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Allocative Efficiency of Cropshare Cultivation: Interpreting the Empirical Evidence

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Because of the simultaneity problems raised by supervision problems, and the low opportunity cost of labour which may induce an inverse size-productivity relationship in agriculture, tests requiring a comparison of the productivity of farmers or farms of different tenure groups tend to be biased. Even a comparison of the performance of farmers of different tenure groups, though of the same size, may not necessarily yield unbiased results. The paired *t*-test, which involves comparing the performance of the owner-tenants on their own and cropshare land, has been found to be the most satisfactory method of comparing the efficiency of cropshare tenancy with that of owner cultivation. The study also suggests some disciplining influence imparted by a better choice of tenant and threat of eviction, preventing the tenants from wasting the rental land.

1. INTRODUCTION

There are broadly two views regarding the consequences of cropshare tenancy on input use and productivity of land. The first of these views, held by economists at least since the time of Adam Smith and commonly associated with the name of Marshall, states that the share tenants will not use inputs (supplied by them) to their optimum levels because of lack of adequate incentives and, hence, the productivity of share rented land will be lower. But the proponents of the second view, first expounded by Cheung (1968), regard such inefficiency as incompatible with competitive equilibrium. They argue that when private property rights are well-defined and freely alienable, maximization of wealth by the landlords and competition for land among the prospective tenants will ensure that the productivity of the land (and hence input-use) cannot vary with tenure status.

The Marshallian view regarding inefficiency of share tenancy is considerably modified when various factors (other than tenurial status) which affect the behaviour of the farmers are taken into consideration. One of the first of these factors to be

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analyzed by economists is the alleged inverse relationship between farm size and productivity. Agriculture of many economically less developed countries is believed to exhibit such a tendency of inverse relationship.[1] If this is true, and if most of the tenant farms are small farms, then the effects of farm size and tenurial status on productivity would run in opposite directions, making a comparison of tenure status on productivity difficult or inconclusive [e.g., Zaman (1973)]. Another factor which has received some attention recently is the problems of supervision of hired labour. Because work effort is unpleasant, hired labourers have a tendency to shirk; hence, they have to be supervised in order to ensure that they deliver the right amount of effort. Just as the rental share introduces a distortion in the choice calculus of the tenants, supervision problems introduce a distortion in wage cultivation. If the tenants in general cultivate the land with family labour and the landlords cultivate the land with wage labour, the effect of tenurial status is masked by that of supervision problems, such that the final outcome is indeterminate. Hence, any empirical evidence that the tenant cultivators are as efficient as the owner cultivators does not refute the Marshallian proposition, although it may apparently support Cheung's theory.

Two methods have been suggested to overcome this simultaneity problem in empirical investigations. The first requires a comparison of inputs and outputs of farms of different tenure status but of the same size [Hossain (1977)].[2] Such a method would eliminate the effect of farm size and also reduce the difficulties posed by supervision problems, as farms of the same size are likely to face supervision problems of a similar severity. The second method, which is more satisfactory than the first on both theoretical and statistical grounds, requires the comparison of inputs and outputs of the same farmer on his own and tenanted land [e.g., Bell (1977)]. This method is made possible by the fact that a great majority of the tenants are not landless, but possess some land of their own. The productivity of the land varies because of not only the difference in the intensity of use of the inputs which are observable and measurable, but also such intrinsic factors as the management and entrepreneurial quality of the farmers, severity of supervision problems faced by them, attitude to risks, and the like. These factors may vary from farmer to farmer, and this may cause a difference in outputs even though the intensity of use of inputs is the same. To the extent that these factors may vary systematically with tenurial status, the actual inputs and outputs may not be a good indicator of the (in)efficiency of cropshare tenancy. But if a comparison is made between the intensity of use of various inputs and the yield rate achieved on own and share

[1] The literature on the inverse size-productivity relationship in agriculture is voluminous. For a recent example, see Taslim (1989).

[2] Actually Hossain suggested the method to net out the effects of farm size only.

rented land of the same farmer, all these factors are held constant. Therefore, any difference between the intensity of use of inputs and the yield rate on own and share rented land may be attributed to the tenurial status of land barring any systematic difference in the quality of land.

This paper performs several statistical tests to find whether or not there is any systematic difference between the efficiency of cropshare and owner cultivation in Bangladesh agriculture. A sample survey data from six villages in three districts of Bangladesh are utilized for this purpose. A short discussion of the survey and the households is contained in Section 2. Section 3 describes the indicators of efficiency and performs several tests to establish any difference between the efficiency of cropshare and owner cultivation. Section 4 discusses the general policies adopted by the landlords to ensure a satisfactory cultivation of the cropshare land. Section 5 concludes the discussion.

