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Insecurity of Property Rights and Matching in the Tenancy Market

Karen Macours

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Karen Macours
Department of Agricultural and Resource Economics
University of California at Berkeley

Abstract

This paper analyzes the functioning of land rental markets in the Dominican Republic using a new data set collected specifically to characterize the entire market. We analyze the choice of the landlords and the tenants in the search for the optimal partner. We show how insecure property rights leads to segmentation in the tenancy markets along socio-economic group and hence severely limits access to land for the rural poor.

Keywords: insecurity of property rights, land markets, matching

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Contact Address: Karen Macours, Department of Agricultural and Resource Economics, 207 Giannini Hall, University of California, Berkeley, CA 94720-3310, USA. Tel: (510) 643 0846 Fax: (510) 643 8911
Email: **macours@are.berkeley.edu**

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"Because the rights (to most of the poor's resources) are not adequately documented, these assets cannot readily be turned into capital, cannot be traded outside narrow local circles where people know and trust each other ..." (Hernando de Soto, 2000)

1. Introduction

Many macro-economic studies have emphasized the role of law enforcement, security of contracts and property rights for economic growth and development (Knack and Keefer, 1995; Barro, 1996; Heckelman, 2000). The empirical results of these studies however have been questioned due to a number of methodological problems found in cross-country growth studies in general (see Temple, 1999). In this paper, we will address the importance of insecurity of property rights using a micro-level dataset. More specifically, we will analyze how property rights affect the functioning of land rental markets in two regions in the Dominican Republic (DR). We show how insecure property rights lead to segmented markets and hence shed light on a specific mechanism in which lack of property rights might impede efficiency and equity gains, and hence influence growth and development.

In the DR, land reallocations through the rental market are limited (14%), as in most of Latin America. This stands in sharp contrast with agricultural land rental markets in many other parts of the world (e.g. 73% of the land is rented in Belgium, 44% in the United States). Different hypotheses can be raised for this lack of land rental market activity, but a factor that is likely to be important, in the Dominican Republic, as well as in most other countries in Latin America, is the landlord's fear of loss of the land. Such fear results from insecure property rights, due to weak law enforcement, and in many cases, lack of formal title.

In the Dominican Republic, land ownership and distribution has been severely affected over time by the different property right systems of the different foreign powers (Spanish, French and American), that got implemented without abolishing the previous system, and by the redistributive land reform, initiated in the 60s after the fall of the dictatorial regime of Trujillo. Those policies have resulted in a considerable heterogeneity of property rights and in the strength of these rights. Furthermore, until today, legislation is in place that allows for expropriation of ill-used land, creating incentives for invasions and squatting of land by tenants (Gill, 2000).

In order to better understand the functioning and the constraints on the land rental market, we need to understand what determines access to land through the land rental market. Existing empirical work that analyzes the functioning of the land rental market attempts to explain the net demand for land as a function of the asset endowments and household characteristics. For instance, Deininger and Chamorro (2000) estimate the probability of renting in and show that land tenancy markets in Nicaragua enhance equity and efficiency by transferring land to more efficient producers with lower land-labor ratios and higher profit levels. This is consistent with results of DeSilva (2000) who finds that more skilled households are more likely to rent in. Also Baland et al. (2000) model the decision to rent in as a function of the characteristics of the tenant and show that land tenancy markets, together with land sale markets, correct for initial inequality in land endowments in Uganda.

In these empirical specifications, one only considers either the characteristics of the tenant or the characteristics of the landlord. However, in a situation with considerable excess

demand for land, access to land will be determined by the characteristics of the potential tenants that are desired by the specific landlords in the market.[1] If all the landlords have the same preferences over the type of tenant, the probability of renting in can indeed be modeled as a function of the characteristics of the tenant. Yet, with heterogeneous landlords and heterogeneous tenants, different landlords might prefer different tenants. In this paper, we will argue that these preferences will be significantly influenced by the security of property rights over land. In particular, landlords who are afraid to lose their land, will only trust renting out land within narrowly defined social circles. Belonging to the circle of confidence of particular landlords will be a key determinant for access to land in environments with a lot of property rights insecurity.

Hence, access to land for a particular tenant will not only depend on his own characteristics, but also on the characteristics of all available landlords and all other potential tenants, and on the institutional context that might influence the landlords' preferences. Analyzing the matching process on the tenancy market, should therefore help to disentangle the micro-foundations of access to land through the land rental market.

