agricultural ladder.

Having tested against the farm level data, I would like to utilize the market equilibrium model of farm rental in explaining the geographic variation of the tenancy rate across townships. Excluding the townships having less than five farms in the sample, rate of tenancy varied from zero to as high as 74 percent. Table 5 shows the results of township level regressions. Since the dependent variable is a proportion closed between zero and one, I transformed it into a log odd ratio form, log [tenancy rate/(1-tenancy rate)], and ran weighted

(25) For related discussions, see for example Field (1978) and Wright (1979).

(26) The role of speculators can also be viewed in a more salutary way. "We can rightly regard the operations of the speculator as a means of sending capital to regions that were desperately in need of it." Bogue (1963), p. 45.

Table 5. Township Level Regression of Tenancy Rate

Dependent Variable: Log Odd Ratio of Tenancy Rate		
Weight: Tenancy*(1-Tenancy) *Number of Farms		
Intercept	37.9359(18.6784)**	71.9157(21.6249)***
Log Age	−9.7646(5.1927)*	−14.1596(5.1489)***
Literacy	−0.9632(1.8728)	− 0.0379(1.7991)
In-state Born	1.0655(1.3727)	−0.8163(1.4605)**
Foreign Born	2.2637(0.9018)**	1.7901(0.8681)
Born in English speaking countries	−4.2391(1.6994)**	−3.3816(1.6336)**
Log Length of Residency	−1.8084(0.7902)**	−1.2696(0.7706)
Personal Property	−0.000240(0.000371)	−0.000249(0.000350)
Log Age times Settlement	2.7364(8.3375)	7.5842(8.0610)**
Log Residency times Settlement	4.2526(2.2696)	5.3079(2.1760)
Settlement	−15.4744(28.5745)	−39.0416(28.2669)
Settlement squared	−7.6150(2.6685)***	−6.0746(2.5791)**
Corn Share	1.7729(0.9048)*	2.1689(0.8659)**
Improved Acreage	0.001596(0.007087)	0.002492(0.006699)
Beef Share	0.1890(4.8503)	2.2931(4.6411)
Animal Product Share	−1.5284(1.5061)	−1.3905(1.4229)
Value per Acre	0.01297(0.00727)*	0.00807(0.00709)
Log Wage		−7.4822(2.6767)***
Degree of Freedom	56	55
R-Square	.503	.564
F Ratio	3.53	4.19

standard errors in parentheses
* significant at .10 level; ** significant at .05 level; *** significant at .01 level

regressions to correct for the heteroscedasticity with the weight, (tenancy rate)* (1-tenancy rate)*(number of farms in each township).

Coefficients of practically all variables have expected sign, and together they explain more than a half of the spatial variation in the tenancy rate. As noted previously, this specification assumed a uniform state of the labor market across geographic areas.

The second equation of Table 5 takes account of the diversity of the labor market condition by including additional variable, wage. The agricultural wage

rates of 1860 by state were taken from Lebergott (1964, p. 539). The higher the wage rate, the lower the limit rent of a prospect tenant will be, since the value of his labor in the alternative employment is higher. Likewise, the reservation rent of a landlord will be lower, because the costs of hiring and enforcing(keeping on his farm for the contract period) the wage labor will be higher. Thus the direction of influence on the overall tenancy rate is ambiguous, and will be determined by the relative sensitivity of the demand and supply in the rental market.[27]

The inclusion of wage decreases the residual variance by about 6 percentage points. The highly significant negative coefficient of the wage variable indicates that the tenant's response was more sensitive to the labor market condition than the owner's.

IV. Productivity Comparison

The behavior of tenants is affected by the nature of rental payment, and by the duration and security of the tenure. A share renter will not supply the efficient amount of input since he chooses the outlay on inputs at which *his* share of marginal revenue equals marginal cost, unless the contract stipulates the exact amount of input to be supplied. This is the famous doctrine of inefficiency of sharecropping espoused from Adam Smith to Marshall.[28] Moreover a farmer on a short term lease will have no interest in long term state of the property, and will concentrate on types of activities which promise immediate benefits(unless given a compensatory payment).

(27) The model of Bardhan and Srinivasan(1971) derives a positive relation between wage and tenancy rate. This came from the uncommon property of their equilibrium solution, where the condition of zero marginal product of land is retained with the concave production function of share tenants. David Newberry pointed out that their equilibrium is not only noncompetitive but also unstable. Modified to meet the existence problem, "the final outcome will depend on the relative strength of the two effects and cannot be predicted a priori." (Newberry, 1975, p. 126)

(28) For a good summary of history of thoughts on the farm tenancy, see for example Bizzell (1921), chs. 3-6; and Johnson(1950).

