Multiple Leasing under Cropshare Tenancy — A Note

M.A. Taslim

Department of Economics, University of New England, Armidale N.S.W. 2351 (Australia)
and University of Dhaka, Dhaka (Bangladesh)

(Accepted 20 March 1989)

Abstract

Taslim, M.A., 1990. Multiple leasing under cropshare tenancy – a note. *Agric. Econ.*, 4: 91–98.

This paper attempts to explain the perplexing tendency to multiple leasing by both landlords and tenants in some countries. It shows that if the negotiation of share contracts involves significant transaction costs and there is some uncertainty regarding the output on tenanted plots, a risk-averse landlord maximizing expected utility will find it in his advantage to subdivide his land among several tenants and also permit his tenant to lease land from other landlords.

An intriguing feature of the tenancy market in some land-scarce countries like Bangladesh is that *both* landlords and tenants frequently engage in multiple leasing. That the landlords subdivide their land among several tenants is well known and accepted, but until recently it was not suspected that the tenants, too, engage in multiple leasing. Table 1, put together from the findings of several authors, shows this tendency clearly. About 45% of the tenants in Bangladesh, 67% in India and 50% in Pakistan leased land from more than one landlord. Such empirical findings are evidently contradictory to the assertion in much of the literature that the landlords prevent their tenants from leasing land from other landlords (see, for example, Cheung, 1969; Lucas, 1979; Quibria and Rashid, 1986). Some of the models of cropshare tenancy permit the landlords to lease out land among several tenants, but similar freedom is seldom given to the tenants[1]. However, it is not always clear if the landlords have any *economic* motive to subdivide their land among several tenants or to prevent the tenants from leasing land from other landlords. Cheung (1969) was one of the first authors to attempt an answer to the vexing question of

---

[1] In fact, the internal logic of some of these models may be compromised if the tenants are given such freedom.

TABLE 1

Multiple leasing by tenants

Number of landlords from whom each tenant leased land	Frequency distribution of sample tenants		
	Bangladesh	India	Pakistan
1	115	7	27
2	68	6	18
3	18	4	9
4	7	2	–
5 or more	1	2	–
Total	209	21	54

Sources: Bell (1977), Nabi (1986), Taslim (1987).

what determines the number of tenants among whom the land will be subdivided for cropsharing. But his model has been shown to be either inconsistent or indeterminate (see Taslim, 1987). If agricultural production is subject to non-decreasing returns to scale, output (and hence rental income) cannot be increased by subdividing the land among several tenants; while under decreasing returns to scale it pays the landlord to subdivide his land into infinitesimally small plots such that a physical limit to subdivision has to be arbitrarily imposed to derive a meaningful result as indeed was done by Bardhan and Srinivasan (1971). If the negotiation of a lease contract involves some transaction costs (see Cheung, 1969), multiple leasing would appear to be a Pareto-inferior choice for the landlords at least under non-decreasing returns to scale[2]; and yet there is a paradoxical tendency to such leasing. This paper attempts to show that if the negotiation of share contracts involves significant transaction costs and there is some uncertainty regarding output on tenanted plots, a risk-averse landlord maximizing expected utility will subdivide his total rental land among several tenants and at the same time permit his tenants to lease land from other landlords.

It will be useful to first briefly discuss some features of the tenancy market and its functioning in some of these countries[3]. The rental income of a landlord from a share contract[4] suffers from two distinct types of uncertainties: firstly,

---

[2]There is not much evidence that the agriculture in these countries is subject invariably to decreasing returns to scale.

[3]See Bliss and Stern (1981) for an account of the functioning of the tenancy market in India, and Taslim (1987) for that of Bangladesh.

[4]Nearly 95% of the lease contracts in Bangladesh and 86% in Pakistan are in the nature of share contracts (see Taslim, 1987; Nabi, 1986). However, share contracts account for a much lower share (about 50%) of all lease contracts in India.

the more familiar uncertainty due to exogenous weather conditions, and secondly, uncertainty regarding the supply of effort[5] by the tenant. The former has been adequately discussed in the literature, but the latter has not received ample attention[6]. But an analysis of the latter can, as shown below, shed much light on the paradox posed above.

