Appendix: The Meaning of Kinship in Sharecropping Contracts

by

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Article Abstract

Analysis of a household survey from the Philippines shows that the behavior of sharecroppers with a kinship relation with their landlord is not affected by the disincentive effects of product and factor sharing, while behavior of the other sharecroppers responds to the contract terms. We characterize the meaning of kinship ties through a survey of opinion conducted among tenants. It shows that kin landlords help or are expected to help more frequently in case of emergency than other landlords, and they do so with a wider range of instruments, providing the incentive for cooperative behavior in sharecropping contracts among kin.

Key words: sharecropping, efficiency, kinship

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Sharecropping Contracts Appendix

Tenant Behavior under an Unenforceable Contract

The general tenancy contract is defined as (r, r'), where r $(0 \le r \le 1)$ is the landlord's output share and r' $(0 \le r' \le 1)$ is the landlord's share in the cost of purchased inputs. The tenant decides on the provision of both the labor input L, which he provides entirely, and the purchased input x the cost of which is shared in an exogenous proportion $(1 - r')$ with the landlord. A fixed rent contract is obtained with $r = 0$, a wage contract with $r = 1$, and a sharecropping contract with $0 < r < 1$. Assuming that plot size is exogenous to the input decision under consideration, production q is function of L, x, fixed factors z, and the realization of a random variable θ distributed with mean 1 and variance σ^2. Assuming a perfect labor market, the opportunity cost of labor is the market wage w. If $\theta q(L, x; z)$ is output at harvest time, the tenant's income y is:

$$y = (1-r)p\theta q(L,x;z) - wL - (1-r')p_x x + T,$$

where p is output price, p_X purchased input price, and T non-farm income.

The tenant chooses the levels of L and x that maximize his expected utility:

$$\underset{L,x}{Max}\, W = EU\left[(1-r)p\theta q(L,x;z) - wL - (1-r')p_x x + T\right].$$

The first order conditions are:

$$\begin{aligned}(1-r)p\, q'_L &= w\, EU'/EU'\theta,\\ (1-r)p\, q'_x &= (1-r')p_x\, EU'/EU'\theta.\end{aligned} \qquad (1)$$

These expressions identify two potential sources of inefficiency: on the right hand side of the equations, the standard Marshallian disincentive effect of the contract term $(1 - r)$ on both labor and purchased input, unless, for the latter, sharing in factor cost $(1 - r')$ is equal to sharing in the product; and, on the left hand side of the equations, risk aversion $(EU'/EU'\theta)$ when there is not a socially optimal risk sharing between landlord and tenant.

Taking a first-order Taylor expansion of the utility function around $\theta = 1$ (see Newbery and Stiglitz), and noting

$\overline{U'} = U'(\theta = 1)$ and $\overline{U''} = U''(\theta = 1)$,

we obtain:

$$U \approx \overline{U} + (\theta - 1)\overline{U}'(1-r)pq + \frac{(\theta-1)^2}{2}\overline{U}''r^2p^2q^2.$$

Neglecting higher order terms, this gives:

$$U' = \overline{U}' + (\theta - 1)\overline{U}''(1-r)pq$$

and hence

$$EU' = \overline{U}'$$

and $$EU'\theta = \overline{U}' + \overline{U}''(1-r)pq\sigma^2 = \overline{U}'\left[1 - \rho\frac{(1-r)pq}{y}\sigma^2\right],$$

since $E(\theta - 1) = \sigma^2$,

where ρ is the tenant's coefficient of relative risk aversion $-y\overline{U}''/\overline{U}'$. In equations (1), the risk aversion term can thus be approximated by:

$$\frac{EU'\theta}{EU'} = 1 - \rho\frac{(1-r)pq}{y}\sigma^2.$$

The tenant's choice of labor and purchased inputs are hence the solution to the system of equations:

$$\begin{aligned}(1-r)\,pq'_L &= w \,/\left[1 - \rho\,\frac{(1-r)pq}{y}\,\sigma^2\right],\\ (1-r)\,pq'_x &= (1-r')\,p_x \,/\left[1 - \rho\,\frac{(1-r)pq}{y}\,\sigma^2\right].\end{aligned} \qquad (2)$$

These expressions show that the risk factor in square brackets is function of risk aversion ρ, the level of risk σ^2, and the share of risky income in total income $s_\theta = (1-r)pq/y$, which itself depends on the terms of the contract. Hence, labor and purchased input use decrease with risk aversion, the level of risk, and the share of risky income in total income.

The Enforceable Contract

We define the cooperating sharecropper as a sharecropper who accepts to use the levels of inputs which the landlord would want him to use. This level is hence the solution to the landlord's optimal enforceable contract, where the landlord maximizes his expected utility *EV* with respect to *L*, *x*, *r*, and *r´*:

$$\underset{L,x,r,r'}{\text{Max}}\; EV\left[rp\theta q(L,x;z) - r'p_x x + Z\right],$$

subject to the tenant's reservation utility constraint

$$EU\left[(1-r)p\theta q(L,x;z) - wL - (1-r')p_x x + T\right] = \overline{W},$$

where *Z* is the landlord's other income and $\overline{W}$ the tenant's reservation utility level.

