

The costs of contracting: the tenancy contract

The study of contracts lies at the heart of the study of property rights. Contracts, whether formal or informal, reallocate rights among contracting parties; the tenancy contract between tenant and landlord — between the owner of labor and the owner of land — is relatively simple and is thus appropriate to the commencement of the study of contracts.

On a family farm a single operator or a single family — the owner of labor — undertakes the bulk of farm activities. Family farming is common and relatively simply organized. By studying tenancy contracts in the context of family farming, it is possible to isolate some basic contracting problems that may be obscured in more complex organizations. As a background to the analysis of the tenancy contract I offer a critical review of the traditional approach to the relationship between tenant and landlord.

THE STUDY OF THE SHARE CONTRACT, AND CHEUNG'S CONTRIBUTION TO IT

Price theory textbooks routinely introduce the notion of a production function and discuss the marginal product of a factor such as labor for given levels of such other factors as capital and land. Given the productivity of the factors and the market prices of factors and products, it is easy to determine both the optimum amounts and the values of the contributions of each factor. The assumptions that factors are uniform and that all relevant information is freely available usually underlie such discussions. In such a setting, the problem of organizing production is trivial.

These textbook assumptions are violated in reality. In agriculture, weather, pests, and other forces affect output differently in different periods and in different locations. In addition, no two pieces of land or two workers are identical to each other. Determining the properties of each unit of input requires extensive and costly measurement. Owing to diver-

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sity in the forces that affect output, the specific contributions of individuals are extremely difficult to determine. Individuals, therefore, can mask their own low-level contributions by attributing them to other forces. Such attempts to capture wealth make cooperation among individuals costly, and, as will be shown, individuals can gain by organizing their transactions in ways that lower these costs.

The inefficiency associated with the share contract is a particular manifestation of the wealth-capture problem that was recognized long ago and that has received a great deal of attention from economists. In a share contract, a landlord lets a tenant work the land for a share of the output. The tenant's pay to the landlord appears to be similar to an ad valorem tax, and this analogy has been used to suggest that the share contract is inefficient. Consider first, briefly, the ad valorem tax. The demand facing sellers of a taxed commodity is lower than the consumers' demand by the amount of the tax. Because of the shift in demand, the market equilibrium quantity under the tax is less than it is in the absence of the tax. The tax, then, distorts resource allocation: Under the tax, the marginal unit is valued at more than it costs; expanding production would produce a net gain, but the tax creates a wedge that prevents the realization of that gain.

Economists have argued that this tax analysis applies directly to the share contract. In Figure 3.1, adapted from Cheung (1969, p. 43), the tenant's marginal product on a plot of a given size is M_{PT} , and her or his market wage is W . Were the tenant self-employed, she or he would apply L^* units of time to the farm. The landlord, however, receives a share of the output. The tenant whose share of the output is $(1 - r)$ then retains only $(1 - r)$ of her or his own marginal product, and in order to maximize wealth she or he will apply L^T units of time to the farm. For units of labor between L^T and L^* , the output value of the tenant exceeds the wage rate, but the tenant will prefer to sell these units of labor service in the market, because, per unit of labor, her or his share in the farm output is less than W . Such tenants, then, will stop short of producing the output at which the value of their marginal product equals their alternative earnings. The shaded area in Figure 3.1 is the alleged inefficiency induced by the share contract and is comparable to the tax distortion.

The tax analogy contains two implicit, and by no means innocent, assumptions. One is that landlords find it prohibitively expensive to stipulate and police the amount of labor input; the other is that landlords encounter no cost in policing the receipt of their share of the output. Whereas either assumption may be a good approximation of real circumstances in any particular case, the two are unlikely to hold true simultaneously. The assumptions that the cost of monitoring output is always zero and that the cost of monitoring labor input is always prohibitive, implicit in the traditional approach to the share contract, are ad hoc.