Economists of our generation have endeavored to formalize the conditions under which share renters behave not less efficiently than owner-operators.[29] Johnson(1950), Cheung(1969), and Reid(1973) argued that if landlords set their tenants' intensity of effort, then the productive efficiency of share tenants is as high as that of owner-operators. Reid(1973) provided an impressive set of evidence that in the postbellum South a variety of devices were used to specify the tenants' labor inputs, crop outputs, and other details of the production process.

As to the actual productivity measures, Winters(1978, ch. 5) reported that grain yields were not less for the tenants than owners in the postbellum Iowa. Gray et al.(1924, pp. 574-575) noted that "the question whether tenants or owner farmers are the more efficient as measured by crop production per acre can not be conclusively answered except with reference to the particular locality under consideration." The computation of Ransom and Sutch(1977) and Moen (1986) showed lower labor productivity and higher total productivity of tenants than owners in the cotton South in 1880, respectively.[30]

Readng from Table 3, in 1860, tenants had lower labor and higher land and capital productivity and total factor productivity in the Northcentral and in North as a whole, while the opposite was true in the Northeast. The magnitude of the relative total factor productivity of tenants compared to owners are: Northeast 4 percent lower, Northcentral 11 percent higher, North as a whole 6 percent higher. Was it because the Northeastern tenants were subject to static Marshallian inefficiencies and the Northcentral tenants enjoyed the Cheungian-Reidian productive efficiency? Paradoxically, the very similar pattern of input-mix and output-mix from owner to tenant in the Northeast rather reminds us of the discussion of direct supervision of landlords.

Agricultural productivity calculation was widely employed to trace the techn-

(29) Contributions include Johnson(1950), Cheung(1969), Reid(1973, 1977), DeCanio(1974), Hsiao(1975), Newberry(1977), and Lucas(1979).

(30) I have a reservation on these figures. For, the sample that their computations were based on does not have adequate information needed in productivity measurements by tenure.

ological change over time or to compare the performance of different agricultural regions. Whether in temporal or spatial comparison, the differences in the residual term(total factor productivity) call for explanation. They are usually accounted for by the existence of unmeasured inputs, changes in resource allocation, economies of scale, and so on. One way of approaching this issue will be to specify the production function with more inputs. For example, Griliches (1963) introduced an education variable to represent labor quality differentials, and variables reflecting the output-mix of different regions.

Table 6 reports the results of production function estimates. In addition to the conventional inputs of labor, land and capital, the personal characteristics of farm operators were added to reflect the labor quality and managerial experience. The nature of the farm was represented by output-mix variables(share of corn, beef, animal products), scale of operation(improved acreage), and the settlement stage.

The effect of length of residency is not significantly different from zero in all three equations, probably because of measurement errors involved. Personal charactistics generally have significant coefficients of expected sign. Again in the Northeast this is not true. The most important human capital variables, age and residency, completely lack significance. It is suggested that the younger farmers in the Northeast flew to the industrial sector or migrated westward, and did not stay on farm for the costly learning by doing.

The size and the sign of the coefficients of the settlement variables indicate that the productivity of a farm increases in the initial stage of settlement but slowly declines thereafter, which may have reflected changing external economies. The sign of the size of farm(improved acreage) is positive and significant for the Northcentral and negative but insignificant for the Northeast. The opposite signs of corn share and the share of animal products from the Northeast to the Northcentral seems to reflect the pattern of the comparative advantage by region(corn for Northcentral, dairy for Northeast); specialization raises efficiency.

