Insurance and Incentives in Sharecropping

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Abstract

This essay summarizes some recent empirical contributions on two aspects of sharecropping: (i) the effects of the contractual form (incentive power and contract length) on resource allocation and farm performance; and (ii) the exogenous elements behind the choice of different contractual forms.

1 Introduction

Insurance is a term used to describe both formal and informal arrangements designed to mitigate the risk of harmful events. Risk has always been a major human concern and many practices in primitive tribes can be seen as insurance mechanisms. This essay discusses some recent empirical papers on one of these ancient insurance mechanisms, sharecropping, which is used to share the risk posed by nature to agricultural activities.

Sharecropping is a form of land leasing in which a tenant and landlord share the final output as compensation for the managerial labor supplied by the former and the land capital supplied by the latter. This contract has been used throughout time since ancient societies and is still in use in modern economies. For instance, Warriner (1962), Hodkinson (1992), and Huson (2000) describe the use of this system in ancient Mesopotamia, Egypt, and Greece; Hoffman (1984) notes a dramatic expansion of sharecropping in France between the Middle Ages and the 17th century; Ackerberg and Botticini (2000) present an empirical analysis of the risk-sharing properties of sharecropping in early Renaissance Tuscany; and Canjels

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(1998b) and Allen and Lueck (2003) discuss the importance of this contractual form in the present organization of the farming sector in the USA.

Classical View

Agriculture has been a major element in economic thought since the Physiocrats,[1] but Adam Smith was one of the first classical authors to extensively comment on the incentive aspects of the sharecropping practice.[2] In the first volume of the *Wealth of Nations*, Smith discussed the discouragement of agriculture in Europe and strongly stressed the lack of incentives inherent in the sharecropping system. Sharecropping tenants (or metayers) bear most of the input costs (especially labor ones) and receive only a fraction of the final output. This induces them to undersupply these inputs. Furthermore, tenure insecurity reduces their incentive to improve the land. In Adam Smith's words:

> "To the slave cultivators of ancient times, gradually succeeded a species of farmers known at present in France by the name of Metayers. *[...]* It could never, however, be to the interest even of this last species of cultivators to lay out, in further improvement of the land, any part of the little stock which they might save from their own share of the produce, because the lord, who laid out nothing, was to get one-half of whatever is produced." (Adam Smith, 1776, Book II, Chapter II, pp. 412 and 414)

Smith's point of view has influenced many other classical authors. John Stuart Mill (1848) wrote:

> "The metayer has less motive to exertion than the peasant proprietor, since only half the fruits of his industry, instead of a whole, are his own." (John Stuart Mill, 1848, Book II, Chapter VIII, pp. 304)

But Mill also acknowledges the existence of mechanisms available to landlords to mitigate the sharecropping inefficiency. After mentioning the very critical view of Anne R.J. Turgot, Arthur Young, John R. McCulloch, Richard Jones, and M. Destutt de Tracy, Mill describes the view of M. de Sismondi (a landowner from Tuscany) defending the metayer system for protecting tenants from land disputes with their neighbors—such disputes would be part of the landlord's responsibilities. The fact that different generations of the same family live as tenants on some lands is also mentioned as being able to reduce the problems caused by tenure insecurity.

In line with Adam Smith's view, Alfred Marshall (1890) wrote:

[1] See, for instance, Quesnay (1758).

[2] Other contemporaneous authors (such as Anne R.J. Turgot) have also analyzed this practice in similar lines.

> "For, when the cultivator has to give to his landlord half of the returns to each dose of capital and labor that he applies to the land, it will not be to his interest to apply any doses the total return to which is less than twice enough to reward him." (Alfred Marshall, 1890, Book VI, Chapter IX, pp. 644)

However, Marshall also acknowledges that the sharecropping technical inefficiency would be mitigated if the tenants' actions were costlessly monitored.

In a different perspective, Karl Marx (1894) condemned sharecropping, considering it a feudal institution incompatible with capitalism. Curiously, the idea of a noble landlord leasing lands to poor farmers in order to avoid being involved in productive activities does not seem to fit in a dynamic capitalist system, but the idea of an absentee shareholder hiring a manager to run a company became a main characteristic of modern capitalism.

In spite of the disadvantages listed by classical economists, the sharecropping lease remained in use throughout the Old World and became even more popular in the New World. Intriguingly, share contracts in the 20th century tended to have a short duration, contrary to the classical arguments for tenure stability. Noticing this fact, D. Gale Johnson (1950) stressed an important incentive aspect of short-term leases: they must be frequently renewed. Moving is costly for tenants and landlords tend to renew contracts based on relative performance (i.e., by comparing the productivity of sharecropped farms with those of similar lands owned or leased under fixed rent). Repeated contracting could induce sharecropping tenants to supply the appropriate amount of labor and other inputs. Furthermore, the landlord should be willing to pay for land-specific investments, which alter the long-term productivity of the land and, therefore, its rental price. Under these premises, sharecropping generates no loss of efficiency in resource allocation. In Johnson's words:

> "With a short-term lease renters are obviously aware that landlords have the alternative of renting their land for a cash rent independent of current output. Consequently, the tenant must plan to produce an average output per acre that will provide a rental payment, if yields are average, equal to the possible cash rent plus any additional payment required to compensate the landlord for the uncertainty that he bears. *[...]* Once he has found a farm, he may fear that his lease will not be renewed unless sufficient rent is actually paid." (D. Gale Johnson, 1950, pp. I20)

Modern Theory

From Adam Smith to D. Gale Johnson, the debate was mainly concentrated on the sharecropping incentives for proper allocation of resources. Cheung (1969) shifted the focus of the discussion towards the insurance properties of sharecrop-

ping.[3] He argued that efficient resource allocation would be obtained whenever landlords were able to monitor tenants' activities. Under this premise, sharecropping is presented as an efficient way of sharing the production risk between landlords and tenants. In equilibrium, the share of risk borne by landlords and tenants would be determined by the difference in their level of risk aversion.[4]

In 1974, Joseph E. Stiglitz published an influential analysis of the sharecropping problem. Share contracts were viewed as the optimal solution for an insurance problem in a scenario with moral hazard. Tenants usually choose privately observed variables that affect productivity, and the optimal share rate should balance the incentives for exerting this hidden effort and the costs of risk bearing. The works by Stiglitz (1974), Holmstrom (1979), Grossman and Hart (1983), and Holmstrom and Milgrom (1987) showed that the optimal tenancy contract should balance incentives and insurance in environments with moral hazard. Similar to the predictions of Adam Smith and other classical authors, sharecropping would in fact not induce the maximum output per unit of land. However, this productivity loss would be compensated by the welfare gain of sharing risk.