Once a lease goes into operation the landlord does not have much control over the supply of effort by the tenants. If the tenants live up to his expectation (or abide by his stipulations) the landlord receives an adequate rental income, but if the tenant supplies effort skimpily (or not at all) he suffers a partial (or total) loss of income. If a tenant does not perform satisfactorily, the landlord can terminate the lease to penalize him, but he cannot avoid suffering the loss during the current period. To minimize the probability of suffering such a loss repeatedly the landlord usually adopts certain policies. In general, the landlord attempts to avoid the possibility of leasing out land to a tenant who might cultivate it inefficiently by selecting only those from the pool of potential tenants who have established themselves as 'good farmers' or who have already established a reputation as reliable tenants (cf. Bliss and Stern, 1981; and Taslim, 1987). Even after such a careful selection some tenants may nonetheless perform unsatisfactorily. If this happens the landlord may terminate the leases of the defaulting tenants.[7] The termination of the lease is a very effective penalty; not only that it deprives the tenant of the opportunity to earn an income from the rental land of the particular landlord, but it also reduces the probability that he will succeed in finding another landlord willing to lease out land to him. The landlord is particularly distrustful of the tenant who has been evicted by another landlord for dishonesty or inefficient cultivation, and he would not normally offer a lease to such a tenant. Thus a defaulting tenant stands to lose a lot more than his current income from the rental land if he is evicted.

Now we may analyze why the landlord may prefer to lease out his land among several tenants even when agricultural production is assumed to exhibit constant returns to scale. Let the representative landlord own H amount of land. He has the option of leasing the land equally among n identical tenants requiring each tenant to supply l amount of effort, or he may lease out the entire land to a single tenant requiring him to supply L $(=nl)$ amount of effort[8].

---

[5]The term 'effort' has been used in a general sense, and may include all inputs which the tenant is obliged to supply.

[6]Most models (e.g. Cheung, 1969; Stiglitz, 1974; Reid, 1976) assume away the problem by postulating that the landlords stipulate the inputs and the tenants always abide by these stipulations.

[7]For simplicity we assume that the landlord does not seek to know whether a poor performance is due to negligence or such unforseen circumstances as sickness of the tenant. In either case he terminates the lease.

[8]It is not essential for the analysis below to explicitly determine the value of l. All we require is that for any given amount of land, there exists a unique value of l that maximizes the return of the landlord subject to the constraints he encounters and that he stipulates this value of l. Therefore, we shall henceforth disregard this problem.

However, as discussed earlier, requiring a tenant to supply a certain amount of effort does not necessarily imply he will actually supply the said amount. To simplify the exposition, let us assume that the tenant either supplies the required amount of effort or he does not supply any effort at all[9], i.e., he defaults[10]. Let the probability that the tenant will not default be p (and hence the probability of default is $1-p$). Evidently, the policies generally adopted by the landlord are designed to maximize the value of p, but it is unlikely that p could be equal to 1. The expected rental income of the landlord when he rents his land to a single tenant is $R = pr\, F(H, L)$ where r is the rental share and $F(\cdot)$ is a linear homogeneous production function. If he subdivides the land among n tenants, his expected rental income is $R' = npr\, F(H/n, l) = pr\, F(H, L)$. Therefore, $R = R'$, i.e., the landlord's expected rental income is independent of the number of tenants to whom he leases out the land. If there is even a small transaction cost involved in the negotiation of a contract, the landlord's net expected income would be greater when he leases out the land to a single tenant. Hence, if the landlord is assumed to be *risk-neutral*, it is difficult to rationalize multiple leasing. But if the landlord is risk-averse it can be shown that he can increase his expected utility by subdividing his land among several tenants because such a subdivision implies a reduction in the riskiness or variance of the rental income[11].

Proof. $\mathrm{Var}(R) = E(R^2) - E^2(R)$. But $E^2(R) = (prF)^2$ and $E(R^2) = {}^nC_m p^m (1-p)^{n-m} m^2 (rF/n)^2$, where m is the number of non-defaulting tenants. Hence, $\mathrm{Var}(R) = (rF/n)^2 E(m^2) - (prF)^2$. Now $\mathrm{Var}(m) = np(1-p)$ and $E(m) = np$. But $\mathrm{Var}(m) = E(m^2) - E^2(m)$ or $E(m^2) = \mathrm{Var}(m) - E^2(m) = np(1-p) - (np)^2$. Using these results we get: $\mathrm{Var}(R) = (rF/n)^2 [np(1-p) - (np)^2] - (prF)^2$. Simplifying we find: $\mathrm{Var}(R) = p(1-p)(rF)^2/n$. Hence $\mathrm{Var}(R)$ is inversely related to n.   Q.E.D.