2. THE DATA

The findings presented in this paper have been culled out from the data of a survey of two randomly selected villages in each of the districts of Mymensingh, Comilla, and Rajshahi in Bangladesh. The survey was designed and conducted by a research team of the Department of Economics, University of Dhaka, during May-June 1982. Since the study was concerned primarily with cropshare tenancy, fifty households were randomly selected, based on a stratified sampling procedure from that part of each village population which participates in the land lease market. Thus, a total of three hundred households were selected for interview. The households which are involved in the land lease market may be divided into four broad categories in terms of land ownership and type of tenancy transaction.

(1) *Pure landlords* rent out the entire land they own and do not actively engage in cultivation.
(2) *Cultivator landlords* rent out a part of their own land and cultivate the remaining part with the help of family and/or hired labour.
(3) *Owner tenants* own some land and rent in additional land for cultivation.
(4) *Pure tenants* do not own any land and rent in the entire land they cultivate.

The first two groups are often loosely labelled "landlords", while the last two groups are frequently called "tenants". It is possible that some households may both rent in and rent out land. This may happen because some households may rent out any parcel of their land which is at an inconvenient distance from the rest of their land, and may rent in land which is nearer. The existence of such households causes an identification problem. It was arbitrarily decided that such a household would be categorised as a "cultivator landlord" if it rented out at least twice as much

land as it rented in, and an "owner tenant" if it rented in more than twice the amount of land it rented out.

Even after following this auxiliary classification scheme, five households could not be identified with any of the categories. These households are excluded from the analysis below. The distribution of the households and their farm sizes are shown in Table 1. It should be pointed out that the distribution of the households in the sample does not in any way indicate their relative distribution either in the sample villages or in the country as a whole. The purpose of the survey required that a sufficiently large number of observations should be drawn from each category of households, such that each could be put to independent statistical tests. A stratified sampling procedure was, therefore, adopted for the survey. Such a procedure ensures the randomness of the observations pertaining to each category.

3. EMPIRICAL TESTS

Some slected indicators of efficiency (or performance) have been used for the purpose of the statistical tests.[3] These indicators comprise yields (quantity) of some major crops grown by the farmers, intensity of use of various inputs, acre value of all crops grown over the year and cropping intensity.[4]

[3] A cultivation practice is efficient if all the inputs are used up to the point where their value marginal productivities equal their costs. It is a commonplace in the literature to regard cultivation of owned land by farmers as efficient. If this is so, the performance (in terms of productivity and input use) of the cultivator landlords and owner tenants on their own land may be used as a benchmark of efficient cultivation against which the efficiency of cultivation of tenanted land or the performance of the tenants may be evaluated.

[4] 'Gross value per net acre' has been calculated by multiplying the gross output of each crop grown over the past year (1981-1982) by the average market price of that crop prevailing in the country during this period and dividing the sum of the product by the farm size. Thus, if the output of the ith crop grown by the farmer cultivating a farm of size h acres is given by x_i and the prevailing price of the crop is p_i, then the gross value of all crops per net acre is equal to $\Sigma\, p_i x_i/h$, where the summation is over all crops grown during the year. All yields are expressed in quantity terms. Intensities of use of inputs are also expressed in quantity terms, except for seed, which is expressed in value terms. This is so because no meaningfully comparable estimate of seedling used for sugar-cane cultivation could be expressed in quantity terms. Use of any input (say labour) per net acre is defined as the quotient of the total amount of the input used for cultivation over the year and the farm size. 'Cost of material inputs per net acre' is equal to the cost of all inputs except human and animal labour divided by the farm size. Thus the difference between 'gross value of all crops per net acre' and 'cost of material inputs per net acre' is the net return per net acre to labour (human and animal) and land. Value-added by human labour alone could be calculated from this figure by subtracting the cost of animal labour and the rental value of land. However, this was not attempted because of the difficulties in calculating these costs. Finally, cropping intensity is defined as the sum of the area under each crop grown over the year divided by the farm size. Thus if a_i is the area under the ith crop, cropping intensity is equal to $\Sigma\, a_i/h$. It indicates the intensity with which land is cropped over the year.

Table 1
Distribution of the Households and their Farm Sizes

	Mymensingh				Comilla				Rajshahi				All Sample			
	Cult. Landlord	Owner Tenant	Pure Tenant	Pure Landlord	Cult. Landlord	Owner Tenant	Pure Tenant	Pure Landlord	Cult. Landlord	Owner Tenant	Pure Tenant	Pure Landlord	Cult. Landlord	Owner Tenant	Pure Tenant	Pure Landlord
Number of Observations	22	50	18	9	24	48	19	7	17	62	12	7	63	160	49	23
Farm Size (Acre)	4.33	3.62	0.94	n.a.	2.04	1.32	0.71	n.a.	9.17	5.29	1.95	n.a.	4.77	3.58	1.09	n.a.

