

# Untitled:

## A Study of Formal and Informal Property Rights in Urban Ecuador

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### *Abstract*

*In this paper we explore the substitutability of formal and informal property rights. We analyze new survey data from Ecuador, where households have both formal and informal claims to urban residential property. We develop a theory of the ability to sell or rent property in which a distinction is drawn between transferable property rights (e.g., title) and non-transferable claims (e.g., length of residence). The theory shows that the increase in price that follows the granting of title may be an overestimate of households' utility gain, which alters the interpretation of hedonic price regressions. We find that the unconditional effect of granting title is to raise properties' value by 23.5%. However, we also find that informal property rights can substitute effectively for formal property rights, so the marginal effect of titling on the ability to transact and on prices can vary widely among communities and among households within a community. Our findings suggest that titling programs should be targeted at young disorganized communities if they are to benefit the recipients..*

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## I. Introduction

Strong property rights occupy a prominent position in the list of prerequisites for market economies to function well. The strength of a country's property rights is typically associated with the formal institutions that maintain these rights, such as title registries and judicial systems. However, even in societies characterized by a high degree of formalization, ownership rights can be created and enforced by other means. These might include community information and ability to sanction, or the activity of private protection agents stepping in where state enforcement is weak, as is currently observed in many East European countries.<sup>1</sup> We find that the effect of formal property rights on economic behavior and welfare depends on the availability of informal sources of rights. This is neither surprising nor controversial. However, here we assess whether these interactions are empirically important. Finding that they are, we take them into account when estimating the value of formal rights to property owners.

The standard approach to quantifying the utility conferred by a particular property right is to compare the sale value of a property with that right to that of a similar property which does not have that right associated with it. We estimate such hedonic price equations to capture the aggregate effect of different sources of rights on welfare.<sup>2</sup> Typically, the estimation of hedonic price equations requires dealing with both unobservable quality characteristics and the endogenous nature of some types of rights. By using a purposefully designed survey we avoid both of these econometric problems by estimating 'within' household (and property) changes in price, using responses to questions about the value of property in hypothetical title states.

We also show with a simple model of property transactions that a change in property value due to a change in formal rights overstates the utility gain that would be implied by an equivalent increase in income. Market prices are a function of the utility conferred by ownership of a property, but also the confidence of buyers that a commitment to sell will be honored. If a selling household

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<sup>1</sup> There is a wide and varied literature on the role of social groups in upholding ownership rights and enforcing contracts, in contexts as diverse as kinship groups in Africa, 'claims clubs' among early U.S. squatters on federal land, to contemporary ranchers on the American plains (see, for example, Kanazawa, 1996, and Ellickson, 1991). Gambetta (1993) gives a fascinating account of the role of the Mafia as a private source of property rights in Sicily.

<sup>2</sup> Throughout the paper, changes in 'rights' refers specifically to changes in the *sources* of rights, although this may also have an effect on the bundle of rights (to use, exclude, transfer, alienate). 'Having title' refers to possession of a full set of ownership rights, recognized by the state and certified by a valid title deed.

has strong ownership claims, but ones that cannot be transferred to a buyer (because, for example, they derive from length of residence or family composition), buyers may be uncertain about being able to keep the property and therefore willing to pay less than they would in the absence of this uncertainty. Thus, a change in property rights affects prices not only because it changes the utility conferred by ownership, but also because it changes the uncertainty associated with a given transaction. This effect must also be considered when interpreting a price change as a measure of the welfare gain associated with formal property rights.

The model suggests that the key distinction among sources ownership claims is whether they are transferable or not. Stronger informal rights, to the extent that they are non-transferable, may make it more *difficult* to engage in property transactions. Because a household cannot convey these rights to a buyer, and further, cannot credibly commit to forsaking the use of these rights to reassert its ownership after a ‘sale’, potential buyers face greater contract uncertainty when transacting with households that have strong non-transferable rights. Importantly for our empirical analysis, the same feature has the converse effect in the rental market. There, having strong non-transferable rights improves a household’s ability to transact by lowering the likelihood that difficulties are encountered in trying to reclaim property from a renter after the period of the rental contract. We use the differential effect of non-transferable rights in sale and rental markets to provide evidence of transaction uncertainty impeding the operation of property markets. This, then, informs the interpretation of our hedonic price estimates.

While the points made above are general, our investigation centers on land ownership in low-income communities in Guayaquil, Ecuador. This setting is particularly interesting in two respects. There, as in many cities in the developing world, a significant part of the population lives on land that it does not formally own. Despite this, many of these untitled squatters consider themselves to be the ‘owners’ of the land that they occupy and, in fact, have frequently paid money to obtain this right. Often large numbers of people arrive overnight to squat on a piece of land in so-called ‘land invasions’, quickly building temporary shelters and relying on the weight of their numbers to help them avoid eviction. These invasions are frequently coordinated by ‘*dirigentes*’ or ‘organizers’ and it is to such a person that participants may make payments in order to acquire ‘ownership’ of a plot.<sup>3</sup> The overlay of community, organizer, and formally supported ownership rights in these communities allows us to consider the interaction of multiple

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<sup>3</sup> As noted below, organizers are typically involved in politics. Thus the requisite ‘payment’ may be partly or entirely political in nature. For example, a squatter may be expected to attend rallies in support of the organizer or his party.

sources of property rights.

There is also a policy rationale for focusing on this setting given that titling programs have been proposed and implemented recently as development projects. In 1992 the Municipality of Guayaquil itself launched a titling program to formalize the rights of untitled squatters. Are these programs a good idea? A complete analysis would need to consider the benefit to squatters, the costs to both recipients and the government, the effects of expropriation on current owners, and general equilibrium effects such as on land development and on the frequency of invasions. Our results provide empirical evidence regarding the first important component – the direct benefit to the recipients of having a formal title. The possible sources of these benefits are various. Having a title may increase tenure security, which has intrinsic value and also allows households to capture the benefit of durable investments in housing and community assets. By clarifying ownership rights and making those rights transferable, titling may lower transactions costs in the land market.<sup>4</sup> Even for households who never intend to sell, the ability to alienate property may be valuable in permitting the use of land as collateral for formal loans. Thus, granting title not only could increase the incentive of households to improve their properties and their communities, but also, by lowering the cost of credit, their ability to do so. In addition, when urban land is titled, utility providers are able to charge for services, and municipal governments can use property taxes to finance infrastructure investments.<sup>5</sup> The cost of such municipal services is often far lower than the cost of the alternatives available to poor households (World Bank, 1994).

In this paper we analyze newly collected survey data which include an array of quantitative information about household and community characteristics related to both formal and informal ownership rights to land. For households in these low-income communities, our

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<sup>4</sup> Observers of the African experience suggest that one cannot assume that the effects of a titling program need even be positive. There, with customary rights very well entrenched, granting formal title may have actually increased ownership and transactions uncertainty in situations where it became unclear which of the dually operating systems of rights would prevail.

<sup>5</sup> A well-known Peruvian advocate of property rights, Hernando de Soto, has suggested that banks and utility companies could be convinced to underwrite some of the costs of titling since they would benefit from expanded markets (*Economist*, December 9, 1995). In Lima, KARPA S.A., a construction company which sells housing supplies on credit to titled households in invaded areas, has donated material, computers and salaries to government agencies involved in the titling and registration of squatter communities in order to accelerate the process for would-be customers (Lastarria-Cornhiel and Barnes, 1995).

results suggest that having title generates a sizable increase in the expected market value of their properties - 23.5% of the value of their properties if they remained untitled on average. The increase in price is an upper bound on each household's utility gain. We also find that the benefit depends importantly on other features of the environment. For example, in recently settled communities without an organizer, where one would expect informal rights to be relatively weak, title is particularly important. (The expected market price of properties in communities only one year old and with no organizer increases as much as 51.6 percentage points if titled than those in communities with mean characteristics.) Further, we find that acquiring title has a significantly greater effect on the utility that more vulnerable households obtain from their property. This implies that there may be distributional benefits of titling programs. Together, the results suggest that a titling program should be targeted at communities with weak systems of informal rights, or at households with limited access to them, if it is to significantly improve recipients' welfare.

Previous empirical studies of the role of formal property rights have not focussed on the complex interaction between formal and informal systems of rights, lacking measures that capture the variety of sources of ownership claims.<sup>6</sup> A few studies have considered the related question of how *market* characteristics mediate the value of formal property rights, investigating whether formal rights are less useful when market access is costly, formal credit is limited, or there are imperfections in other input markets. This possibility is discussed, for example, in Feder, *et. al.* (1988), Migot-Adholla, Hazell, Blarel and Place (1991), and Carter, Wiebe and Blarel (1994), and formalized in Alston, Libecap and Schneider (1996) and Carter and Olinto (1996). In estimates of the effect of land rights on investment in Africa, Besley (1996) includes, in addition to formal title, both household and plot characteristics that might affect the degree of informal control over property. However, he does not allow for interactions between formal and informal sources of rights. All of these studies have focused exclusively on rural areas.