Since the expected rental income is independent of n but its variance is inversely related to n, it is obvious that a risk-averse landlord will find it worthwhile to subdivide his land among several tenants.

To formally analyze the decision problem of the landlord let us assume that his expected utility, U, is a function of his expected rental income net of any

---

[9]A critical reader may question why a tenant should lease in land if he does not wish to put in any effort. The assumption is made for the sake of simplicity and it should not be taken literally. One could instead assume that the tenant either supplies the stipulated effort or, say $x\%$ of the stipulated amount. The latter may also be assumed to be equal to the amount that the tenant would supply under Marshallian conditions. It should be evident that the qualitative results of the analysis are not affected by this.

[10]The analysis remains valid also in the case of fixed rent tenancy if the fixed rent is payable after the harvest and there is a possibility that the tenant may not pay up.

[11]It is obvious that $\mathrm{Var}(y) = \mathrm{Var}(R)$.

transaction costs and the riskiness of the income: $U = U(y, v)$, where $y = R - C$, and v is the variance of income[12]. C is the transaction cost which is assumed to be an increasing function of n. The landlord maximizes his expected utility by choosing n (or equivalently the amount of land to be given to each tenant. The first-order condition for an interior maximum is:

$$-C' U_y - (v/n) U_v = 0$$

which simply states that the marginal cost of an additional contract should be set equal to the marginal gain due to a reduction in the variance of the rental income[13]. Differentiating the left side of the first-order condition with respect to n, we get:

$$-C'' U_y + 2(v/n^2) U_v + (C')^2 U_{yy} + 2C'(v/n) U_{yv} + (v/n)^2 U_{vv}$$

which is negative under the plausible assumption that U_{yy}, U_{yv}, U_{vv} and U_v are all negative, and the marginal transaction cost of share contracts does not diminish[14]. Hence, the first-order condition defines the value of n which maximizes the expected utility of the tenant.

Figure 1 presents a simple geometric interpretation of the results derived above. The ray $O'K$ in Panel I shows the total output of the rental land, and the ray $O'J$ shows the expected output share accruing to the landlord. given the total land endowment of the landlord $O'H$, his expected rental income is R_e. The curve $O'M$ in Panel II shows the utility derived by the landlord from income *if* there were no risk. Thus MR_e is the utility that the landlord would enjoy if he received a certain income of R_e. The curve ABC in Panel III plots the utility of an expected income of R_e for various values of the variance of the income. The curve is concave downward given our assumptions regarding the utility function $U(y, v)$. The hyperbola in Panel IV depicts the relationship between v and n. The 45° degree line in Panel V transfers n corresponding to various v to the horizontal axis in Panel VI. To derive the relationship between utility and n from the curve ABC, draw two vertical lines at any v, say v_1, and the corresponding n, say n_1. Draw a horizontal line at the point of intersection between ABC and the vertical line at v_1. The intersection point F between this horizontal line and the vertical line through n_1 defines the utility derived by the landlord when he divides his land among n_1 tenants. By repeating the process we generate the curve OEF which shows the utility derived by the landlord

---

[12]Note that both y and v are functions of a single variable, n.

[13]This condition will be met if the marginal transaction costs are nondecreasing and the landlord is risk-averse.