The structure of this paper is as follows: in the next section, we will first discuss the data that were collected for the analysis. In section 3, we analyze the determinants of renting in considering the tenant characteristics in line with the existing literature. We then turn to the analysis of the matching between landlords and tenants in section 4. In the last section we conclude and discuss the policy implications of our findings.

2. The Data

2.1. Survey Methodology

To analyze access to land through the tenancy market, we use the data we collected specifically for this purpose, in two regions of the Dominican Republic (DR). An "indirect" survey approach was used to obtain data on communities and on each household and each plot within these communities. The idea behind the indirect approach is that a lot of private information is public at the level of the community. Hence, selected informants from the community can be used to answer questions about individual community members on matters that are locally public.

The most important advantage of this approach is that it allows to define the universe (in our case the complete rental market with all actual and potential tenants and landlords), because data are collected on every household in a geographically closed area, and selectivity bias due to non-response or difficulties of reaching certain households (often the most marginal groups) is eliminated. Furthermore the indirect approach is an efficient method of collecting data, as information about a large amount of households can be gathered in a short time period, and with relatively little effort compared to direct interviews with each household concerned. The accuracy of the indirect approach still needs to be established, which is the aim of ongoing research. However, work by Takasaki, Barham, and Coomes (2000) shows that reliable information on households' asset endowments can be obtained using an indirect survey approach.

In a first step, basic information about all households and all plots in a community was obtained in order to (1) define the complete land rental market, (2) match landlords with their respective tenants and hence obtain information about the partners on both sides of the

[1] The data show that 49% of the household would be willing to rent in more land at the market rate. This indicates that there is indeed an excess demand for land in the market in the regions studied.

transaction, and (3) obtain a sampling frame for more detailed household and plot level questions. In a second step, a stratified sample of households was drawn in order to oversample the landlords and tenants in the population. This was necessary to guarantee sufficient observations on the variables of interest, as rental in some communities is a rare event. All landlords and tenants were selected, complemented by a random sample of all other households in the community. In addition to household-level information, data on all the plots these households owned (either owner-cultivated or rented out) and rented in was obtained. Data on community characteristics were also collected.

Data were collected in the regions of Constanza (1092 households) and San Francisco de Macoris (1431 households). Constanza is located in a fertile valley in the mountainous area in Central DR (La Vega province). It is characterized by a very intensive irrigated horticultural production, which depends to a large extent on hired labor. San Francisco de Macoris is located in the flatlands of the Cibao region (Duarte province) and agricultural production is mainly rice, complemented by plantains and pastures.[2] In both regions, agricultural income is a very important component of households' budgets.

2.2. Descriptive statistics

Table 1 shows that the land rental market is quite developed in Constanza and much more reduced in San Francisco de Macoris (Table 2). In Constanza, where 77% of the land has a formal title, the land rental market involves about half of the households as landlords (25%) or tenants (22%) and 52% of the land. In contrast, in San Francisco de Macoris, where only 26% of the land has a formal title, only 21% of the households and 39% of the land is part of the land rental market. In addition, a larger share of the households is land constrained (i.e., reported as wanting to rent in more land) in the second region (60%) as compared to the first (46%). Hence, contrasting these two regions suggests the importance of security of property rights in supporting an active land rental market.

The weakness of property rights in the rice-growing region is not only reflected in the low share of titled land, but also in the much greater occurrence of land conflicts (Table 2). The frequency of land conflicts originates in a long and complex history of land reform in this region and might explain why, in the majority of the communities in the San Francisco region, the primary reason for difficult access to land in rental was identified as fear of the landlords to lose their land (64% of communities). In contrast, in the Constanza region, where the land reform had only a very marginal impact, this seemed not to be the major concern (0% of communities). The occurrence of more rental contracts that are in writing in the region of San Francisco might be a response to this uncertain environment, although the share of written contracts is still low at only 21%.

3. Empirical analysis of the determinants of renting

We first estimate a logit model to analyze the determinants of renting in. A weighted regression was used to account for the sample frame. The regression results in the first column of table 2 show that the household's asset endowment is an important determinant of renting in. The

[2] In both regions, land is mainly used for annual or seasonal crops, not for perennial crops. Only a limited amount of plots are used as pasture. Hence, the use of the land does not seem to be a limiting factor for renting.

results confirm that ownership of machinery significantly increases access to land in rental. [3] A positive but diminishing effect of education indicates that a minimum level of education is desirable to obtain land in rental, but logically people with a high education rent in less as the opportunity cost of their labor in other occupations is higher. Furthermore, households that are active in one of the community organizations are more likely to rent in. On the other hand, the rental market is effective in redistributing land for cultivation to the landless and land-poor as households without land are more likely to rent in and owning more land decreases the likelihood of renting in.

