LAND-LABOR INTERLINKAGES IN A LATIN AMERICAN CONTEXT

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Alain de Janvry and Elisabeth Sadoulet

DEPARTMENT OF AGRICULTURAL AND
RESOURCE ECONOMICS

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DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS
DIVISION OF AGRICULTURE AND NATURAL RESOURCES
UNIVERSITY OF CALIFORNIA at Berkeley.

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I. Introduction

There, by now, exists an important literature on interlinkages in market transactions which has shed significant new insights on the nature of agrarian social relations. This literature originated principally in an Asian context and, for that reason, has attributed fundamental importance to the pattern of competition in credit markets. According to who the moneylender and who the borrower are, interlinkages have been explained between land and credit, labor and credit, and products and credit. Virtually no formal studies of interlinkages are available for Latin American rural society.

One hypothesis, long entertained to explain this paucity of Latin American studies, is that market failures are less frequent in Latin America than in Asia and that the contractual arrangements of interlinkages are, consequently, less important. Agrarian relations could thus be reduced to exchange relations on performing markets with no gains from linking transactions. This is, however, an unlikely explanation as there clearly exists a whole array of transactions costs (labor recruitment and supervision, captive family labor, imperfect information, lack of insurance markets, etc.) that reflect market failures. Even though Latin American agriculture may be more advanced in the development of capitalist social relations than most regions of Asia, it is, by now, well established that interlinkages and contractual arrangements, such as sharecropping, by no means reflect precapitalist arrangements and do not tend to disappear with the spread of capitalist social relations (Gillian Hart, 1986; Pranab Bardhan, 1984; Miriam Wells, 1981).

Another, more likely, hypothesis is that Latin American social scientists have been more concerned with eliminating the existing social relations in agriculture--which they hold responsible for the perpetuation of poverty, a high level of inequality, and often stagnation as well--than with fine tuning an understanding of their rationality. Additionally, whatever explanation of the rationality of current social relations has been given, it has more often been sought in the systemic functionality of these relations for the accumulation of capital and for the reproduction of the existing class system than in the individual rationality of the choices made by the agents involved. While it is clear that existing social relations often need to be changed if poverty is to be reduced, it remains that understanding their rationality is also a precondition to any meaningful attempt at changing them. Many unfortunate errors in the management of land reform, tenancy regulation, minimum wage laws, and rural development projects could have been avoided with a better understanding of the individual rationality of the various parties involved and of the role of specific institutions in reducing transactions costs.

Interlinkages in the Latin American context assume, however, markedly different forms than those observed in Asia due to the specific structure of Latin American agrarian society. The two dominant structural features that establish their flavor are the strong landed monopolies associated with a system of gigantic (in Asian standards) commercial landholdings and the great degree of dualism in technology and in access to institutions that characterizes the peasantry as opposed to the commercial sector. It is these two structural features and the particular transactions costs which they imply that are at the core of the present study of interlinkages.

We use this study, in particular, to shed light on the heated debate among Latin American scholars on the nature of dualism in agriculture, as to whether it reflects a competitive relation between large and small farms or a symbiotic (functional) relation between landlords and peasants (Alain de Janvry, 1981). This debate is important as it pretends to predict whether the peasantry is expected to persist or eventually disappear and, if it persists, if it would do so as competitive producers, according to the first, or largely as a labor reserve for the landlords according to the second. Expliciting the logic of the interlinked land-labor contracts serves to predict when functional dualism among operational units internal to large ownership units can be expected to prevail.

Our study of Latin American interlinkages is based on the evolution of the Chilean inquilino system, a linked land-labor transaction still observed in a variety of Latin American countries. Starting from a system of land contracts with fixed rents paid in kind between the late 1600s and 1760, it evolved first toward a land rental contract with partial payment in labor services between 1760 and 1840, then toward a labor contract with partial payment in land usufruct between 1840 and 1930, and finally into a labor contract with payment of a cash wage. It is the purpose of this paper to explain why contractual relations between landlords and labor have assumed this variety of forms, evolving from a pure land contract to a pure labor contract through two forms of land-labor interlinkages. Following the work of Debraj Ray and Kunal Sengupta (forthcoming), explaining the emergence of interlinked contracts will be based on showing that interlinking creates a net social gain for the two parties involved relative to separate land and labor contracts. If the relation between the two parties is one of principal agent, dualism is functional and the net gain is eventually fully appropriated by the landlord.

The inquilino system has been extensively described in the classical studies of Chilean agriculture by Claudio Gay (1982), George McBride (1936), Mario Gongora (1960), A. L. Stinchcombe (1978), Alejandro Schejtman (1971), and Cristobal Kay (1971). We start by using them to establish, in part II, the historical determinants of the sequence of contracts observed. Using this information, we construct, in part III, formal rational choice models of the principal-agent variety which explain under what conditions each particular form of contract will be preferred by the dominant landlord. Finally, in part IV, we use data from a 1966 survey of inquilino contracts to verify the predictive power of the models in explaining the importance of land rights in the observed labor contracts.