The principal aim of this section is to investigate whether the values of the indicators of efficiency discussed above vary systematically and significantly with tenure status as claimed by many authors. The *t*-test, which is widely used in the literature, is employed for this purpose. The performance of the farmers of various tenure categories is presented in Table 2. The cultivator landlords of Mymensingh obtained higher yields of most crops than the owner tenants or pure tenants; but the difference is mostly statistically insignificant. Only the yeilds of *aus* is significantly higher on cultivator landlord farms than on owner tenant farms. In Rajshahi, the cultivator landlords could not obtain a significantly higher yield of any of the crops than the owner or pure tenants. In Comilla, only the yield of *boro* achieved by the cultivator landlords was significantly greater than that achieved by the pure tenants. On the whole, the mean yields of each crop obtained by the farmers of various tenure categories are close to one another and the differences that exist are not statistically significant. Similarly, there is no significant difference between the tenure categories in the intensity of input use, cropping intensity or gross value of all crops per net acre. Therefore, it may be concluded that there is no significant difference in the performance of farmers of various tenure categories in any district.[5]

The performance of farmers of different tenure categories may not reveal any disincentive effect that cropshare tenancy may have because of the inverse size-efficiency relationship. To eliminate the effect of farm size on efficiency, the performance of tenants and cultivator landlords who operate farms of similar size is compared. Table 3 shows the values of the selected indicators of efficiency of tenants and cultivator landlords whose operational holdings do not exceed five acres. Thus, these farmers may be regarded as relatively small farmers. There is hardly any systematic difference between the two groups at the district level. When all sample households are pooled, the performance of cultivator landlords appears to be somewhat better than that of the tenants. Small landlords employ significantly more labour and chemical fertilizer per acre of land than the tenants, and their expenditure on non-labour (human and animal) inputs is also higher. However, their yields of various crops, though generally higher than those of the tenants, are not significantly different. Thus this test, too, fails to establish conclusively any inefficiency of cropshare cultivation.

Next the intensity of input use on – and yields from – own land and cropshare

[5] This paper is not concerned with the reasons for differences in performance of farmers in different districts. As evident from the tables, the farmers in Comilla are in general much more productive than the farmers in the other two districts. This could be due to a variety of factors like soil fertility, climatic conditions, and spread of the HYV technology.

Table 2

Performance of Farmers of Different Tenure Categories

Indication of Efficiency		Mymensingh				Comilla				Rajshahi				All Sample			
		Cult. Landlord	Owner Tenant	Pure Tenant	Total	Cult. Landlord	Owner Tenant	Pure Tenant	Total	Cult. Landlord	Owner Tenant	Pure Tenant	Total	Cult. Landlord	Owner Tenant	Pure Tenant	Total
Mean Yield (Maunds per Acre) of:	Aus.	17.7**	12.1	13.1		–	–	–	–	17.9	19.5*	16.3		17.8	16.1	13.9	16.2
	Aman	21.1	15.0	18.9		23.4	26.2	26.5		17.8	18.8	17.7		21.1	19.8	21.4	20.2
	Boro	33.1	30.2	34.0		41.3	41.8***	35.8***	–	–	–	–		39.6	38.4	35.4	37.7
	Jute	14.5	15.5	–		–	18.6	–	–	12.5	16.8*	10.1		13.4	16.1	12.1	15.0
	Sugar-cane	722	681	–		–	–	–		584	545	572		597	554	572	565
Per Net Acre:	Gross Value (Taka)	4136	3826	4256	3967	7016	7086	6400	6852	1878	1983	1786	1977	4624	4090	4482	4284
	Labour Man-days)	87	82	81	83	118	104	111	110	122	108	111	111	108	99	100	101
	Bullock Labour (Days)	61	65	59	63	35	34	33	34	40	39	41	40	45	46	44	45
	Chemical Fertilizer (Seers)	40	32	44	36	281	232	228	243	111	98	105	100	151	118	130	128
	Organic Manure (Maunds)	5	4	3	4	111	121	111	115	92	121	103	115	69	84	69	78
	Seed (Taka)	197	192	253	205	484	389	385	413	379	368	445	381	355	319	351	334
	Cost of Material Inputs (Taka)	363	339	539	384	2095	2007	2031	2023	1002	882	843	897	1195	1050	1192	1109
Cropping Intensity		1.81	1.84	1.84	1.83	1.76	1.64	1.66	1.67	1.14	1.12	1.20	1.14	1.61	1.50	1.61	1.54

An asterisk over a figure in cultivator-landlord or owner-tenant column denotes that the difference between it and the corresponding figure in the column to the right is statistically significant at one percent level. Two asterisks denote significance at five percent level, and three asterisks at ten percent level. Asterisks in the pure-tenant column are used to denote statistical significance of the difference in the values of the indicators of efficiency between pure-tenants and cultivator-landlords.

