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Contributed Paper
1977 Annual Meeting
American Agricultural Economics Association
August, 1977

The Economics of Sharecropping in Northeast Brazil

by

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Contributed Paper
1977 Annual Meeting
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Session Number: 19 Session Title: Economic Issues in Developing Countries

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Abstract

Incentives exist for landowners to employ sharecroppers in Northeast Brazil. Four components of a typical sharecropping contract were parameterized. The sensitivity of landowner income, number of sharecroppers employed and enterprise mixes revealed unexpected relationships. These results are important to policymakers interested in regulating sharecropper contracts.

The Economics of Sharecropping in Northeast Brazil

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Lee W. Bettis, Richard L. Meyer and Francis E. Walker*

I. Introduction

Recently the economic relations between landowners and sharecroppers have been studied by several researchers. Much of the literature has advanced the theory of share tenancy (Cheung, Ho, Newbery, Reid, Stiglitz, Warr), although some work has aimed at empirically testing parts of the theory (Kutcher and Scandizzo, Rao). This renewed interest in an old issue reflects increasing concern by policymakers about the agricultural and rural development process in Third World countries.

This paper reports on attempts to estimate the effect on landowner net income of varying contractual arrangements between landowners and sharecroppers. The research is based on farm level data from Northeast Brazil where sharecropping is prominent among large farms. In this region the landowner faces important economic decisions regarding sharecropping. The most important concerns using sharecroppers as a source of farm labor supply versus hired labor. This choice depends on certain crucial components of the sharecropping contract including 1) the minimum amount of land required for each sharecropper to meet his income and consumption objectives, 2) the size of the crop share received by the owner, 3) the amount of labor the sharecropper provides to the owner for work on the owner-operated part of the farm, and 4) the margin earned from marketing the sharecropper's marketable surplus.

II. Problem Setting

A. Characteristics of Large Sharecropped Farms

The mean characteristics of the twenty-eight large sharecropped farms on

which this study is based are presented in table 1.[1/] The farms are part of a larger group randomly drawn from municipios (counties) in the semi-arid area of the state of Ceara in Northeast Brazil where cotton production predominates. The average farm size is 434.9 hectares. The farms include relatively humid (type A) land, drier (type B) land and natural pasture land. Crops are grown on types A and B land, partly by landowners and partly by sharecroppers. Cattle are usually produced only by landowners and are grazed on natural pasture and crop stubble.

Perennial cotton is the most important crop in terms of area cultivated and cash income. More of the cotton grown by the owner is in a five-year cotton rotation than in a three-year rotation. The reverse is true for sharecroppers. Cattle are an important complementary enterprise as they graze the cotton stubble left standing after harvest. The average number of cow units per farm is 26.4.[2/]

The production technology is transitional, that is, much of the cultivation is done by hand but some insecticides are used. Work animals are used for transport but only in a limited way for cultivating. Cattle raising is land extensive and, except for planted pasture, use few purchased inputs and little labor.

In this region labor is provided by the landowner's family and various amounts of hired labor, both permanent and temporary, and sharecroppers. Payment is made in various combinations of cash and in-kind prerequisites. The mean number of sharecroppers is 6.6 per farm with the range from 1 to 20. Ten farms had three or less and ten had eight or more.

B. The Sharecropping Contract

In the study region, landowners and sharecroppers negotiate a sharecropping contract including several components. Although the landowers wield considerable

economic, social and political power, they cannot unilaterally dictate the terms of a sharecropping contract since sharecroppers have some economic alternatives. Both parties actively press their demands during the contract bargaining process. The contract generally is verbal but nonetheless real for both the landowner and sharecropper.

A contract typically includes: 1) the size of each sharecropper's plot, 2) the specific share the owner is to receive, if any, of each crop, 3) the amount of sujeicao labor the sharecropper provides the landowner for use on owner-operated production, and 4) the marketing charge the landowner receives for selling the sharecropper's share of cash and surplus food crops. Sharecropper family food requirements are also a concern in this region where most subsistence requirements are met from own production. This study assumes that a non-negotiable subsistence requirement for selected food crops is specified. Accordingly, bargaining between landowners and sharecroppers concerns only the four cited components of the contract.[3/]

1. The Crop Share

The landowner receives a share of most sharecropper production. The share usually differs between cash and subsistence crops. Cotton output is generally equally divided, while the landowner typically receives 30 percent of food crops.