By connecting the early discussion of resource allocation with Cheung's analysis of optimal contract design, the literature on moral hazard set the basis for our modern understanding of tenancy contracts. This literature together with the works on asymmetric information developed by Akerlof (1970), Spence (1973), and Rothschild and Stiglitz (1976) became the core of modern insurance theory.

However, insurance and incentives are not the only motives raised in the economic literature to explain the design of tenancy contracts. Rao (1971) and Prendergast (2002) argue that the value of managerial effort and entrepreneurial activities is much higher in risky environments. Risky farms should then be rented under contracts with high incentive power (i.e., contracts in which a high share of the output is retained by the tenant). This prediction is in sharp contrast with those based on insurance. In a different vein, part of the literature stresses the importance of labor market imperfections to the choice of tenancy contracts—see Otsuka, Chuma, Hayami (1992) for an extensive discussion on this topic and Ray (1999) for a recent contribution. Furthermore, the literature on transaction costs lists a number of different features that can affect the contract choice. For instance, negotiations to determine the rental price in a fixed-rent contract can destroy trust between the parties, since landlords usually have better information about the land (see Williamson, 1979 and Murrell, 1983). Also, nonlinear supervision costs can explain systematic variation in the incidence of share contracts (see Alston, Datta, and Nugent, 1984); and costs for measuring the final output tend to discourage share contracts (see Allen and Lueck, 1992).

New aspects of the agency problem have been pointed out recently. Eswaran and

[3] Higgs (1894) had already suggested that sharecroppers face more stable income than owner farmers, but Cheung (1969) was the first to use insurance to explain the design of share contracts.

[4] See also Cheung (2002).

Kotwal (1985) and Bhattacharyya and Lafontaine (1995) model the environment where the landlord also exerts productive activities.[5] In this case, sharecropping would not only share the risk between the two parties, but also provide incentives for both of them. For this reason, share contracts promote better allocation of resources than fixed-rent contracts in the presence of double-sided moral hazard. Laffont and Matoussi (1995) stress that, when dealing with a poor and credit-constrained tenant, sharing the output might be the only way the landlord has to extract the tenant's surplus. Hence, the sharecropping technical inefficiency would be related to the lack of enforceable mechanisms available to the principal to extract the tenant's surplus. Sengupta (1997) and Ghatak and Pandey (2000) show that sharecropping is the optimal tenancy contract in environments with limited liability in which the tenant controls the average productivity and the riskiness of the farm—since limited liability makes the tenant's willingness to take risk be increasing in the contract's incentive power.

Some other aspects related to Johnson's (1950) analysis were also recently formalized. For instance, Lazear and Rosen (1981) and Green and Stokey (1983) show that compensation schemes based on relative performance can in fact alleviate incentive problems in environments with shocks that are common to all tenants. Moreover, eviction threats provide incentives for actions affecting the current revenue and, as shown by Banerjee and Ghatak (2004), there are scenarios in which these threats also induce long-term investment. Repeated contracting is another tool used to improve the efficiency of resource allocation in lands under sharecropping. First-best efficiency is approximately achievable in environments where contracting agreements are infinitely repeated and tenants are sufficiently patient, as shown by Rubinstein and Yaari (1983) and Radner (1985). In finite-horizon settings, Lambert (1983) and Rogerson (1985) show that the optimal finite-horizon dynamic contract is history dependent and provides intertemporal insurance for the tenants, but also imposes some risk on them within each period, similarly to Holmstrom (1979). However, first-best results could also be approximated in finite-horizon scenarios if one works with the epsilon-equilibrium concept defined by Radner (1981).

All these theoretical advances have raised the sophistication level of the debate about sharecropping, making empirical investigation even more crucial to test the relevance of each argument. Recently, the availability of well-built databases as well as the development of new identification strategies have brought some light to the debate. This essay is intended to discuss some of these contributions.

There are many comprehensive surveys of land contracts—see Otsuka and Hayami (1988); Otsuka, Chuma, and Hayami (1992); Binswanger, Deininger, and Feder (1995); Deininger and Feder (1997); among others. This essay instead focuses on recent empirical contributions regarding two particular aspects of this debate: (i) the effects of the contractual form (incentive power and contract length) on resource

[5] Reid (1977) argued that landlords supply managerial advice to sharecroppers.

allocation and farm performance; and (ii) the exogenous elements behind the choice of different contractual forms. Some empirical articles and working papers on these two topics, written in the last decade, have been selected to be discussed here. A few classic papers are also included in order to provide a perspective of the current trends. An advantage of this strategy is that, by narrowing the focus of the essay, one is able to provide a more extensive presentation of the selected papers.

The remainder of this essay is organized as follows. Section 2 discusses the empirical research on resource allocation. This section is divided into two subsections: one comparing the impact of different share rates on input use and farm productivity; and another studying the effects of tenure stability on land improvements. Section 3 presents papers testing different arguments raised to explain the design of tenancy contracts. The essay is then concluded with a brief summary discussing a few policy implications.

2 Resource Allocation

The main elements of tenancy contracts are: (i) the contract incentive power (described by the share of the final output retained by the tenant and the shares of different input costs borne by the tenant); and (ii) the contract length.

Share contracts display lower incentive power than ownership and fixed-rent contracts, since sharecropping tenants receive only a fraction of the total output and fully bear the costs of many inputs—even when the landlord shares the costs of observed inputs, the tenant still bears the effort cost of managerial activities. In the absence of dynamic incentives and threats, farmers under share contracts would underuse those inputs whose costs are not shared with the landlord. Consequently, their farms would be less productive. The first subsection here presents empirical papers addressing this topic.

Furthermore, since sharecropping and fixed-rent tenants face uncertainty of tenure security, fear of expropriation would lead them to make suboptimal levels of noncontractible long-term investments. Note that this issue is not exclusive to sharecropping. In many developing countries, even owners and tenured tenants fear expropriation due to land reforms. Hence, at some level, this issue is related to a broader debate about property rights. Nevertheless, for completeness, a few papers on this subject are presented in Section 2.2.