Jimenez (1984) and Friedman, Jimenez and Mayo (1988) estimate hedonic price regressions for urban areas of the Philippines. In an acknowledgment of the fact that the value of title may vary with the strength of informal rights, they interact title with the age of the dwelling to allow for the fact that older units might be 'de facto' secure from eviction. Their results, like

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<sup>6</sup> Some studies have considered variation in types of *formal* rights. For example, in Thailand, the government granted formal titles and also certificates granting formal tenure security but not the right to alienate property (Feder, Onchan, Chalamwong and Hongladarom, 1988; see also Hoy and Jimenez, 1997). Anderson and Lueck (1992) analyze the productivity effects of different land tenures on U.S. Indian reservations.

ours, support this contention. They do not, however, go any further to explore other features of communities that might affect property rights. As here, they also find that household characteristics affect the price premium associated with title, but their rationale for this finding is quite different from ours. Using a model of location choice, they show that household characteristics may be correlated with unobservable *exogenous* variation in community-level risk of eviction. By contrast, in our model, a change in household characteristics alters informal rights and therefore *changes* the risk of eviction. That is, rather than richer households choosing areas where title is less important, title is less important by virtue of the fact that they are rich households and therefore can assert their rights without having title. It is not possible to distinguish between these two interpretations of the effect of household characteristics on value with only on the results of hedonic price regressions. For this, the more detailed look at households' abilities to transact in different markets presented here is important in showing that household characteristics may, in fact, be determinants of informal rights and thus the risk associated with property ownership.

The following section describes important features of our particular setting. In Section III we develop a general model of property transactions. We use the model to investigate the theoretical links between sources of ownership claims in their effect on the ability to transact and on the market value of property. In Section IV we discuss the relationship between variables in the data and types of ownership claims. Because, to our knowledge, this is the first survey of this sort, much of the analysis has been exploratory in nature: there is little known about how to go about quantifying the strength of different sources of informal rights and certainly no pre-existing sets of well-established proxy variables. In Sections V to VII we investigate empirically how formal and informal rights contribute to tenure security; to a household's ability to sell and rent its property; and to the market value of property. The focus is on the effect of title, and on the interaction of title and other mechanisms for enforcing property rights. Section VIII concludes with a discussion of the welfare and policy implications of the survey results.

## **II. The Setting**

The data derive from household and community surveys specifically designed to address the property rights issues described above. One section of the household survey is devoted to questions regarding tenure security, the ability to make property transactions, and property

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values; another section gathers detailed information about characteristics of properties and communities; other sections concern households' investments in their own properties and in their communities; and a final section asks for detailed information on credit and associated collateral requirements. In addition to these purposefully designed sections, others adapted from the 1995 Ecuadorian LSMS (*Encuesta de Condiciones de Vida*, ECV) provide information on household demographics, wage and home business income, household consumption and assets. Each household sampled was asked to designate a person in the community whom they viewed as particularly knowledgeable about the community and, on the basis of this information, a short questionnaire was also administered to a community representative. This community survey gathered information about the origins of each community and further details about current community characteristics.<sup>7</sup>

Twenty communities were chosen as a stratified random sample from 43 low- and middle-income communities in the city of Guayaquil. The monthly per-capita consumption in the population of the city as a whole was \$143 in 1995 compared to \$75 among our sampled households for 1996 (figures in 1996 U.S. dollars, population statistic based on ECV, 1995). The sample was stratified with respect to both community age and the percentage of community properties with formal title in order to ensure that it would encompass areas with property rights taking a variety of forms.<sup>8</sup> Within each community, twenty households were selected at random to receive the household survey. If a chosen household turned out to be renting, an attempt was made to interview the property owner (usually unsuccessfully). The survey was fielded in July-August of 1996. In all, information was obtained for 400 households comprising 1,921 individuals.

Table 1 presents a breakdown of the sampled households by type and by title status. Only 22 of the households surveyed purchased their properties, with title, at the time that they first occupied the land ('purchasers'). Far more commonly, lower-income households began their occupancy, whether on public or private land, as squatters without title (92 percent in our

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<sup>7</sup> The communities are large: the median size is 2,750 households. Interestingly, the question of what constitutes a 'community' and thus how to define boundaries did not appear problematic to anyone we spoke to in Ecuador. Most of the communities have names and are recognized by those names.

<sup>8</sup> We thank Ab. Jose Javier Varas Calvo and the M.I. Municipalidad de Guayaquil for providing this information on age and title status for the population of low- and middle-income communities in the city and Peter Lanjouw, World Bank, for providing the population income figure.

sample). Over time many proceeded to obtain title.<sup>9</sup> It is important to note that our designation of a squatter household as ‘owning’ a property does not imply that it holds title—it simply reflects the respondents’ claim to be the owner. Similarly, our designation of a household as a squatter household does not imply that its property is currently untitled.

The role of title in enhancing ownership claims is suggested by the fact that the occupancy of a property by someone other than the owner is nearly twice as likely among titled properties as among untitled properties. If the physical presence of the owner is an important alternative to title in ensuring ownership rights, then this is precisely what one would expect. Further, only 24 percent of the non-owners who pay rent occupy untitled properties; while 37.5 percent of those who do not pay rent, who are likely to be relatives or friends of the owner, occupy untitled properties.<sup>10</sup> Although this difference is not statistically significant, it does suggest that not only are property owners without title reluctant to be absent from their properties, if they are to be absent, they would prefer to ‘lend’ their properties to relatives and friends rather than to rent them to strangers.

In Table 1 we see that most untitled owners were in the process of trying to obtain title at the time of the survey (since no minimum action was specified, ‘trying’ need not entail very active efforts). All but two gave improved tenure security as the primary or secondary reason for their efforts.<sup>11</sup> Only three households mentioned trying to obtain title for the purpose of selling their properties. This is consistent with the long expected residence reported by the sampled households (see below, Table 3). Interestingly, two of the households not seeking title stated that the reason was a problem with multiple claimants (family), and another two expressed concerns about the response of the organizer.<sup>12</sup> The latter indicates that rights associated with having a

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<sup>9</sup> In our empirical work we do not distinguish between titled properties which are registered and those which are not, a distinction which has been found significant elsewhere. Among our sampled households with title, only a few have failed to register their property titles.

<sup>10</sup> The fact that those not paying rent tend to be more informed about whether the household has a title or not supports the idea that they have a closer relationship with the owner.

<sup>11</sup> This was an open question, to which the most common responses were: to increase security; prolonging stay on property; to avoid being forcibly removed; so land not taken by the municipality.

<sup>12</sup> One of the main difficulties encountered by the municipality in its efforts to title is the fact that it is not in the political interest of the ‘leaders’ to allow *their* squatters to obtain title (interview Ab. Jose Javier Varas Calvo, emphasis ours).

community boss may sometimes be non-transferable. Since some owners with disputed claims or potentially displeased bosses have no doubt gone ahead with trying to get title, these numbers are likely to understate the prevalence of such situations.

Table 2 presents descriptive statistics for each of the twenty communities. The first column indicates the number of years since each community was first settled (*age*). The oldest was settled in 1944, the youngest in 1992. This is followed by four columns which describe features of its original settlement: whether the land was invaded; and if so, whether an outside organizer was involved; whether there was resistance to the invasion and whether it occurred on privately owned land. Sixteen of our communities started as invasions and about one-half had an organizer. In eight of the nine organized invasions, the organizer is described as being involved in politics. About half of the invasions were met with resistance and about half were on private property. However, there is surprisingly little relationship between these features: some private owners did not resist the invasion of their land; the city sometimes did; and organizers seem to have been equally active in invasions of private and public properties.

We asked each squatter household whether, when they obtained their property, they made any payments to a community leader that were not for the property itself. If the household responded positively, then they are designated as having a *paid boss*. With only a few exceptions these were one-time payments. The column headed *percent paid boss* then indicates the percentage of the sampled squatter households that paid a boss within each community.<sup>13</sup> This measure of the presence of a community authority differs from the dummy variable for an organizer in column three in several ways, and one can see in the table that they are not very closely related. The first is that community organizers are not necessarily paid. The second difference concerns timing. The community organizer variable takes on a value of one if an outsider operated as an organizer in the formation of the community. The household variable, on the other hand, refers to payments made at the time that the household arrived, which is often well after the establishment of the community. An authority or ‘boss’ might develop in a community that was not originally formed as an organized invasion. Finally, *percent paid boss* may indicate the extent rather than simply the presence of an organizer’s influence.

Column seven shows the percentage of sample households occupying titled properties in each community. The untitled properties in the first four communities, those not settled by an invasion, are encroachments by smaller numbers of squatters on fringe areas of formal

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<sup>13</sup> In the case of community one this percentage is zero because there are no squatters. For the remaining communities with zero, none of the existing squatters made payments.

neighborhoods, such as steep slopes or the edges of roads or parks.