2. The Size of the Sharecropped Plot

The sharecropper on the average receives a 7.8 hectare plot. The size of the plot varies directly with the share of each crop paid to the landowner.[4/]

3. Sujeicao Labor

Sharecroppers are commonly obligated to provide labor to the landowner for a daily wage somewhat less than that earned by temporary or permanent laborers. The number of man-days required depends on the size of the plot, that is, the

larger the plot the more man-days of labor per hectare the sharecropper must make available to the landowner.

4. The Marketing Charge

Sharecroppers generally market their share of cash crops and surplus food crops through the landowner. The landowner usually retains a marketing margin for this service.

III. Model Structure

A linear programming model was used to test the sensitivity of the landowner's use of sharecropping to parameterized values for the four components of the contract. The enterprise mix of both the owner and the sharecropper and the landowner's net income were determined for all solutions. The model assumed the owner maximizes income without considering the effects of risk.[5/]

1. The Objective Function

The landowner was assumed to maximize net income defined as:

Money receipts from sale of products
+ marketing charge for selling sharecropper's marketable surplus
- costs of purchased inputs
- interest charged on short term credit required for crop and livestock activities
- reservation wages for family farm members.

This measure ignores on-farm consumption by the landowner, and thus overstates actual income to a limited extent. A reservation price on land was omitted since it is assumed to have no alternative uses in the short run. Likewise no alternative use (savings activity) was introduced for farm cash balances.

2. Activities

Production activities were defined for both the landowner and sharecropper. The landowner may produce crops and cattle, but sharecroppers are restricted to crops as most contracts prevent them from raising cattle. The crop activities include the interplanting of cotton with corn and beans in both three-year and

five-year rotations,[6] the interplanting of corn and beans, and the isolated cropping of beans, rice, manioc and planted pasture.

Two types of land were specified with respective yield and operating cost differences. Type A cropland is used by the landowner for rice, interplanted corn and beans, manioc and planted pasture, and by the sharecropper for rice. Type B cropland is used for interplanting cotton, corn and beans in either a three or five year rotation by both the landowner and sharecropper. The sharecropper also uses Type B land for corn and beans. Cattle graze on natural pasture and cotton stubble.

Activities were specified for selling crops; hiring temporary, permanent, and sujeicao labor; and number of sharecroppers employed. Minimum land and food crop consumption requirements were specified for the sharecropper. The sharecropper provides a specified amount of sujeicao labor to the owner measured in mandays per hectare sharecropped for each of four production periods in the year. Cash operating expenses were specified for each production activity and for hiring non-family labor. The per day wage rates of permanent, temporary and sujeicao labor were set at Cr$5.50, 6.60, and 4.07, respectively, consistent with the sample averages.

3. Restrictions

Except for accounting rows and balances, restrictions pertain to available supplies of land, maximum supplies of family and permanent labor per production period, and borrowing limits. Total temporary labor use was constrained at the mean level of the sample but no constraint was placed on the seasonality of usage.

IV. Results of the Analysis

A. Base Solution

The base solution to the model described above is shown in Table 1. The

assumptions underlying the model are: (1) no minimum size of the sharecropped plot; (2) cotton share on a 50-50 basis; all other crops shared on a 30-70 basis; (3) the maximum supply of sujeicao labor per hectare sharecropped in Period I (soil preparation) is 2.7 man-days, Period II (planting) 1.8, Period III (cultivating) 2.2 and Period IV (harvesting) 3.0; and (4) a marketing charge of 15 percent.

The base solution is a reasonably good approximation of average values for selected variables for the farms surveyed. The model slightly underestimated the number of sharecroppers employed per farm and the size of the sharecropped plot. It also overestimated the area in cotton and underestimated the area in other crops. These differences may be due in part to the fact that risk considerations were not considered. Also, the area in the two types of cotton is sensitive to crop prices used in the model.