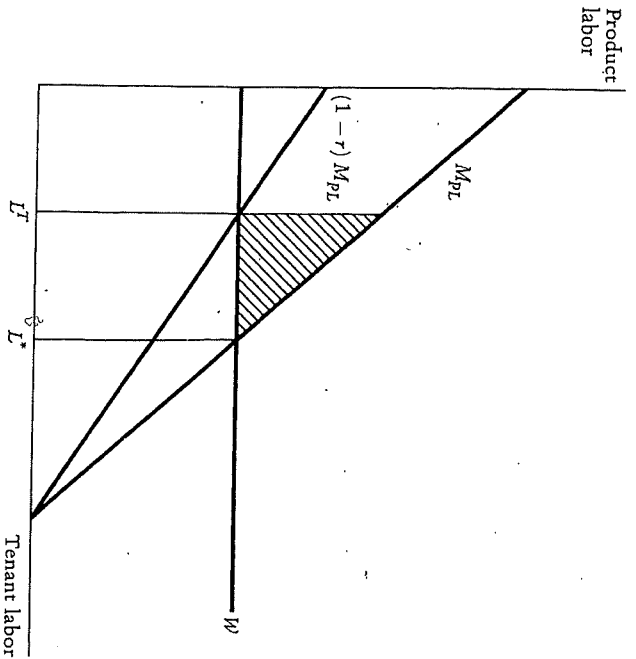


Figure 3.1

In his ground-breaking work on the theory of share tenancy, which he tested empirically against observed practices in China, Cheung (1969) makes several points that are pertinent to the discussion here. The first, consistent with the Coase Theorem, is that in a world of zero transactions costs, the share contract will yield an efficient outcome, as will other contract forms. This is because contractors can costlessly add and police contract stipulations in such a way that all inefficiency is eliminated. Second, Cheung points out that sharecropping is unlikely to have been inefficient, given its long history of survival. Third, he spells out some of the stipulations that were necessary for efficiency to have been attained in sharecropping. Among these are fixed plot size, required levels of other inputs, and restrictions on allowed crops. Finding that practices in China were consistent with these implications, Cheung proceeds to argue that risk aversion may explain the prevalence of share tenancy, because under share tenancy the landlord and the tenant share in the vagaries of variations in output and in output value. Whereas Cheung's critique of the received analysis that claims that the share contract distorts the allocation of resources is well taken, his risk-aversion explanation is not. Risk aversion does not satisfactorily explain the share contract. Arti-

tude toward risk is a matter of taste. If, as we usually assume, taste is a personal matter that may vary unpredictably across individuals, an explanation based on risk aversion is not refutable. Even the assumption of uniformity of tastes toward risk, that is, the making of risk aversion a function of such observable variables as wealth, is still not sufficient to explain sharecropping. In a zero transaction cost world, sharecropping by itself is not an attractive method of sharing risk. Share contracting does distribute the crop of a single plot between the two parties, but there are other ways to distribute variability that can remove more of the risk. For instance, because two persons residing on opposite sides of the globe are not subject to common random forces, pooling the risks between them reduces the risk each would face alone. Under the assumption of costless transactions, such pooling involves no added costs and thus will be practiced. In reality, of course, transacting is costly, rendering some risk pooling difficult to effect. When transacting is costly, however, all contract forms are costly; and in that case sharing may be chosen not, or at least not only, for its effect on risk but also because of some properties of transaction costs. Moreover, when transacting is costly, other contracts may be chosen in spite of their riskiness. Next I offer a transaction cost hypothesis to explain sharing; in subsequent chapters I offer transaction cost hypotheses to explain other forms of organization, assuming throughout that people are risk-neutral.¹

THREE METHODS OF COLLABORATION BETWEEN OWNERS OF LAND AND OWNERS OF LABOR

Given the total amounts of land and labor, there is some plot size of, more generally, some size distribution of plots that maximizes total output. Only a fraction of workers, however, own the commensurate amount of land. Those who own more land than they can most profitably cultivate by themselves can gain by cooperating with those whose holdings are too small. In order to realize the gains, the factor owners must contract with each other. I consider here three methods by which two owners can collaborate and in which ownership patterns are preserved: (1) the wage contract, (2) the rental contract, and (3) the share contract. The discussion of the consolidation of ownership will follow.

It was pointed out earlier that individual specimens of both land and when the sole contractual problem between tenant and landlord is the method of dividing output, the role of risk aversion seems both simple and important. If, however, many sources of variability confront the parties, the role of risk aversion in contracting for the assignment of any of such sources becomes much less clear and much less important. For instance, it is not at all clear how transferring the maintenance of irrigation ditches from the landlord to the tenant affects the distribution of risk.