Table 3 presents further characteristics of communities, as well as properties and households, broken down by type of household. Households on untitled properties have heads who are less educated and far less well off than other property owners. This is true in terms of per-capita expenditure, and even more dramatically in terms of household non-property assets (durables and financial assets but excluding the residence). Squatters on untitled property average \$910 in assets, whereas those on titled properties have average assets valued at \$2,020, and purchasers have average assets of \$6,810. Most of the sample households have been occupying the same property for many years and intend to stay almost indefinitely into the future, regardless of whether the property is currently titled or not. The last line of the table indicates that about 90% of the sampled households have adult male members, a characteristic that is shown to be important in the empirical results that follow.

### **III. A Model of Property Transactions**

In this section we develop a model of property transactions in order to examine systematically the interaction of formal and informal sources of rights, as well as to motivate the econometric specification of the estimations which follow. We first model the utility that households derive from property and then the uncertainty involved in property transfers, both as functions of the strength, and source, of ownership claims. Then, using the model, we determine the probability that a given household would be able to sell to a random potential buyer and investigate how this probability changes with changes in property rights. We then discuss how the results would differ for a rental market. Next we consider how introducing in formal property rights might change the price at which transactions occur. Most of the calculations have been relegated to a technical appendix.

#### ***The Model***

Suppose there is a single period and let  $U_h$  be the utility that household  $h$  would expect to derive from owning a given property.  $U_h$  is defined in monetary units and is assumed to be separable from income and other goods.<sup>14</sup> The level of expected utility depends upon the

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<sup>14</sup> This will let us equate utility changes and income changes, which is convenient for exposition. The results are not reliant upon this special form of the utility function, however.

qualities,  $Q$ , of the individual property, and, in our case, of the community in which it is situated. Greater ownership security would also increase utility: it lowers the likelihood that the household will be faced with a boundary dispute or eviction; it widens the potential sale and rental market; and it may improve the household's ability to use the property as a collateral asset. Let  $S_h$  be the probability that household  $h$  would be able to maintain ownership claims against the government, neighbors, and family.

Security of ownership,  $S_h$ , depends, in turn, on a number of factors. One is the clarity of the boundaries of the property. It is more difficult to assert ownership claims when there is a lack of agreement about what constitutes 'the property'. Security of ownership also depends on the extent to which a household can, at a given cost, successfully claim to be the owner of the property when confronted with others who would like to make the same claim. In our specific context this might be a function of household characteristics, the support a household receives from an organizer and its formal rights to the property.<sup>15</sup> Although all sources of the ownership claims of household  $h$ ,  $C_h$ , contribute to security, they differ in an important sense. Some of them are transferable and others are not. These are denoted  $C_h^T$  and  $C_h^N$ , respectively. In our context, for example, if one of our households is able to assert its authority because it is headed by a wealthy, well-educated male, or because it has been resident on the same property for many years, its security of ownership may be strong. It would not, however, be able to convey these ownership advantages to a buyer. Further, not only would the household not be able to give these advantages to a buyer, it also could not commit to forsaking the use of its own advantages to reassert its rights over the property after a 'sale'. Buyers of untitled property might be particularly concerned about the seller reasserting a claim if a titling program is actively underway in the community, since the previous occupants' claims might be given official status, and quickly. At the other extreme lie claims derived from having a formal property title, which are relatively easy to transfer credibly.

We model the expected level of security as a function of the strength of both types of ownership claims,

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<sup>15</sup> Formal and informal sources of claims contribute to security only if they are cost effective. For example, if courts are slow or costly then a titled household may not make use of formal enforcement in a dispute even if it is eligible. Even in our formally settled and titled communities 15% of respondents named the mediation of a community leader as the primary mode of dispute resolution. Of course, even if the cost of formal enforcement is prohibitive a title deed may contribute to *informal* rights if makes community recognition more likely.

$$S_h = S(C_h^N, C^T), \quad (1)$$

and expected utility as:

$$U_h = U(S_h(C_h^N, C^T), \varepsilon_h; Q) = v(C_h^N, C^T; Q) \varepsilon_h, \text{ where} \quad (2)$$

$\varepsilon_h$  captures any unobservable factors which contribute to the utility that household  $h$  would derive from the property, and is assumed to have a proportionate effect.

$$\text{Assumptions Set 1:} \quad \frac{\partial \ln v}{\partial C^T} \text{ and } \frac{\partial \ln v}{\partial C_h^N} > 0 \quad \text{and} \quad \frac{\partial^2 \ln v}{\partial C^T \partial C_h^N} < 0.$$

The negative cross-partial expresses the substitutability of transferable and non-transferable claims in enhancing security of tenure, and therefore the utility derived from property. To simplify notation in the following discussion we suppress  $Q$ .

The ability of a household to sell its property, and the price that it will be offered by another household and will find acceptable, depend on each party's valuation of what is being offered. If property rights were perfect, this would depend only on attributes of the property - location, size, amenities, and so on. With imperfect property rights, there are two additional factors. First, as discussed above, there is the probability that a household can maintain ownership against claims made by the government, neighbors, and family,  $S_h$ . Second, and more central to our work, is the probability that the purchasing household is able to maintain ownership if the selling household tries to take back the property after a 'sale'. Denote this probability by  $\theta$ . The probability that a household purchasing a property will be able to maintain ownership against possible competing claims coming from both the seller, and the government or others in the community, is then  $\theta S_h$ .

In the following discussion of  $\theta$  we assume that full payment is made by a buyer at the time of sale to focus attention on the buyer's uncertainty about whether the seller will be successful in his attempt to reclaim the property after the transaction. Success is determined by the claims that each party can bring to bear on the property, both transferable and non-transferable. It also depends on unobservable factors that affect the seller's ability to reclaim property.

Let  $R_S$  be an indicator, uniformly distributed between zero and one, of a selling household's (unobservable) reliability in making transactions.<sup>16</sup> Define  $\theta_{SB}$  as the probability that a transfer of property between seller  $S$  and buyer  $B$  will be honored. Let  $\underline{\theta}_{SB}$  be the lowest level that  $\theta_{SB}$  can take on, given the observed characteristics of the buyer and seller. That is,  $\theta_{SB} = \underline{\theta}_{SB}$  when  $R_S = 0$ .  $\theta_{SB}$  is modeled as follows:

$$\theta_{SB} = R_S(1 - \underline{\theta}_{SB}) + \underline{\theta}_{SB} \quad (3)$$

Thus  $\theta \in [\underline{\theta}, 1]$  and is uniformly distributed over the interval. (Subscripts have been suppressed for convenience.) The distance between  $\underline{\theta}$  and 1 indicates the extent of the buyer's uncertainty about the ability of the seller to reclaim a transferred property.  $\underline{\theta}$  is a function of the observable ownership claims of both parties:

$$\underline{\theta} = \underline{\theta}(C_S^N, C_B^N, C^T), \text{ with } \underline{\theta} \in [0, 1].$$

$$\text{Assumptions Set 2: } \quad \frac{\partial \underline{\theta}}{\partial C^T} > 0, \quad \frac{\partial \underline{\theta}}{\partial C_S^N} < 0 \quad \text{and} \quad \frac{\partial^2 \underline{\theta}}{\partial C^T \partial C_S^N} > 0.$$

Thus, in our setting, if the presence of an organizer gives the seller less scope to renege on a deal, then the organizer's presence implies a higher value for  $\underline{\theta}$ . When  $\underline{\theta} = 1$ , a property transaction will be honored with certainty.

At the beginning of the period, a property-owning household may incur search costs to find a potential buyer. If it does so, a transaction is deemed to be possible if and only if the minimum price that the household would accept from the buyer,  $\underline{P}$ , is less than the maximum price that the buyer would be willing to offer,  $\bar{P}$ . We now define these bounds.

A property-owning household will be willing to sell its property if and only if the price paid,  $P$ , plus the household's expected utility from reclaiming the property,  $(1-\theta)U_S$ , is at least as

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<sup>16</sup> There might be a similar unobservable factor affecting the buyer's ability to hold on to a purchased property. We assume that unobservable variation across buyers is relatively small and treat it as zero for simplicity. This seems appropriate here, as sellers are far more likely to have hidden information about the history of the property and the community relevant to determining ownership claims.

high as the utility it receives from retaining the property:

$$(1 - \theta)U_S + P \geq U_S. \quad (4)$$

It follows that the minimum sale price which would be acceptable to the seller is  $\underline{P} = \theta U_S$ . It is important to notice here that the reason that the seller will accept a price less than  $U_S$  is that, in expectation, what he is selling is, in effect, less than the whole property.

A (risk neutral) household that is considering buying the property will only make the purchase if the utility it derives from the property,  $U_B$ , times its expectation of being able to keep it,  $E[\theta]$ , is greater than the price. Thus, the potential buyer will purchase the property if and only if:

$$E[\theta]U_B - P \geq 0. \quad (5)$$

This defines the maximum price that a potential buyer would be willing to pay as  $\bar{P} = E[\theta]U_B$ .