B. Results of Parameterizing Components of the Contract

1. Minimum Land Requirement

Table 2 reports the results of parameterizing the minimum size of the sharecropper's plot holding all other components of the contract constant. The results reported include landowner's net income, the number of sharecroppers employed and the crop enterprises of both.

The land requirement was parameterized in two hectare increments from the base value of zero to 12 hectares. No change in optimum solution occurred over the 0-6 hectare range since the average sharecropper plot was 7.1 hectares as reported in table 1. At a eight hectare level, however, the landowner's income decreased 2.1 percent and the average number of sharecroppers per farm decreased slightly. The amount of land cultivated by the owner decreased by over two hectares to meet the sharecropper's increased land requirement. The sharecropper reduced 3 year cotton and began producing 5 year cotton

with its lower labor requirement. These trends noted in the eight hectare solution continued when the minimum plot size was set at 10 and 12 hectares. Owner's income at the 12 hectare level was 12 percent less than in the base solution and the number of sharecroppers fell to 3.5.

This analysis showed the competition which exists for the sharecroppers labor supply. As the minimum land requirement was raised, the sharecropper shifted to less labor intensive enterprises and provided less labor for use on the owner-operated land.

2. The Cotton Share

The share of cotton received by the owner was parameterized from zero to 100 percent while holding all other parameters constant. Compared to the base model with a 50 percent share, lowering the share to zero reduced income over Cr$5,000. Raising the share so the owner received the entire production increased owner income over Cr$8,700, a 30% increase.

When the share was raised above 50 percent, the number of sharecroppers and amount of land cultivated per sharecropper increased, as did the total amount of land sharecropped. The enterprise combination for sharecropped land shifted increasingly into cotton. Conversely, the owner-operated area declined, and the owner shifted out of cotton into other crops. Hired labor also declined as the owner-operated area declined.

As the owner's share increased, sharecroppers produced more 3-year rotation cotton which has a lower net return but, also, a lower labor requirement. As the owner-operator area declined, labor on that portion of the farm was allocated to other enterprises with higher net returns and labor requirements per hectare.

3. Sujeicao Labor

The supply of sujeicao labor was parameterized from zero to 200

percent of the base solution. As expected the owner's income and the supply of sujeicao labor were positively related. Even when the amount of labor the sharecropper must offer the owner was doubled, the owner's income only increased by 3 percent.

Landowner's might be expected to employ fewer sharecroppers as the supply of sujeicao labor per sharecropper decreases; however, the converse occurred. At zero levels, the owner employed almost 6 sharecroppers compared with just over 5 in the base solution. Doubling the supply reduced the number of sharecroppers employed to just under five.

As the labor supply increased, the area sharecropped fell and the owner-operated area rose. The increased time the sharecropper spent working on the owner's land competed with the labor available for use on sharecropped land. The owner preferred to use more of the sharecropper's time on his own plot rather than letting the sharecropper use it on the sharecropped plot.

4. Marketing Charge

The marketing charge the owner assessed the sharecropper for selling his crop was parameterized from 1 to 25 percent. The owner's income increased accordingly, of course, but the number of sharecroppers and the crop enterprise mix of both owner and sharecropper were unchanged.

V. Implications

Some policymakers have argued that, as a way to reduce rural poverty, sharecropper contracts should be written and regulated to increase sharecropper's benefits. Ignoring the difficulty of enforcing such changes, this paper shows that landowners may be quite sensitive to changes in important components of the contract. When alternative, but lower cost, farm labor is available, institutional changes intended to benefit sharecroppers may lead to less sharecropping and the use of more temporary laborers who frequently are

economically even worse off. Furthermore, landowners may choose less labor intensive enterprises which have a correspondingly lower value of production. In this Brazilian case, changes in the share of cotton paid to landowners and in the minimum amount of land provided a sharecropper appear to be particularly sensitive components of the sharecropping contract. Thus, just as Green Revolution technologies have been reported to alter sensitive landowner-sharecropper relations resulting in the expulsion of some sharecroppers, so might efforts to change and enforce sharecropper contracts. The benefits received by sharecroppers retained by landowners must be weighed against the losses of others that might be expelled.