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labor are not uniform, and that, in addition, production is subject to variability due to factors such as weather and pests. Output, therefore, will vary from plot to plot not only because of the variability in both of the inputs but also because of random variability. Characteristics of the variability are crucial to the choice among contracts.

Before analyzing the general case in which both land and labor are variable, I will consider the special cases in which either the land or the labor is uniform. Suppose that land is entirely uniform and unchangeable. If collaboration is by a wage contract, workers can gain by shirking, exerting themselves less than they would were they self-employed. Because output is subject to variability both because of random factors affecting output directly and because workers' contributions to output vary, it is difficult to isolate the effect of change in effort from the effect of the random factors. Workers, of course, will be supervised, but given that supervision is costly and subject to economy, workers will not be fully penalized for a reduction in effort, and such a reduction is therefore expected. Wage payment is accordingly adjusted to the expected reduction in effort, and workers' real income ultimately declines as a result of shirking. Lowering the wage implies that shirking is penalized; workers are paid, on average, for what work they accomplish. Such workers would prefer to work harder and be paid more, because they operate at a point at which the cost to them of an extra unit of effort is less than the corresponding value of the increase in output brought about by that effort; but the cost of effecting such an arrangement exceeds the gain it would generate. Under the given conditions, then, the wage contract requires costly supervision, and labor is not applied at the rate that self-employed workers would choose.

Tenants who operate under share contracts retain a portion, but not all, of their marginal product. Although the incentive to shirk is not as strong here as it is in the wage contract, it is induced by the same factors, and the preceding discussion of the wage contract applies.

Tenants who collaborate with landowners by renting their land pay a fixed amount for its use. Output will differ from that expected, first, because of random fluctuations, and, second, to the extent that the tenants alter their own effort. Since land is uniform, land does not contribute to output variability; the tenants' expected output, then, varies only as a function of their own effort. The tenant is the "residual claimant"; barring bankruptcy, the landlord receives a fixed amount, and the tenant receives whatever is left over after paying the rent (this difference may, of course, be a negative amount). Apart from the random element, tenants' reward is strictly a function of their own effort.²

²The fact that the fixed-rent contract has not been claimed to be inefficient suggests that land (inclusive of the improvement and equipment that accompanied it) has been viewed as unchangeable. On the other hand, economists have been quick to criticize

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The analysis of the situation where land is heterogeneous and labor (and labor effort) uniform is the mirror image of the one presented above. When labor is uniform, wage contracts make expected output a function of the quality of the land only. Landlords, then, have the right incentive to maintain and improve their land and will not gain from misrepresenting its quality. In this case, the landlords are the residual claimants, and they are the only ones affected by their own actions. A rental (or a share) contract would be inefficient here, producing less total income for the contracting parties. The more efficient contract, that of the fixed wage, would prevail under such conditions.

But neither land nor labor is generally uniform. All three contract forms are, then, subject to efficiency problems. When discrepancies between costs and valuations are inevitable, an arrangement in which such problems are observed cannot be thought of as inefficient. Inefficiency implies preventable waste — that would not occur if people were to maximize. In an imperfect world, even the best solution is still subject to discrepancies between marginal costs and marginal valuations, because not all such discrepancies can be eliminated economically. There is no point, then, in investigators' attempts to discover inefficiencies, that is, situations that can be improved upon, because these are not discoverable given the assumption of maximization. Our task is, rather, to determine what changes in resource allocation and in economic organization will be brought about by a change in circumstances. In order to be able to analyze changes in resource allocation, a more detailed discussion of the nature of variability is necessary.

THE EFFECTS OF VARIABILITY WITHIN FACTORS

Because it is commonly, though only implicitly, assumed that land is uniform and unchangeable it is instructive to probe into the nature of land and the effects of variability in it. Each acre of land differs from all others, even from the ones adjacent to it, in a variety of ways: in the incidence of rocks, in steepness, in the degree of soil erosion, in the amounts of various nutrients, in exposure to the wind and sun. Land parcels also differ from one another in such features as access to groundwater, quality and quantity of irrigation canals, availability of pumping equipment, types of roads serving them, and distance to markets. Moreover, the ease of exploiting such features also varies. Land use Henry George's single-tax proposal pointing out that since his assumption that land was unchangeable was too far from reality, his policy conclusions were rendered useless. Had economists been consistent in recognizing in all their applications that land is changeable, it is less likely that the share contract would have been singled out as the only inefficient tenure contract. The fixed-rent contract would also have been considered inefficient.