II. History of Land-Labor Contracts in Chile

We can usefully contrast four periods in the historical evolution of land rental and rural labor contracts in Chile.

2.1. 1690 to 1760: From Squatter to Tenant

Historians of agrarian relations in Chile have long debated whether the inquilino system had its origin in the colonial system of encomienda, whereby the native Indian population was assigned to specific settlers who had received large land grants from the Spanish crown. The definitive work of Mario Gongora on this subject has shown that this was not the case. Indian labor, initially bound to landlords by obligations to pay tax and to perform personal services, gradually evolved toward a system of unattached labor gangs paid principally through wages. The origin of the inquilino system was in a markedly different population.

In the 17th century, large landholdings were used as highly extensive livestock operations producing animal fat and hides for exports on the world market. These large landlords, with clear land surpluses and often uncertain land titles, frequently allowed poor Spaniards and mestizos, often former militars, to settle on small plots of land on their large properties. Rents were generally not demanded, and the indirect purpose was to confirm ownership rights and gain some access to labor available for hire.

With the opening of the wheat export market toward Peru in 1687, landlords started to shift production from livestock to wheat and the opportunity cost of the land started to rise. With a growing population of tenants, land rents paid in cash or in kind were charged and rising. The panorama by 1760 was one of a large number of tenants with relatively ample family farms, with low productivity of labor on their own plots of land, and with yet relatively few employment opportunities in the labor market or on the landlord's estate. While the landlords were hiring labor for wheat and livestock production on their estates, there was no interlinkage between land and labor contracts.

2.2. 1760 to 1840: From Tenant to Inquilino

Continued expansion of the wheat trade toward Peru induced the landlords to capitalize their estates and to increase the area planted in wheat. Simultaneously, rising rents and stagnant productivity for their tenant farmers, combined with an eventual series of bad harvests, led to the bankruptcy of many tenants and to a rising probability of default on rent payments. Since, at the same time, the landlord's labor needs were increasing, a transition occurred in tenancy contracts redefining the payment of rents from cash or products to labor services. Interlinked land-labor transactions were thus established, and the inquilino systems was born. While the size of tenant

farms decreased with rising rents and with the obligation for one family member to work at least part time on the landlord's estate, the contract remained fundamentally a land rental contract and no wages were paid to the inquilino for his labor in addition to usufruct of a piece of land.

2.3. 1840-1950: From Land Contract to Labor Contract

The second half of the 19th century was one of extraordinary economic dynamism. Wheat exports boomed with the opening of new markets in California (1949), Australia (1854), and England (1860), reaching a peak in 1874. The mining, industrial, and construction sectors were also in rapid expansion. Rising external and internal demands for agriculture led to further capitalization of the estates, particularly through investments in machinery and irrigation. A rising opportunity cost for land as well as increasing labor demand in both agriculture and the other sectors of the economy induced the landlords to seek greater extraction of labor from their tenants. The land plots given to inquilinos was thus reduced in size, the rent in labor services was increased, and complementary wages were paid to compensate for increased labor and lesser access to land. The wage was, however, only a complement to land rights; and it reached, for the inquilinos, only about half the level prevailing on the rural labor market. The interlinked contract of inquilino-tenant with a rent in labor services was thus transformed into a contract of inquilino-worker with a mixed payment of land rights and wage. On his land plot, the inquilino produced subsistence food with largely captive family labor; and the land plot served to stabilize a labor supply for the modernized estate and to cheapen labor relative to reliance on fully proletarianized laborers.

2.4. 1950-1968s: From Inquilino to Proletarian

Labor relations changed markedly after 1947 when the first law allowing the unionization of farm workers was passed. Minimium wage legislation was introduced for the first time in 1953, defining what percentage of the minimum wage necessarily had to be paid in cash, even if labor contracts were interlinked wih land contracts. Before that date, cash wage payments did not exceed 10 percent of the inquilino's household income. After that date, this percentage with successive laws rose as follows:

Year	Share of the Minimum Wage to be Paid in Cash (percent)
1953	25
1963	35
1964	50
1965	75
1967	100

Thus, by 1967, even though surplus labor had been rising steadily with demographic growth and mechanization, the interlinkage of land and labor contracts had lost its function, except for skilled workers paid above the minimum wage. The result was a rapid decline in the number of inquilinos, reduction of the area given to workers, an increase in wage as a share of household income, and a rising number of fully proletarianized workers. According to the censuses of 1935, 1955, and 1965, the number of inquilinos and the area given to them in usufruct declined as follows:

Year	1935	1955	1965
Number of inquilinos	107,906	82,367	73,938
Inquilinos in percentage of agricultural EAP[a/]	20.5	12.4	8.4
Area in land usufruct (hectares)	b/	132,166	83,000

a/ Economically active population.

b/ Information not available.

