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***LAND TENURE AND EFFICIENCY IN BORO RICE PRODUCTION IN AN
AREA OF MYMENSINGH DISTRICT****

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ABSTRACT

This paper examines the relative efficiency of the alternative forms of land tenure in irrigated boro rice production with a sample of 124 farms. Inter-tenure comparison revealed that there were no major differences in resource use and yield among the specified tenure groups. However, owner-tenant farms obtained highest yield, gross and net return per acre while yield of crop, gross and net return per acre were lowest for the pure tenant farms. Comparative analysis of the owned and rented components of the same owner-tenant farms revealed that they used more of all the inputs and obtained higher yield on owned land than on rented land. Thus the evidence lend support to the Marshallian proposition that share tenancy results in under-utilization of resources and hence is an inefficient form of tenure arrangement.

I. INTRODUCTION

The comparative productive efficiency of alternative forms of land tenure has long been debated. In Bangladesh, a number of recent studies provided contradictory results (Zaman 1973, Jabbar 1977, Hossain 1977, Mandal 1979). These studies implicitly assumed tenure duration for full year in that no change in tenure status of farms and lands within a year were considered. In reality, rental terms may permit tenancy duration of a few months for production of a single crop to more than a year and total duration may last for several years with periodic renewal of contracts

Evidences are available showing that proportion of farms and farm areas falling into different tenure categories vary from crop to crop within a single year (Jabbar 1978, Mandal 1977). Thus level of tenancy is likely to vary from crop to crop. Also, type and intensity of input use vary from one crop to another. Therefore, a more realistic

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way to assess the impact of tenancy on productive efficiency would be to measure and compare resource use and productivity in respect of individual crops.

The present study attempted to ascertain the tenure distribution of farms producing irrigated boro rice in a selected area and to determine the effect of alternative tenures on resource use and productivity of the crop. Irrigated boro rice is increasingly contributing to the total rice acreage in Bangladesh. A substantial proportion of boro rice is grown on share rented land. Also, cultivation of boro rice requires relatively higher intensity of input use.

Data for the study were collected from 124 farms producing irrigated boro rice from two purposively selected villages of Fulbaria thana of Mymensingh district. Out of 242 boro producers falling into four major tenure categories, 124 were selected by stratified random sampling. Data were collected by survey method during July-September 1979 (see Talukder 1980 for details).

Section II of the paper discusses briefly some characteristics of the sample farms. Section III analyses relative productive efficiency of alternative tenure classes in respect of boro cultivation. Conclusions are drawn in the final section of the paper.

II. CHARACTERISTICS OF THE SAMPLE

Area Owned and Operated by Tenure Groups

Four distinct tenure groups identified among farms producing irrigated boro rice were : landlord-operators, owner-operators, owner-tenants and pure-tenants. Distribution of the sample farms falling into different tenure categories are presented in Table 1. Inter tenure comparisons of farm size has been done on the basis of two criteria : acres owned and acres cultivated. As would be evident from the table, size of farm consistently decreased from the tenure class of landlord-operator to that of pure-tenant in terms of both acres owned and operated. Owned land of a landlord-operator was more than double the same of an owner-operator. Assuming that farms owning more than 7.5 acres of land fall in the large farm category (as is often done in Bangladesh), landlord-operators could be generally considered as large farms. However, the statement does not hold true when operated area is considered as the measure of size, since the average operated area for the tenure category is only 5.96 acres.

Both owner-operators and owner-tenants could be called small farms in terms of both owned and operated areas. Pure tenants' operated area of 0.82 acres could by no means be considered as viable cultivated area. It would also be evident from table 1 that landlord-operators rented out 21.4 per cent of their own land while area rented in

TABLE 1 AREA OWNED AND OPERATED BY TENURE CATEGORIES OF FARMS

Tenure categories	No. of farms	Acres per farm				Percent of	
		Owned	Rented in	Rented out	Operated	Owned area rented out	Operated area rented in
		1	2	3	4	5=2+3-4	
Landlord-operator	14	7.58	a	1.62	5.96	21.4	a
Owner-operator	60	3.30	a	a	3.30	a	a
Owner-tenant	39	2.03	0.66	a	2.69	a	24.5
Pure tenant	11	a	0.82	a	0.82	a	100.0
All farms	124	3.12	0.28	0.17	3.23	5.5	8.7

a. Not applicable.

constituted 24.5 per cent of the operated area of the owner-tenant farms indicating that degree of tenancy was substantial from both ends.