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would be efficient if landlords were compensated by users of land for the exact reduction in land value. Because land is not uniform, however, the exact evaluation of these effects requires measurement at every spot. Exact and comprehensive measurements are obviously prohibitively costly, and thus measurements are neither exact nor comprehensive. Indeed, certain features may not be measured at all.

Tenants who can gain from exploiting those land attributes that they are not marginally charged for will use them to the point at which the net gain they yield falls to zero. Thus, even though there are only two parties to the transaction, an unpriced attribute is effectively placed in the public domain. Tenants can capture such an attribute by simply exploiting it; capture is costly to the transactors because exploitation is carried beyond the point where the value of its contribution equals the reduction in its value and where the value of the land declines more than the value of output increases.

Any land attribute that can be changed by the tenant and is not charged for by the landlord becomes a free attribute to the tenant and is then subject to overuse. Similarly, any changeable land attribute that remains under the landlord's control will be undersupplied. If the landlord is not contractually committed to maintaining capital improvements, she or he is likely to postpone doing so beyond the contract period. All such inefficient practices reduce joint wealth and ultimately harm the two parties, inducing both to seek methods to lower such inefficiencies and to maximize the net value of their resources.

METHODS FOR RESTRAINING LOSSES

Labor and land are complex factors, each with many attributes, but contracts between pairs of owners are usually quite simple. How are the individual attributes, then, controlled by contract, and what forces determine which contract will maximize the value of the resources? A fixed-rent land contract can simply stipulate duration and rent; alternatively, it can be as detailed as the contracting parties wish it to be.³ Whereas contractors are free to stipulate whatever they wish, not all attributes are worth stipulating and monitoring. Any attribute that is not stipulated and that can be varied becomes a free attribute. Tenants who are in control of such an attribute will use extra units so long as they generate added positive (net) income; landlords will similarly use attributes under their control.

Although by assumption the loss associated with free attributes is too

³In either case, a mechanism to enforce contract performance is required. Such a mechanism is usually provided partly by the contractors and partly by the courts. The existence of such a mechanism will be taken here as a given.

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costly to avert directly, it can be controlled in two distinct general ways: by altering contract stipulations regarding attributes related to the ones subject to excessive exploitation or inadequate provision, or by switching to an altogether different contract that directly controls those attributes left uncontrolled under the first contract.

Manipulating related attributes

The tenancy contract involves many attributes that are costly to stipulate. Similarly, the parties can affect many dimensions of their transaction in order to maximize the value of their exchange and lower dissipation. They can manipulate prices of commodities related to hard-to-control attributes, manipulate corresponding quantities, and manipulate contract duration.

The excessive use of free attributes may be controlled by exploiting the fact that the consumption of a commodity will change when the prices or quantities of related commodities change. In the case of a soil nutrient, for instance, the difficulty in measuring its use over the rental area precludes its direct pricing and turns it into a free attribute. Its use, however, may be curbed by the appropriate manipulation of substitute or complementary attributes — for example, lowering the price of a substitute. If a landlord lowers the price his tenant pays for a fertilizer that is a substitute for the soil nutrient, the tenant's demand for, and level of use of, the nutrient will fall. It is true that the price subsidy will result in excessive use of the fertilizer; however, there is always a subsidized price for the substitute commodity that generates a combined net gain.

One cost of effecting such a subsidy is the need to fine-tune it: Whenever conditions change, its level must be calculated anew. A particular low-transaction-cost application of a price subsidy is to provide free of charge whatever amount of the fertilizer the tenant wishes to use. The tenant's incentive to overuse the fertilizer as well as to sell it correspondingly increases. Nevertheless, in some cases the added cost will still be less than the loss reduction in conserving the soil nutrient.⁴ A nutrient-control method that is closely related to that of a price subsidy and that may be employed by the landlord is the provision of a fixed quantity of the fertilizer at no charge. It will, like the method above, lower the demand for and the use of the soil nutrient.