However, access to land through the land rental market is constrained in communities with weak property rights or with lack of enforcement of these rights. The regression results suggest that access to land is facilitated in communities with a lot of land with strong property rights. The presence of conflicts on the other hand, has a very significant negative effect on land rental.[4] Furthermore, we see that in communities that were categorized as being well "united" land rental is less likely. Although counterintuitive at first sight, this suggests that in communities with a lot of social capital, this social capital plays in favor of the poor, hence inducing fear among those with a lot of land to rent out to the poor. This is confirmed by the interaction term showing that, for those who own more land themselves, access to land actually increases in the more united communities. This interpretation of the pro-poor bias of well-united communities was confirmed in extensive field interviewing.[5]

Landowners are more likely to trust people that belong to the same kin or the same socio-economic group. To investigate whether belonging to the circle of confidence is more important in the absence of secure property rights, we introduce interaction terms between the circle of confidence variables and security of property rights. The results show that in the absence of secure property rights, having a lot of family members (and hence potentially a lot of landlords who trust the household) in the community becomes an important determinant of access to land. Also having a lot of parcels owned by people of the same ownership category increases the likelihood of renting when property rights are insecure. This result suggests that the role of circle of confidence in supporting land rental contracts declines when property rights become stronger. In an alternative specification in column 2, the positive sign of the number of parcels owned by members with the same livings standard also confirm that belonging to the circle of confidence of potential landlords is a crucial determinant of access to land.

Access to land is also more difficult in larger communities (as measured by the total number of parcels owned by community members) which might be due to the fact that both observability and social enforcement of contracts is more difficult in these communities. The regression further shows that the higher the number of landowners without machinery in a community, the higher the probability of renting in, which further underlines the fact that machinery ownership is an important condition for cultivation, and hence lack of capital severely constrains access to land for the poor.

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[3] The variable 'own machinery' measures the ownership of machinery if the household head is younger than 35. For this category of households, machinery ownership can be considered exogenous, as the period of potential accumulation is relatively short.

[4] The variable is an index measuring the presence and prevalence of different types of conflicts related to land.

[5] The pro-poor bias might be explained by the fact that the majority of the households in these communities are poor.

Finally, distance to the market increases the likelihood of renting in, indicating that lower profitability (higher transaction costs) makes more land available for rental by landlords with higher opportunity cost than tenants. Interestingly, less renting occurs in communities where fixed rent contracts are the most common contract used. As the estimations of the determinants of renting only allows to capture the matching between landlords and tenants in an indirect way, we now turn to analyzing the matching between landlords and tenants directly.

4. Matching in the tenancy markets

Given the excess demand for land in the regions studied, it seems reasonable to assume that the matching equilibrium will be achieved by having the landlord making the offers to the tenants, while the tenants have the possibility to accept or reject. Furthermore, we assume that all players know the best possible pay-offs of each of the other players. Hence, we will model the matching process as a decision process of the landlord, who takes the reservation utility of the potential tenants into account. The reservation utility of a potential tenant is the maximum of the utility he would derive from his best possible match in the tenancy market and the utility he would derive when not participating in the tenancy market.

We assume that landlords and tenants have perfect information about all the players in the market and their preferences. Hence we do not rely on a search mechanism to explain the matching patterns as is often done in the literature. (Mortensen, 1982; Pissarides, 1990; Burdett and Coles, 1999). Search will occur if the employers do not have perfect information on the traits of the potential employees, but can obtain this information by engaging in a costly search process. The assumption of perfect information on the variables that matter seems warranted for the village communities in the DR, as information sharing (gossiping) is an inherent part of social life. Furthermore, different studies in other parts of the world find that information on attributes of farmers is widely available in village communities (Bardhan, 1984; Bell, 1988; and Lanjouw, 1999). In future research, we will formally test this assumption for the regions studied.