We consider two types of potential buyers. The first type, which we shall call friends and family (F), are households who know the unobservable reliability,  $R_S$ , of the seller and consequently  $\theta$ . The second type of potential buyers are outsiders who do not know the unobservable reliability of the seller household and thus do not know  $\theta$ . These buyers must form an expectation of  $\theta$  based on the observable characteristics of the seller (see the Appendix for a derivation of this expectation).

Given our assumption that a sale is possible whenever  $\underline{P} \leq \bar{P}$ , we can write the condition for a transaction to occur between a seller and a potential buyer as the following condition on the size of  $U_B$  relative to  $U_S$ :

$$U_B \geq \gamma^i U_S, \quad i = F, O. \quad (6)$$

where the superscripts  $F$  and  $O$  represent friends and outside buyers, respectively.  $\gamma^F = 1$  and  $\gamma^O(R_S, \underline{\theta}) \geq 1$ . (See Appendix equation A.3 for the formula for  $\gamma^O$ .)  $\gamma$  indexes the inefficiency of property transactions due to imperfect information. When the buyer is a friend or family, an exchange will occur whenever  $U_B \geq U_S$ , that is, wherever it is efficient.<sup>17</sup> This condition

highlights the fact that, in transactions between informed parties, *uncertainty about the reliability of the transaction does not enter the determination of whether it will occur*. Any uncertainty can be accommodated, to the buyer's and seller's mutual satisfaction, by adjusting the price. The size of  $\gamma^p$  is decreasing in the amount of certainty and, as  $\underline{\theta} \rightarrow 1$ ,  $\gamma^p \rightarrow \gamma^f$ . This result highlights one of the advantages of being able to commit credibly to transactions: selling to strangers becomes as easy as selling to friends and family, which increases the population of buyers available to a household.

### ***The Ability to Transact***

We can now write the probability  $q$  that a household with reliability  $R_S$  and ownership claims  $C^T$  and  $C_S^N$  will be able to transact with a randomly arriving potential buyer having characteristics  $C_B^N$ . For expositional simplicity in the derivation of  $\gamma^p$ , we assume in the Appendix that  $\varepsilon_S = 1$ , all  $S$ . Maintaining this assumption, inserting the definition of expected utility in (2) into condition (6), and taking logs of both sides:

$$q = 1 - F[\ln v(C_S^N, C^T) - \ln v(C_B^N, C^T) + \ln \gamma^j], \quad (7)$$

where  $F[\cdot]$  is the cumulative density function of  $\ln \varepsilon_B$ . The probability of being able to transact is decreasing in the utility that the seller obtains from owning the property and in the index of transactions uncertainty,  $\gamma$ . It is increasing in the observable utility,  $v$ , that would be obtained by the buyer if he were to own the property.

In the Appendix we derive the comparative statics of changes in property rights on the transaction probability  $q$ . We do this for both purchases and rentals. Whereas the concern in the purchase market is over the buyer's ability to retain the property, the corresponding concern in the rental market is over the owner's ability to reclaim the property at the end of the rental period.

The effects of changes in property rights can be summarized as follows: An increase in

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<sup>17</sup> Transactions costs would increase the minimum distance between  $U_S$  and  $U_B$  required for a sale, adding to  $\gamma$  such that  $\gamma^j > 1$ , all  $i$ . Not all efficient trades would occur even among friends and family. One might expect transactions costs to be higher with less secure rights, as more effort would have to be put into information gathering in advance of a sale, and in resolving disputes afterwards (see Johnson, 1972). If so, our results would be strengthened by the inclusion of transactions costs in the analysis.

the property rights of the seller, if the source is stronger *non-transferable claims*,  $C_S^N$ , has a negative effect on the probability of being able to sell a property, particularly to outsiders. This counter-intuitive result is due to the combined effect of  $C_S^N$  on the seller's own valuation of the property and his ability to reclaim the property. Stronger seller rights enhance the transfer uncertainty faced by the buyer. By the definition of non-transferable rights,  $C_S^N$  will not have corresponding impacts on the buyer's utility, or ability to retain the property. The key difference with a rental market is that, in a rental market, stronger seller rights improve the chance the contract between the parties is honored, reducing transfer uncertainty. Thus, while an increase in  $C_S^N$  has a negative effect on the ability to rent when the recipients are friends and family, the effect is ambiguous when renting to outsiders. If transfer uncertainty is a significant feature of the environment, stronger non-transferable rights may even have a positive effect on the ability to rent to outsiders. (See Appendix Table A.1, row 1)

When a household has strong non-transferable rights, an increase in *transferable claims*,  $C^T$ , always makes it easier to transact, in either the sale or rental market. Although for weak  $C^N$  households the effect of an increase in  $C^T$  is theoretically ambiguous, it will be positive if transfer uncertainty is important - particularly increasing the ability of such households to transact in the rental market.

### ***Transaction Prices***

We use the same model to explore the effects of formal and informal ownership claims on expected transactions prices. In this analysis we look at the changes in two prices for any given transaction -  $\bar{P}$ , the highest price that the buyer would have to pay and  $\underline{P}$ , the lowest price that the seller would accept. We are agnostic about where in the interval  $P \in [\underline{P}, \bar{P}]$  the transaction price will lie.

In the Appendix we show that  $\underline{P}$  will unambiguously increase with  $C^T$ , since both  $U_S$  and  $\underline{\theta}$ , and thus  $\theta$ , increase with more formal property rights. When we consider  $\bar{P}$ , we also find an unambiguous increase with  $C^T$ , but only when the buyer is an  $F$ . For an outside buyer, an ambiguity is introduced because an increase in  $C^T$  may worsen the asymmetric information problem. (As the utility derived from property increases with  $C^T$ , increasingly less reliable sellers remain in the market at any price.)

As was true with the ability to transact, the magnitude of the effect of formal rights on

price depends on the seller's non-transferable ownership claims.<sup>18</sup> For the lower-bound price, authoritative households will see a greater price increase with formal rights if transfer uncertainty dominates, and less authoritative households will see a greater price increase with formal rights if security concerns dominate. For the upper-bound price, authoritative households get a relatively greater increase from formal rights when buyers are friends or family members and, it appears, will often also benefit more when they face outside buyers.

### *Model Extensions*

To check the robustness of our comparative static results, we examine two extensions to the model: to multiple periods, giving the seller the choice to search for a more attractive buyer, and to multiple properties, making the seller worry about his reputation for reliability. In a multi-period model, the expected value of property ownership to household  $h$  (either buyer or seller) is no longer just  $U_h$ , but has two components. The first is the discounted stream of utility that the household would enjoy were it to maintain ownership over the future periods. This enters the model just as the one-period  $U_h$  and if it were the only consideration the extension to multiple periods would clearly leave the comparative static results unchanged. However, there is a second benefit - having the option to make a future sale to a more attractive buyer. Strong transferable claims increases this option value, just as it does the utility from usage, so in this case the second component merely reinforces the first. On the other hand, while claims that are strong but are not transferable raise the utility from usage, the transactions uncertainty they engender lessens a household's ability to benefit from a potential future sale. However, as long as first effect dominates the second, which is likely given discounting and search costs, the comparative static results in a model extended to multiple periods would be the same as in the one period model presented here.

In the second extension we assume that each household has a second property (or durable good) which it may wish to sell. We assume that friends and family members are perfectly informed of sellers' actions and that, if a household tries to take a property back from a buyer after a sale, it is punished by being blocked from engaging in further property transactions with friends and family. With transactions in the market for the original property having implications for the sale of other goods, not all households will find it optimal to *try* to take back property after it has been sold. Different types of ownership claims affect the likelihood that an

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<sup>18</sup> We do not analyze the direct effect of changed in non-transferable claims as it is of less policy interest and is not estimated empirically.

attempt to reclaim will be made. Changes which lower the likelihood of success (increasing  $\theta$ ) tend to lower the probability that a household will try. Specifically, when considering the effects of non-transferable claims,  $C_S^N$ , introducing reputational concerns unambiguously reinforces the conclusions made in the single property model, both regarding the direct effects of  $C_S^N$  and their interactions with transferable rights. When considering the effects of transferable claims,  $C^T$ , it is not possible to say whether the single property model results will be enhanced or offset without further restrictions, but they are likely to be enhanced in the empirically relevant case. (See Lanjouw and Levy, 1999, for details.)

#### **IV. Measures of Property Rights**

The data include a multitude of variables that reflect both different sources of property rights and variation in the strength of rights across households. Because we want to explore how the same features affect a number of different outcomes we focus attention on the limited set of variables listed below. Experimentation has shown that these tend to have explanatory power, and together they capture three distinct sources of property rights: individual household authority and claims, the definition and enforcement activities of a community boss, and the formal system backed by government authority.