Land-Man Ratio and Degree of Fragmentation

Average family size of farms consistently decreased from the tenure class of landlord-operator to that of pure tenant. Average acres owned and cultivated per farm also followed the same pattern. Consequently, average acres owned and cultivated per head also decreased from the tenure class of landlord-operator to that of owner-tenant/pure tenant (Table 2). Owner-operators' owned and operated area of 0.43 acres per head represents almost the national per capita land holding of 0.40 acres (Alamgir 1975).

Degree of fragmentation measured by the number of fragments per farm and per acre can also be ascertained from Table 2. Number of fragments per farm was the highest for the landlord-operator and the lowest for the pure tenant farms. This was consistent

TABLE 2 LAND-MAN RATIO AND DEGREE OF FRAGMENTATION BY TENURE CATEGORIES

Tenure categories	Family members per farm	Acres owned per head	Acres cultivated per head	No. of Fragments	
				Per farm	Per acre operated
Landlord-operator	8.8	0.86	0.68	17.8	2.8
Owner-operator	7.6	0.43	0.43	12.5	3.6
Owner-tenant	7.2	0.28	0.37	13.7	4.8
Pure tenant	5.0	a	0.16	4.8	5.2
All farms	7.3	0.42	0.44	13.0	4.1

a. Not applicable.

with the highest and lowest acreage for the respective group of farms. However, although owner-tenant farms were smaller in size than the owner-operator farms, number of fragments per farm of the former were higher than that of the latter tenure category. Since owner-tenants' operated area consists of both owned and rented land, it would not be proper to attribute the matter to tenancy effect. However, an examination of the number of fragments per acre operated might give some clue in this regard. In addition to the fact that number of fragments per operated acre of the owner-tenant farms was higher than that of the landlord-operator and owner-operator farms, pure tenants' fragments per operated acre were still higher (Table 2). This might be attributed to the tendency of the land owner to rent out more fragmented land and keep less fragmented land for self cultivation.

Fixed Labour and Fixed Capital

Family labour and small amount of annually hired labour constituted the total fixed labour supply for the farms. Although annually hired labour constituted 26.7 per

cent (Table 3) of the total man units of fixed labour for the landlord-operator farms, the group did not have, on an average, one full man-unit of annually hired labour. None of the owner-tenant and pure tenant farms had any annually hired labour.

Work animals, other animals, tools and equipments were considered as the main components of fixed capital. Work animals constituted the major share of the total fixed capital for the farms. Bullocks were the main work animals, although cows and buffaloes were also used. Owner-operators and owner-tenants, on an average, had about one pair of work animals. Only landlord-operators possessed more than 3 units of work animals. Average number of work animals for the pure-tenant farms were only 1.3 (Table 4). This was due to the fact that many of the pure tenant farms did not have work animal at all. Total value of fixed capital including the value of tools and equipment and also that of other animals, was highest for the landlord-operators and lowest for the pure-tenants. However, value of fixed capital per acre operated gave the opposite picture. Fixed capital per acre operated was highest for the pure tenant and lowest for the landlord-operator farms. Thus, although pure tenants' fixed capital per farm was lowest of all the tenure categories, they possessed more fixed capital in relation to their cultivated land.