Duration is another contract feature that affects the parties' behavior with regard to attributes. A wheatland owner may find a one-year rental contract satisfactory. On the other hand, in the case of an orchard, the

⁴A price subsidy (and other practices to be described) will be effective only if the cost of reselling it exceeds the tenant's gain from using it. One particular transaction cost permits reducing the loss from another.

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care and maintenance of the trees, which can be most efficiently provided by the tenant, become free attributes to a one-year tenant, whereas a longer-term rental contract enhances the tenant's incentive for care and maintenance, thus reducing the tenant's exploitation of these attributes.

The task of caring for the trees need not be assigned to the tenant, just as equipment maintenance is not necessarily a tenant's task. Such assignments are a matter of choice: The contractors are expected to assign the provision of particular attributes to whichever party is more suitable. The existence of such a choice points to another aspect of the loss-restraining problem. It may seem that in the land-rent contract it is clear which inputs each contractor furnishes: The landowner supplies the land and the tenant the labor. The recognition, however, that any commodity is a collection of attributes suggests that the real situation is more complex. Improvements, for instance, are obviously not an integral part of the land, and the contractors are free to decide which party will take charge of any of them.⁵ More generally, the contractors have leeway in deciding which of them should furnish particular attributes.

With regard to each attribute, one can ask: Which of the two parties will be more inclined than the other to affect the (net) value of output by manipulating that attribute? The principle I applied earlier to labor and land applies also to individual attributes. If the party that will be more inclined to affect the outcome by varying the level of an attribute is put in control of that attribute, becoming, therefore, the residual claimant of its variability, misallocation will be minimized. If, for example, land is rented out on an annual basis, the maintenance of long-lasting improvements will tend to be placed in the landlords' charge, because they are the chief beneficiaries of proper maintenance through the higher rents they can charge for future periods.

Changing the contract form

In the preceding section it was shown that the fixed-rent contract places various land attributes in the public domain and that the associated losses can be lowered by manipulating the prices and quantities of related goods. The overuse of those various contract attributes that are not directly controlled may be curbed, then; however, it cannot be eliminated. It is proper to ask whether collaboration between owners of land

If landlords are legally required to keep certain improvements present on the plot at the time the contract is signed, there is no need to spell this out in the contract. Similarly, if a landlord plans to maintain the improvements, she or he will not require such maintenance from the tenant. Some contracts, then, may appear to be lacking in detail but, nevertheless, may differ significantly from similarly worded tenancy contracts in areas where the particular improvements are simply absent.

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and owners of labor should occur through a contract that is an alternative to the land-rent contract.

Any contract is subject to problems of non-optimal use, and therefore no single contract is best under all circumstances. Changes in the circumstances that affect contract choice may be gradual, but the change in contract *form* cannot be gradual; either it takes place or it does not. Thus, a comparison between contract forms must be "global"; total net values must be calculated in order to determine which contract generates the highest net gain. Economists are not equipped to make such comparisons directly. Conditions under which a switch from one form to another is likely, however, can be spelled out. Turning to the three contract forms here, one refutable implication of the model above is that when market wage rises relative to land rent, the contract form will shift away from the wage contract, which induces (relatively) careless use of labor, to the land-rent contract (though perhaps first to the share contract), which induces relatively careless use of land. In order to be able to compare the different contract forms, however, we should first study share contracting.

ADVANTAGES AND DISADVANTAGES OF SHARING

The share tenancy contract stands halfway between the fixed-rent and the wage contract. When sharing, both the landowner and the tenant are residual claimants, because each is remunerated by a fraction of whatever the output is. At the same time, each gains from shirking; the landowner will not maintain land improvements as vigorously as she or he would under the wage contract, and the tenant will not work as hard as she or he would under the fixed-rent contract. The margins subject to distortion under the share contract include, then, all those of the other two contracts. In addition, the specification and monitoring of output are likely to consume more resources under the share contract than under the other contract forms. Although more margins are subject to distortion when the contract calls for sharing, the loss from each margin of distortion is reduced more than proportionately. A new angle on the previously discussed tax analogy may demonstrate how the share contract can result in a lower level of distortions than the level associated with the other two contracts.