2.1 Incentive Power

This subsection studies the effects of incentive power on input use and farm productivity. It starts with the paper by Rao (1971), which contains an investigation of the productivity difference between owner-operated and share-rented farms in India. The results are not conclusive; owner-operated farms produce more output per acre, but sharecroppers are more productive than owners when farm-size level

is held constant. In another important work, Shaban (1987) uses data from the International Crops Research Institute for Semi-Arid Tropics (ICRISAT), in India, to study differences in resource allocation across owned and sharecropped lands cultivated by the same farmer. He finds that farmers are more productive and use inputs more intensively on their own lands, suggesting the existence of incentive problems. Next, Laffont and Matoussi (1995) theorize that, under limited liability, poor sharecroppers would tend to retain a lower fraction of the output and, thus, exert less effort and be less productive. They provide evidence from Tunisia supporting their theory.

The last work presented here, Braido (2004a), suggests that the incentive problems measured by comparing land productivity and input use across farms under different contracts can be biased by land-quality heterogeneity. In situations where land quality is not randomly distributed across different contracts, one must be careful when interpreting differences in the per acre value of each input used and output produced. Typically, tenants cultivate lands with lower value, which directly reduces their productivity as well as the marginal return of each input. Hence, the fact that sharecroppers are less productive and employ lower amounts of each input does not necessarily imply the existence of shirking behavior. This paper uses ICRISAT data to revisit Shaban's conclusions from this new perspective. The results raise some doubts over the belief that sharecroppers shirk systematically.

Rao, J.P.E., 1971 — Part I

An important part of Rao's paper refers to optimal contract design and is left to Section 2. Here, I present another investigation carried out in that paper (pp. 588) testing the average productivity difference between owner-operated and share-rented farms. The work uses farm-level data from the Studies in Economics of Farm Management in India. In this part of the paper, the author uses 137 observations from two different cropping years, 1957-58 and 1958-59, in ten different villages (seven of them in the rice zone and three in the tobacco zone).

The author argues that land quality (measured by imputed values of land resources) and other inputs are highly correlated. Hence, he estimates a Cobb-Douglas production function where land quality is the only independent variable (capturing the joint effect of land quality and other inputs).

The results are ambiguous. Output per acre is higher in the owner-operated fields than in share-rented farms, but observed land quality explains around 90 percent of this variation. Moreover, the elasticity coefficients indicate the existence of diminishing marginal productivity among owner-operated plots and constant marginal productivity under sharecropping. Rao then estimates the effect of the contract on the average per acre output at each farm-size level, and unlike before, the productivity is higher in sharecropped lands than in owner-operated farms of corresponding sizes.

Shaban, J.P.E., 1987

This work tests two theoretical models of sharecropping: the Marshallian approach versus Cheung's monitoring approach. The Marshallian approach assumes a prohibitively high cost of monitoring the tenant's activities. Non-monitored farmers tend to use inputs less intensively in their sharecropped lands relative to their owned lands. Consequently, this leads to a lower output per acre in sharecropped farms. The monitoring approach, on the other hand, theorizes that if landlords accessed an effective and inexpensive monitoring technology, they would stipulate all relevant actions to be followed by tenants. In this scenario, there would be no misallocation associated with sharecropping.

The empirical investigation uses farm-level data from the ICRISAT's Village Level Studies, which contain detailed farming information from eight villages in India. The database contains a subsample of sharecroppers who simultaneously own and sharecrop different fields, allowing one to control for household heterogeneity. Shaban compares the average per acre values of the output produced and the different inputs used across owned and sharecropped lands of the same household. Higher output and input intensities on owned land would support the Marshallian approach, while equal values for owned and sharecropped lands would favor Cheung's monitoring approach.

The results indicate significant differences. Controlling for irrigation, plot value, and some observed soil characteristics, one finds that the per acre output is higher by 16.3 percent on owned lands relative to sharecropped lands of the same household. Farmers also use significantly more of each input on each acre of their owned farms.

Laffont and Matoussi, Rev. Econ. Stud., 1995 — Part I

This paper develops a model of sharecropping with the objective of explaining contracts observed in El Oulja, a rural area of Tunisia. The key aspect of the model is the presence of financial constraints that limit the tenants' ability to pay up front rents and invest in productive inputs. Thus, fixed-rent contracts, which induce appropriate levels of effort, might not be feasible for landlords dealing with poor tenants. In their theory, share contracts have the function of providing effort incentives and solving financial constraints. They show that the share of the product retained by the tenant, the level of effort exerted, and the output produced are decreasing in the tenant's working capital.

These predictions are tested using data collected with the help of the Tunisian National Institute of Statistics in 1986 from the rural area of El Oulja, Tunisia.[6] The empirical part can be divided into two subparts: one studying productivity across contracts and another one investigating the determinants of contract design. Here I focus on the productivity discussion, leaving the part on contract choice for Section 2.

[6] A later data collection was carried out in 1988, but as the authors do not seem to trust these more recent data, they are used only to test the robustness of the results.

The database contains information on the general characteristics of 100 families (including wealth and income) and detailed farming information on each plot operated by these families (including plot size, type of crop, tenancy status, and production and input levels). The authors estimate a log-linear production function using output (per hectare) as the dependent variable. The control variables include the amount of hired labor, family labor, and other inputs (evaluated per hectare) and dummies for the contractual characteristics—namely, two dummy variables describing the contract form (sharecropping versus owner or fixed rent) and, for sharecropping contracts, a variable describing the number of months of the relationship between the landlord and the sharecropper. They acknowledge the fact that the contract is endogenous and attempt to solve potential endogeneity biases by means of instrumental variables. They claim that the type of crop (e.g., tomato, potato, melon, vegetable), the tenant's wealth, and the number of active members in the family are good instruments for the contractual characteristics. For that to be true, these variables should be correlated to the tenancy contract and not correlated to unobserved features affecting output. The IV estimates for the contract-dummies coefficients are similar (namely, 4.8 for fixed rent and 4.4 for sharecropping—see pp. 391), but statistically different from each other. Since the coefficients of the contract dummies measure the impact of each contract on expected output, this result suggests that sharecroppers exert less effort than fixed-rent tenants. It is also found that, in sharecropped fields, productivity is positively related to the number of months of the landlord-tenant relationship.

Braido, Mimeo, 2004a

Land characteristics vary considerably across farms under different tenancy status. Typically, lands leased out to tenants (under sharecropping or fixed rent) have lower quality than those cultivated by the owners. Some authors argue that good lands are cultivated by owners because they display larger scope for soil exploitation—see, for instance, the papers by Allen and Lueck (1992 and 1993) and Dubois (2002) discussed in Section 3.