[14]A negative U_{yy} implies a diminishing marginal utility of income, while a negative U_{yv} implies that the marginal utility of income declines with an increase in risk. $U_v < 0$ means that the utility of a given income declines with an increase in risk and $U_{vv} < 0$ implies that utility decreases at an increasing rate with risk. Some of these assumptions will not hold if the landlord is not risk-averse. If the marginal transaction cost of contracts does not diminish with an increase in the number of contracts, then $C'' > 0$.
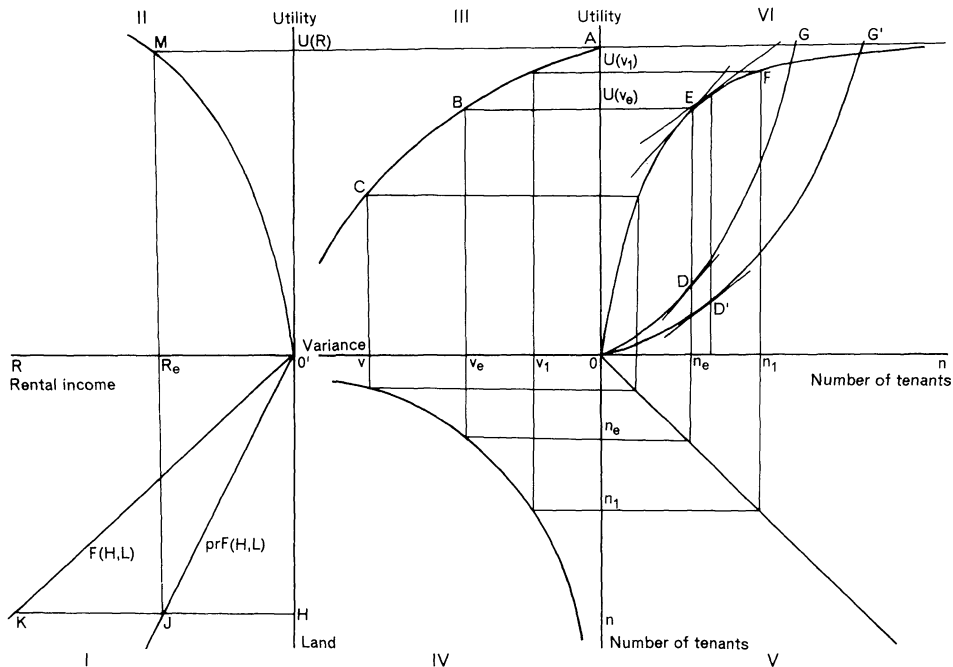
96

Fig. 1. Multiple leasing by the landlord.

from his expected rental income R_e when he divides his land among n tenants. As $n \to \infty$, utility asymptotically approaches OA ($= MR_e$) which is the utility of income R_e if it is certain. The curve ODG depicts the utility equivalent of the transaction costs. As drawn, the shape of the curve indicates that the transaction costs increase at an increasing rate with n.[15] The value of n at which tangents to OEF and ODG are equal, defines the equilibrium of the landlord. Therefore, n_e is the equilibrium number of tenants among whom the landlord will subdivide his land. When $n = n_e$, the variance of R is v_e and the utility of the landlord net of transaction costs is ED. As evident from the diagram, utility cannot be increased by either increasing or decreasing n from n_e.

Some interesting results are suggested by the diagram. If the landlord is risk-neutral and if the utility of an expected income R_e is given by MR_e ($= OA$) then both ABC and OEF coincide with the horizontal line through A. Now if

---

[15]It is unlikely that the curve ODG can be concave downwards for all values of n. Beyond some minimum plot size, the probability of default will almost certainly rise, and when the plot size reaches some critical minimum no tenant will be willing to lease the land or if they do they will default. Hence the transaction costs, broadly defined to include any loss of expected rental output due to an increase in the number of tenants, must rise if the subdivision of the land is carried beyond this point. For simplicity we have assumed that the marginal transaction costs are non-decreasing for all n.

there are no transaction costs involved in negotiation of contracts [16] then the value of n is indeterminate given our assumption of constant returns to scale, i.e., utility is independent of n. But if there are any transaction costs the optimum point is the origin, that is to say, n falls to its minimum value as asserted earlier[17]. However, if the landlord is risk-averse and there are no transaction costs, then the optimum n is infinitely large. Since the expected rental income is independent of n but the variance is inversely related to n, the utility of the landlord can be indefinitely increased by increasing n. But if there are some transaction costs, there exists a finite value of n that maximizes the utility of the landlord[18]. The importance of the transaction costs is clearly indicated by the diagram. If these costs fall as shown by a clockwise pivoting of ODG to OD'G' the equilibrium n increases and so does the utility of the landlord. The lower the transaction costs, the greater the value of n; and as $C \to 0$, $n \to \infty$.