In the context of the rural Dominican Republic, different concerns are likely to influence the matching process. In particular, the threat of losing the land because of squatting by the tenant, once the plot is rented, is not only likely to decrease the total amount of land offered for renting, but might also influence the access to land for specific groups in society. In deciding who to rent out to, landlords will account for the probability of losing their land. We hypothesize that conflicts and insecurity of property rights will lead to positive assortative matching along group or class-membership.[6] Such positive matching is likely to occur because enforcement against squatting is easier for members of the same group.

In order to test our hypothesis, we will control for other factors that might influence matching in the tenancy market. First of all, positive assortative matching along group membership can also occur for other reasons. For instance, transaction costs might be lower when contracting with people from the same group. Also if effort is better observed or enforced within the own class, we would expect such a positive assortative matching (at least for the sharecropping contracts). Other reasons for positive assortative matching could come from differences in plot size or crop choice. E.g. if land poor potential tenants are credit constraint and hence won't be able to apply the optimal amount of inputs (such as fertilizer, pesticides and machinery) on a large plot of land, they will prefer renting in smaller plots, and landlords in turn will prefer not to rent out large plots to them, as they will have a lower profitability. Given that

[6] Membership of different groups might be relevant, going from living in the same community, to belonging to a same living standard class or landownership class, to, in the limit, belonging to the same family.

large landowners are more likely to rent out plots that are larger, positive assortative matching will result. Also, if certain crops are more risky but also more profitable, wealthier landlords might prefer wealthier (less risk-averse) tenants.

Furthermore, in the tenancy market, the productive assets (land, labor, capital, education) of landlord and tenant are substitutable inputs in the agricultural production function. Therefore, Becker's theorem of assortative mating (1973) predicts that utility maximization by landlords and tenants will result in landlords matching with tenants whose endowment of production factors is different from their own, which will lead to negative assortative matching along productive assets.

4.1 Empirical specification

The importance of endogenous partner choice for explaining economic outcomes has been incorporated in recent studies in different areas of economic activity, such as fertility (Rosenzweig, 1999), children's education (Foster, 1998; Liu and Zhang, 1999), intergenerational transmission of religious traits (Bisin, Topa and Verdier, 2000) and choice of the rental contract (Ackerberg and Boticelli, 2000). These studies all focus on assortative matching along a certain trait and hence, do not fully model all variables influencing the 2-sided utility maximization matching process.

Little empirical work on matching has been done to explain the determinants of matching at the individual level. However, two recent papers, Jepsen and Jepsen (1999) and Suen and Lui (1999) try to bridge the gap between Becker's theory of assortative matching in the marriage market and the empirics.

Jepsen and Jepsen (1999) estimate a conditional logit model, modeling the matching process as a choice by one of the partners, determined by a vector of characteristics of the couple. They use the absolute value of the differences in traits to compare the relationship of the traits of the choices to the traits of the chooser. While this is an interesting approach there are potential problems with modeling the matching process as a one direction decision process, not taking into account utility maximization of the other side, nor the competition in the market. In large markets the effect of such competition (i.e. the probability that your preferred match is all ready matched with somebody else that he/she prefers) is likely to be negligible. Yet, in thinner markets this might not be the case. Furthermore, partner selection differs from a discrete choice problem because the choice of a spouse is mutual and because different individuals can not chose the same alternative.

Suen and Li (1999) explore a method that does not build on such an assumption, but is in stead directly derived from the Becker model of efficient competitive matching in the marriage market. Specifically, Becker's result that the marriage market maximizes marital output provides a framework for estimating a model of spouse selection. This model has the advantage to takethe reservation utility of the potential partners into account. However, it draws on the assumption of efficiency in the market, which might be too strong an assumption to make in a tenancy market characterized by conflicts and insecurity of property rights.

We model the tenant choice made by the landlord for each plot, based on utility maximization, in a conditional logit framework. The conditional logit allows estimating how the characteristics of the alternative (i.e. the tenant), as relevant for the landlord, affect the choice of the landlord. Specifically, it allows capturing the effect of differences between the characteristics of the landlord and the tenant, and hence estimating along which characteristics there is assortative matching. Hence, we define the probability that a landlord chooses tenant j for his plot i as

$$P(\delta_{ij}=1)=\frac{e^{E(U_{ij})}}{\sum_{k\in I} e^{E(U_{ik})}}=\frac{e^{X_{ij}\beta}}{\sum_{k\in I} e^{X_{ik}\beta}}$$

where $E(U_{ij})$ is the expected utility the landlord derives from renting out plot i to tenant j, X_{ij} is the vector of characteristics of the partnership created by matching the landlord of plot i with tenant j, and β is the vector of coefficients to estimate and *I* the set of all potential partners for i. Note that by modeling the probability of a certain match as a function of all possible matches, we account for the distribution of the relevant traits in the population. All possible matches are obtained by matching the landlord-plot i with all potential tenants in the community (i.e. all households who are reported as wanting to rent in more land at the most common contract).[7] The expectation of the utility of the landlord depends on the probability of losing the land through squatting.