With continued capital accumulation in the landlord's estates, the inquilino system disappeared first in the most efficient haciendas (Alejandro Schejtman, p. 211). Most inquilinos were transformed into landless workers while a few, who had been able to accumulate capital as inquilinos with specialized tasks, were able to take tenancy contracts as sharecroppers. Interlinked contracts only remained with a few skilled workers receiving minimal land plots while most unskilled workers were paid cash wages, generally on a seasonal basis permitted by the rising pool of surplus labor.

While the old inquilino system has largely disappeared today across Latin America, interlinked labor-land contracts where the worker receives his payment partially in land usufruct remains a reality in many countries. Sugar plantation in the north of Argentina and banana plantations in Honduras give plots of land to their workers in order to lower wage cost, stabilize the labor force, and provide work incentives. The permanent workers of large farms in most countries also receive some access to land which allows landlords to valorize captive family labor and to provide efficiency wage at lower cost. It is the theory of this distinctively Latin American land-labor interlinkages which we develop in the following section.

III. Model of Interlinked Contract

This section develops a model of the specific land-labor interlinking described above. To fully understand the nature of the advantage that the interlinking brings to the landlord, we first consider the functioning of the two markets separately: (1) the land market in which the landlord enjoys monopoly power and thus captures part of the return to peasant's assets; and (2) the labor market in which the landlord/employer operates to recruit for his own cultivation. We then explore four cases in which the interlinking of the land and labor transactions brings to the landlord a profit which is above the sum of the profits he could make in the two separate markets. In the first case, the monopolist landlord, who is limited to linear contracts, charges a higher monopoly rent which induces an inefficiency that the interlinking of contract can avoid. In the second case, the probability of default in payment of the land rent by the peasant brings inefficiency in land use and prevents the landlord from extracting the total monopoly rent which the interlinking can in certain conditions recover. In the third and fourth cases, involuntary unemployment or costly transactions costs on the labor market may be eliminated by the interlinking which then increases the surplus that the landlord can extract.

3.1. Separate Transactions on Land and Labor

Consider a landlord with land assets $\underline{A}$ and local monopoly power over the land market.[1/] With a limited amount of fixed factors of production $\underline{K}$, he will choose to rent out part of his land to landless peasant households. The rental contract is set out in a principal-agent framework in line with the landlord's monopoly power. The terms of the contract which include a rental

rate r and an entry fee B or, equivalently, a decreasing rental rate r + B/a with plot size a are determined by the landlord with full knowledge of the peasant decision behavior.

Consider then the conditions faced by the peasant household and his decision process. The assets of the household include $\underline{L}_f$ units of captive labor and one unit of free labor (the male head of the household). Only free labor has access to labor market opportunities. Each household has an identical utility function u(y, e) defined over its income y and the labor effort e of family labor and a reservation level $\underline{u} = u(\underline{w}, 0)$, where $\underline{w}$ is the wage that free labor could get in the labor market before engaging in the rental contract with the landlord. However, once the household decides to rent land on the hacienda, free labor has lost some mobility and restricted itself to a local labor market in which the opportunity wage w* is generally lower than $\underline{w}$.

The peasant household which engaged in a rental contract chooses the plot size a and the allocation of free labor time between work on his own plot (1 - ℓ) and on the labor market (ℓ) to maximize its utility:

$$\underset{a,\ell}{\text{Max}}\ u[pq(a, \underline{L}_f, 1 - \ell) - ra - B + w^*\ell, e]$$

where p is the market price of the peasant's product and q its production function. The first-order conditions are:

(1) $$pq_a' = r$$

(2) $$pq_\ell' = -w^*.$$

This leads to choose levels of a and 1 - ℓ which increase with family size and decrease with the cost of land and with the opportunity cost of free labor:[2/]

$$a = a(+\underline{L}_f, -r/p, -w^*/p)$$

$$\ell = \ell(-\underline{L}_f, +r/p, +w^*/p).$$

The maximum accessible income is then:

$$y = pq - ra - B + w^*\ell = y(+\underline{L}_f, -r/p, -B, +w^*/p)$$

which increases with family size and with the opportunity cost of free labor and decreases with the rental cost.

Assume now that there are diseconomies of scale in the cost of recruitment of tenants and management of these rental and let C(N) be the total cost for the landlord of renting N plots, with $C'(N) > 0$, $C''(N) \geq 0$. For his own cultivation, the landlord recruits labor in the labor market in which he has no particular advantage at the ongoing wage rate $\underline{w}$.