Table 3

Performance of Small Tenants and Small Cultivator Landlords

Indicators of Efficiency		Mymensingh				Comilla				Rajshahi				All Sample			
		Small Tenant		Small Landlord		Small Tenant		Small Landlord		Small Tenant		Small Landlord		Small Tenant		Small Landlord	
		Nos.		Nos.		Nos.		Nos.		Nos.		Nos.		Nos.		Nos.	
Mean Yield (Maunds per Acre) of:	Aus.	52	12.8	10	14.4	–	–	–	–	37	18.9	6	22.8	91	15.4	20	17.5
	Aman	54	16.3	10	21.1	58	26.2	21	23.2	34	19.0	4	19.5	146	20.9	35	22.1
	Boro	17	32.7	–	–	66	40.1	21	41.6	–	–	–	–	85	38.1	23	40.2
	Jute	27	15.7	7	14.7	4	18.6	–	–	7	13.4	3	11.0	38	15.6	12	12.7
	Sugar-cane	4	680	–	–	–	–	–	–	44	550	5	540	48	561	7	590
Per Net Acre:	Gross Value (Taka)	56	4136	11	3711	67	6891	23	6977	49	1968	7	2304	172	4592	41	5303
	Labour (Man-days)	56	83	11	95	67	106	23	118	49	111	7	133	172	100**	41	114
	Bullock Labour (Days)	56	64	11	67	67	34	23	35	49	41	7	47	172	46	41	46
	Chemical Fertilizer (Seers)	56	37	11	35	67	231	23	282	49	98	7	150	172	130**	41	194
	Organic Manure (Maunds)	56	4	11	6	67	118	23	116	49	129	7	137	172	84	41	90
	Seed (Taka)	56	217	11	205	67	388	23	491	49	383	7	411	172	331	41	401
	Cost of Material Inputs (Taka)	56	422	11	349	67	2017	23	2124	49	859	7	1148	172	1167**	41	1481
Cropping Intensity		56	1.85	11	1.80	67	1.64	23	1.77	49	1.15	7	1.29	1727	1.57	41	1.69
Hired Labour per Family Worker (Man-days)		53	35**	8	105	67	46**	23	93	49	126	7	115	169	66**	48	98
Hired Labour per Acre (Man-days)		56	23*	11	67	67	53*	23	91	49	74	7	108	172	49*	41	87

The asterisks have the same meaning as in Table 2.

land are compared (cf. Table 4).[6] There is no significant difference in yields from own and cropshare land in Mymensingh, although more human and animal labour and organic manure are used on own land than on cropshare land. In Comilla, the yield of *boro* paddy only is significantly greater on own land. The farmers in this district used more organic manure and spent more on seeds for their own land. The cropping intensity is also significantly greater on own land than on cropshare land. This results in a considerably greater gross value of all crops per net acre from own land. Indeed, the Comilla farmers obtain nearly forty five percent more output (in value terms) per acre of own land than that from cropshare land. In Rajshahi there is no significant difference in any of the indicators of efficiency. These results seem to suggest that the tenure status does not influence the cultivation practices of the farmers in Rajshahi.

However, when the data of all districts are pooled, the performance on own land appears to be significantly better than that on cropshare land. Yields of *aus, aman* and *boro* paddy obtained from own land are significantly greater than the yields obtained from cropshare land. The greater yields were made possible by using significantly greater amounts of inputs like seed, organic manure and bullock labour on own land. The cropping intensity on own land is also higher. A higher cropping intensity and higher yields of some of the crops from own land result in a significantly greater gross value of all crops per net acre from own land. Thus, it would appear from the aggregated data that the farmers tend to use more inputs on – and obtain greater yields from – their own land than cropshare land.[7]

Finally, the performance of the owner tenants on their own land is compared against their performance on cropshare land. The paired *t*-test is used for this purpose. Applying this test to the sample, it is found that the yields of *aman* paddy in Mymensingh and *boro* in Comilla, obtained from own land by the owner tenants, are significantly greater than the yields obtained by the same owner tenants from cropshare land (cf. Table 5). For all other crops, the difference in yields from own

[6]Cultivator landlords, owner tenants, and mixed farmers cultivate all or part of their owned land while all tenure groups (excluding pure landlords) may cultivate cropshare land.

[7] Much caution is needed to interpret the results derived from pooled data, as pooling may introduce some bias in the results. To give an example, assume that there is no difference in the yields of the two categories of farms in any of the districts but the yields of both categories of farms in one of the districts, say Rajshahi, are much lower than those in the other districts. Now, if the Rajshahi sample were to contain relatively more farms of one category, then pooling would reduce the yields of this category of farms by a greater amount than those of the other category. Hence, it is possible that one may find the yields of one category of farms lower than those of the other at the aggregate level even though this may not be true in any of the districts. When such problems are suspected, pooling of data is inappropriate. Throughout this paper, the pooled data are presented for illustrative purposes only; the conclusions are based on the district level data findings only.