We specify X_{ij} as containing variables measuring the absolute value of the difference between the landlord's and the tenant's characteristics, for those characteristics where we expect assortative matching to occur. To measure assortative matching along group membership, we enter the absolute value of the difference in living standard group ($LCLASS_{ij}$) and land ownership ($LAND_{ij}$).[8] Furthermore, as positive assortative matching is expected to matter more for plots with insecure title and/or in communities with more conflicts, interaction terms with $TITLE_i$ and $CONFLICTS_i$ are added.[9]

To control for negative assortative matching along productive assets X_{ij} contains variables capturing the difference in productive assets. Specifically it will contain the absolute value of the difference in land ownership, labor endowment, $LABOR_{ij}$, machinery ownership, $MACHIN_{ij}$, and human capital endowment, $EDUC_{ij}$ (level of education of the household head). Since we expect negative matching along productive assets, we expect the coefficient of these variables to be positive. Hence,

$$\begin{aligned} X_{ij}B = \\ & \beta_0+\beta_1 LABOR_{ij}+\beta_2 MACHIN_{ij}+\beta_3 EDUC_{ij}+ \\ & \beta_4(1+\gamma_0^l TITLE_i+\gamma_1^l CONFLICT_i)*LCLASS_{ij}+ \\ & \beta_5(1+\gamma_0^o TITLE_i+\gamma_1^o CONFLICT_i)*LAND_{ij} \end{aligned}$$

The problem with the model specified above, is obviously that it models the matching process as a one-sided decision problem without accounting for competition in the market and

[7] Given that the communities are located at small distances from each other, one could also consider all potential tenants in the region (or in neighboring communities). This approach was not followed because the number of across-community matches is rather small and as this would increase the number of non-realized matches considerably.

[8] Unfortunately, we do not have information on kinship relationships with households other than the actual tenants, and hence we cannot account for positive assortative matching along kinship.

[9] In our sample, given that ownership of a title is largely determined by different historical events that were beyond the control of the current possessors, title can be treated as an exogenous variable. Conflicts are a community level variable and therefore also exogenous to the household.

utility maximization of the tenant. In a market with excess demand however, as we have in the two regions studied, this might be a justifiable approximation of the true process.

In an alternative specification, we introduce tenant fixed effects, to capture the reservation utility of each tenant. This is similar to the fixed effects introduced in Suen and Lui (1999). The reservation utility of each tenant is the maximum between the utility he would derive from his best-possible match and the utility he would derive outside the tenancy market. It hence captures the utility maximization process of the tenant and the effect of competition in the market. The specification of the conditional logit with tenant fixed effects is consistent with a model in which the landlords make the offers and the tenants accept or reject.

Introduction of the tenant fixed effects solves the two shortcomings of the conditional logit specification in Jepsen and Jepsen, i.e. it allows both for accounting for the utility maximization of the tenant side, and for competition in the market. In addition, it reduces a possible endogeneity bias that might result if there is a unobservable that is correlated both with the probability of the match, and with one of the tenant characteristics. At the same time, we do not need to make the assumption that the matching market is efficient (as Suen and Lui need to do), which might be too strong an assumption to make in a tenancy market characterized by conflicts and insecurity of property rights.