The landlord's decisions regarding the number of peasants with whom to enter in a land rental contract, the terms of the contract, and the level of employment for his own cultivation derive from the following maximizing problem:

$$\underset{N,r,B,L}{\text{Max}} \quad PQ(A, \underline{K}, L) - \underline{w}L + N(ra + B) - C(N)$$

subject to

$$A + Na = \underline{A}$$

$$a = a(+\underline{L}_f, -r/p, -w^*/p)$$

$$u(y, e) \geq u(\underline{w}, 0),$$

where Q is the landlord's production function, P is the price of the products he sells, and L is the number of workers he hires. The first-order conditions for an interior solution give

(3) $$PQ_A' = r$$

(4) $$PQ_L' = \underline{w}$$

(5) $$C'(N) = B$$

and

(6) $$B = pq + w^{*}\ell - ra - \underline{y},$$

where $\underline{y}$ is the income level at which the peasant household is down to its reservation utility, i.e., such that

$$u(\underline{y}, e) = u(\underline{w}, 0).$$

One can verify that the standard assumptions on production functions and $C''(N) \geq 0$ are sufficient conditions for the second-order conditions to be satisfied.

These relations show that the landlord will optimally:

1. Behave competitively on the labor market.

2. Choose to rent a limited number of plots. The maximum number of plots is reached when the marginal cost of management is equal to the surplus B extracted from the peasant household.

3. Set the rental rate at the marginal productivity of land under his own cultivation.

4. Fix the entry fee so as to leave the peasant household at its reservation utility.

The profit made by the landlord from the land renting activity is

$$N(ra + B) - C(N)$$

while the return from own cultivation of A is

$$\Pi_K + rA,$$

where $\Pi_K = PQ(A, \underline{K}, L) - rA - \underline{w}L$ is the return to his fixed factor $\underline{K}$. The total income of the landlord is, therefore,

$$r\underline{A} + \Pi_K + NB - C(N).$$

The first two terms represent "normal" returns to the landlord's assets, and NB - C(N) is the monopoly profit that he can extract on the land market.

The entry fee B charged by the landlord upon renting the land can be written:

$$\begin{aligned} B &= pq(a, \underline{L_f}, 1 - \ell) - ra - w^*(1 - \ell) - (\underline{y} - w^*) \\ &= \Pi_{\underline{Lf}} - (\underline{y} - \underline{w}) - (\underline{w} - w^*), \end{aligned}$$

where $\Pi_{\underline{Lf}} = pq - ra - w^*(1 - \ell)$ represents the return to the captive labor force, $(y - \underline{w})$ represents the income compensation for the family labor effort, and $(\underline{w} - w^*)$ represents the loss of income that the household is incurring on its free labor due to the imperfection on the labor market. This gives a measure of the level of surplus extraction which the land monopoly situation provides to the landlord.

By total differentiation of the system (1) to (6), sensitivity analysis can be done around the equilibrium solution. Under the standard assumptions on the production functions, the following sign results can be derived:

$$dr = dr(+d\underline{K}, +d\underline{L_f}, -dw^*/p, -d\underline{w}/P, -d\underline{y})$$

$$da = da(-d\underline{K},\ d\underline{L}_f,\ -dw^*/p,\ +d\underline{w}/P,\ +d\underline{y})$$

$$dN = dN(-d\underline{K},\ d\underline{L}_f,\ +dw^*/p,\ +d\underline{w}/P,\ -d\underline{y})$$

$$dB = dB(-d\underline{K},\ d\underline{L}_f,\ +dw^*/p,\ +d\underline{w}/P,\ -d\underline{y})$$

$$d\ell = d\ell(+d\underline{K},\ d\underline{L}_f,\ +dw^*/p,\ -d\underline{w}/P,\ -d\underline{y})$$

$$dL = dL(+d\underline{K},\ d\underline{L}_f,\ dw^*/p,\ -d\underline{w}/P,\ -d\underline{y}).$$

This shows that:

1. The large estates will be cultivated under a dualistic structure with a mix of small plots rented out to tenants and a large area under direct production by the landlord with hired labor. The benefit of this dualistic land use pattern is, however, confined to the rent that the landlord can derive from his ownership of land (and his monopoly power).

2. An increase in the landlord's opportunities for own cultivation, here characterized by an increase in the specific factors $\underline{K}$ or in the price P of the landlord's product, will move the equilibrium toward a lower number of land rent contracts with higher rental fees and smaller plots. As expected, own cultivation of the landlord's land will increase.

3. On the contrary, tighter conditions on the labor market and a higher wage $\underline{w}$ increase the number and size of rented plots by peasant families.

4. Increasing the opportunity of free labor for off-farm labor (an increase in w^*) reduces the demand for land by individual households and, therefore, the rental rate r. But, since this also increases the possibility of surplus extraction B by the landlord, the number N of land rental contracts increases.

3.2. Cases for Interlinkage

Our next step is to explore the interlocked contract in which the landlord rents out land to and hires free labor from the same household, the inquilino. We will concentrate on the rationality of the interlinkage of two contracts, leaving open the issues of (1) the induced change in the number of contracts (N and L) that may occur with the possibility of interlinkage of some of them and (2) the pattern of contracts that will prevail when the number of tenants N does not exactly supply the needed number of workers L (i.e., $N\ell \neq L$). If, in the model presented above, the labor market is perfect ($w^* = \underline{w}$), the interlocker's profit will be equal to the sum of the profits in both markets and the interlinked contract does not bring any particular advantage to the landlord.[3/] Indeed, efficiency is insured in both markets, and the non-linear contract provides the conditions for maximum surplus extraction by the landlord.