Table 4

Efficiency of Cultivation of Own Land and Cropshare Land

Indicators of Efficiency		Mymensingh				Comilla				Rajshahi				All Sample			
		Own Land		Sharecrop Land		Own Land		Sharecrop Land		Own Land		Sharecrop Land		Own Land		Sharecrop Land	
		Nos.		Nos.		Nos.		Nos.		Nos.		Nos.		Nos.		Nos.	
Mean Yield (Maunds per Acre) of:	Aus.	70	14.1	61	12.1	3	17.5	–	–	69	19.4	41	18.4	142	16.7***	103	14.7
	Aman	71	17.5	58	14.7	68	28.0	33	23.7	62	19.3	35	19.5	201	21.6***	126	18.4
	Boro	19	27.3	11	36.3	66	43.9*	59	37.4	–	–	–	–	85	40.2**	72	36.8
	Jute	48	15.3	17	14.5	7	17.3	–	–	22	15.3	5	13.2	77	15.5	22	14.2
	Sugar-cane	7	649	–	–	–	–	–	–	72	553	46	539	80	559	48	566
Per Net Acre:	Gross Value (Taka)	73	4443	69	4484	74	8513*	71	5893	81	2206	76	1913	228	4956**	214	3979
	Labour (Man-days)	73	100**	69	84	74	138	71	121	81	113	76	115	228	117	214	107
	Bullock Labour (Days)	73	79*	69	62	74	40	71	37	81	40	76	40	228	53**	214	46
	Chemical Fertilizer (Seeds)	73	40	69	36	74	268	71	267	81	102	76	104	228	136	214	131
	Organic Manure (Maunds)	73	5.5*	69	2.4	74	168*	71	107	81	119	76	132	228	98***	214	81
	Seed (Taka)	73	224	69	231	74	512**	71	358	81	393	76	366	228	378*	214	318
	Cost of Material Inputs (Taka)	73	395	69	417	74	2342	71	2111	81	935	76	878	228	1218	214	1099
Cropping Intensity		73	2.11	69	1.98	74	1.93*	71	1.48	81	1.15	76	1.13	228	1.71*	214	1.52

Table 5

Performance of Owner Tenants on Own and Cropshare Land

Indicators of Efficiency		Mymensingh			Comilla			Rajshahi			All Sample		
		Nos.	Own Land	Sharecrop Land	Nos.	Own Land	Sharecrop Land	Nos.	Own Land	Sharecrop Land	Nos.	Own Land	Sharecrop Land
Mean Yield (Maunds per Acre) of:	Aus.	47	12.6	11.9	–	–	–	31	19.4	18.8	79	15.3	14.7
	Aman	42	16.5**	13.2	15	38.7	23.2	23	20.6	20.7	84	22.7	17.5
	Boro	–	–	–	33	47.0*	37.6	–	–	–	38	45.7*	36.2
	Jute	10	14.7	15.2	–	–	–	–	–	–	10	14.7	15.2
	Sugar-cane	–	–	–	–	–	–	34	535	526	35	542	566
Per Net Acre:	Gross Value (Taka)	50	4373	4336	48	8703*	5679	62	2312	1927	160	4822*	3785
	Labour (Man-days)	50	101*	79	48	141	111	621	111	115	160	117	104
	Bullock Labour (Days)	50	83*	60	48	41	36	–	41	39	160	54*	45
	Chemical Fertilizer (Seeds)	–	38	30	–	251	265	–	101	100	–	124	125
	Organic Manure (Maunds)	–	7*	2	–	183*	97	–	127	137	–	104*	82
	Seed (Taka)	50	224	203	48	511**	326	62	401	350	160	376*	296
	Cost of Material Inputs (Taka)	50	388	347	48	2354	2000	62	925	883	160	1167	1034
Cropping Intensity		50	2.16	1.90	48	1.87*	1.42	62	1.16	1.11	160	1.68*	1.45

and cropshare land is not significantly different. The performance of the owner tenants in Rajshahi does not seem to differ with tenurial status of land. None of the indicators of efficiency shows any significant difference between performance on own and cropshare land. The owner tenants in Mymensingh employ significantly greater amounts of human and animal labour and organic manure on own land, but the gross value obtained per net acre of own land is about the same as that from cropshare land. The owner tenants in Comilla spend more on seed and use more organic manure on own land. The cropping intensity on own land is also significantly higher than that on cropshare land. The gross value per net acre from own land, achieved by the Comilla owner tenants, is more than fifty percent greater than that from cropshare land. Finally, if the data of all districts are pooled, the owner tenants are found to perform generally better on own land. The yield of *boro* is found to be significantly greater on own land. The owner tenants employ significantly higher levels of all inputs except labour and chemical fertilizer per acre of own land than cropshare land. The cropping intensity of own land is also greater than that of cropshare land. Greater use of inputs and higher cropping intensity results in a twenty-seven percent greater 'gross value of all crops per net acre' obtained from own land than from cropshare land.