The first order conditions are:

$$\frac{\partial EV}{\partial L} = EV'\theta rpq'_L + \lambda\left[EU'\theta(1-r)pq'_L - EU'w\right] = 0 \quad (3)$$

$$\frac{\partial EV}{\partial x} = EV'\theta rpq'_x - EV'r'p_x + \lambda\left[EU'\theta(1-r)pq'_x - EU'(1-r')p_x\right] = 0 \quad (4)$$

$$\frac{\partial EV}{\partial r} = EV'\theta pq - \lambda EU'\theta pq = 0 \quad (5)$$

$$\frac{\partial EV}{\partial r'} = -EV'p_x x + \lambda EU'p_x x = 0. \quad (6)$$

From equations (5) and (6), $\lambda = \frac{EV'\theta}{EU'\theta} = \frac{EV'}{EU'}$. Substituting for $\lambda = \frac{EV'}{EU'}$ into equation (3) gives:

$$\frac{EU'\theta}{EU'} pq'_L = w.$$

Using the same Taylor expansion as above, to approximate $\frac{EU'\theta}{EU'}$ gives the optimal labor input:

$$pq'_L = w/\left[1-\sigma^2\frac{(1-r)pq}{y}\rho\right], \quad (7)$$

where ρ and y are the tenant's relative risk aversion and income level, respectively.

Similarly, substituting for λ into equation (4) and using the Taylor expansion approximation gives the optimal fertilizer input:

$$pq'_x = (1-r')p_x/\left[1-\sigma^2\frac{(1-r)pq}{y}\rho\right]. \quad (8)$$

The socially optimal risk sharing between landlord and tenant determines the terms of output sharing r. Using the Taylor expansion approximations in $\frac{EV'\theta}{EV'} = \frac{EU'\theta}{EU'}$ gives:

$$r = \frac{\rho_T / y_T}{\rho_L / y_L + \rho_T / y_T},$$

where ρ_L and ρ_T are the coefficients of relative risk aversion of the landlord and tenant, respectively, and y_L and y_T their respective income levels. Thus:

If the tenant is risk neutral, $\rho_T = 0$, $r = 0$, and the optimal contract is a fixed rent contract;

If the landlord is risk neutral, $\rho_L = 0$, $r = 1$, and the optimal contract is a wage contract;

If both are risk averse, $(\rho_T, \rho_L) > 0$, $0 < r < 1$, and the optimal contract is a sharecropping contract.

If the relative risk aversion of the tenant compared to that of the landlord, ρ_T/ρ_L, increases, the optimal share r increases, and the landlord absorbs more risk.

The tenant's reservation utility constraint imposes a relationship between the contract terms r and r'. Hence, while r is chosen to maximize contract efficiency from the landlord's standpoint by sharing risk optimally, r' is used to set the tenant at his reservation utility level. In other words, in the terms of the contract (r, r'), r is set to insure maximum efficiency while r' is set to insure maximal surplus extraction from the tenant, reducing him to his reservation utility level $\overline{W}$.

The optimal contract, as set by the landlord under enforcement, is socially efficient, since the marginal productivities of labor and fertilizer in equations (7) and (8) are not multiplied by the tenant's share (as opposed to equation (2)) and there is socially optimal risk sharing since

$$\frac{EU'\theta}{EU'} = \frac{EV'\theta}{EV'} \text{ or } \frac{\rho_T}{y_T} = \frac{\rho_L}{y_L} \text{ or } R_T = R_L,$$

where R_T and R_L are the coefficients of absolute risk aversion of the tenant and landlord, respectively.

Comparing Factor Use by Sharecroppers, Tenants, and Owner-operators

We can now compare the expressions defining the optimal levels of factor use under the three types of contracts: a non-cooperating sharecropper (equation (2), with $r > 0$), a cooperating sharecropper (equations (7) and (8)), and a fixed-rent tenant (equation (2), with $r = 0$). Owner-operators behave like fixed-rent tenants. For labor:

i) Non-cooperating sharecropper:

$$(1-r)\, pq'_L = w \Big/ \left[1 - \rho \frac{(1-r)pq}{y}\right]\sigma^2 = w \Big/ \left[\frac{EU'\theta}{EU'}\right] > w \Big/ \left[\frac{EV'\theta}{EV'}\right]$$

ii) Cooperating sharecropper:

$$pq'_L = w \Big/ \left[1 - \rho \frac{(1-r)pq}{y}\right]\sigma^2 = w \Big/ \left[\frac{EU'\theta}{EU'}\right] = w \Big/ \left[\frac{EV'\theta}{EV'}\right]$$

iii) Fixed-rent tenant or owner-operator:

$$pq'_L = w \Big/ \left[1 - \rho \frac{pq}{y}\right]\sigma^2 = w \Big/ \left[\frac{EU'\theta}{EU'}\right]$$

Similar equations are obtained for the factor x.

These results show that:

a) For given income riskiness, total income level, and level of relative risk aversion, the cooperating sharecropper applies more labor to production than the non-cooperating sharecropper.

b) Furthermore, the contract terms themselves will be chosen differently in these two cases. Since the contract terms give to the cooperating tenant a higher level of risk sharing with the landlord, the tenant will use even more input.

c) The cooperating sharecropper applies more labor than the fixed rent tenant. This difference is due to the insurance benefit which the risk averse tenant derives from the sharecropping contract.

References

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