Interlinking will, however, be superior when it increases the landlord's capacity to extract surplus if it was not total and/or when it generates more surplus in one of the markets. In the first case (the example below of interlinking when only linear contracts are possible), it is an issue of distribution in which the landlord benefits while the tenant looses. In the second case (illustrated below with an imperfect labor market), the interlinkage creates an overall net social gain for the two partners which may either be shared or completely appropriated by the landlord. Both phenomena of incomplete surplus extraction and inefficiency are present and justify the interlinking of contracts when there is a risk of default payment by the tenant.

3.2.1. Only Linear Contracts Offered

Most of the literature on the interlinking of contracts starts with the assumption that nonlinear contracts are not possible, i.e., that the rental rate is independent of plot size or $B = 0$.[4/] In that case, the pure landlord exercising his monopoly power on the land market would charge a rental rate higher than his own opportunity cost of land and create an inefficiency in resource allocation. This, in turn, reduces the total surplus that he can extract from a tenant with a given level of reservation utility.

The landlord/employer, on the other hand, can offer a rental rate at his own opportunity cost of land and tax the tenant in the labor transaction by offering a lower wage rate w^*:

$$w^* = \underline{w} - B/\ell.$$

If the labor supply were infinitely elastic, this level of wage would serve as a perfect lump-sum tax. If, however, the tenants's labor supply responds to the wage, inefficiency would be created by such a distortion. The optimum contract (r, w^*, ℓ) should then specify the amount of work ℓ that the tenant has to provide to the landlord at the reduced wage w^*.

While the constraint of linearity in contracts is generally assumed in the literature, it is difficult to justify both theoretically and empirically. Unless there exist very special institutional constraints, the monopoly power enjoyed by the landlord should allow him to set a variable rental rate just as easily as a rate higher than the competitive level.[5/] Empirical studies do confirm that interest rates commonly decrease with loan size (J. Platteau et al. 1980) and that land rental rates decrease with farm size (Albert Berry and William Cline, 1979). We, consequently, do not retain this model to explain the inquilinage contract.

3.2.2. Probability of Default in the Rental Payment

Returning to the original model with a nonlinear land rent contract, we examine the case where the tenant defaults on the rental payment whenever his income falls below a minimum subsistence level.

The risk of default originates in the stochastic nature of the peasant's production and income. Assuming, for simplicity, additive risk in production,

$$q(a, \underline{L}_f, 1 - \ell) + \theta$$

with

$$E(\theta) = 0, \ var(\theta) = \sigma^2,$$

the peasant defaults whenever his net income falls below a minimum level D, which happens whenever the stochastic element θ falls below the minimum level θ_0:

$$\theta \leq \theta_0 = (D + ra + B - \underline{w}\ell - pq)/p.$$

The peasant's optimum strategy is to

$$\underset{a,\ell}{\text{Max}} \ pq - f(\theta_0)\ (ra + B) + \underline{w}\ell,$$

where $f(\theta_0)$ is the probability of nondefault, $f(\theta_0) = \text{prob}\ (\theta \geq \theta_0)$. This leads the peasant to perceive a marginal cost of land lower than r and, therefore, to rent more land than in the nondefault case. The marginal productivity of land on the peasant's plot is

$$pq_a' = r[f + f'(ra + B)]/[1 + f'(ra + B)],$$

while no bias is introduced in the labor market, $pq_\ell' = \underline{w}$.

The landlord's optimum choice is now written as:

$$\underset{N;L,r,B}{\text{Max}} \; PQ(\underline{A} - Na, \underline{K}, L) - \underline{w}L + N f(\theta_0)(ra + B) - C(N)$$

subject to

$$pq - f(\theta_0)(ra + B) + \underline{w}\ell \geq \underline{y}.$$

After some rearranging of the terms, the first-order conditions for an interior solution ($r > 0$, $B > 0$, $L > 0$) can be written:

$$-(PQ_A' - fr) Na_r' + (N - \lambda)[af + (ra + B) f' \theta_{0r}'] = 0$$

$$(N - \lambda)[f + (ra + B) f' \theta_{0B}'] = 0$$

$$-(PQ_A' - fr) a + fB - C'(N) = 0$$

$$pq - f(ra + B) + \underline{w}\ell - \underline{y} \geq 0$$

$$\lambda[pq - f(ra + B) + \underline{w}\ell - \underline{y}] = 0,$$

where λ is the Lagrangian multiplier associated with the peasant's income constraint. Two locally optimum solutions of this system are, respectively, given by

I. Constrained Optimum

$$N = \lambda$$

$$PQ_A' = fr$$

$$C'(N) = fB$$

$$pq - f(ra + B) + \underline{w}\ell = \underline{y}$$

II. Nonconstrained Optimum

$$f + (ra + B) f' \theta_{0B}' = 0$$

$$PQ_A' = fr$$

$$C'(N) = fB$$

$$\lambda = 0 \text{ and } pq - f(ra + B) + \underline{w}\ell > \underline{y}.$$

The nonconstrained optimum II will be the landlord's solution if f' is sufficiently small for the condition $f + (ra + B) f' \theta'_{0B} = 0$ to hold for values of B below the maximum given by the peasant's income constraint.