The findings presented in Tables 2 and 3 apparently show that the Marshallian inefficiency hypothesis does not hold either at the district or at the aggregate level. But the findings presented in the last two tables (Tables 4 and 5) seem to indicate that owner cultivation is more efficient than cropshare cultivation in Comilla. To a lesser degree the same is also true of Mymensingh, since many of the inputs are employed more intensively on own than on cropshare land although this does not lead to a greater productivity of own land.[8] The inefficiency of cropshare cultivation is accentuated by aggregation. The pooled data in the last two tables show owner cultivation to be definitely more efficient than cropshare cultivation. Most of the indicators of efficiency have a significantly greater value for own than for cropshare land at the aggregate level.

Table 2, which presents the values of some selected indicators of efficiency of cultivation of different tenure categories, *could* lead to the conclusion that tenure status does not affect the efficiency of cultivation of different farmers. Such a conclusion was indeed drawn by Cheung (1969); Huang (1975), and many others on the basis of similar evidence. As already noted, such a conclusion may be incorrect in view of the supervision problems and inverse size-efficiency relationship in agriculture. To net out the effect of farm size on efficiency, the performance of cultivator land-

[8] Note that the Marshallian theory rests on the argument that the share tenants undersupply inputs for cropshare land. Actual output may vary for various exogenous reasons, e.g., weather conditions.

lords and tenants of similar size has also been compared. But this test, too, does not reveal any inefficiency of cropshare tenancy. If there are some other factors besides farm size, which systematically impart a downward bias to the efficiency of owner cultivation and/or upward bias to that of cropsharing, this test would also be inappropriate. If the small cultivator landlords use relatively more hired labour than the small tenants, and if the employment of hired labour entails significant supervision problems, then the efficiency of owner cultivation would suffer more than that of cropshare cultivation – such that the actual data may reveal no difference between the two tenure systems. The small owners (cultivator landlords) indeed employ more hired labour per family worker (and also per acre) in the sample areas, as illustrated in Table 3. Thus, it would seem that this method of comparison [used also by Hossain (1977)], too, is inappropriate for testing the alleged disincentive effect of cropshare tenancy.

If the distribution of cropshare land among farms of different sizes is similar to that of own land,[9] and if the use of hired labour on both types of land is not substantially different, it may be expected that a comparison of efficiency of cultivation of own and cropshare land (cf. Table 4) will not suffer from the simultaneity problems caused by size-efficiency relationship and supervision problems. If one can reasonably assume these conditions to hold, this test is applicable. It has been shown already that this test does not reveal much difference in the performance of Rajshahi farmers on own and cropshare land, but the farmers in Comilla (and, to a lesser degree, Mymensingh) seem to cultivate own land more intensively than cropshare land. Performance on cropshare land is also found to be materially lower when the data of all three districts are pooled.

The paired *t*-test (cf. Table 5) is one of the more satisfactory methods of testing the efficiency of cropshare cultivation because it avoids many of the simultaneity problems noted above. It not only nets out the effects of farm size and supervision problems on the behaviour of farmers, but also controls the influence of many other factors like entrepreneurial and managerial skill, attitude toward risk and such other personal attributes of the farmers as may affect their efficiency. This test shows that owner tenants in Comilla cultivate own land more efficiently than cropshare land, but that no such difference in efficiency exists in Rajshahi. Although the owner tenants in Mymensingh use significantly greater quantities of some of the inputs on own than on cropshare land, the productivity of own land is not higher. At the aggregate level the performance of owner tenants on own land is significantly better than that on sharecrop land. Thus, the last two tests, which may be expected to be relatively free from the simultaneity problems besetting the first two, provide some

[9]There may be some ground for making such an assumption. The amount of land rented varies directly with the amount of land owned by the tenants. See Taslim (1987), Appendix A

support for the Marshallian hypothesis that cropshare cultivation is less efficient than owner cultivation.