Most of the literature on incentive power compares the amount of different inputs used and output produced (evaluated per unit of land) across fields under different contracts. However, in the presence of land heterogeneity, comparing quantities (or values) is not a valid procedure to test the existence of incentive problems. It is usually optimal to use inputs less intensively on lands with lower quality, and this relationship is not necessarily linear (as assumed by Shaban, 1987) or log-linear (as assumed by Rao, 1971). Furthermore, many land characteristics are privately observed and so not available in the data. Thus, whenever sharecropping is associated with lower-quality lands, these farms will naturally employ inputs less intensively and be less productive (even after controlling *linearly* or *log-linearly* for *observed* land characteristics).

Braido (2004a) acknowledges this fact and use the ICRISAT's Village Level

Studies (India) to revisit the incentive-power analysis from this perspective.[7] In order to better illustrate the main point of this paper, consider the following Cobb-Douglas production function:

$$y_i = A_i k_i^{\alpha} \exp(\varepsilon_i), \tag{1}$$

where i indexes the plots in a certain period, y_i represents the output produced per unit of land; A_i is a productivity factor related to observed land quality; k_i represents all inputs used per unit of land; $\alpha \in (0,1)$; and ε_i is an error term accounting for productive shocks as well as for hidden actions (such as managerial effort) and unobserved characteristics of landlords, tenants, and lands.

Define $\theta_i = E\left(\frac{p}{r}\exp(\varepsilon_i) \mid \mathcal{I}_i\right)$, where p and r represent the prices for y_i and k_i (respectively), and $\mathcal{I}_i$ is the information set available to the farmer cultivating plot i. Notice that θ_i is not constant across plots due to differentiated information about characteristics of landlords, tenants, lands, and expected prices and shocks.

For general production functions, profit-maximization conditions establish an implicit relationship between k_i and $A_i\theta_i$. For the Cobb-Douglas, this relationship is explicitly given by:

$$k_i = (\alpha A_i \theta_i)^{\frac{1}{1-\alpha}}. \tag{2}$$

A few important features are worth noticing from (2). First, lower land quality (A_i) implies lower input use and thus lower output per unit of land. Second, even minor differences in land quality (A_i) may significantly impact productivity (y_i), since this effect is amplified through input choices.

Under a Cobb-Douglas technology, the profit-maximizing input choice would make $\ln(k_i)$ and $\ln(A_i)$ colinear if and only if θ_i were constant across plots (i.e., $\theta_i = \theta$). In this case, one could ignore inputs when estimating the reduced form of (1). However, there are reasons for θ_i to vary across plots, so that ignoring inputs (k_i) introduces a serious problem in the estimation of (1).

The paper then proceeds in the following manner. First, it tests the effect of the contract form on productivity when observed land quality and input choices are used as control variables. The results show that the entire productivity gap across contracts is explained by differences in input use. This could be due to the fact that tenants shirk in their input choices or that these choices reflect land-quality heterogeneity. One must then test whether input choices were distorted.

The paper notices that y_i and k_i do not differ across contracts in villages where the average land quality is homogeneous across plots under different contracts. This supports the idea of differences in quantities being driven by differences in land quality. Next, a structural approach is developed to test the existence of technical inefficiencies in the input choices.

[7] See also Braido (2002).

If inputs were chosen in order to maximize profits, the marginal productivity of each factor should be the same across farms under different tenancy contracts, regardless of the unobserved characteristics of the land, the tenant, the landlord, and the environment. In this sense, a test procedure based on the marginal productivity of each input is free of selection problems. Moreover, when the production function is Cobb-Douglas, the marginal productivity is easily measured by $\alpha\frac{y_i}{k_i}$. The empirical results for the ICRISAT data do not reject the hypothesis that the marginal productivity of labor and nonlabor inputs are constant across plots under ownership, fixed rent, and sharecropping.

2.2 Contract Length

The review here begins with the paper by Besley (1995), which studies the relation between land-specific investments and property rights in Ghana. The results support the hypothesis that land rights and investments are positively correlated. This finding is indirectly related to tenure status since, like better-defined property rights, tenure stability avoids expropriation of long-run investments. The second paper discussed, Banerjee, Gertler, and Ghatak (2002), uses a very unique quasi-experiment to study the effect of land tenure on resource allocation. The authors use an exogenous change in property rights in West Bengal that increased tenure stability of tenants and subsequently increased the incentive power of tenancy contracts and the lands' average productivity.[8] The next paper discussed, Jacoby, Li, and Rozelle (2002), uses a statistical procedure to estimate the plot-level hazard of expropriation and shows that this measure is positively correlated to the use of organic fertilizer in China. Also, Manyong and Houndékon (2000) find that land tenure was positively related to the adoption of a new resource management system in Benin Republic (West Africa); Jacoby and Mansuri (2003) suggest that owned lands tend to receive more specific investments than leased lands in Pakistan; and Bandiera (2004) shows that Nicaraguan farmers are more likely to grow trees in combination with annual crops in their owned lands (as opposed to leased lands).

Besley, J.P.E., 1995

This work examines the correlation between investment and land rights in Ghana. The author lists three possible channels driving this correlation. First, land rights would affect investments through fear of expropriation. Second, better-defined land rights may facilitate land being collateralized, reducing interest rates faced by landowners and increasing land investments. Finally, there is a link between investment and land rights through gains from trade. Superior land rights improve the market for selling and renting the land. This amplifies the effects of new investment on the land's price and rent, increasing the incentives to invest.

[8] Note that this paper links the exogenous change in the tenure status to the contract's incentive power. Consequently, it is also related to the topic of the previous subsection.

The empirical analysis is based on farm-level data from two regions of Ghana, namely Wassa and Anloga. The main product grown in Wassa is cocoa and the only significant investment made to improve the land is planting tree crops. In Anloga, most agriculture is devoted to growing shallots (a type of small onion) and land improvements are much more diverse than in Wassa. The database contains: (i) information on land and household characteristics; (ii) a binary variable indicating whether land investments were made or not; and (iii) discrete variables describing household rights on each operated field. There is significant variation in property rights as a consequence of Ghana's transition from a traditional system (where land ownership was communal and controlled by a tribal chief) to a more modern system that emphasizes individual claims. These rights fall into twelve categories: rights to sell, rent, gift, mortgage, pledge, and bequeath, each of them with or without lineage approval. In many parts of the paper, property rights are aggregated into two categories: number of rights with and without need of approval.

The author starts by investigating the relationship between investment and land rights by means of a discrete choice model. Estimations are conducted with and without household fixed effects.[9] A number of variables describing the mode of acquisition of each farm (purchased, appropriated, gifted, etc.) and the number of years since the acquisition are used as instrumental variables for property rights. The results for Wassa indicate that land rights do influence investment: better rights significantly raise the probability of land investments. The results for Anloga are less robust, but still broadly in line with the theory.