The first set listed are household characteristics that may contribute to a household's authority or claims. They may also indicate that the household has greater access to other mechanisms of property rights enforcement (via better information, media attention, contacts, bribes). For example, having been resident for a long period may enable a household to call upon the informal or formal system. All of these variables are indicators of stronger but non-transferable ownership claims,  $C_S^N$ .

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| <b>Characteristics that Influence the Strength of Property Rights</b> |  |                                     |
|---|--|-------------------------------------|
| <b>Set I - (<math>C^N_S</math>)</b>                                   | <b>Set II - (<math>C^N_S / C^T</math>)</b>   | <b>Set III - (<math>C^T</math>)</b> |
| <b><u>Household Authority and Potential Claims</u></b>                | <b><u>Informal Community Enforcement</u></b> | <b><u>Formal System</u></b>         |
| Income  | A community organizer                        | Title                               |
| Assets  | Percentage paid boss                         | Resolution of disputes by           |
| Education   | Paid boss                                    | courts, judges, or                  |
| Adult males   | Age of the community                         | the municipality                    |
| Years of residence  |  |                                     |
| Not paying a boss in area where many others have                      | Having an ownership document (?)             | Having an ownership document (?)    |

The second set are characteristics which indicate the presence of an informal source of property rights beyond the household itself, while the third set indicate that formal property rights operate.<sup>19</sup> Having an ownership document could be either, depending on the type of document. (Almost three-quarters of the owners of untitled properties in our sample do have some form of ownership document.) We expect the two variables *community age* and *whether disputes in a community are settled by formal means* to indicate the extent to which property boundaries in the neighborhood are undisputed, in addition, perhaps, to indicating the extent to which any specific household has claims to a particular piece of property. Rights stemming from the presence of a community authority may be transferable or not, depending on the attitude of the boss to the transfer, while all variables representing the formal system will also contribute to transferable ownership claims,  $C^T$ .

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<sup>19</sup> This distinction may be blurred. On the one hand, a formal title deed may enhance community recognition of ownership. On the other, community-based rights may form the basis of formal rights. For example, Libecap (1989) recounts how, in the second half of the 1800s, mining camps in the U.S. formed local, informal, rules for the protection of squatters' rights to mineral claims. These were later recognized in the federal Mining Laws of 1866 and 1872 which assigned private rights to these lands. A recently initiated program in Peru to formalize untitled squatters in Lima (the Registro Predial) accepts a declaration by a community leader or six neighbors as proof of ownership. The municipality of Guayaquil is currently moving in this direction in an effort to simplify the titling process (Blake Rawdin, personal communication).

## V. Security

In this section we investigate how different household and community characteristics contribute to a household's feeling of tenure security (Equation 1). The fact that virtually all households seeking title report doing so in the interest of increasing their security suggests that having a formal title effectively diminishes the threat of eviction. However, we find that even untitled owners are not particularly worried about eviction by the government, at least in the short run. Each untitled household was asked what it viewed as the likelihood that it would be given an eviction notice in the coming year. The breakdown of responses is presented in Panel A of Table 4. Among all untitled squatters, only 22.5 percent allowed for any chance of eviction.<sup>20</sup> These subjective assessments of the risk of eviction are consistent with the recent past in Guayaquil, with no evictions under the municipal administration at the time of the survey.

Although the threat of eviction is thought by all households to be low, the probit results presented in Panel B indicate that there are some significant differences across households in their willingness to assert that eviction is 'impossible'. In this probit the dependent variable takes a value of one if eviction was said by a household to be impossible and zero otherwise. Two of the household authority and claims variables are positive and significant (*years of residence* and *assets*). The former has a substantial effect: a one standard deviation increase in years of residency (6.7) increases the probability by about seven percentage points. It should be noted that the positive effect of long years of residence could have two interpretations in this case. The length of physical possession could increase rights because of community recognition, as suggested above. However, it could also be the result of a selection process. If households have differing, and exogenous, probabilities of eviction in any year then one would expect that those remaining after

many years would tend to be the ones with the low eviction probabilities. Thus, years of residence could indicate an increase in a household's rights due to the passage of time, or signal the presence of some other feature that enhances the security of that household.

While we expect that having *adult males* is advantageous to a household in community interactions, it appears to lower a household's confidence that it will not be evicted by the

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<sup>20</sup> Which raises the question of why these same untitled owners say that their main interest in obtaining a title is to increase their security. It may be that they are less confident of their longer term safety from the government or from losing their properties through informal pressure. Low income households may also be very risk averse, making even a low probability of eviction

government. This may be because it causes less of a public outcry if such households are made homeless (and why women and children have an important role in the early stages of an invasion).

The presence of an informal source of property rights enforcement, in the form of a boss who is being paid by many residents, has a very large and positive effect on tenure security. A one standard deviation increase in *percent paid boss* increases the probability that a household will consider eviction impossible by 17 percentage points. Organizers appear able to protect squatter communities from government threats (which may have something to do with their political involvement). We see here, however, the ambiguous nature of the variable *paid boss*. On the one hand, the fact that a household paid a community boss to obtain its property increases the likelihood that it will benefit from being under his protective wing. Hence the appearance of *paid boss* in Set II, the measures of informal rights, listed above in Section IV. On the other hand, finding that a household paid a boss for the right to occupy a property in a neighborhood in which others did *not* might suggest that it is in some way a weak household (both because weak households are more likely to be obliged to pay, and because they may have more of an interest in remaining in the protective good graces of the boss). Thus *paid boss* also enters Set I, the measures of household authority, but negatively.<sup>21</sup> The estimate here suggests that, controlling for the percentage of squatters in the same community having paid a boss, the fact that a household itself did so means that it is less likely to feel secure--the second interpretation of *paid boss*.

The effect of having an *ownership document* on security is marked, increasing the probability that eviction is considered impossible by 19 percentage points. Like years of residence, an *ownership document* may either confer greater security or be a proxy for some unobservable characteristic.<sup>22</sup> Finally, squatter households feel significantly more at risk in

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costly in utility terms (a point formalized in Feder, *et. al.*, 1988).

<sup>21</sup> Conditional on the percentage who paid a boss, having paid a boss indicates being one of the earlier squatters (*paid boss* is negatively related to the number of years between the establishment of the community and the arrival of the property owner.) Thus, another possible interpretation of the relationship between these two variables is that being late is better for security, for example because only secure properties are purchased by subsequent arrivals to a community. However, an alternative dummy variable, for whether the household is the original squatter, which captures this more directly is not significant in this analysis so the interpretation given appears appropriate.

<sup>22</sup> The first seems likely if the document comes from the government. It may not: in some periods in Guayaquil, squatters used certificates issued by the electricity company as ownership

communities close to the center of the city, where land is more valuable and densely populated. They also feel more vulnerable when the invasion occurred on private land.<sup>23</sup>

## VI. The Ability to Contract

One of the advantages of formalizing property rights highlighted in Section III is that it may facilitate land transactions--both sales and rental--by clarifying the boundaries of property, validating who has ownership rights, and making those rights transferable with the signing over of a title deed. To investigate this aspect of property rights, we asked each property owner several sets of nested questions regarding his ability to sell the property or rent the entire house. For example, in one set of nested questions we asked whether the household would be able to sell its property to someone outside of the community; if no, whether they would be able to sell to someone inside of the community; and if no, whether they would be able to sell to a relative or friend. These yes/no answers correspond to the probability  $q$  of equation (7). The higher is the probability  $q$  that, for example, a randomly arriving outside buyer would offer a price acceptable to a household, the more likely is that household to respond 'yes' when asked whether he would be 'able' to sell to an outsider. Assuming that a household's friends have characteristics similar to that of potential outside buyers, being able to sell to an outsider implies being able to sell to a friend.<sup>24</sup> Thus, a positive response finished the questioning. On only a few occasions did a household distinguish between being able to transact with strangers inside versus outside the community. Thus, in the analysis we reclassify the responses as either being able to transact with an outsider; family or

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documents (Caroline Moser, World Bank, personal communication.)

<sup>23</sup> The last may seem entirely obvious but it is not. Private owners who want to avoid fulfilling high quality zoning laws when developing residential property (for example, a requirement to supply sewage connections to each home or to maintain a minimum lot size) have staged invasions in return for payments from the invaders for the substandard lots. We find that lot sizes in invaded communities are considerably smaller than those in communities formed otherwise.

<sup>24</sup> They may not be the same. A household may have a limited number of friends and relatives and know that this group would not gain much utility from owning its property. Such a household might feel able to sell to an outsider but not to its circle of friends. On the other hand, it may be that a household's friends would value its property more highly than a group of outsiders. Then the household would be able to sell to a friend but not an outsider, not just because of lower transactions uncertainty but because of the more favorable distribution of utility in that group of buyers. For this reason, we do not draw inferences from responses to the nested questions directly, but only from how they change with stronger property rights.

friends; or to no one.