Table 6. Production Function Estimates with Tenure Dummy

Dependent Variable: Log of Value of Farm Output

	North	Northeast	Northcentral
Intercept	3.5487*** (0.1026)	2.8343*** (0.2400)	3.2952*** (0.1212)
Log Labor	0.1874*** (0.0122)	0.1814*** (0.0167)	0.1771*** (0.0174)
Log Capital	0.2522*** (0.0084)	0.3354*** (0.0143)	0.1814*** (0.0104)
Log Land	0.1925*** (0.0075)	0.1809*** (0.0106)	0.2391*** (0.0107)
Log Age	0.0703*** (0.0234)	0.0274 (0.0503)	0.1226*** (0.0294)
Dummy for Literacy	−0.0754*** (0.0273)	−0.1029 (0.0695)	−0.0768*** (0.0295)
Dummy for In-state Born	−0.0416** (0.0190)	−0.1014*** (0.0359)	0.0309 (0.0246)
Dummy for Foreign Born	−0.0834*** (0.0235)	−0.1357* (0.0769)	−0.0382** (0.0250)
Dummy for Born in English speaking	0.1067*** (0.0306)	0.0898 (0.0864)	0.0626* (0.0330)
Log Length of Residency	0.0053 (0.0103)	0.0200 (0.0370)	0.0079 (0.0108)
Personal Property	5.858E-05*** (0.504E-05)	3.617E-05*** (0.610E-05)	7.907E-05*** (0.845E-05)
Settlement	0.1780* (0.1011)	2.7224*** (0.4619)	−0.1082 (0.1167)
Settlement squared	−0.5015*** (0.0850)	−2.0982*** (0.3032)	−0.2294 (0.1069)
Corn Share	0.1341*** (0.0488)	−1.6376*** (0.1761)	0.3434*** (0.0527)
Improved Acreage	0.00161*** (0.00029)	−4.024E-05 (46.498E-05)	0.00116*** (0.00038)
Beef Share	−1.0717*** (0.1114)	−3.3514*** (0.3343)	−0.3198** (0.1248)
Animal Product Share	−0.2822*** (0.0630)	0.1863 (0.1348)	−0.7022*** (0.0781)
Dummy for Tenant	−0.0397* (0.0210)	−0.0207 (0.0379)	−0.0672*** (0.0248)
Dummy for Northeast	−0.1106*** (0.0560)		
Number of Farms	8556	3175	5381
R-Square	.450	.509	.456
F Ratio	388.69	192.47	264.84

standard errors in parentheses

* significant at .10 level; **significant at .05 level; ***significant at .01 level

Returning to the issue of the productivity of tenants, it appears that the paradox between the two regions can be resolved. The inferity of Northeastern

tenants and the superiority of Northcentral tenants relative to the owner farmers appear to be explainable by the characteristics of their farms. The coefficients of tenant dummy have all negative signs, which are statistically significant for the Northcentral and for the North as a whole. In the Northcentral, where the productivity measures gave tenants 11 percent higher points than owner farmers, tenants seem to have been, other things equal, less productive than owners(by about 7 percent). The tenants in the Northcentral region appeared more productive because (i) they tended to operate farms with bigger size, (ii) which produced higher proportion of corn crop. This implication is hard to dismiss as a statistical artifact, since the characteristics of the tenant farmer, such as age, length of residency, and the value of personal property, implies lower agricultural productivity, unless fully supplemented by his landlord's supervision. In the words of Allan G. Bogue(1963, p. 66), "In general, tenants were most common where the soils were highly productive." To quote from a census monograph published in 1924, "tenants are likely to lease farms situated on better land, while the farms on poor soil are most likely to be operated by their owners."(31)

Likewise, the tenants in the Northeast looked less productive because they operated farms that produced higher proportion of corn crop and lower proportion of dairy product (which is against the comparative advantage of the Northeast).

If we rely on the results of the production function estimates, then, other things being equal, the tenants in the Northeast were as productive as owners, and those in the Northcentral had approximately 7 percent lower productivity than the owners. It looks to me that the substantial difference in the input mix in the Northcentral alludes a possible existence of Marshallian misallocation, while the almost identical input and output mix suggests that the landlord supervision might have operated more in the Northeast.

In the Northcentral, where the labor market, capital market and the comm-

(31) Goldenweiser and Truesdell (1924), p. 65.

unication network of farm management knowledge might not have yet gained sufficient efficiency, the tenancy served as a stepping stone toward the farm ownership, which will require an accumulated stock of human and physical capital. On the other hand, for the Northeast where younger farmers were constantly drawn out of farm, the explanatory power of the agricultural ladder hypothesis declines sharply. Even six decades later, this pattern seems to have remained. "In the United States as a whole [in 1920], 42 percent of the owner farmers reported no previous farm experience as wage hands or tenants.... The percentage is high in New England [, 59 percent], where tenancy is an unimportant step in the tenure ladder,..."(32) Thus, the institution of tenancy worked quite differently according to the market environment where it operated.

Throughout the North, farm characteristics reflecting the risk, transaction costs, and the condition of land market loomed important as determinants of tenancy. The emergence and dispersion of tenancy can be fairly well explained by the market equilibrium model. The labor market influence could be incorporated into the model also. It appears that despite the apparent productivity of tenants, *ceteris paribus*, the Marshallian allocative inefficiency might have existed. It is suggested that the institution of farm leasing as a whole has worked viably, because the contemporary economic forces located tenants on more productive farms.