The possibility of default payment introduces two discrepancies with the standard model. First, inefficiency in land allocation results from different perceptions of the marginal cost of land by the landlord and by the peasant (in both cases I and II). Secondly, if the probability of default increases rapidly with rental costs, the landlord may not be able to set B to the maximum value that allows him to capture all of the peasant's surplus. The optimum strategy consists in a lower than maximum B which leaves the peasant household's income above its reservation level (case II).

Interlinking can protect the landlord/employer against these losses of defaulting by transforming the rental payment, at least partially, in payment in labor services. Depending on the relative sizes of the opposite transactions $ra + B$ and $w\ell$, the net payment will be either a rent or a wage. With very limited employment opportunities for the peasant ($\underline{w}$ low), the land rental contract is dominant, $ra + B > \underline{w}\ell$, and the two contracts (r, B) and ($\underline{w}$) can be replaced by an interlinked contract with

$$r^* = r - (\underline{w}\ell - B)/a, \quad B^* = 0, \quad w^* = 0.$$

However, to avoid the inefficiency in input choices that the distorted prices r^* and w^* will induce, the contract needs to also specify the correct amount of land a which the peasant can rent and the amount of labor ℓ which he has to provide free of wage. The interlinked contract (r^*, a, ℓ) can be interpreted as the rental contract of a plot of land of size a at a reduced rate r^* plus payment in kind of a prespecified quantity of labor on the landlord's estate. With increasing wage on the labor market and decreasing plot

size for the peasant, such that ra + B becomes lower than $\underline{w}\ell$, the interlinked contract evolves toward a labor contrat (a, ℓ, w*) at a reduced wage

$$w^* = \underline{w} - (ra + B)/\ell$$

and a complementary payment in land usufruct. Again, to avoid inefficiency, the contract needs to specify the plot size a and the amount of work ℓ which the peasant has to provide.

A landlord engaged in a dualistic utilization of his estate, with small plots of land rented out to tenants and direct cultivation with hired labor, will consequently have an advantage in hiring his own tenants as workers. Dualism, thus, becomes functional in the sense that it is through the labor market transaction that the full rent of peasant family labor can be extracted. The individual contract may, however, be dominated by either the land or the labor transaction as we have seen it above. The overall pattern of contracts given by any landlord depends upon the relative size of the supply of labor by his tenants ($N\ell$) and his demand for labor (L). As observed in the Chilean sequence of contracts, starting from a pure land rental contract, interlinked contracts spread as the share of land in own cultivation increases; and a mix of interlinked contracts and complementary pure labor contracts diffuse when land use becomes dominated by direct cultivation.

3.2.3. Involuntary Unemployment Among the Peasants

Consider, now, the initial model in which the opportunity cost of the peasant's labor is w* below the market wage $\underline{w}$. This will occur, in particular, when there is open unemployment and each peasant has only a certain probability of finding employment, while the market wage is maintained at $\underline{w}$.

The difference $\underline{w} - w^*$ can be thought of as a transactions cost in getting access of the labor market.

Interlinking by the landlord who hires his own tenants allows him to recover this transactions cost. At which wage should the transaction be settled? If ℓ is fully absorbed in the landlord's labor force and the wage rate is w, $w^* \leq w \leq \underline{w}$, the benefit accruing to the landlord is

$$\underbrace{\Pi_{\underline{Lf}}(\underline{L_f}, r, w) - (\underline{y} - \underline{w}) - (\underline{w} - w)}_{\text{on the rental market}} + \underbrace{(\underline{w} - w)\,\ell}_{\text{on the labor market}}$$

$$= pq[a, \underline{L_f}, 1 - \ell(w)] - ra - \underline{w}(1 - \ell) - (\underline{y} - \underline{w})$$

which is maximum for $w = \underline{w}$.

The optimum contract will then consist in offering to the peasant the wage $\underline{w}$, increasing by this his labor supply on the market and raising his productivity on his plot, and then to capture a higher rent from him by increasing B.

The interlocker enjoys a privileged situation that neither the employer nor the landlord could create. Compared to an employer, he can recover part of the cost $(\underline{w} - w^*)$ of this labor force through the rental market. Compared to a pure landlord, he can raise the income of the free labor by $(\underline{w} - w^*)$ and increase surplus extraction by the same amount.

The landlord may choose to rearrange this optimum contract $(r, B, \underline{w})$ with part of the rent paid in labor services. As in the previous case, the contract will then also need to specify the quantity of the transaction.