The analysis of tax distortions is standard fare in taxation literature. It is well known that the distortion associated with a tax (or with a subsidy) rises as the square of the tax (or subsidy) rate. Thus the welfare-loss triangle of a 10 percent tax on a commodity is (approximately) four times as large as that of a 5 percent tax on the same commodity. In the wage contract, the reduction in effort is a free attribute available to the worker, because the worker is not penalized for the reduced effort; it is as if the worker were to pay a 100 percent tax on the increase in output induced

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by greater effort. Similarly, under the fixed-rent contract, it is as if the tenant were to receive a 100 percent subsidy on soil nutrients and the landlord were to pay a 100 percent tax on land improvements yielding returns within the contract period. In a share contract, these taxes and subsidies are reduced from 100 percent to the worker's share in the case of the extra effort; the subsidies are similarly reduced in the case of the soil nutrient, and a tax of 100 percent is reduced to the landlord's share in the case of the maintenance expenses. A fifty-fifty sharing arrangement would reduce the distortions from each of the attributes to one-fourth of their levels at the 100 percent tax or subsidy. Whereas *all* of these items are taxed or subsidized in a share contract, compared with only about *half* of them being taxed or subsidized when one or the other of the two contract forms is used, the quadratic relationship is capable of lessening the total burden under the share contract to a level below that of the burden either of the other forms generates. The share contract, however, entails an increase in monitoring costs, which may tip the scale against it.

Monitoring serves to reduce the losses associated with margins of distortion. The monitoring of each margin of distortion, however, entails its own start-up cost. Since the share contract is subject to more margins of distortion than are the other two contracts, its costs of monitoring are higher. The gains the share contract is capable of generating in reduced distortions, then, may not be large enough, and the share contract may fail to be adopted. As conditions gradually shift, favoring, say, the wage contract over the fixed-rent contract, the share contract becomes attractive as an intermediate step; nevertheless, because of the extra monitoring costs required, the share contract may be skipped completely.⁶ As the fixed-rent contract becomes less attractive, the fraction of rent contracts is expected to fall and the fraction of wage contracts is expected to increase; but it is not possible to state, a priori, whether the fraction of share contracts will increase or fall. Besides the three contract forms emphasized here, there is one other arrangement that merits special attention: sole ownership.

COSTS OF SOLE OWNERSHIP

I have focused so far on the costs and gains associated with fixed wages, fixed rents, and share contracts between owners of land and of labor. Although different contracts encounter different incentive problems, every exchange, and therefore every contract, is subject to some such problems. The sole-ownership arrangement is free of those contracting problems that arise when land and labor are not owned by the same individual; it may

⁶Not only is a fifty-fifty sharing formula simpler to administer than others, it also tends to yield the highest reduction in distortions. As the value of the contributions of the two parties become more equal, a sharing arrangement is more likely to emerge.

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seem, then, that sole ownership should be the preferred method of operation. The sole-ownership arrangement, however, is subject to two sets of transaction costs associated with owning all of the inputs in a production process. The first set of costs arises because the pattern of ownership of productive non-human assets is extremely unlikely to match fully the ownership pattern of human skills that would have generated the highest output. Total output, then, can be increased if people exchange productive assets in order to arrive at a better match of resources. To accomplish this, owners of labor would have to borrow in order to buy the land with which to work. This would not occur unless transacting is reintroduced — here the transaction between borrower and lender replacing that between owner of labor and owner of land — and it cannot be determined a priori that the transaction between the former two would yield a higher net gain than the transaction between the latter two.

The second, and equally important, set of costs of sole ownership is due to the losses in specialization that occur when one individual owns and uses all of the productive inputs. Although sole ownership does remove the incentive to shirk, the gains from specialization are also forgone. In order to maximize the return from their land, landowners will engage in such activities as maintenance work and prevention of erosion. The owners of labor will invest in such activities as maintaining and improving their cultivation skills. A person who owns both assets cannot profitably specialize as much as the two individual owners of the two assets can. Moreover, the notion that land and labor can produce output is a gross oversimplification; the output is produced by numerous production factors. Farmers are seldom, if ever, the sole owners of all inputs. A true contemporary sole-owner farmer in the United States would, among other things, have to own and operate her or his own spray plane and conduct her or his own plant research and development. As markets grow larger, the potential gains from specialization should increase, and any one individual should gain from relinquishing ownership of various sets (or attributes of some asset) and engaging in contracting with owners of other inputs in order to acquire the corresponding services. The gains from sole ownership must, then, be balanced against the falling output caused by the commensurate lower level of specializing.