TABLE 3 TOTAL MAN-UNITS OF FIXED LABOUR AVAILABLE PER FARM
FOR FARM WORK BY TENURE CATEGORIES

Tenure categories	Man-units per farm					
	Family		Annually Hired		Total	
	No	%	No	%	No	%
Landlord-operator	2.2	73.3	0.8	26.7	3.0	100
Owner-operator	2.1	87.5	0.3	12.5	2.4	100
Owner-tenant	2.0	100.0	a	b	2.0	100
Pure tenant	1.2	100.0	a	b	1.2	100
All farms	2.0	83.3	0.4	16.7	2.4	100

a. None

b. Not applicable

TABLE 4 AVERAGE VALUE OF FIXED CAPITAL PER FARM BY TENURE CATEGORIES

Tenure categories	Average per farm						
	Value of tools & equipments (Taka)	Work animals		Other animals		Total value (Tk.)	Value per acre operated (Tk.)
		No	Value (Tk.)	No	Value (Tk.)		
Landlord-operator	360	3.2	4826	4.6	2161	7347	1232
Owner—operator	265	2.1	3718	2.8	1342	5325	1614
Owner—tenant	240	1.9	3143	2.0	780	4163	1548
Pure—tenant	135	1.3	1650	1.5	616	2401	2928
All farms	256	2.2	2930	2.5	1949	4235	1589

Yield of Major Crops by Tenure

There was no systematic relationship of yield of major crops with tenure status of the farms. While for boro paddy owner-tenants obtained the highest yield, for aman and aus owner-operators and pure tenants respectively obtained highest yields. For sugarcane and jute, again, owner-operators and pure tenants respectively obtained highest yields although differences in yields between tenure classes were not very high (Table 5).

TABLE 5 YIELD OF MAJOR CROPS BY TENURE CATEGORIES

Tenure categories	Yield per acre in maunds				
	Aus paddy	Aman paddy	Boro paddy	Jute	Sugar-cane
Landlord-operator	16.5	18.7	24.7	13.6	314.6
Owner-op-rator	19.0	21.2	29.5	15.0	318.2
Owner-tenant	19.8	19.0	30.3	14.8	312.6
Pure tenant	20.0	18.5	20.2	16.3	310.0
All farms	19.1	19.6	26.5	14.8	314.2

III. ECONOMICS OF BORO RICE PRODUCTION BY TENURE

Input Use and Associated Cost by Tenure

Farmers used a variety of inputs as would be reflected in the gross cost of production, but utilization of only four main inputs namely human labour, manures, fertilizers and seedlings have been examined in detail.

Human Labour

Human labour use, both family and hired, is shown in Table 6. Owner-tenants used highest amount of labour followed by pure tenants. Hired labour accounted for substantial proportions of total labour for both landlord-operator and owner-operator farms. It would be evident from Table 6 that pure tenants used more hired labour (23.2%) than owner-tenants (19.0%). This apparently seem to be inconsistent. But this was due to the fact that some of the family members of the pure tenant farms were engaged in temporary off farm employment and they could not work on their own farms in times of need because, either they had previous commitment of work outside or the opportunity cost of outside work was higher. So they employed hired labour in times of urgent need.

TABLE 6 HUMAN LABOUR USE PER ACRE FOR PRODUCING BORO PADDY BY TENURE CATEGORIES OF FARMS

Tenure categories	Average per acre					Cost (Taka)
	Man-days					
	Family	Hired	Total	Hired as ^o / _o of total		
Landlord-operator	43	35	78	44.8	936.00	
Owner-operator	47	28	76	37.3	912.00	
Owner-tenant	68	16	84	19.0	1008.00	
Pure tenant	63	19	82	23.2	984.00	

Manures, Fertilizers and Seedlings

Farmers used meagre amount of manure, mostly cowdung and some ashes. Landlord-operators used the highest quantity of manure (22.5 maunds per acre) and owner-tenants used the lowest quantity of 12.0 maunds per acre (Table 7).

There was no marked difference among the tenure categories in respect of use of fertilizers. However, the highest quantity (104 seers of fertilizers per acre) was used by owner-operators followed by owner-tenants who used 99.5 seers. Pure tenants used the lowest quantity of 73.5 seers per acre (Table 7). Although there was no marked variation among tenures in the use of fertilizers, value of fertilizer per acre varied directly with the quantity used. This might indicate that the mix of fertilizer also did not vary much among the tenure classes.