4. GENERAL POLICIES TO ENSURE BETTER PERFORMANCE

The upshot of these tests is somewhat surprising in view of the fact that the landlords stipulate neither the cropping pattern nor the inputs to be supplied by the tenants. [See Taslim (1987), Appendix A]. The tenants are apparently quite free to rent land from several landlords and cultivate it as they wish. One might expect that such freedom would lead to a very inefficient cultivation of cropshare land, but the evidence presented above indicates that there is no significant difference in the efficiency of cropshare and owner cultivation in Rajshahi. Cropshare cultivation in Comilla appears to be inferior to owner cultivation; and in Mymensingh, although the farmers employ more of some inputs, the yield rates do not vary much with tenure status. The landlords are apparently not dissatisfied with the performance of their tenants. These findings would seem to suggest that there are some countervailing forces operating in the land lease market which prevent the tenants from being too negligent in their cultivation of cropshare land. These forces cannot possibly be legal, as most share contracts are informal and verbal. Hence, they have no sanction in law, precluding any legal action if they are violated. Furthermore, no evidence was discovered that suggested the landlords could impose any direct social or economic penalty on any tenant for violation of a contract. The apparent smooth functioning of the land lease market, with the efficiency of sharecrop cultivation not much inferior to owner cultivation or unsatisfactory to the landlords, seems to be due to certain common policies adopted by the landlords in renting out their land for cropsharing. These policies, which enable the landlords to enforce some minimum efficiency of cultivation of cropshare land, are discussed below in some detail.

The landlords are aware that some tenants, if unsupervised, may not cultivate the cropshare land satisfactorily. But they cannot or do not like to undertake the responsibility of an elaborate supervision of their tenants' work. Indeed, this would defeat the very purpose for which most of the landlords rent out land. In general, the landlords attempt to avoid the possibility of renting land to tenants who might cultivate it inefficiently by selecting only those from the pool of potential tenants who may be regarded as 'good farmers', or those who have already established a reputation of being good and reliable tenants.[10] In order to qualify as a good farmer, a prospective tenant must have been engaged in farming for a while so that his farming abilities can be determined. Usually, he must also possess the inputs necessary for cultivation. Two such inputs, which are of paramount importance in the tenancy

[10]Also see Bliss and Stern (1982), Chapter 5, and Zahid (1982) for a similar argument.

market in the sample areas, are bullocks and family labour. The main reason for attaching such importance to the possession of these inputs is the non-existence of or imperfections in the relevant markets. There is hardly any reliable market for bullock services in Bangladesh.[11] The labour market, too, is risky because of substantial seasonal fluctuations. Even if smooth markets existed, the landlords could not ascertain in advance whether or not the tenants would have the funds to hire these inputs when needed. Thus the landlords usually rent out land to only those tenants who possess these inputs.

However, mere possession of these inputs by the tenant may not lead to an efficient cultivation of cropshare land. The tenant may rent an excessive amount of land from several landlords so that his available inputs may not be sufficient to cultivate his entire operational holding efficiently. The landlord's reaction to such a possibility is to ration land among the tenants, so that no tenant gets an amount of land which is more than what he can be expected to cultivate properly with his available resources.[12] Hard as the landlords may try to avoid renting too much land to any tenant, they may not always succeed in doing so. Moreover, even if a tenant rents only so much land as the landlord considers appropriate, he may nonetheless fail to cultivate the land efficiently. The landlords, therefore, need a further instrument of control to set things right in case of such an eventuality. Most commonly, the landlords minimize the probability of repeatedly suffering a loss because of inefficiency of their tenants by granting only short-term leases to those tenants whose sincerity and ability have not yet been ascertained. A short-term lease enables the landlord to evict a tenant if he fails to cultivate cropshare land efficiently. This seems to be the most effective indirect penalty or economic cost that the landlord can impose on the tenant for his inefficiency. Eviction of a tenant not only deprives him of the opportunity of earning an income from cropshare land in the current period, but also reduces the probability that he will succeed in finding any other landlord willing to rent out land to him in the near future. The landlords are particularly distrustful of the tenants who have been evicted by other landlords for dishonesty or inefficient cultivation of rented land, and they would not normally offer tenancy to such tenants. Thus the tenants stand to lose a lot more than their current income from cropshare land if they are evicted for poor performance.

The general policy of the landlords of renting out land to only those tenants who own a sufficient amount of family labour and bullocks to cultivate their own land (if any) and cropshare land efficiently, also helps to increase the severity of the

[11] One of the reasons for the absence of the bullock labour markets is the possibility of mistreatment of the animals by the hirers. For a discussion, see Taslim (1987), Appendix B.

[12] Bliss and Stern (1982) have also found such a rationing process to be behind the apparent competitive equilibrium in the tenancy market in India. See Chapters 5 and 9.

penalty implied by the termination of lease. If the tenants fail to secure an alternative lease, these resources will remain underutilized. Because of the indivisibility of the bullock teams, and the imperfections of the bullock labour market, it may not be possible to hire out the services of bullocks that remain unutilized. Family labour is often non-tradeable due to socio-psychological barriers to entry into the wage labour market. Thus, losing tenancy also means losing the income that could be produced by these otherwise unemployable resources. The high cost of losing tenancy makes the tenants cultivate cropshare land with a degree of efficiency acceptable to the landlords – or that is sufficient to maintain their reputation as good tenants.