The functionality of the interlinkage is quite clear, but the role of the labor and the land transactions are very symmetric. One can see the land

rental as performing the function of decreasing the cost of labor to the landlord from the market level $\underline{w}$ to the lower w^* or the labor market as raising the opportunity cost of free labor from w^* to $\underline{w}$ and, hence, allowing to recover the full rent of the family labor on the land market.

3.2.4. Labor Scarcity and Recruitment Costs

A very symmetric case of transactions costs on the labor market occurs where there is labor scarcity. The landlord needs to incur high recruitment cost c to find employees in sufficient number for his direct cultivation, in particular for highly seasonal activities. Therefore, there exists a difference between the labor cost $\underline{w} + c$ to the landlord on the demand side and the price $\underline{w}$ received by workers on the supply side, a transactions cost that the landlord can avoid by hiring his own tenants.

In this case, interlinkage is justified by imperfection of the labor market, does not need the assumption of monopoly power and surplus extraction on the land rental market, and would exist even in the case of land surplus. The social welfare gain of the interlinkage may then be partly shared by the landlord through a subsidy to land rental. In this case the two separate contracts would have been a land rental contract $(r, B = 0)$ at market rental rate r and a labor contract $(\underline{w} + c)$ with market wage $\underline{w}$ and recruitment cost c. The landlord may attract tenants by proposing an interlinked contract $(a, \underline{w})$ at a lower rental rate r^* equal to $(r - c/a < r^* < r)$ for a prespecified plot size a. This may even take the form of almost free usufruct of land for the promise of working a certain number of hours for the landlord. The rental of small plots to tenants, and thus dualism in the agrarian structure, is in this case actively sought by the landlords not for collecting any rent but to decrease labor costs.

IV. Determinants of Plot Size in Land-Labor Contracts

We can verify some of the model predictions for the land-labor contracts using a 1966 survey of 258 inquilinos on large farms in the Central Valley of Chile done by Alejandro Schejtman. While the original data are no longer available, a number of two-way frequency distribution tables allow us to calculate correlations and simple regressions between the size of the land plot cultivated by the inquilino and a number of characteristics of both the landlord's estate and the inquilino. The results obtained are presented in Table 1.

Among the landlord characteristics, the size of the land plot given as part of the land-labor contract changes as follows:

1. It increases with the size of the estate (A). With decreasing marginal returns in production, the opportunity cost of the land for the landlord decreases as farm size increases, and it is thus more logical for him to pay in land usufruct a higher share of the inquilino's labor income.

2. It decreases with land productivity on the estate (K). Rising productivity raises the opportunity cost of the land for the landlord and leads him to reduce the share of land in the inquilino's contract. As a result, it is in the more modern farms that the peasants are given the least access to land.

3. It increases with the degree of geographical isolation of the estate (measured as a dummy variable). Since this implies that access to the market is more difficult, farm-level product prices are lower and so is the opportunity cost of the land. This also leads landlords to increase land rights in the inquilino's labor income.

The size of the plot is also influenced by several characteristics of the worker's household.

Table 1

Determinants of Plot Size in Land-Labor Contracts, Chile, 1966

	Model variables or proxies	Units	Mean	Coefficient of variation	Correlation with a	Elasticity at means	t-statistic
Plot size	a	ha	1.6	0.97	1.00		
Landlord characteristics							
Size estate	A	ha	597	1.47	0.17	0.25	2.70
Land productivity	K	U. S. $/ha	315	1.43	-0.31	-0.45	-5.16
Labor scarcity	w	1 = scarce	0.27	0.61	0.04	0.02	0.63
Isolation	P	1 = isolated	0.29	0.64	0.24	0.16	3.91
Worker Characteristics							
Age household head	L_f	years	41.7	3.64	0.10	0.18	1.54
Seniority	k	years	18.8	1.61	0.11	0.36	1.79

Source: A. Schejtman's 1966 household survey. Sample size: 258 households.

1. It increases (significant at the 94 percent level) with the age of the head of household. Using this as a proxy for family size and assuming, as we have done above, that a given fraction of family labor is captive within the household, the productivity of land use on the tenant's plot increases with the age of the head of household. If the fixed reservation utility level of this household is the level of remuneration which the landlord must satisfy, it is cheaper for the landlord to give larger plots of land to those households with a greater captive labor force.

2. It increases with the worker's seniority measured by the number of years of continuous employment on the present estate. Since tenants gradually capitalize their plots with accumulated earnings, seniority is a proxy variable for capital intensity on the land plot (k). Such a variable was not explicit in the formal model but would play exactly the same role as L_f. Seniority then leads to higher productivity and to a larger share of labor income paid by landlords under the form of land usufruct.

Table 2 shows the relationship between income derived from the inquilino's plot of land and total household income. It shows that the average share of plot income in total income was 49.3 percent in 1966. The share of plot income in total income increases with total income as the elasticity between total and plot income is equal to 1.51.