Extensions attempt to assess which of the channels previously listed drive this relationship. In such extensions, the author makes use of the disaggregated definition of household rights. Being allowed to use a particular field as collateral does not necessarily imply that the investments will occur in that specific field. Thus, if the relationship between investments and land rights were driven by the effects of property rights on access to credit markets, investments should be related to rights enjoyed in all fields, rather than field-specific rights. Next, under the gains-from-trade argument, some land rights (such as the right to sell or rent the field) should have a greater impact on investments than other rights (such as the right to mortgage, for instance). The empirical results do not strongly support any of these two particular theoretical views.

Banerjee, Gertler, and Ghatak, J.P.E., 2002

In the late seventies, there was a major change in property rights in West Bengal, India, due to a reform of tenancy laws known as Operation Barga. The reform, carried out by a newly elected left-wing administration, increased tenants' bargaining power and secured land tenure. The election of this new administration in West Bengal is interpreted by the authors as a national response to the party in power,

[9] Household fixed effects account for farmer heterogeneity, but rule out the identification of effects that depend on the average rights (as in the collateral-based theory).

which had ruled India since its independence, rather than a local particularity. Operation Barga is thus interpreted as an exogenous change in property rights and used to examine the relationship between tenancy laws and efficiency.

The paper first develops a theoretical approach to the landlord-tenant relationship based on moral hazard and limited wealth of tenants, which is used to analyze the potential effects of the reform on contractual relationships. The reform increased tenants' reservation utility, since they could not be evicted by the landlord anymore and could choose to retain the share of the output accorded before the reform. Due to limited liability, a higher outside option increases the optimal share rate retained by the tenant. The authors present evidence showing that the incentive power of tenancy contracts has in fact increased after the reform. Greater tenure security and a higher share rate induce the tenant to increase the supply of effort and noncontractible land-specific investments. On the other hand, after the reform the landlord loses the possibility of using the threat of eviction as a credible incentive device.

The effect of Operation Barga on productivity was estimated using two approaches. The first is a quasi-experiment that uses Bangladesh as a control. The authors argue that Bangladesh may be used as a control because: (i) it did not introduce tenancy reform; (ii) it is very similar to West Bengal in terms of agroclimatic conditions, prevalence of tenancy, and agricultural technology; (iii) it had growth rates similar to West Bengal during the period before the reform. The second approach compares the productivity growth in districts in which Operation Barga was implemented intensively to districts in which the implementation was less intensive.[10] The results from both approaches indicate a positive impact of Operation Barga on sharecropping productivity.

It is worth stressing that the productivity increase that followed the land reform in West Bengal is due to a combination of two effects: tenure stability and higher incentive power. Hence, this paper is also related to the discussion in Section 2.1.

Jacoby, Li, and Rozelle, A.E.R., 2002

This study is based on a survey conducted by the World Bank containing information on 3,113 plots of 727 households from 31 villages in the Northeast region of China in 1995. Unlike other papers in the literature, risk of expropriation is not measured in this paper by land rights or tenure status. Instead, the authors estimate a hazard model and predict the risk of expropriation associated with each land. This predicted hazard of expropriation is then shown to be positively correlated to the use of organic fertilizers (which has long-term impact on soil quality). The same result is not found for the use of chemical fertilizers (whose effects on soil quality do not last for long) and for maintenance investments.

[10] Intensity is measured by the number of sharecroppers who registered with the Department of Land Revenue (a necessary condition for the tenant to be entitled to permanent and inheritable land tenure).

Manyong and Houndékon, Mimeo, 2000

In 1987, a group of international institutions introduced a new land-improving technology to the farmers of Benin Republic (in West Africa). Using data collected six years later, Manyong and Houndékon (2000) identify land tenure as an important element explaining the adoption of this technology on different farms.

Jacoby and Mansuri, Mimeo, 2003

Using data from the Pakistan Rural Household Survey completed in 2001, Jacoby and Mansuri (2003) study whether farmers tend to invest more in their own lands than in the lands they lease (under sharecropping and fixed rent). Land-specific investment is measured by the amount of farmyard manure (FYM) used per acre cultivated during the year. The authors argue that: (i) FYM improves land quality and its effects last for many seasons; (ii) FYM is not portable once incorporated into the soil; (iii) FYM is usually collected as a byproduct of farmers' own livestock and manuring is very labor intensive. Thus, under imperfect monitoring, farmyard manure could be interpreted as a noncontractible land-specific investment.

The database contains a subsample of mixed tenants (i.e., households that cultivate both owned and leased lands). This feature makes it possible to compare investment behaviors across plots of the same household, avoiding potential biases caused by unobserved characteristics of the tenant. In addition to this, one must also worry about selection bias caused by soil-quality heterogeneity. The authors use information about the landlord (such as total landholdings and tractor ownership) as instruments for the leasing decision. These instrumental variables capture characteristics of the landlord that are correlated to the leasing decision. Moreover, if the landlords did not interfere in the investments made in their leased lands, these variables would also be uncorrelated to unobserved aspects of FYM investments (the dependent variable). The results indicate that FYM investments are lower on leased (as opposed to owned) lands cultivated by the same household, which supports the existence of a holdup problem.

Bandiera, Mimeo, 2004

Cultivation of trees in combination with regular crops is costly, but preserves soil fertility and reduces soil erosion (a benefit not fully appropriated by untenured tenants). Using household data from the 1998 Nicaragua Living Standards Measurement Survey, Bandiera (2004) analyzes the choice of farmers who may or may not grow trees.

A subsample of farmers who own and rent different plots is used to control for non-random heterogeneity in household characteristics. Since land characteristics are not available, three different strategies are used to address potential selection bias due to land-quality heterogeneity. First, the opportunity cost of the land (reported by owner and tenant farmers) is used as a proxy variable for land quality. Second, subsamples of geographically close farms (among which the soil type could be more

similar) are analyzed. Third, the author introduces a control variable indicating whether a particular owned farm was originally acquired via land reform (rather than through purchase or inheritance). Owned lands acquired via land reform were originally leased before the reform, being thus similar to currently leased farms.

The results indicate that owned lands are more likely to have trees together with annual crops. The tenant's wealth is not a significant determinant of tree cultivation, which suggests that limited liability and risk sharing are not crucial aspects of the problem. Since wealth is endogenous, the value of the house and the number of bedrooms are used as instruments.