TABLE 7 USE OF MANURES, FERTILIZERS AND SEEDLINGS PER ACRE FOR PRODUCING BORO PADDY BY TENURE CATEGORIES OF FARMS

Tenure categories	Average per acre				Seedlings (Taka)
	Manures		Fertilizers		
	Quantity (maunds)	Value (Taka)	Quantity (seers)	Value (Taka)	
Landlord-operator	22.5	101.25	98.0	158.25	244.25
Owner-operator	20.0	90.00	104.0	173.80	252.50
Owner-tenant	12.0	54.00	99.5	164.00	258.40
Pure tenant	16.0	72.00	73.5	129.40	234.50

Use of seedlings also did not vary markedly among the tenure categories. Seedling costs were highest and lowest for the owner-tenant and pure tenant farms respectively being Taka 258.40 and Taka 234.50 per acre (Table 7).

Profitability of Boro Cultivation

Resource Use and Yield in Boro

Comparative use of selected inputs and yields of boro paddy of the tenure categories are presented in Table 8. Inter-tenure comparisons of the selected inputs except animal power have already been done through the preceding section. It would be evident from Table 8 that animal power use also did not vary much among the tenure categories.

TABLE 8 RESOURCE USE AND YIELD IN BORO PADDY BY TENURE CATEGORIES

Resources/yield (per acre)	Landlord- operator	Owner- operator	Owner- tenant	Pure tenant
Human labour (mandays)	78	76	84	82
Animal power (pair-days)	17	16	16	14
Seedlings (Taka)	244.25	252.50	258.40	234.50
Manures (Taka)	101.25	90.00	54.00	72.00
Fertilizers (Taka)	158.25	173.80	164.00	129.40
Yield (Maunds)	24.7	29.5	30.3	20.2

As regards yield per acre of boro paddy, it would be evident also from Table 8 that differences in yield between tenures were substantial particularly between owner-tenants and pure tenants. Highest yield of 30.5 maunds per acre was obtained by the owner-tenant farms followed by owner-operators who obtained 29.5 maunds of paddy yield per acre. Pure tenants' 20.2 maunds of paddy yield was substantially lower than the owner-tenants' 30.3 maunds. However, difference between owner-tenants' and owner-operators' yield per acre of 30.3 maunds and 29.5 maunds respectively was very negligible.

Gross cost, Gross and Net Returns

Gross cost of boro production consisted of all labour and material costs including opportunity costs of land and operating capital. Gross cost per acre was the highest for the landlord-operator and the lowest for the pure tenant farms (Table 9). Gross return per acre of boro represented the value of crop and by-product. Gross return per acre was highest for the owner-tenant farms. This was consistent with the highest paddy yield of 30.3 maunds for this group of farms (Table 9). Net return per acre, which represented the difference between gross return and gross cost per acre, was also highest for the owner-tenant farms resulting, perhaps, from the highest yield and gross return of the group. Owner-operator farms obtained the second highest net return of Taka 1344.00 per acre which was consistent with the second highest yield and gross return for this group of farms. Lowest net return of Taka 187.88 for the pure tenant farms conformed to the lowest yield and gross return of the group.

Although net return per acre of landlord-operators was higher than that of pure tenants, average net return of the group was less than half the same of both owner-operators and owner-tenants.

TABLE 9 GROSS COST, GROSS AND NET RETURNS FOR BORO BY TENURE CATEGORIES

Tenure categories	Average per acre			
	Gross cost (Taka)	Paddy yield (Maunds)	Gross return (Taka)	Net return (Taka)
Landlord-operator	2823.56	24.7	3459.28	635.72
Owner-operator	2776.00	29.5	4120.00	1344.00
Owner-tenant	2816.91	30.3	4214.15	1397.24
Pure tenant	2597.12	20.2	2785.00	187.88

Thus, from the very low net return of both landlord-operators and pure tenants, one can draw first hand conclusion that the two tenure groups were less efficient than the other two groups i.e. owner-operators and owner-tenants. Again, of the owner-operators and owner-tenants net return per acre of the latter was higher than that of the former. This might indicate higher level of efficiency of the owner-tenant over owner-operator farms. However, net return per acre is only a partial measure of efficiency and since the effect of tenure does not occur in isolation and many factors, both physical and human, are integrally related to tenure, we reserve our judgement as to relative efficiency until we control some of the variables such as farm size, resource endowments etc. in analysing the performances of different tenure classes.