4.2. Estimation results

The first column in table 3 reports the results for the conditional logit estimation without fixed effects for the region of San Francisco de Macoris, i.e. the region with high insecurity of property rights. The results provide evidence of positive assortative matching along group membership with insecurity of property rights, as households who belong to a different ownership class are less likely to match, but only if the landlord has no secure title on the plot. Furthermore, in communities with more conflicts, positive assortative matching along living standard class is more likely. The results are also consistent with negative assortative matching along productive assets, as the effects of the differences in machinery ownership and differences in labor endowments are positive and highly significant. Also, the point estimate for differences in education is positive, although not significant.[10]

The second and third column reports results for a restricted sample, in which only the actual tenants are considered (as opposed to all the potential tenants). In the third column, the specification with tenant fixed effects is reported. We note that the results regarding the positive assortative matching along land ownership and living standard group remain in this restricted sample, with and without the inclusion of fixed effects. However, the coefficients of the differences in productive assets turn insignificant. This indicates that the significant effects in the first column, are probably not due to matching along productive assets, but rather capture the tenant characteristics. This is consistent with our earlier findings of the importance of asset endowment for access to land. However, the robust significant effects of the positive assortative matching along land ownership in the presence of insecurity of property rights, confirms the main hypothesis of this paper.

In table 4 the results for the region of Constanza are reported. It is striking, and in line with our hypothesis, that in this region, where property rights are much better respected and land conflicts are much less prevalent, we do not find positive assortative matching along landownership category. The results in the first column do seem to support the negative

[10] As there might be a potential endogeneity problem with labor and machinery variables, the estimation was also done without these 2 variables (not reported), and the results of the other variables are robust.

assortative matching along productive assets, but as was the case for the other region, these results disappear once only the restricted sample is used.

5. Conclusions

This paper has been motivated by the observation that land rental markets in Latin America are atrophied compared to many other parts of the world, particularly Europe, the United States, and Asia. In these other regions, land rental markets have fulfilled important efficiency and equity functions. Observed atrophy in Latin America suggests that there exists an important missed opportunity to improve the performance of agriculture and to combat rural poverty through rentals. As opposed to other parts of the world where access to land has been promoted through the regulation of land rental contracts, the issue of access to land in Latin America has focused on a long history of state-led expropriative land reforms and, more recently, on land market-assisted land reforms (Deininger, 1997), focusing in all cases on access to land in ownership and suppressing access to land through rental arrangements. Observation of relatively inactive land rental markets suggests that the policy focus on access to land needs to go beyond land reform and land ownership toward enhancing contractual forms of access to land that are less politically demanding than expropriative land reform, cheaper than land market-assisted land reform, and more progressive than the free operation of land sales markets.

To understand the determinants of access to land through the land rental market in a Latin American context, this paper uses new survey data for the Dominican Republic. Results from these surveys show that land rental markets can be progressive since those in the community with less land are more likely to rent in. Land rental markets can thus play an equalizing function between the distribution of land in ownership and the distribution of land in use. However, those who rent are not the poorest since they need working capital (especially machinery), some education, and social capital in the community. Land rental markets thus concentrate land among a middle class of endowed tenants.

Furthermore, the likelihood of renting in is increased by the security of property rights in the community and a lower incidence of conflicts over access to land. Moreover, insecurity of property rights constrains the equalizing potential of the land rental market as it induces positive assortative matching along land ownership group. Hence, in the absence of secure property rights, a segmented rental market results, clearly limiting access to land for the landless and the land-poor.

Preliminary conclusions to enhance the scope of land rental markets and make these markets more effective for efficiency gains and poverty reduction stress three elements. The first is the importance of strengthening property rights through both formal and informal mechanisms. In many cases, weakness of property rights affecting rental is due to lingering land reform legislation, that has in general fallen into disuse from its initial purpose of land redistribution in ownership, but that remains a threat in letting land to be used by tenants. Urgent is to revise this legislation which is creating a loss-loss situation: it no longer helps the poor access land in ownership, and it blocks them from accessing land in rental. In other cases, weakness of property rights is due to incomplete land titling programs, or to titling that has no legitimacy in the community because is was not done with local participation and approval (see for example Jansen and Roquas (1998) for Honduras). Secure property rights can also be grounded in the social capital of communities (see Katz (1999) for Guatemala), and this too can be modestly enhanced through outside interventions (Durston, 1999).

The second is the importance of enhancing reliable and low cost conflict resolution mechanisms. Our results show that the existence of conflicts over land in a community is a

major deterrent to rentals. Contracting cannot occur without anticipating the emergence of conflicts and the mechanisms through which they may be resolved. Without those, contracting will simply not occur.

Finally, if the land rental market is to serve as an effective instrument for poverty reduction, the performance of this market needs to be "assisted" on behalf of poor participants, in the same perspective as land market-assisted land reform for access to land in ownership. This would include helping poor candidates secure the threshold asset endowments needed to enter this market. It would also include the development of innovative institutional arrangements such as group rentals, rental with option to buy, and community supervision of rental transactions to both secure the rights of the landlord and enhance the bargaining position of the tenant.