2.3 Comments and Perspectives on Resource Allocation

Our understanding about the effects of different contractual elements on resource allocation has considerably improved in the last decade. Yet definitive conclusions are far from being reached. Conclusive experiments, in the molds of natural sciences, are difficult to be implemented and the existing empirical tests are based on market data. Hence, the contracts studied are endogenously designed and their observed characteristics (incentive power and length) are probably related to unobserved characteristics of landlords, tenants, lands, crops, and other features of the environment (such as taxes, laws, traditions, etc.).

The empirical literature in the last decade has attempted to develop different techniques to deal with selection and endogeneity issues. The paper by Rao (1971), discussed in Section 2.1, does not account for endogeneity issues, while Shaban (1987) uses tenants who simultaneously cultivate multiple plots under different contracts to account for endogenous heterogeneity in household characteristics. The paper by Laffont and Matoussi (1995) uses the method of instrumental variable to deal with all types of endogeneity problems (such as heterogeneity in landlord and tenant characteristics, land quality, and institutions). The difficulty of this method is that it strongly relies on the quality of the instrument (a variable that must be correlated to the contract design and not related to any unobserved feature affecting the dependent variable). A truly exogenous instrumental variable is often difficult to be found. Braido (2004a) uses the economic theory to derive a testable prediction that is free of endogeneity considerations—instead of comparing the amount of inputs used, this paper compares the marginal productivity of each input across lands cultivated by owners, fixed-rent tenants, and sharecroppers. This type of structural test, however, depends on parametric assumptions on the production function. In fact, there is an intense debate in economics regarding the use of reduced form models estimated by instrumental variables versus the use of tests based on structural economic models.

The literature discussed in Section 2.2 essentially relies on instrumental variables to deal with the endogeneity problem. Hence, the validity of those analyses depends on the quality of the instruments used. A remarkable case is found in Banerjee,

Gertler, and Ghatak (2002), where a quasi-experiment is constructed from an exogenous reform of tenancy laws. As with experiments in the natural sciences, this quasi-experiment uses exogenous treatment and control groups to test a certain theoretical prediction, but this type of quasi-experiment is not replicable and does not allow the researcher to control the variables to be exogenously changed.

Increasing our capability to deal with selection issues, with a special focus on replicability, is certainly an important goal for future research. Creative identification strategies coupled with the development of new data surveys are likely to be the key elements in this process.

3 Contract Design

This section reviews the debate on the designs of tenancy contracts. The two main characteristics of tenancy contracts are, again, incentive power and length. The literature however has mainly focused on the former, and Bandiera (2003) is the only paper discussed here that explicitly addresses the latter issue.

Regarding incentive power, there are three different classes of arguments commonly used to explain it. First, agency theory (see Holmstrom and Milgrom, 1987) stresses the trade-off between incentives and risk. Holding tenants' risk aversion constant, high-powered contracts are more likely to be used in fields with low exogenous risk. On the other hand, delegation theory (see Rao, 1971 and Predengast, 2002) predicts exactly the opposite: since the scope for entrepreneurship is higher in high-risk fields, incentives are also more important in these farms. Finally, arguments based on transaction costs predict that crops with lower costs for monitoring effort and for measuring the inputs and the final output are more likely to be rented under sharecropping.

The review starts with the part of Rao (1971) that was purposely omitted in Section 2. Rao finds a positive association between farm risk and incentive power, supporting the delegation theory. Next, three papers on transaction costs are discussed: Hoffman (1984) suggests that vine plots are usually rented under sharecropping due to lower costs of monitoring the tenant; Allen and Lueck (1992) stress aspects related to soil exploitation and costs of measuring the final output as important in explaining tenancy contracts; and Allen and Lueck (1993) extend this analysis to explain the share rate for input costs in sharecropping contracts. Next, I discuss a small part of Laffont and Matoussi (1995) showing that the contractual incentive power is affected by the tenant's working capital but not by the tenant's wealth—emphasizing the relative importance of financial constraints over insurance motives to explain contract designs. Allen and Lueck (1999) also present evidence against the risk-sharing theory of sharecropping. Unlike these findings, Ackerberg and Botticini (2002) find that the contract power is positively affected by the tenant's wealth in Renaissance Tuscany. Dubois (2002) studies how share contracts

dynamically balance risk-sharing, effort incentives, and incentives for land-quality maintenance. Chaudhuri and Maitra (2002) provide further evidence that landowners tend to personally cultivate their most valued plots. Finally, some recent working papers by Canjels (1998a), Pandey (2001), Dubois (2001), Bandiera (2003), and Braido (2004b) are presented.

Rao, J.P.E., 1971 — Part II

Let us examine now the part of Rao's (1971) paper related to contract design. The argument developed by the author is based on the idea that tenants perform a variety of different entrepreneurial functions. Fixed-rent contracts permit the tenant to capture the returns associated with decision making and protect the landlord against possible risk arising from the production decisions of the tenant. Hence, these contracts should be observed in environments with high risk and significant scope for entrepreneurship. On the other hand, in low-risk scenarios, where the scope for entrepreneurial decisions is restricted, sharecropping arrangements insure tenants against risk.

This theory is tested against data from the Studies in Economics of Farm Management collected by the Government of India in three different years, 1957-58, 1958-59, and 1959-60, in seven villages of the rice zone and three of the tobacco zone. Sharecropping and fixed rent coexist in the villages studied, the former being predominant in the rice zone and the latter being more common in the tobacco zone. The estimated variance of profits is much higher for the tobacco zone (where fixed rent is predominant) than for the rice zone (where sharecropping is predominant). Furthermore, irrigation pattern, variation in rainfall, and variation in prices also suggest tobacco as a riskier crop than rice. Hence, scope for entrepreneurship rather than risk sharing is viewed as the key element explaining the design of share contracts.

Hoffman, J. Econ. History, 1984

In this work, the author argues that, due to costs of supervising the tenant, landlords are more likely to lease distant lands under higher-powered contracts. Moreover, crops requiring a close landlord are more likely to be rented under lower-powered contracts. These predictions are tested against historical data from 83 contracts, dated between 1533-1633 in France.

Logit estimations show that distant lands are more likely to be rented under fixed rent relative to sharecropping, and to sharecropping relative to wage labor (confirming the first theoretical prediction). Moreover, vines are more likely to use wage labor than tenancy and, among the fields leased, sharecropping is more common than fixed rent. The author argues that vines require present landlords regardless of the tenancy contract. Considerable damage could be caused if the tenant neglected buildings and fences. Moreover, by cutting the vines very short, one increases return in that season at the cost of reducing productivity thereafter.