The analysis above shows that it may be in the interest of the landlord to subdivide his land among several tenants. But why does he frequently permit his tenants to engage in multiple leasing (see the table above) contrary to the assertion of much of the literature that he forbids the tenants to rent land from other landlords? A little reflection will reveal that a decision by the landlord to subdivide his land among several tenants may also imply a dual decision to permit the tenants to lease land from other landlords. Given the endowments of a tenant, he can lease and also satisfactorily cultivate only a certain amount of land[19]. If the landlord wishes to lease out to him an amount of land that is smaller than what he can satisfactorily cultivate, then he must be allowed to lease land from other landlords for a fuller utilization of his resources[20].

The foregoing analysis shows that when there is some uncertainty regarding the supply of effort by the tenants, the landlord may find it desirable to subdivide his land among several tenants[21]. The equilibrium number of tenants

---

[16]When there are no transaction costs, ODG coincides with the horizontal axis On.

[17]Since n cannot be less than 1 (if $n = 0$, the landlord ceases to be a landlord), the origin may be defined to be set at $n = 1$ and $U = U(y, v(1))$, where $v(1)$ is the variance of R then $n = 1$. We are, therefore, assuming that the transaction costs are not so high as to induce the landlord to cease leasing altogether.

[18]Strictly speaking this is true only if the transaction cost curve ODG is (weakly) convex.

[19]The total amount of land that a tenant may cultivate satisfactorily is determined by his endowments of non-land inputs like family labor and draft power. The difference between this amount and the amount of land owned by him is the amount that he may lease. See Bliss and Stern (1981) for an exhaustive account of the leasing decision of farmers.

[20]If the endowment of the tenant is just enough to satisfactorily farm the amount of land that the landlord wishes to lease out to him, then he may be forbidden to lease land from any other landlord. While this situation may obtain for many farmers, it is unlikely that it will obtain for all farmers.

[21]This should not be taken to imply that the choice of tenants depends only on economic calculations. The landlord, for example, may wish to increase the number of tenants even when it is not economically profitable to do so in order to broaden his sociopolitical power base through a patron–client relationship with a greater number of tenants. What is implied above is that even in the absence of a sociopolitical motive, there may be an independent economic motive for the landlord to engage in multiple leasing.

will be determined by the transaction costs of share contracts and the reduction in the riskiness of the rental income due to an increase in the number of tenants. If the tenant possesses more non-land inputs than are necessary to satisfactorily cultivate whatever land the landlord decides to allocate him, the tenant will be permitted to lease land from other landlords. Hence many tenants, too, will be found to engage in multiple leasing.

Acknowledgement

References

Bardhan, P.K. and Srinivasan, T.N., 1971. Cropsharing tenancy in agriculture: a theoretical and empirical analysis. Am. Econ. Rev., 41: 48–64.

Bell, C., 1977. Alternative theories of sharecropping: some tasks using evidence from North-East India. J. Dev. Stud., 13: 317–316.

Bliss, C.J. and Stern, N.H., 1981. Palanpur: The Economy of an Indian Village. Oxford University Press, New Delhi.

Cheung, S.N.S., 1969. The Theory of Share Tenancy. Chicago University Press, Chicago, IL, 188 pp.

Lucas, R.E.B., 1979. Sharing, monitoring and incentives: Marshallian misallocation reassessed. J. Polit. Econ., 87: 501–520.

Nabi, I., 1986. Contracts, resource use and productivity in sharecropping. J. Dev. Stud., 22: 429–442.

Quibria, M.G. and Rashid, S., 1986. Sharecropping in dual agrarian economies: a synthesis. Oxford Econ. Pap., 38: 94–111.

Reid, J.D., Jr., 1976. Sharecropping and agricultural uncertainty. Econ. Dev. Cult. Change, 24: 549–576.

Stiglitz, J.E., 1974. Incentives and risk sharing in sharecropping. Rev. Econ. Stud., 41: 219–255.

Taslim, M.A., 1987. An analysis of the tenancy market in Bangladesh. Agriculture Ph. D. dissertation, La Trobe University, Australia, 294 pp.