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Table 1. Descriptive statistics for the two survey regions

	Constanza (La Vega)	San Francisco de Macoris (Duarte)
HOUSEHOLDS		
Total number of households	1092	1431
% landlord households	25	10
% tenant households	22	11
% autarkic households	11	22
% landless households	43	58
% land constrained households	46	60
LAND		
Total number of plots	667	658
% plots owner-operated	36	64
% plots rented out	64	36
of which % plots rented out to family	32	53
% plots rented out to non-family	68	47
% plots with written rental contract	1	21
% plots in land reform	5	45
% plots with title	72	23
% land owner-operated	48	61
% land rented out	52	39
of which % land rented out to family	33	47
% land rented out to non-family	67	53
% plots with written rental contract	1	25
% land in land reform	3	41
% land with title	77	26
COMMUNITIES		
Total number of communities	12	14
% communities with "fear" as main reason for non rental	0	64
% communities with few invasions/occupations	17	36
% communities with a lot of invasions/occupations	0	21
% communities with few ownership disputes	6	57
% communities with a lot of ownership disputes	0	7
% communities with few other conflicts	33	14
% communities with a lot of other conflicts	0	21

Table 2. Determinants of renting in land: weighted logit estimation

Variable name	Variable type°	Probability of renting in Coeff.	Robust z	Probability of renting in Coeff.	Robust z
Household asset endowment					
Amount of land owned per capita (ha)	h	-0.0077	-1.97 **	-0.1485	-2.18 **
No land owned	h^d	0.7639	4.48 ***	0.8039	4.73 ***
Education of the household head	h	1.1940	3.07 ***	1.2403	3.21 ***
Square education of the household head	h	-0.1795	-2.00 **	-0.1941	-2.17 **
Household members living in other countries	h	-0.1175	-0.69	-0.1185	-0.67
Own machinery if younger than 35	h^d	1.2433	4.13 ***	1.2114	3.95 ***
Member of a community organization	h^d	0.3621	2.73 ***	0.3390	2.56 ***
Secure property rights					
Number of parcels with title (actual or provisional)	v	0.0197	3.76 ***	0.0129	3.44 ***
Land conflicts					
Conflicts in the last 5 years	v	-0.1977	-2.81 ***	-0.1964	-2.84 ***
Well united community	v^d	-0.3305	-1.98 **	-0.3729	-2.20 **
Interaction united community*land owned	h	0.0034	2.40 **	0.0574	2.46 **
Circle of confidence					
Many family members in the community	h^d	0.6417	2.84 ***	0.5672	2.56 ***
Many family members*secure prop rights	h^d	-0.0054	-3.19 ***	-0.0049	-3.00 ***
Number of parcels owned by hh of same living standard	h	-		0.0180	2.17 **
Parcels of hh same living standard*secure prop rights	h	-		0.0000	-0.69
Number of parcels owned by hh from same ownership category	h	0.0056	0.51	-	
Parcels of hh same ownership category*secure prop rights	h	-0.0002	-2.67 ***	-	
Living less than 10 years in the community	h^d	-0.3677	-0.78	-0.3299	-0.74
Living less than 10 years*secure prop rights	h^d	0.0023	0.80	0.0018	0.65
Supply and demand control variables					
Age of the household head	v	-0.0016	-0.30	-0.0015	-0.29
Female headed household	h	-1.6431	-7.25 ***	-1.6141	-7.13 ***
Total number of parcels owned by community members	h	-0.0330	-3.19 ***	-0.0391	-5.39 ***
Total of non-agricultural employment	h	-0.0000	-0.44	0.0000	-0.84
Price of good land (peso/ha)	v	-0.0000	-0.02	0.0002	0.75
Distance to market (minutes)	v	0.0183	2.13 **	0.0229	2.83 ***
Fixed rent as most common contract	v	-0.1549	-0.78	-0.3443	-1.93 **
Number of land owners without machinery	v	0.0666	5.09 ***	0.0521	4.20 ***
San Francisco de Macoris	v^d	-1.1975	-3.83 ***	-1.0761	-3.57 ***
Intercept	v	-3.6251	-5.25 ***	-3.2083	-4.86 ***
Number of observations		1664		1664	
Wald chi^2		286.13		282.94	
Prob > chi^2		0.0000		0.0000	
Pseudo R^2		0.1867		0.1867	
% of correct predictions		77		76	

