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NEW APPROACHES TO THE THEORY OF RENTAL CONTRACTS IN AGRICULTURE

Clive Bell and Pinhas Zusman

This paper addresses two issues: the relationship between the choice of rental contract in agriculture and the set of conditions or environment under which such contracts are arrived at, and the implications of this relationship for efficiency, equity, and development policy. Both issues have been the subject of much discussion in the theoretical literature of late. In particular, close attention has been paid to the role of imperfections in, or outright failure of, one or more markets. This has led, in turn, to the notion of "market interconnectedness" in the narrow sense that the same two agents will deal with one another in several markets simultaneously, an obvious example being the landlord who also provides credit to tenants. Two main analytical approaches are discernible. The first posits free entry for an indefinitely large set of agents who have access to parametrically given alternative utility levels elsewhere in the economy. The resulting equilibria are normally characterized by utility equivalent contracts, which are the outcome of a Nash noncooperative game. The second assumes barriers to entry in the face of market failure so that, in equilibrium, the set of contracts is the outcome of a system of Nash cooperative games. Taken together they yield a rich taxonomy and a number of interesting results.

Why Does Tenancy Exist?

Suppose, first of all, that there is a complete set of perfect markets. If every agent also has access to the same constant returns to scale production function, it is immaterial whether he buys inputs in order to produce output for eventual sale, or exchanges part or all of his initial endowment for other commodities. Hence, there may be no particular incentive to trade in a specific good or factor. Taking the argument one step further, if land, say, is not tradeable, profit maximization will still ensure that the marginal product of each tradeable input is equated to its price in all uses, so that production will still be efficient. There is no need for land to be leased in or out, as all necessary adjustments can be made by varying the amounts of traded inputs combined with it (Bliss and Stern). The argument applies symmetrically to each case in which there is just one nontraded factor or good.

If there are two or more nontraded factors, then production will not be efficient unless all agents' endowments of them are the same (up to a scalar multiple)—an improbable state of affairs. In many rural settings, there is no separate market in the cultivators' managerial and husbandry skills, and there may also be none for the services of their draft animals. Moreover, even though labour markets are generally active, some family labour is often less than perfectly marketable. Nevertheless, while the leasing of land cannot bring about full efficiency in production under these circumstances, it will still bring about an improvement therein (Bell; and Bliss and Stern). In this connection, it is generally the case that hired workers require closer supervision than family workers. Hence, households which are relatively well endowed with land can save on supervision costs by leasing land to households which are relatively well endowed with labour.

There is nothing in the argument so far which points to one form of lease being preferred over another, but there is a strong suggestion that the choice of least contract is likely to be connected with the structure of markets for other factors and goods. As we will see, this is especially important in the presence of risk and the absence of a full set of insurance markets, because one reason commonly advanced for the existence of sharecropping is that it provides a way

of spreading risks.

Equilibria with Free Entry and Utility Equivalent Contracts

Traditional Anglo-Saxon theory emphasized the inefficiency of resource allocation under sharecropping arrangements, in sharp contrast to the allocative efficiency of fixed rents and long leases (the so-called "English" system). This proposition, which has inspired much land tenure legislation in some developing countries, went largely unchallenged until Cheung's seminal contribution which served as the point of departure for further important theoretical work (Newbery, 1975 and 1977; and Stiglitz). The "new school," as it might be called, retained the old assumption of free entry—by would-be tenants at least—but insisted on the proposition that in a competitive equilibrium the only contracts to exist would yield agents exactly the (parametrically given) utilities available to them elsewhere in the economy.

There are two ways of contriving utility equivalent contracts in a timeless world. The first is to assume that there is costless contractual enforcement of all input levels. Before discussing this case, we need the following result: if (1) all inputs are tradeable in perfect markets, except insurance (for which there is no market), and (2) production is stochastic and takes place under constant returns to scale, then a competitive wage-rent equilibrium exists and is a constrained Pareto efficient allocation (Newbery, 1977). This leads to a key proposition: With costless contractual enforcement, sharecropping contracts are at best equivalent to a combination of wage and fixed rent contracts (Newbery, 1977; and Stiglitz) so that the introduction of appropriate sharecropping contracts will have no effect on allocation or equity. Hence, as sharecropping normally involves heavier transaction costs than fixed rent leases, it will not be observed under these particular circumstances. The risk spreading argument for the existence of sharecropping advanced by Cheung is therefore invalid. If, however, the assumption of a perfect labour market is relaxed to admit risky wages, then, with multiplicative risk in production, a competitive equilibrium which is production efficient can be established with agents entering all three forms of contract—wage, fixed rent, and sharecropping. If several input markets are risky, the introduction of share contracts permits increases in output in all states of nature, and, even if production risk is not multiplicative, such contracts enlarge the economy's set of contingent consumption possibilities (Newbery, 1977). On this line of argument, the risk spreading advantages of share leases arise out of uncertainty in input markets, but, if they are to be realized, all three forms of contract must coexist, and at least one agent must enter into all three simultaneously.