Hence, the cost of monitoring other farming activities is significantly lower in vines and the fact that these lands are leased under lower-powered contracts supports the second theoretical prediction.

Allen and Lueck, J. Law & Econ., 1992

Due to insecurity of tenure, tenants have incentives to overuse the land. Sharecropping alleviates this distortion relative to fixed rent because sharing the output reduces the tenant's gains in overusing the land. However, in order to implement share contracts, the landlord must incur the costs of measuring the final output.

This is the basic trade-off studied by Allen and Lueck (1992). Under this theory, sharecropping is expected to occur in environments with high possibilities for soil exploitation and where the cost of dividing the output is low. The authors test this prediction using a sample with 3,432 leasing contracts from the 1986 Nebraska and South Dakota Leasing Survey. Measurement costs are proxied by the type of crop cultivated. Hay crops are more difficult to measure, since they are typically sold through private sales in contrast to other cultures that are publicly sold at local markets. Scope for soil exploitation is measured by proximity to urban areas and presence of irrigation. Proximity to urban areas provides alternative uses for the land, making concerns about soil exploitation less important. Irrigation makes soil exploitation less likely. Thus, proximity to urban areas and irrigation should be positively correlated to fixed rent.

A logit analysis is conducted and the results support the underlying theory. In addition, the authors find that sharecropping is positively related to corn and wheat. Since corn is a crop with high profit variability and wheat is a low-risk culture, the author argues that this evidence does not support the risk-sharing motives commonly associated with sharecropping.

Allen and Lueck, RAND, 1993

Here, the analysis of the previous paper is extended to understand not only the share rate used to divide output, but also the share of input costs borne by the landlord. Agricultural production depends on land and productive inputs. Assuming a production function that is separable in each factor, fixed rent induces proper use of inputs. However, since the opportunity cost of using the land is typically lower for untenured tenants as opposed to owners, fixed-rent contracts induce land overuse. Sharecropping, on the other hand, alleviates the incentives for land overuse, but implies costs of measuring the output. Share contracts also distort incentives for the proper use of other inputs, but this could be solved by sharing input costs between landlords and tenants at the same rate used to share the output.

In this setting, one should expect sharecropping to be associated with lower costs of measuring output and high possibilities for soil exploitation. Moreover, for easily measured inputs, sharecropping landlords would share costs at a rate equal to the crop-share rate. Finally, fixed-rent contracts would be associated with environments

with few possibilities for soil exploitation and high measurement costs.

These predictions are tested using data from the 1986 Nebraska and South Dakota Land Leasing Survey. Evidence shows that, in general, tenants either bear input costs alone or share them with the landlord at the same rate as the output share. Tenants retain a higher share of the output when they bear input costs alone.

Moreover, logit estimates show that inputs purchased in the market are more likely to be shared than those provided by the farmer (i.e., those harder to measure). The probability of having an input being shared is negatively affected by the land's value, which proxies for scope of soil exploitation, and by the fraction of the total area cropped under the current contract—the more lands from the same landlord, the lower the tenant's ability to shirk on the use of shared inputs.

Laffont and Matoussi, Rev. Econ. Stud., 1995 — Part II

This paper has multiple aims, some of them already discussed in Section 1. Here, I focus on a small part of it (pp. 395-397), which uses an ordered probit model to study the selection of contracts. Evidence from El Oulja, in Tunisia, shows that incentive power is negatively related to the landlord's working capital, positively related to the tenant's working capital, and not significantly related to the tenant's wealth. The authors conclude that financial constraints are more important than risk aversion in explaining the design of tenancy contracts.

Allen and Lueck, J.L.E.O., 1999

Allen and Lueck (1999) use four different land-leasing surveys (from Nebraska, South Dakota, British Columbia, and Louisiana) to test the relationship between risk and incentive power. They have data on the form of the tenancy contract (fixed rent versus sharecropping) and the fraction of crop retained by the sharecropping tenant. Exogenous risk is measured by the variability of crop yield across plots of a certain region. A logit analysis shows that risk does not have a positive impact on the probability of a crop being leased under sharecropping. Tobit regressions also indicate that, in general, the tenant's share rate does not decrease with risk.

Ackerberg and Botticini, J.P.E., 2002

The possibility of endogenous matching between landlords' and tenants' unobservable characteristics is addressed in this paper, by means of a historical data set from Renaissance Tuscany. Endogenous matching happens when there are reasons leading landlords and tenants to contract with each other. For instance, if tenants were heterogeneous in their level of risk aversion and plots differed in their level of riskiness, it could possibly be the case that less risk-averse tenants match with more risky plots. Since the rule governing the matches is unknown, using proxies for tenants' risk aversion and plot risk is not enough to account for the endogeneity bias.

The paper uses geographical-based instruments to account for the endogeneity bias. The underlying assumption is that exogenous differences across regions affect

the matching between tenants and landlords, without affecting the contract design (the dependent variable) through other channels. Once this matching is taken into account, the authors find a positive correlation between the contract share and the tenant's wealth. Assuming that wealth is a proxy for risk aversion, this evidence supports insurance motives for share contracts.

Dubois, J.D.E., 2002

This paper develops a dynamic principal-agent model for agricultural tenancy where the optimal contract design balances risk sharing, effort incentives, and concerns about land-quality maintenance. In the model, land fertility is noncontractible and evolves over time. Moreover, contracts expire at the end of each season and long-term contracts are not enforceable.

The author derives testable predictions that relate contract choice and land value in environments where production effort can reduce land fertility due to land overuse. The analysis is implemented using data from rural areas of the Philippines, collected by the International Food Policy Research Institute (Washington) and the Research Institute for Mindanao Culture (Xavier University, Philippines).

Results reject the pure risk sharing model and the pure transaction costs approach. The trade-off between productivity and land-quality maintenance is supported by the data. Non-parametric estimation shows that the probability of leasing out a plot is inverse U-shaped with respect to the land's value. Among the leased plots, landlords choose more incentive-powered contracts for more valuable plots and for cropping patterns that are less likely to induce land overuse.

Chaudhuri and Maitra, Economica, 2002

This paper uses ICRISAT data from India and finds that the probability of a land being leased out to a tenant decreases with its value. Among the tenants, sharecropping is positively correlated to the plot's value.