We begin by investigating whether transfer uncertainty is an important consideration in this environment by looking at two simple relationships in the data. First, recall that if there is no transactions uncertainty, it is as though every buyer is a friend or family member. In this case, stronger rights have a symmetric (probably negative) effect on the ability to sell and rent (see Appendix Table A.1). One would expect, therefore, that most sellers would be able either to both sell and rent, or to do neither. On the other hand, when transactions uncertainty is an issue, stronger non-transferable rights,  $C_s^N$ , have opposite effects in the sale and rental markets. On this account, one might expect to see households able to sell but not rent, and vice versa. What we see in the table below is that almost a quarter of our sample feels able to transact in only one market, which is consistent with strong but non-transferable rights creating transfer uncertainty.

**Ability to Contract with an Outsider  
Observed Probabilities**

| Number of squatters /<br>Percent of sample |     | Can Sell  |            |
|--|-----|-----------|------------|
|  |     | Yes       | No         |
| Can Rent                                   | Yes | 43 / 17 % | 13 / 5%    |
|  | No  | 41 / 16%  | 157 / 62 % |

***Transactions with Friends and Family and Outsiders***

We investigate this hypothesis further by identifying the (26) households with no adult males as being less able to assert their ownership claims in the absence of other authority, that is, as having relatively low non-transferable rights. If this identification is correct, and transfer uncertainty is a concern, the model leads to the following predictions (Appendix Table A.1, row 1). Households with no males should find it easier to sell. They should have a particularly strong advantage in sales to outside buyers. This is because they are both less demanding and because they engender less transfer uncertainty. In our sample, 52% of households without males reported that they would be able to sell their property to a friend or family member versus 35% of households with an adult male. The difference grows to 52% versus 29% when asked about sales to outsiders. As with sales, households with no males should find it easier to rent--when

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the person renting is a friend or family member. However, they may have more difficulty renting to outsiders. When asked about rental of the whole house, 38% of households without males said that they could rent to a friend or family member versus only 30% among households with males.<sup>25</sup> But when asked about rental to outsiders, the advantage of female-only households almost disappears: 21% say that it is possible, versus 19% for households with males. That the pattern of household responses matches (in point estimate) the pattern predicted by the model supports our inclusion of transfer uncertainty as a feature influencing the ability of households to engage in land transactions. It also supports the identification of households without males as those with weaker non-transferable ownership claims.

### *Transferable Claims and the Ability to Transact*

We turn next to a multivariate analysis and ask how transferable property rights affect whether a household will be able to transfer its property. The predicted effect of stronger transferable rights is to facilitate both sales and rental to outsiders (Appendix Table A.1, row 2). Thus, we construct a dependent variable that is one if the household can transfer its rights in any form – either by renting out the entire house (a transfer of usage rights) or by selling it (a transfer of complete ownership rights) – and zero otherwise. This is the relevant concern from the point of view of a household which would like to move to another part of the city, for instance to take up new employment. In all, only 38 percent of the sampled property owners reported that they would be able to contract, either by sale or rental, with an outside buyer, with an additional 14 percent able to contract with a relative or friend.

Before turning to the results, we note that our inclusion of a title dummy variable might create an endogeneity problem. Households can choose to apply for title and the government can support or impede the process.<sup>26</sup> Unobservable characteristics of households or communities that facilitate or hinder land transfers might also influence the likelihood that a household has obtained title. Appendix Table A.2 presents two-stage conditional maximum likelihood

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<sup>25</sup> We consider rental of the whole house, rather than of a room, for two reasons. First, transfer uncertainty is likely to be most important when rental entails the absence of the owner. Second, in addition to transfer uncertainty, a household without males may be relatively more reluctant to rent out a room to outsiders for reasons of personal security and we do not want to conflate the two effects.

<sup>26</sup> This is well recognized. Besley (1996) and Brasselle, Gaspart and Platteau (1998), for example, allow for the simultaneous nature of property rights and investment when estimating econometric models of the effect of rights on investment.

estimates which take into account this potential endogeneity by including the residual, and residual interactions, from a first-stage regression for title (Rivers and Vuong, 1988). Since we do not reject exogeneity (the null hypothesis that the coefficients on the residual terms are jointly zero) the discussion below focuses on the uninstrumented probit estimates in Table 5.

What is striking is the way in which the *age of the community*, whether there was a *community organizer*, and formal *title*, as sources transferable claims,  $C^T$ , substitute for one another in allowing owners to transfer property. Because of the significance of the interaction between these variables, composite marginal effects are presented in Table 6. Having a title is extremely important when trying to contract in the early years of a community, particularly in one without an organizer. When such a community is eight years old (one standard deviation below the mean age), having title increases the probability of being able to transfer by 82 percentage points! In recently settled communities without an organizer there appears to be considerable uncertainty about property boundaries and ownership claims. Comparing the first two sets of probabilities, we see that the benefit of title falls substantially in communities founded through organized invasions. Having had a *community organizer* lessens the positive effect of title by 39% (32 percentage points). The benefit of title also falls as communities become better established. Having title contributes only half as much (40 percentage points) to a household's ability to transact once its community is 18 years old.

We also find, in unreported results, that when *percent paid boss* is included as a measure of the presence of a community authority in place of *community organizer*, both the estimated direct and interacted effects are insignificant. One explanation of this is that bosses who are paid have an incentive to obstruct transfers because they want to extract further payments and fear losing control if ownership changes (implying that paid bosses confer rights which are non-transferable). While this may be part of the story, it is not clear why they could not exert pressure on new residents and, further, our sampled households report that almost all payments to organizers were made at the time of arrival. An alternative explanation is that it is less the current presence of a community authority that is important, but his presence at the *start* of a settlement. As described in the introduction, one of the roles played by the organizers is to allocate plots on invaded land to the squatters.<sup>27</sup> One would expect, therefore, that having had a

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<sup>27</sup> We visited land on the outskirts of Guayaquil which had been invaded two weeks earlier. The housing was rudimentary--boards and plastic--but the houses were laid out in an obvious regular grid pattern with space for future roads.

community organizer would make it more likely that a community has clearly defined internal boundaries. Together with the strong positive effect of the age of a community, the differential effect of the variables *community organizer* and *percent paid boss* points to the importance of boundaries being clearly established for transactions to occur.

### ***Non-transferable Claims and the Ability to Transact***

When investigating non-transferable claims it becomes important to distinguish between the ability to sell and the ability to rent. Thus, Table 7 gives probit results where we distinguish between the two types of transactions. In the first, the dependent variable takes on the value one if the household says that it could sell to an outside buyer, and in the second, the dependent variable is one if the household says that it could rent its whole house to an outside buyer.

Having a titling program underway in a community has an interesting effect in these two probits. *Government titling program* is a dummy variable that is one if the community representative indicated that the government had been in some way actively promoting titling in the community in the past two years. It has a moderate but significant negative effect on the probability that a household feels able to sell its property, lowering it by ten percentage points. Since length of residence is important in being granted a title, a titling program confers a benefit to the current household that it may not be able to transfer fully to another party. Titling activity has an even more pronounced negative effect on a household's reported ability to rent, lowering the probability by 18 percentage points. Households clearly do not want to be absent from their properties when the government is allocating formal claims. This finding supports the idea that physical possession of a property is another important contributor to ownership rights. A similar story may explain the significant negative effect of *invasion resisted*. If there was dispute with the pre-invasion property owner and it is in the process of resolution, owners might be reluctant to have others seen in their place if it would weaken their claims.

Turning to the characteristics representing household authority, which appear in the final group of variables in Table 7, we see that household wealth (*assets*) has a positive effect on being able to transfer property rights by either rental or sale. Since greater wealth would presumably make a household more powerful, it is surprising that it facilitates sales given the potential concerns of a buyer which were discussed above. However, it is a small, if significant, effect. The truly striking result is in the differing effect across these two regressions of having *adult males* in the household. As predicted in Section III, among untitled households, having adult males *decreases* the likelihood that a household will be able to sell its property, by 45

percentage points. At the same time, it has a strong positive effect on being able to rent property. In fact, it is so important that not a single one of the 14 untitled, female-only, households felt able to rent its property. This renders the full set of gender/title effects unestimable (being theoretically positive and negatively infinite), so we indicate only their signs in Table 7 and estimate the other coefficients in column three restricting the sample to male households.<sup>28</sup> A second indicator of strong non-transferable rights, *years resident*, tells the same story. The strong positive effect of these indicators when renting is consistent with the prediction of the model in situations where transfer uncertainty is important.

The pattern of interaction effects with title is also consistent with the predictions of the model. In the sales market, title should be important for a household with strong non-transferable rights. It increases the utility enjoyed by most potential buyers relative to that of the seller, as well as their confidence in retaining the property after a sale, both of which increase their willingness to pay. Title may have a negligible, even negative effect for a household with weak non-transferable rights. It gains more in utility than most potential buyers, making it relatively more demanding, and, since such a household does not engender distrust, it does not benefit from the lower transactions uncertainty associated with titled property. In our probit for the ability to sell, the estimated effect of title for male households is positive and significant (2.24, estimated standard error, 0.75), while it is positive but insignificant for households without males.