In the preceding story, the possibility of mixing contracts, especially wages with leases, is of the essence. But if, as the traditional theory implicitly assumes, the contractual enforcement of input levels is prohibitively costly, especially where labour "effort" is concerned, then utility equivalent contracts must be of an exclusive kind. In particular, the landlord must have the power to prevent the tenant from working for wages outside his tenancy if the tenant is not to earn intramarginal rents. Otherwise, there will be excess demand for sharecropping leases unless the rental share is unity, in which case tenants would not enter into them at all. With this option closed, the tenant will apply himself more diligently to the landlord's plots, the level of his effort being set by its disutility as well as the income it yields, as against the (given) utility he can obtain by working elsewhere in the economy. If tenants differ in their responsiveness to incentives, there will not be production efficiency unless the production function has unitary elasticity of substitution, although it does not necessarily follow that labour effort would be lower under sharecropping than a wage system with enforceable contracts (Stiglitz).

If the contractual enforcement of input levels is out of the question and agents can mix contracts, then an equilibrium in the land market with utility equivalent share contracts will not exist unless the technology demands inputs in fixed proportions, in which case there is no enforcement problem. With this exception, the landlord does not then possess the means to tax away the intramarginal rent that will accrue to the tenant when the latter can choose, without restriction, the levels of variable inputs to be used on his tenancy, whatever its size. Indeed, in this so-called "Marshallian" setting, there are circumstances in which agents will not enter into sharecropping contracts. Bliss and Stern, in a careful and scholarly treatment of Marshall's analysis of sharecropping, show convincingly that Cheung's discussion of Marshall's views is somewhat misleading. For example, if there is no uncertainty and both landlords and tenants have the same constant returns to scale production function and access to a perfect labour market, then landlords will never find it profitable to offer share contracts, whether the land market be competitive, monopolistic, or imperfectly competitive (Bell and Braverman). Here the technology rules out any role for nontraded inputs specific to the firm, such as management or possibly draft power services, so that share contracts do not offer any incentives. On the contrary, as landlords cannot keep their share tenants to their tasks, they must resort to fixed rent leases or self-cultivation with hired labour if they are to maximize their incomes. Moreover, as nontraded inputs are not present, it is implicitly the case that there is free entry for tenants who therefore obtain from wage or fixed rent contracts what they could earn by working elsewhere in the economy.

It is hardly realistic to assume that nontraded factors can be ignored. In particular, some farmers have superior husbandry and managerial skills, and if there is no market for such skills, landlords can get access to them only by leasing out land. If there are also barriers to the entry of new tenants, as may happen, for example, if the ownership of nontraded factors depends on the workings of imperfect capital markets, then both landlords and existing tenants stand to gain from cooperation through lease contracts, and the division of these gains depends on their respective bargaining strengths. Hence, the set of equilibrium contracts will be the outcome of a system of cooperative games. As long as the marginal product of nontraded factors remains positive, the landlord always stands to gain from the entry of new tenants if the only contracts available to him are "Marshallian" share contracts. In this case, free entry remains compatible with bargaining within the framework of a cooperative game.

Assuming that the conditions for utility equivalent contracts exist is certainly one way of dividing up the gains from cooperation in a constrained Pareto efficient way. In many circumstances, it may be the most plausible way, given the dominance of landlords over their tenantry, which is shored up by a whole apparatus of extraeconomic coercion. However, it cannot lay sole claim to the role of solution concept. Indeed, once it is conceded that there are gains from cooperation, then it is proper to seek solution concepts from cooperative game theory. This is the tack taken by Bell and Zusman (1976 and 1977) who use Nash's solution to the bargaining problem as the basis for deriving the set of bilateral lease contracts in a universal cooperative equilibrium without coalitions.