Intra-tenure Comparison

One way of controlling the effects of extrinsic factors may be intra-tenure comparisons. This was done here in two ways : (i) by keeping the tenure status of land constant and allowing the tenure status for farms to vary, and (ii) by keeping the tenure status of farm constant and allowing tenure status of land to vary.

In the first approach the resource use and productivity between owned land of owner-tenant farms and that of owner-operator farms were compared. However, effect of farm size was not controlled in this comparison. The results of the comparison are presented in Table 10. It would be evident that use of some inputs such as human labour, animal power, seedlings were more on owned land of owner-tenants than on land of owner-operators. Owner-tenants, however, used lesser amount of manures and fertilizers on their owned land compared to owner-operators. Owner-tenant farms also obtained higher yield on their owned land than the owner-operator farms. Except for the use of fertilizers and seedlings, differences in use of resources and differences in yield between the two categories of farms were significant at 1 and 10 per cent levels (Table 10).

TABLE 10 RESOURCE USE AND YIELD IN BORO PADDY OF OWNER-OPERATOR AND OWNER-TENANT FARMS

Resources/yield (per acre)	Owner operator (1)	Owner-tenant		Percentage difference	
		Owned (2)	Rented (3)	Owned land (OT) with Owned land (Owner-operator) (2-1)	Owned land (OT) with rented land (OT) (2-3)
Human labour (mandays)	76	88	82	15.8*** (5.72)	7.3*** (4.21)
Animal power (pair-days)	16	18	15	12.5*** (2.63)	20.0*** (4.32)
Seedlings (Taka)	252.50	268.00	255.00	6.2 (1.05)	5.1** (2.28)
Manures (Taka)	90.00	75.61	38.40	-19.2*** (3.25)	96.9*** (8.97)
Fertilizers (Taka)	173.80	168.60	168.10	-3.0 (0.49)	21.7*** (5.18)
Paddy yield (maunds)	29.5	33.8	23.7	(14.5)* (1.64)	42.6*** (5.66)

Figures in the parentheses are estimated 't' values.

***Significant at 0.01 level,

**Significant at 0.05 level

*Significant at 0.10 level

In the second approach, resource use and productivity of the owned and rented land of the same owner-tenant farms were compared. This was rather a more direct test where some extraneous variables such as farm size, management and resource endowments of the farms could be controlled, of course, within limit. In order to see whether there were significant differences in inputs and outputs between owned and rented lands of the same owner-tenant farms, paired t-test was applied. The postulated null hypothesis was : "there is no significant difference in resource use and yield per acre between owned and rented land of the owner-tenant farms". The results of the test are presented in Table 10. It would be evident that the hypothesis of equality of means of resource use and yield between the two types of land was rejected. Owner-tenant farms used more of all the inputs on owned land than on rented land. They also obtained 42.6 per cent higher yield on owned land than on rented land and all the differences in respect of resource use and yield were significant at 1 per cent or 5 per cent levels. This indicated that owner-tenants used significantly higher inputs on their owned land than on rented land and also their owned land was more productive than rented land.

IV. CONCLUSIONS

Evidence presented in the study lend support to the Marshallian proposition that share tenancy results in under-utilization of resources and hence is an inefficient form of tenurial arrangement. Two policy options are implied : major tenure reform measures involving abolition of share tenancy or reform measures that will increase productivity and ensure more equitable distribution of income from rented land.

It has been argued that cooperative farming can provide an alternative to share renting in Bangladesh if due shares of returns for all land and non-land resources supplied by members are ensured (Ahmed 1980). If major land reform measures are not feasible under the given socio-political conditions in Bangladesh, certain selective reform measures may be attempted. One of the often suggested measures is sharing variable inputs in proportion to the share of output. This can give at least some intermediate solution to the whole problem of attaining higher level efficiency in agricultural production.

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