SOME IMPLICATIONS

The contracting model discussed thus far can generate many implications with regard to actual tenancy practices. Because information problems are at the heart of the high cost of transacting, I will concentrate on those implications that are a direct consequence of information problems. Two sources of change in information costs will be considered, one associated

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with the introduction of a new crop, the other with the arrival of new workers.

When a crop new to an area becomes profitable, information on how well it will do in different locations within the area is more costly to obtain than is similar information on old crops. Landowners who personally cultivate only part of their holdings and contract with others to cultivate the rest of their land know, as a rule, more about their land than do their tenants. Because they are also the main beneficiaries of good decisions about new crops, the discrepancy in landlord versus tenant knowledge for the new crop is likely to be higher than it was for the old crop. Tenants who are offered fixed-rent contracts may suspect that the rent landlords demand is excessive and that the landlords are exaggerating their plots' productivity in growing the new crop. Such suspicion is hard to allay, and so the tenants' demand for land and their associated counteroffers are likely to be low. Wage contracts are free of this particular problem because landlords who pay fixed wages bear the entire new-crop risk, about which they are better informed than are the tenants. As more landowners switch to the new crop, wage contracts should become more common. In addition, it is expected that, as time passes, the trend will be reversed, at least in part; with time, the cost of determining the suitability of land parcels to the new crop will decline, inducing the readoption of fixed-rent contracts where they were preferred before.

Another information problem arises with immigration. Little is known about how workers who are new to an area will perform. Landowners are reluctant to commit themselves to paying new workers the prevailing wage. Given the lack of knowledge regarding workers' abilities and attitudes, both demand for the services of such workers and, consequently, the wage offered are likely to be low. A new worker who believes that she or he is more productive than the wage she or he is offered indicates can "guarantee" her or his output by offering to operate as a fixed-rent tenant. The worker, then, bears the onus of the information problem. Therefore, it is expected that relatively more new workers than established ones will operate as fixed-rent tenants. Moreover, new tenants will be given parcels that are less easy to exploit, such as those containing few improvements. Some old-time tenants may acquire a reputation for being gentle on the land and on improvements; these individuals will be favored. Newcomers do not have such reputations and are therefore expected to get land parcels for which the lack of information makes less difference.

CONCLUSIONS

The owners of labor and of land can increase the value of their assets by collaborating, because total output is then larger than it would be were

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Source of losses from various contractual forms

	Policing labor	Policing land	Policing output	Lack of specializing
High losses	FW	FR	SC	SO
Intermediate losses	SC	SC	FW, FR	SC
Low or no losses	RR, SO	FW, SO	SO	FW, FR

so: Sole owner of land and labor
 sc: Share contract
 fw: Fixed-wage contract
 fr: Fixed-rent contract

they to operate alone. Effecting the collaboration, however, is itself costly because it is difficult to prevent wealth capture when cooperation is attempted. Measuring each factor's contribution to output is necessary for successful cooperation. Such measurements are costly and therefore will not be precise. This lack of precision, coupled with the variability in output due to unpredictable factors such as the weather, implies that individuals can gain at each other's expense and that they will spend resources in order to capture these gains. Together, owners of labor and owners of land (bolstered by competition from other owners) will adopt the contract form that generates the largest net output value where maximization is subject to conventional production costs as well as to the costs associated with the capture of wealth.

Neither labor nor land is uniform; specimens of each vary in the levels of their different attributes. The contract between the owners, therefore, will attempt to control not only the factors as a whole but also various individual attributes. Some of these attributes may be controlled directly (e.g., a tenant pays for irrigation water supplied by the landlord); ones that are difficult to control directly may be controlled indirectly by fixing quantities and altering prices. A basic principle underlying the maximization process is that individual attributes will be placed under the control of the party who can more readily affect the net value of the outcome by manipulating the attribute.

The accompanying table catalogues and compares the losses associated with the various contractual arrangements analyzed in this chapter. This table brings out most clearly that no one solution is best under all circumstances. As circumstances change, the form of organization will tend to change, too.