In the rental market, title should again have a positive effect for a household with strong non-transferable rights, although more muted since in the rental market such households have less transactions uncertainty in the absence of title. The prediction is ambiguous for a household with weak non-transferable rights: it again gains relatively more in utility than most potential renters, which would make it harder to rent, but now it would benefit the most from the increased certainty associated with transacting over a titled property. Restricting the data to include only households with males, we find that title increases the probability that such households are able to rent by 82 percentage points (coefficient 3.62, p-value < 0.01). The results for rental strongly support the hypothesis that households with only women and children have relatively low levels of household authority and thus fear that they will not be able to reclaim their property after a rental period without another sources of claims. As noted above, not a single female-only

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<sup>28</sup> Note that the switch in signs rules out another explanation for the reported greater ability to sell among female-only households: that female respondents are more predisposed to respond 'yes' to questions.

household thought itself able to rent *unless* it had title. A general implication of these sets of results is that transfer uncertainty appears to be a real concern of households trying to engage in property transactions in this environment.

## VII. Title and Property Value

We now turn to the effect of the various sources of property rights on the value of property. In previous studies, the effect of titling on property values has been estimated by including a dummy variable for title in hedonic price equations. One drawback of this approach is the endogeneity of title status which was discussed above. There may be unobservable characteristics of properties or communities which influence both the value of the property and whether the owner has obtained title. Other authors have addressed this problem by instrumenting for title, as well as by including rich sets of controls for observable housing and community characteristics. Because we were able to control the design of the survey, we have adopted an alternative approach to this problem. For each household that claimed that it was able to sell its property, we asked the respondent to give an estimated sale value. Among this group, the owners of untitled properties were then asked what they felt they could obtain in a sale of their property if were in a *titled* state. Similarly, titled owners were asked if they thought that they would be able to sell their properties if the properties were not, in fact, titled and, if so, what price they thought that they could obtain.<sup>29</sup> Thus, for a subset of our owners (51 respondents) we have their estimates of the difference in the sale price that they would receive if they were to sell their properties in each state. These ‘within respondent’ differences in values allow us to estimate the effect of title controlling for *all* unobservable characteristics--those of the community, the property and the household, including  $R_S$ .<sup>30</sup>

Table 8 presents the results of a weighted regression of the difference in the log of the sale value expected by household when a property changes from untitled to titled. Thus, the

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<sup>29</sup> We asked households whether a transaction was possible before asking them to estimate a price to avoid forcing respondents to put meaningless values on transactions not viewed as reasonable. We expect that the resulting loss of observations is made up for in higher quality information.

<sup>30</sup> In a similar way, Alston, Libecap and Schneider (1995) asked 13 untitled squatters in rural Brazil to estimate the current value of their properties, and then the value of their properties with formal title. The respondents’ estimates ranged from a zero to a 100% increase in value, with an (unconditioned) average increase of 36%.

coefficients represent *interaction* effects - the extent to which the effect of title on property value is enhanced or diminished by the indicated variable. The fact that the dependent variable is in logs, and the absence of observed quality characteristics of the properties as explanatory variables, implies that we are imposing the functional form restriction that the strength of property rights has a proportional effect on the value of properties of all quality levels. The same restriction has been imposed in other, hedonic, price studies.

An inverse Mills ratio is included to allow for a potential selection effect. If there are household or community characteristics which affect ownership claims, unobservable to us but observable to potential buyers, then having restricted ourselves to a sample of households which can sell in any state would mean that we have selected those with either high levels of these unobservables if they are transferable or low levels if they are non-transferable. The value of the inverse Mills ratio is calculated using the estimates for the ability to sell found in Table 6.<sup>31</sup>

Before turning to an examination of the results, it is worth noting that these ‘within’ estimates may not be exactly comparable to the results of hedonic value regressions. In the latter, the person stating the value of the property is only being asked to estimate the value of something he already owns. Here, the respondent is also being asked to estimate value in a hypothetical state. It may be that an untitled owner is less informed about property values in a titled market and vice versa. If this just leads them to make noisier predictions it will not bias our results. If, on the other hand, titled owners have title because they perceive it to be valuable, and untitled owners do not have title because they see it as not being valuable, their hypothetical estimates may not reflect true values in a given state. We use the fact that the prediction bias goes in opposite directions for titled and untitled owners to test for this effect. We test whether the current status of the respondent’s property leads to differences in the size of the expected change in value with title by including it as a separate regressor (unreported regression). It is insignificant so there is no evidence in the data of bias in the property value estimates given for hypothetical states.

Recall that the percentage change in the expected transaction price with an increase in transferable rights,  $\partial \ln P / \partial C^T$ , was predicted to be positive, under almost all assumptions about price determination (see Section III). In Table 8 we see that this is confirmed empirically. The unconditional expected mean effect of titling a property is to raise its expected sale price: by an

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<sup>31</sup> Let  $x_i^T$  be a vector of household and community characteristics for household  $i$ , with title = 1;  $x_i^{NT}$  a vector of characteristics for household  $i$ , with title = 0; and  $b$ , the coefficient estimates from column one of Table 7. Then  $M_i = -\phi(x_i' b) / \Phi(x_i' b)$  where  $x_i' b = \min\{x_i^T b, x_i^{NT} b\}$ .

estimated 23.5 percent. This estimate is comparable to the effect of title found in hedonic price equations using urban data from Manila and Davao. In these cities, being titled was estimated to raise the value of property by 14 and 58 percent, respectively (Jimenez, 1984; Friedman, Jimenez and Mayo, 1988).

In the first group of variables, we again see the way in which *title*, *age* and, in this case, *percent paid boss*, substitute for one another as sources of transferable claims. Both community age, and the fact that many households paid a boss, make title significantly less important. Age is particularly influential: the impact of title is 45 percentage points lower in a community which has been in existence for 14 years (the mean) than it is in a community just after its establishment. The impact of title is nine percentage points lower in communities where a third of the households paid a boss (again the mean) compared to its impact in a community where none of the squatters paid a boss. The fact that official institutions such as courts and judges are resolving disputes in the community (*formal enforcement*) strongly reduces the importance of title in raising property values. Again, this could be an indicator of the extent to which property boundaries are settled and recognized. Somewhat surprisingly, given the positive effect of *distance* on security from eviction indicated in Table 4, title appears more important in more distant communities.

Turning to the second group of variables in Table 8, which are indicators of non-transferable ownership claims, we see, first of all, that in point estimate, all of the non-transferable claims variables dampen the effect of title on price. The coefficient on wealth (*assets*) is not significant here, which is somewhat surprising given its significance in explaining security (Table 4) and the ability to transact (Table 7). However, those on *years of residence* and *male* are significant. In particular, households with only women and children gain a vastly greater price increase from title than households with adult males. The interaction effects at the bottom of the table indicate that, at sample means, the expected sale value of a property owned by a female-only household in a newly established neighborhood increases 41% with title. Title has two positive effects: it lowers transfer uncertainty and raises the utility gained from property ownership (see, for example, A.8). We expect the first effect to be most important to households with males, and the second effect to be more important to female-only households. Since we have a negative coefficient on the interaction of males with title, it suggests that the utility enhancing effect dominates (that is,  $\partial\theta\partial C^T\partial C_S^N > 0$  small, and  $\partial U_S\partial C^T\partial C_S^N \ll 0$ ). However, there is evidence that the *combination* of being a household with *males* and having been *resident* on the property for a long period together constitute a threat to potential buyers. For households

with males, longer residence increases the positive effect of title on property values. (See the summary of the interaction effects at the bottom of the table.)

### **VIII. Conclusions**

The results presented in this paper show that the value of formal property rights to low- and middle-income urban households is very dependent on the other sources of ownership claims available to them. Using a variety of empirical indicators, we have identified multiple sources of informal rights which appear important in urban Ecuador. These include household characteristics that contribute to its authority or its ability to access other sources of rights. Household wealth and years of residence are important, as one might expect. However, we also find that having adult male members greatly enhances a household's ability to assert its ownership claims. A second important source of rights stems from the activities of a community organizer or boss. These may include defining plot boundaries, identifying and enforcing individuals' claims, and protecting a community from the threat of eviction by the government.

In our modeling and empirical work we have emphasized that there are two ways in which conferring formal rights might increase the welfare of squatter households: by increasing households' security from eviction or boundary disputes and by reducing the transfer uncertainty associated with transactions undertaken in an environment where all rights are informal. When a buyer cannot be sure that a household will honor the 'sale' of its property, and when a property owner cannot be sure that a renter will honor his commitment to leave, households have a more limited range of people with whom they can transact, perhaps including only friends and family members. In general this limitation impedes the allocation of properties to households who would value them most. It is particularly detrimental to households needing, for example, to move to new locations for work or with growing families in need of more space. Further, just as transfer uncertainty limits a household's ability to sell its property, it limits a bank's ability to repossess property, lowering the value of property as a collateral asset. In future work we plan to investigate the use of property in the credit market in the surveyed communities.