In order to be effective the threat of eviction must be real. Unless the landlords can actually evict the tenants for unsatisfactory performance, and rent the land out to other tenants who would perform better, the threat may not have any real effect on the efficiency of the tenants. Therefore, a threat of eviction is real if there exists a pool of potential tenants to whom the reclaimed land can be rented out and who may be expected to perform better than the evicted tenants. The landlords increase their expected return by reallocating the land reclaimed from the evicted tenants to other tenants; but the evicted tenants lose their income from cropshare land.

Just as the threat of eviction must be real in order to be effective, the tenants must also be systematically rewarded by the renewal of their leases if their performance is satisfactory. If a better performance does not lead to a greater probability of renewal of the lease, the tenants may not have any incentive to cultivate cropshare land efficiently. Hence, this 'carrot and stick' policy of promise of renewal and threat of eviction must be applied systematically in order that the tenants cultivate cropshare land with the desired level of efficiency.

Bangladesh is a land-scarce country where most rural households are landless or own only a small amount of land. The potential demand for cropshare land is generally greater than the supply. Thus, the landlords can evict the tenants for unsatisfactory performance and also find, without much trouble, other suitable tenants to rent out the reclaimed land. But the tenants who are evicted normally find it difficult to rent land from other landlords. To make eviction possible the landlords in Bangladesh usually grant only short-term leases to the tenants [see Hossain (1977) and Jannuzi and Peach (1980)].[13] Although not much concrete data regarding the duration of share leases in the sample areas are available, the general impression we get from the replies of the respondents is that share leases are usually of short duration, which enables the landlords to resort to eviction to penalize

[13] The empirical observation that many tenants hold tenure for a long time is sometimes interpreted as an evidence of long-term leasing. This may not be correct. Some of these tenants might have repeatedly leased the same plots of land for a number of consecutive short periods rather than one long period.

negligent tenants. On the other hand, the tenants who have built up a reputation as good farmers, or whose performance is satisfactory to the landlords, normally do not encounter any great difficulty in renting land for cropsharing.[14] Therefore, the threat of eviction and the prospect of renewal of the lease jointly ensure that the efficiency of cultivation of cropshare land is not unsatisfactory to the landlords, even though it may be occasionally lower than the efficiency of owner cultivation. The empirical evidence presented above is not inconsistent with such a view.

5. CONCLUSION

The main purpose of this paper was to emphasize that much care is needed in interpreting various test results one finds in the literature. Because of the simultaneity problems raised by supervision problems, and the low opportunity cost of labour which may induce an inverse size-productivity relationship in agriculture, tests which require comparison of the productivity of farmers or farms of different tenure groups tend to be biased. Even a comparison of the performance of farmers of different tenure groups, but of the same size, may not yield unbiased results if the farmers of the two groups use significantly different quantities of hired labour. The paired *t*-test, which involves comparing the performance of the owner tenants on their own and cropshare land, has been found to be the most satisfactory method of comparing the efficiency of cropshare tenancy against that of owner cultivation. This test indicates that cropshare cultivation may be somewhat less efficient than owner cultivation in Bangladesh agriculture.[15-16]

It has been shown elsewhere [see Taslim (1987)] that the landlords in Bangladesh do not usually stipulate the inputs or the cropping pattern of the tenants, who are also free to rent land from several landlords. This might have led one to suspect that cropshare cultivation would be inefficient or unsatisfactory. On the contrary, the evidence suggests that there is some disciplining influence on the tenants which prevents them from wasting the rental land. This is imparted by the general policies

[14] Also see Bliss and Stern (1982), Chapter 5, for similar findings in the context of an Indian village.

[15] Hossain (1977); Mandal (1980) and Talukder (1980) also reached the same conclusion on the basis of paired *t*-tests.

[16] Like most other empirical works in the literature, this study is based on cross-section data of a single year only. Agricultural production tends to be variable, and the performance of farmers in any year may vary due to factors other than the tenure status. If the performance is affected by exogenous factors in a systematic way, then it is possible that the actual effect of tenure status on performance may be either masked or accentuated, and consequently the test results could be biased. One way of getting around this problem would be to collect data from a target group of households over a number of successive years and use average values of the indicators for the tests. But this would be enormously costly and has not been attempted here.

of the landlords to choose only those as their tenants who have established a reputation of being good farmers or tenants, and to ration the land among these tenants according to their command or ownership of the resources necessary for cultivation. A further disciplining influence is the threat of eviction if the tenants are found negligent. These policies of the landlords seem to be quite effective in eliciting sufficient effort from the tenants, so that the efficiency of cropshare cultivation is not much inferior to that of owner cultivation or unsatisfactory to the landlords.

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