The foundations are provided by the following simple model of a system featuring only sharecropping leases (Bell and Zusman, 1976). A single landlord who does not personally cultivate can deal with a fixed and sufficiently large number of identical tenants who grow one crop under perfect certainty and have access to a perfect labour market, the wage in which is their disagreement payoff. The tenant decides on the labour input, the landlord on the size of each

tenancy, and the rental share is the outcome of a series of bilateral bargains which underpin a universal cooperative equilibrium. All land is cultivated and resource allocation is inefficient (unless the elasticity of substitution between workers' labour and land is zero) when there is costless enforcement brought about by the technical conditions of production. The rental share depends on the exogenous wage rate, the size of each tenancy, and the form of the production function. (In certain cases, it is possible to derive closed form solutions for the rental share in terms of these parameters.) If the assumption that tenants are identical is relaxed to allow them to have differing abilities as farmers (though not as workers), then it can be shown that the distribution of land is identical with the distribution of abilities (up to a scalar) if the latter appear as Hicks neutral efficiency parameters in the production function. The rental share is the same across the board, and the distribution of tenants' incomes will usually be more equally distributed than would be the case under a system of competitively determined fixed rents (Bell and Zusman, 1977).

Screening

So far it has been assumed that landlords are fully informed about the abilities of the tenants with whom they are dealing, even if they are not always able to tax away the rents associated with those abilities. However, if landlords are not thus well informed, then the worker's choice of contract will reveal something of his abilities. The most productive of them will choose fixed rent contracts, those of middling ability will opt for share contracts, and those who are least productive will work for wages. In effect, the spectrum of contracts operates as a screening device (Hallagan; and Newbery and Stiglitz).

If landlords are risk neutral and workers match their abilities with contracts in the manner just indicated, there is one form of screening equilibrium in which the expected return per acre is the same on all plots of land (Newbery and Stiglitz). In general, the values taken by the contractual parameters when they are performing their screening function will afford the middling and superior workers a rent over and above their alternative utility levels as unscreened, least able workers. This is to be contrasted with the cooperative game approach which does the same thing but on the basis of full information. Naturally, allocation and distribution will not be the same in the two systems even if everything else is identical.

Conclusions

Throughout this paper, we have placed great emphasis on the role played by incomplete or imperfect market structures in the broad sense. And, the discussion suggests that it is natural to look at contractual arrangements as the outcome of attempts, however faltering, to achieve fair levels of efficiency in the face of the constraints imposed on agents by market structure, uncertainty, imperfect information, and the workings of institutions. It follows that any changes in these features of the economic environment will alter contractual arrangements and, hence, in general, both equity and allocative efficiency. In particular, movements toward a more complete market structure will probably make for greater allocative efficiency, although there can be no presumption that equity will also change for the better.

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OPENER'S REMARKS—Norman Rask

Recent changes in the land market have raised some very interesting questions about equity in the minds of landlords operating with fixed cash rent contracts. Inflation has increasingly caused land to be viewed as both a hedge against inflation and a factor input to production. This additional demand has pushed land values well above their income generating capacity. Many landlords do not clearly recognize the dual valuations of the land resource. Hence, as land values rise, they feel that land rents should continue to hold a fixed relationship to market value of land even though productivity may not have increased. Thus, general inflation and overvaluing of land for production purposes leads to demands by landlords for relatively higher cash rents and shorter term leases. Under these conditions, tenants could not be expected to maintain soil fertility or to make capital improvements. It may also drive the final negotiated leases more toward share leases. Depending on how share leases are written, this may result in lower overall investment in production inputs. In either situation, allocation efficiency could decline. Equity changes are unclear.

What are some of the shortcomings of the theoretical literature dealing with rental contracts, and does it deal at all with the issue of inflation and inflated land values, which are real problems for those advising landlords and tenants on current leasing arrangements?

RAPPORTEUR'S REPORT--S. N. Kulshreshtha

How does the inflation in land prices affect the tenancy arrangements? How do the risk aversion tendencies on the part of the landlord and tenants determine the rental contracts, particularly with respect to the crop insurance practices? Input sharing between tenant and landlords also poses another complication in the rental contracts.

Bell responded that in the situations which he was talking about the landlords were more powerful than the tenants. However, this may not apply in the U.S. situation where both may be working more or less as partners trying to optimize their returns. Landlords select tenants based on their ability to farm.

In situations where land prices are increasing, Bell suggested two approaches: indexing of rental contracts or sharing of a part of the profits. Similar

arrangements can be made where inputs are shared between the tenant and landlord. However, there is the possibility that the landlord may implicitly change the conditions of rental contracts by sharing the inputs. For example, more fertilizer used by the landlord and shared by the tenant would lead to more labour input by the tenant.