Canjel, Mimeo, 1998a

This work uses a panel from the 1998 Agricultural Economics and Land Ownership Survey in the USA to construct regional measures for the yield risk due to weather variation. It shows that the likelihood of a plot being under a share contract is positively related to this measure of risk.

Pandey, Mimeo, 2001

The effects of technology on the design of share contracts are studied by means of a database collected by the author in 1996 and 1998 in four villages of North India. The sample contains plot-level data on output and inputs of 270 randomly selected plots cultivated under sharecropping and ownership. The design of share contracts varies across villages in terms of the share of the output received by the tenant, the share of costs borne by them, and whether the contract was repeated from one period to the next.

The author constructs different measures of noise, based on the standard deviation of the error term in a linear regression of output on different regressors (such as plot characteristics and dummy variables for the tenancy contract, year, village, and crop). Risk aversion is proxied by the tenant's caste. The author finds that the probability of having a share contract repeated from one period to the next is negatively related to the output noise. Moreover, sharecroppers' rewards are lower powered when the output is noisier.

Dubois, Mimeo, 2001

This paper uses data from Pakistan to assess the risk-sharing properties of household consumption. A structural model for the households' preferences is used to construct the coefficients of absolute risk aversion. The author shows that more risk averse households are more likely to sign contracts with lower incentive power.

Bandiera, Mimeo, 2003

This article studies the determinants of the design of tenancy contracts (incentive power and length), by means of a historical data set containing information on the characteristics of tenants, landlords, and crops of 705 tenancy contracts written between 1870 and 1880 in the district of Syracuse, Italy.

The empirical results indicate that: (i) the tenant's wealth is positively related to long-term and fixed-rent contracts; (ii) female and aristocratic landlords (with high monitoring costs) tend to lease their lands under long-term and fixed-rent contracts; (iii) the most maintenance intensive crops tend to be leased under long-term contracts, combined with either sharecropping (for poor tenants) or fixed rent (for rich tenants).

This work is important for studying different elements of tenancy contracts, instead of focusing exclusively on their incentive-power dimension.

Braido, Mimeo, 2004b

Two of the main difficulties in testing the relationship between risk and incentive power are that: (i) measures of risk based on output variability are usually affected by the farmer's actions, and (ii) risk aversion is heterogeneous across farmers. Braido (2004b) uses data from the ICRISAT's Village Level Studies in India to address these issues.

Exogenous risk is measured by the variability of the error term of a stochastic Cobb-Douglas production function. This measure of risk controls for variability caused by endogenously chosen inputs, cropping pattern, irrigation, and cropped area, among other factors. Plot fixed effects were also introduced in these estimations, exploring the panel nature of the data.

Once a metric for exogenous risk is constructed, the paper tests the risk-incentive relationship. Risk-aversion heterogeneity is taken into account by means of farmers who simultaneously own and sharecrop different plots in a same period. Holding

the farmer code and period of time constant, the owned farms are riskier than the sharecropped lands. This evidence does not support the risk-sharing argument for sharecropping.

3.1 Comments and Perspectives on Contract Design

The literature on contract design tests the predictions derived from theoretical models of market equilibrium. If the model indeed captured all relevant aspects of the problem, there should be no special concern about selection issues (selection would be part of the equilibrium prediction). However, the multiple features affecting the contract design are not easily incorporated into a parsimonious model. This fact leads many authors to focus on particular aspects of the contracting problem and use the available techniques to control for heterogeneity in the other dimensions of the problem.

Ignoring the contract length dimension of the problem is a common feature in most of the papers discussed (exceptions include Laffont and Matoussi, 1995, and Bandiera, 2003). This is mainly due to the fact that most databases do not have information about the length of each contract. Moreover, many of the existing theoretical results are based on static models, and there is no conclusive theory about how contract length and incentive power interact in a dynamic environment.

While the development of new empirical methods is central in the literature discussed in Section 2, the research agenda on contract design might tend to focus on the development of new testable predictions that are robust to the different features of the contracting environment. New data, with more detailed information on the contract design and on the environment, are also likely to be crucial for future research.

4 Final Remarks and Policy Implications

The insurance literature has seen numerous theoretical contributions, whose predictions have been tested against data from many different markets. Sharecropping is regarded as a classic example of insurance and this essay has discussed some papers studying the impact of different contractual characteristics on resource allocation, and other papers testing different theories used to explain the design of land-leasing contracts. This final section is intended to briefly comment on some of the policy implications derived from these papers.

The studies presented in Section 2.1 discuss whether the lower incentive power of share contracts distorts the allocation of input resources. The evidence presented by most of the literature suggests that share contracts induce lower productivity, but considering the arguments in Braido (2004a), one may still have doubts on this issue. This debate, however, generates no particular policy implication. Even if share contracts did induce lower productivity, they could still be necessary to solve

the trade-off between incentives and risk sharing (see Stiglitz, 1974) or to mitigate soil exploitation (see Allen and Lueck, 1992 and 1993). A different conclusion would follow if share contracts were determined by other market imperfections, as analyzed in Section 3.

Section 2.2 suggests that land investments made by tenants are affected by tenure insecurity (through fear of expropriation). There is a relative consensus among economists that better-defined property rights encourage investment decisions. It is also widely believed that a reliable legal system (able to enforce contracts and to define property rights unambiguously) should positively impact land-leasing efficiency. Besides that, there are papers suggesting that better-defined rights could also reduce the amount of non-utilized lands (see Berry and Cline, 1979 and Assunção, 2002). In some developing countries, landholding is used as store of value (due to capital market imperfections). Fearing land reforms, some of these investors prefer to keep the land unproductive instead of leasing it out to a tenant. Therefore, improving the legal system to expand the set of feasible contracts can lead societies to more efficient allocations.

Finally, the discussion on the determinants of tenancy contracts is presented in Section 3. Many authors suggest that contract designs are determined by market imperfections, such as transaction costs (e.g., Allen and Lueck, 1992 and 1993) and credit-market imperfections (e.g., Laffont and Matoussi, 1995). In these cases, policies reducing transaction cost and promoting the development of capital markets would be desirable.

In closing this essay, it is worth stressing that microeconomic inefficiencies have been neglected for many years in the debate over public policy and economic development. Recently, the growth theory has suggested that differences in total factor productivity account for most of the income inequality across countries (see Parente and Prescott, 2000). Microeconomic distortions, such as trade barriers, rent seeking, market power,[11] and informational asymmetries are among the variables affecting a country's productivity. Therefore, besides evaluating the relevance of different insurance theories, the empirical research on asymmetric information also contributes to a broad agenda in public policy and development economics.

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