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Appendix Tables

Table A1. Various Measures of Landownership

Sources	Area studied	Definition and terminology
Owsley(1949)	AL, GA, LA, MS, TN	Different by state, no definition given, but comparing the figures given with Clark's and reading fn. 7 of p. 193 indicate that AL, GA, TN used Clark definition; MS, Weaver (1945); LA, Coles (1943).
Clark(1942) p. xix, pp. 28-34	TN	Landless=B+C/A+B+C+D Tenants=($\frac{1}{4}$ to $\frac{1}{2}$)* landless Remainder: croppers, squatters, laborers
Weaver(1945) p. 16	MS	B: error in census-taking Landless=C/A+C(?); D includes overseers, adjacent counties, etc.
Bogue(1963) p. 64	IA, IL	Tenants=B/A+B+C+D Farmers without farms=C/A+B+C+D; consists of tenants, passers-through, recently arrived, etc.
Winters(1978) pp. 12-13, 109-113	IA	Tenants=B/A+B
Campbell and Lowe(1977) pp. 36, 37	TX	Landless=C+D/A+B+C+D
Bode and Ginter(1986) Chs. 2, 5, 6	GA	Type I tenants=B/A+B Type II tenants=B+C/A+B+C+D Type III tenants=B+C+farm laborers/A+B+C+D+farm laborers

	Occupation=farmers in population schedule	
	Real property>0	Real property=0
Reported in agricultural schedules	(A)	(B)
Not reported in agricultural schedules	(D)	(C)

Source: Yang(1984a), p. 94

Note 1. To categorize the farming populations as (A), (B), (C), and (D) is a little simplified. A more sophisticated method would subdivide the households recorded in the agricultural schedule into those with positive farm and zero farm values.

Note 2. One might consider adding to the "farming population" the households headed by nonfarmers but reported in the agricultural schedule, as in Campbell and Lowe(1977). However, for the purpose of examining wealth distribution, and not agricultural production, it is appropriate to use the occupation of the household head.

Note 3. The definitions in the table were simplified accordingly, but the result would not be very sensitive.

Note 4. Others who applied similar methods include Cogswell(1975), Huffman(1974), Hahn(1979), and Weiman(1983).

Table A2. Agricultural Tenancy in Rural North, 1860

	Total farmers (number of households)	(A) Owneroperators	(B) Tenants	(C) Farmers without farms	(D) Farmers with positive real estate not listed in agricultural schedule
All sample	13,349(100)	9,150(68.5)	1,210(9.1)	1,373(10.3)	1,616(12.1)
Illinois	1,233(100)	729(59.1)	112(9.1)	227(18.4)	165(13.4)
Indiana	3,658(100)	2,474(67.6)	430(11.8)	454(12.4)	300(8.2)
Iowa	461(100)	280(60.7)	42(9.1)	46(10.0)	93(20.2)
Kansas	401(100)	176(43.9)	53(13.2)	93(23.2)	79(19.7)
Michigan	925(100)	561(60.7)	11(1.2)	36(3.9)	317(34.3)
Minnesota	263(100)	132(50.2)	60(22.8)	27(10.3)	44(16.7)
Missouri	936(100)	662(70.7)	115(12.3)	102(10'9)	57(6.1)
Ohio	528(100)	403(76.3)	15(2.8)	49(9.3)	61(11.6)
Wisconsin	433(100)	331(76.4)	17(3.9)	32(7.4)	53(12.2)
Maryland	285(100)	138(48.4)	119(41.8)	19(6.7)	9(3.2)
New Hampshire	469(100)	383(81.7)	10(2.1)	29(5.5)	50(10.7)
New Jersey	136(100)	99(72.8)	7(5.2)	15(11.0)	15(11.0)
New York	2,234(100)	1,801(80.5)	75(3.4)	115(5.1)	243(10.9)
Pennsylvania	1,195(100)	828(69.3)	136(11.4)	125(10.5)	106(8.9)
Vermont	93(100)	72(77.4)	4(4.3)	4(4.3)	13(14.0)
Connecticut	99(100)	81(81.9)	4(4.0)	3(3.0)	11(11.1)

Source: Calculated from the Bateman-Foust sample. Number in parentheses represents the percentage share. reproduced from Yang(1984a), p. 95.

Table A3. Tenancy Rate, 1880~1969

	North			South		
	Number of Farm Households('000s)		Tenancy Rate (%)	Number of Farm Households('000s)		Tenancy Rate (%)
	Owner	Tenant		Owner	Tenant	
1880	2,007	471	19.0	977	554	36.2
1890	2,140	589	21.6	1,130	706	38.5
1900	2,324	795	25.5	1,389	1,231	47.0
1910	2,447	821	25.1	1,561	1,537	49.6
1920	2,379	868	26.7	1,616	1,591	49.6
1930	2,193	878	28.6	1,433	1,791	55.6
1940	2,180	916	29.6	1,558	1,449	48.2
1950	2,194	542	19.8	1,747	905	34.1
1959	1,693	370	17.9	1,279	366	22.2
1969	1,352	217	13.8	1,025	136	11.7

Source: Computed from *Historical Statistics of the United States*(Washington, D.C., 1975), p. 465.