Table 1. Characteristics of Study Farms and Base Solutions to Model

Item	Sample Survey[a/]	Base Solution[b/]
Farm Size (ha)	434.9	434.9
Cropland (ha)	65.3	65.2
Total Owner-Operated (ha)	20.8	28.5
Cotton, 5 year rotation (ha)	5.8	0.0
Cotton, 3 year rotation (ha)	3.1	23.0
Other Activities (ha)	11.9	5.5
Total Sharecropped (ha)	44.4	36.7
Cotton, 5 year rotation (ha)	11.2	0.0
Cotton, 3 year rotation (ha)	17.2	30.7
Other Activities (ha)	15.8	6.0
Natural Pasture	216.4	216.4
Number of Sharecroppers	6.6	5.2
Size of Plot per Sharecropper (ha)	7.8	7.1
Number of Cow Units	26.4	26.4

Source: a/ IBRD-SUDENE Farm Survey

b/ Base Solution of Model

Table 2

Model Results Parameterizing Minimum Size of Sharecropper Plot[a/]

	Minimum Land Requirement	Owner's Net Income	Number of Sharecroppers	Sharecropped Part				Owner-Operated Part			
					Enterprises				Enterprises		
				Area Cultivated	Cotton 5 Yr	Cotton 3 Yr	Other Crops	Area Cultivated	Cotton 5 Yr	Cotton 3 Yr	Other Crops
	(ha)	(000 Cr $)	(Number)				(ha)				
Base	(0)	29.2	5.1	36.7	0.0	30.7	6.0	28.5	0.0	23.0	5.5
	2					No Change					
	4					No Change					
	6					No Change					
	8	28.6	4.9	39.0	9.9	24.3	4.8	26.3	0.0	19.4	6.9
	10	27.3	3.9	38.9	33.6	0.7	4.6	26.3	0.0	19.4	6.9
	12	25.7	3.5	41.6	39.4	0.0	2.2	21.2	0.0	14.3	6.9

a/ The assumptions of the base model are:
1. Minimum sharecropper plot (ha): 0.0
2. Owner's share: Cotton-50%, Other crops-30%.
3. Sujeicao labor requirement (man-day equivalents): Period 1, 2.7; Period 2, 1.8; Period 3, 2.2; Period 4, 3.0.
4. Marketing change (%): 15.
5. Sharecropper's subsistence requirement (kg): Rice, 400; Corn, 311; Beans, 363.

Footnotes

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1. The data used in this paper were gathered in 1973 under the World Bank-SUDENE Northeast Agriculture Survey Project. The senior author was a field consultant of the Bank on this project. The normal disclaimers apply.

2. A cow unit is defined as including 1 cow, .04 bulls, .39 two year old steers, .41 one year old steers and .43 calves.

3. The sharecropper-owner relationship involves other concerns of somewhat lesser importance such as (1) location of the sharecropper plot on the farm, (2) cost-sharing arrangements, and (3) credit terms for the sharecropper who generally borrows from the landowner.

4. The greater the share received the more willing the landowner is to increase the size of each sharecropper's plot. Similarly, the sharecropper demands a larger plot as the share paid to the landower increases. The sharecropper is vitally concerned with the size of his plot relative to crop shares paid the landowner. At stake is his family's physical survival, especially during drought years in Ceara.

5. Analysis conducted after this paper was written with a variance minimizing quadratic programming model supported the general conclusions reported here. An additional result was that the average enterprise combination and number of sharecroppers found on sample farms could be more accurately duplicated by a point on the EV frontier than by the profit maximization model.

6. Perennial cotton is typically interplanted with two or more food crops during the first one or two years. It is cultivated alone for the remaining one to four years in the production cycle. Maximum cotton yields are usually obtained the second year and slowly decline thereafter depending on the management practices followed.

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