These results support the idea that the better-off workers receive a higher share of their total labor income from land rights and, hence, that land rights are an important element of an efficiency wage. Additionally, better-off workers, usually those with more seniority and more specialized tasks, are able to rent additional land from the landlords, including as sharecroppers. This, again, supports the idea of land as a defined component of workers' incentives. It is confirmed by answers to a question in Schejtman's survey as

Table 2

Share of Producer Income in Total Household Income, Inquilinos, Chile, 1966

Variables	Units	Mean	Coefficient of variation	Correlation with total income	Elasticity at mean with total income	t-statistic
Total income	U. S. $	887	0.42	1	--	
Plot income	U. S. $	459	0.75	0.84	1.51	24.60
Share of plot in total income	percent	49.3	0.47	0.25	0.28	4.14

Source: A. Schejtman's 1966 household survey. Sample size: 258 households.

to whether inquilinos would prefer to receive higher pay in the form of cash or of additional land rights. A preference for land was expressed by 77 percent, with 73 percent among the poorest and 89 percent among the richest inquilinos.

V. Conclusion on the Functionality of Structural Dualism

With dualism being one of the dominant structural features of Latin American agriculture, the causes and dynamics of this dualism have been a subject of intense debate in agrarian studies. Two competing interpretations have been provided. One looks at dualism as the outcome of a competitive relationship between landlords and peasants. The permanence of dualism and of peasants is thus explained by the competitive ability of peasants based, in particular, on a high degree of "self-exploitation" as an element of their complex survival strategies (Claude Servolin, 1972; and Arturo Warman, 1976). The other looks at the coexistence of peasants and landlords as a symbiotic functional relation whereby landlords extract a surplus from peasants on the land and labor markets. Because the continued presence of peasants is thus advantageous to landlords, the latter effectively manage the perpetuation of dualism in the agrarian structure. As opposed to the first interpretation, dualism can then be understood as an element of a stable equilibrium. This latter interpretation had, in particular, been argued by classics of the agrarian question such as Kautsky, who wrote: "Precisely this tendency shows how absurd it is to suppose that, if these small holdings continue to survive, then it must be because they are more productive. The real basis of their survival is the fact that they cease to compete with the large capitalist farms which develop by their side. Far from selling the same commodities as

the larger farms, these small holdings are often buyers of these commodities. The one commodity which they do possess in abundance, and which the bigger holdings need, is their labor power. . . . Under this state of things, both types of farms do not exclude each other but, on the contrary, coexist like capitalist and proletarian, even though the small peasant becomes increasingly proletarianized" (K. Kautsky, 1972, p. 175).

The observed dualism in the structure of operational units can occur either within or between ownership units. In the first case, dualism is internal to the landlords' operation which assumes the character of a multi-enterprise unit with payment of fixed rents in cash or kind, share rents, or rents in labor services. This is the type of dualism which we addressed in this paper. The theoretical model developed and the empirical observations made vindicate the notion of the functionality of dualism. Indeed, we have seen that there is logic for the landlords to create a semiproletarianized peasantry through interlinked land-labor contracts resulting in a strong latifundio-munifundio dualism internal to the former. As we have seen it from both the history of inquilinaje in Chile and from theory, interlinked land-labor contracts are rational for landlords when there is an increasing likelihood that tenants may default on the payment of rising land rents, when there is involuntary unemployment among peasants, and when the landlord needs to incur high recruitment costs due to rising labor scarcity. As we have seen it, the number and size of interlinked peasant enterprises internal to the landlord's ownership unit will tend to increase with the presence of larger, less capitalized, and more isolated haciendas and with peasant households with more captive labor and higher land productivity. They will decrease with the emergence of labor laws that codify the share of reservation wages to be paid in cash.

FOOTNOTES

[1]Underlined variables indicate that they are fixed during the decision period.

[2]Signs in front of the exogenous variables represent the signs of the first derivatives of the function.

[3]In a general model of credit interlinkage, Ray and Sengupta demonstrate that, when (a) nonlinear contracts are allowed, (b) interlockers do not face different terms (relative to other interlockers or to pure moneylenders) in the markets in which they are active, (c) there is no differential information, and (d) there is no market price uncertainty, then all interlockers are equivalent and have no advantage over a pure monopolist in the surplus they can extract. In particular, a pure moneylender can do just as well as any interlocker.

[4]See, for example, Pranab Bardhan (1984), S. Gangopadhyay and K. Sengupta (1986), and A. Braverman and J. Stiglitz (1982).

[5]David Newbery (1975) uses a similar argument in a critique of Badhuri's model of a landlord/moneylender who opposes innovation (as it may increase the tenant's income thus reducing his indebtedness and the landlord's profit derived from the loans). His point is that "if the landlord has sufficient monopoly power to exploit the peasant and to withhold the innovation, then he ought to have sufficient power to extract profit generated by the innovation." (p. 270).

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