Prediction success table

		Actual 0	Actual 1
Predicted	0	1158	45
	1	345	116

		Actual 0	Actual 1
Predicted	0	1148	347
	1	55	114

°Variable type: h: household level variable; v: village level variable; d: dummy

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Determinants of matching in the tenancy market in SFM

Variable name	Variable type °	All potential tenants Without tenant fixed effects Cond. prob. match beween landlord-plot i and tenant j		Only actual tenants Without tenant fixed effects Cond. prob. match beween landlord-plot i and tenant j		Only actual tenants With tenant fixed effects Cond. prob. match beween landlord-plot i and tenant j	
		Coeff.	z	Coeff.	z	Coeff.	z
Absolute difference of productive assets							
number of adults	$\|Xj – Xi\|$	0.2946	2.71***	-0.1674	-1.07	0.0079	0.00
machinery ownership	$\|Xj – Xi\|^d$	0.8444	3.77***	-		-	
education household head	$\|Xj – Xi\|$	0.2575	1.63	0.0209	0.11	0.2312	0.73
Absolute difference group membership							
living standard group[a]	$\|Xj – Xi\|^d$	0.7599	0.97	-0.8408	-3.00***	-0.9535	-2.63***
living standard group*conflicts	$\|Xj – Xi\|^d * Ci$	-0.4022	-1.83*	-		-	
living standard group*title	$\|Xj – Xi\|^d * Pi^d$	-0.4920	-0.81	-		-	
land owned (1/16 ha)	$\|Xj - Xi\|$	-0.0520	-2.15**	-0.0374	-1.59	-0.0342	-0.92
land owned*conflicts	$\|Xj - Xi\| * Ci$	-0.0025	-0.67	-		-	
land owned*title	$\|Xj - Xi\| * Pi^d$	0.0632	2.72***	0.0752	2.50**	0.0999	2.19**
Number of observations		4918		767		767	
LR chi^2		35.22		15.74		27.39	
Prob > chi^2		0.0001		0.0076		1	
Pseudo R^2		0.0522		0.0438		0.0763	

°Variable type: Xj: tenant characteristic; Xi: landlord characteristic; Ci: Community characteristic; Pi: Plot characteristic; d: dummy
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4a. Determinants of matching in the tenancy market in Constanza (with all potential tenants)

Variable name	Variable type °	All potential tenants Without tenant fixed effects Cond. prob. match beween landlord-plot i and tenant j		Only actual tenants Without tenant fixed effects Cond. prob. match beween landlord-plot i and tenant j		Only actual tenants Without tenant fixed effects Cond. prob. match beween landlord-plot i and tenant j	
		Coeff.	z	Coeff.	z	Coeff.	z
Absolute difference of productive assets							
number of adults	$\|Xj – Xi\|$	-0.0916	-1.47	-0.0200	-0.28	0.0437	0.14
machinery ownership	$\|Xj – Xi\|^d$	0.5033	4.06***	0.1829	1.46	0.0626	0.41
education household head	$\|Xj – Xi\|$	0.2182	1.72*	0.1335	1	-0.1921	-1
Absolute difference group membership							
living standard group[a]	$\|Xj – Xi\|^d$	0.2852	0.59	-0.0937	-0.48	-0.0264	-0.11
living standard group*conflicts	$\|Xj – Xi\|^d * Ci$	-0.1798	-1.3	-		-	
living standard group*title	$\|Xj – Xi\|^d * Pi^d$	-0.2481	-0.48	-		-	
land owned (1/16 ha)	$\|Xj - Xi\|$	0.0002	0.04	0.0023	0.49	0.0016	0.32
land owned*conflicts	$\|Xj - Xi\| * Ci$	0.0003	0.23	-		-	
land owned*title	$\|Xj - Xi\| * Pi^d$	-0.0028	-0.64	-0.0032	-0.66	-0.0026	-0.49
Number of observations		18244		5857		5857	
LR chi^2		33.55		4.34		57.45	
Prob > chi^2		0.0001		0.6307		1	
Pseudo R^2		0.019		0.0035		0.0462	

°Variable type: Xj: tenant characteristic; Xi: landlord characteristic; Ci: Community characteristic; Pi: Plot characteristic; d: dummy
* Significant at 10%; ** significant at 5%; *** significant at 1%.