In the model of transactions and property value developed here we highlight the fact that, while all sources of ownership claims contribute to security, rights derived from household characteristics are different from those derived from an outside source in an important way: it is typically not possible to transfer such rights to another party nor to commit to not exercising them after an agreed transfer. As a result household-based sources of stronger property rights,

exactly *because* they increase the security of the current owner, may impede property transactions by raising transfer uncertainty.

The empirical results support the idea that transfer uncertainty is a real concern of households transacting in this environment. Households with adult males, which have strong, but non-transferable, claims, find it significantly more difficult to sell - they represent a greater threat to potential buyers. But in renting property, where the transfer uncertainty is on the side of the owner, it is female-only households who face greater difficulty transacting - they are less able to claim property back. In this environment, titling property can increase welfare by increasing parties' confidence in agreed transactions.

Most of the surveyed households expect to remain on their properties for a very long time, so a more important welfare consideration may simply be the increase in security that households derive from living on a property over which they feel they have stronger ownership rights. Thus, we investigate how various sources of informal rights affect households' perceptions of their short-run security from eviction by the government. Community organizers are very important: a one standard deviation increase in the percentage of squatters paying a community boss increases the probability that eviction is deemed 'impossible' by 17 percentage points. Eviction is also of less concern in communities that have been in existence for many years. Household characteristics, such as wealth and years of residence are also important in increasing security. One reason that households might value security of tenure is that it allows them to capture the benefits of long term investments in their housing or in their communities. In future work we plan to investigate these investment incentive effects of property rights.

Finally, to calculate the aggregate effect that obtaining title would have on the utility of households with varying levels of informal rights, we estimate, in difference form, hedonic price regressions. Using our model of property transactions, we show that changes in prices arising from title will reflect *not only* changes in the utility value of property but also changes in uncertainty. This is important for interpreting the effect of title in the 'within household' estimates presented here, as well as in more traditional hedonic price equations. In particular, since transfer uncertainty falls when a property is titled, the percentage change in transaction prices arising from titling property overestimates the utility value of title.

We have focused on benefits, but titling is not free and it is important to consider also costs. Elsewhere, we find that the estimated cost of obtaining a title represents, on average, 102% (s.d. 12.4) of household annual, per capita, consumption (Lanjouw and Levy, 1999). Although the costs may be spread out over time, they clearly represent a substantial expense for

squatter households. On the other hand, a cost/benefit analysis would suggest that it pays off. Among households reporting a value for a 'similar property sold in the community in the past year', estimated titling costs represent, on average, 6.3% of the value of the property (s.d. 2.0), with a median of 1.5%. Even allowing for the fact that our estimates are upper bounds, it would appear that the private benefits of title are substantially higher than the private costs. It is not surprising that almost all of the untitled squatters in our sample declare that they are trying to obtain a title.

Throughout the discussion we have also restricted our attention to the implications for *owners* of changes in property rights. Feder, *et. al.* (1988) suggest a number of reasons to think that the private value of formalizing property rights exceeds the social value. For example, having a lower risk of eviction is overvalued by owners because they do not take into account the utility of those who would use the property in their place if an eviction occurs. The value of title in facilitating access to the formal credit market is also overvalued relative to the social value if lower interest rates in the formal market are due to government subsidies. Using a number of assumptions about risk aversion, the divergence between the opportunity cost of capital and the formal interest rate, credit supply and probabilities of eviction in their four Thai provinces, Feder, *et. al.*, calculate that that the gross social benefit of titling is at most half of the private value. In so far as the full costs of establishing and maintaining a formal system of rights are not passed on to title recipients, the social costs of titling will also be higher than the private costs. Although data are sparse, this divergence is likely to be substantial. In recent reviews of World Bank-funded titling projects the authors emphasize the consistent underestimation of the large investments in institution building required for the task (see Wachter and English, 1992; Holstein, 1993, and the evaluation reports cited therein). Thus, one would need to expect quite substantial net private benefits to flow from a move towards stronger formal property rights before concluding that social welfare would be enhanced thereby.

Finally, although the presence of transfer uncertainty prevents our pinning down the precise magnitude of the private welfare effect of titling properties, we can draw some conclusions about when it will be *relatively* more important. First, the age of the community and the activity of a community organizer substitute for title as sources of transferable claims. Second, title is particularly important in increasing expected sale values for female-only households. Because these households engender less transfer uncertainty, price changes overstate utility changes for such households to a lesser extent than they do for households with males. Thus we can confidently conclude that formal property rights confer the greatest utility

benefit on households with only women and children. Other considerations would need to be taken into account in determining an appropriate policy towards squatters, such as the incentives created for people to invade land in the first place. However, our results suggest that for titling programs to impart a significant benefit to the recipients, they should be targeted at more recent, and disorganized, squatter communities and care should be taken that more vulnerable households have access to the program.

**Table 1**  
**Numbers of Households: by Type and Title Status**

| <u>Household Type</u>                                 | <u>Total</u> | <u>Title Status</u> |                 |                |
|---|--------------|---------------------|-----------------|----------------|
|   |              | <u>Titled</u>       | <u>Untitled</u> | <u>Unknown</u> |
| <b>Purchasers</b>                                     | 23           | 23                  | --              | --             |
| <b>Squatters</b>                                      | <b>254</b>   | <b>112</b>          | <b>142</b>      | --             |
| <i>Have tried to<br/>    obtain title<sup>a</sup></i> | 228          | 112                 | 116             | --             |
| <i>Not trying</i>                                     | 26           | --                  | 26              | --             |
| <b>Non-owners</b>                                     | <b>123</b>   | <b>73</b>           | <b>33</b>       | <b>17</b>      |
| <i>Pay Rent</i>                                       | 64           | 38                  | 12              | 14             |
| <i>Do Not Pay</i>                                     | 59           | 35                  | 21              | 3              |
| <b>All Households</b>                                 | <b>400</b>   | <b>210</b>          | <b>175</b>      | <b>17</b>      |

Notes: <sup>a</sup> Includes squatter households who have either obtained title or responded that they are in the process of trying to obtain a title.

**Table 2**  
**Characteristics of the Communities**

| <u>Community No.</u> | <u>Age</u> | <u>Established by Invasion</u> | <u>with an Organizer</u> | <u>with Resistance</u> | <u>on Private Land</u> | <u>Percent Paid Boss<sup>a</sup></u> | <u>Percent Titled</u> |
|----------------------|------------|--------------------------------|--------------------------|------------------------|------------------------|--------------------------------------|-----------------------|
| 1                    | 52 yrs     | -                              | -                        | -                      | -                      | 14.3 %                               | 82.4 %                |
| 2                    | 42         | -                              | -                        | -                      | -                      | 0.0                                  | 95.0                  |
| 3                    | 19         | -                              | -                        | -                      | -                      | 25.0                                 | 94.7                  |
| 4                    | 18         | -                              | -                        | -                      | -                      | 0.0                                  | 95.0                  |
| 5                    | 47 yrs     | Y                              | -                        | -                      | -                      | 0.0 %                                | 100.0 %               |
| 6                    | 47         | Y                              | -                        | -                      | -                      | 16.7                                 | 55.0                  |
| 7                    | 21         | Y                              | -                        | -                      | Y                      | 20.0                                 | 0.0                   |
| 8                    | 20         | Y                              | -                        | Y                      | -                      | 0.0                                  | 65.0                  |
| 9                    | 32         | Y                              | -                        | Y                      | Y                      | 76.5                                 | 35.0                  |
| 10                   | 27         | Y                              | -                        | Y                      | Y                      | 13.3                                 | 38.9                  |
| 11                   | 7          | Y                              | -                        | Y                      | Y                      | 0.0                                  | 81.2                  |
| 12                   | 20 yrs     | Y                              | Y                        | -                      | -                      | 43.8 %                               | 30.0 %                |
| 13                   | 18         | Y                              | Y                        | -                      | -                      | 65.0                                 | 35.0                  |
| 14                   | 17         | Y                              | Y                        | -                      | -                      | 78.6                                 | 21.1                  |
| 15                   | 17         | Y                              | Y                        | -                      | Y                      | 26.7                                 | 50.0                  |
| 16                   | 13         | Y                              | Y                        | Y                      | -                      | 6.2                                  | 63.2                  |
| 17                   | 13         | Y                              | Y                        | Y                      | -                      | 6.2                                  | 55.0                  |
| 18                   | 16         | Y                              | Y                        | Y                      | Y                      | 7.7                                  | 65.0                  |
| 19                   | 13         | Y                              | Y                        | Y                      | Y                      | 11.1                                 | 0.0                   |
| 20                   | 4          | <u>Y</u>                       | <u>Y</u>                 | <u>Y</u>               | <u>Y</u>               | <u>11.1</u>                          | <u>40.0</u>           |
| <b>Totals:</b>       |            | <b>16</b>                      | <b>9</b>                 | <b>9</b>               | <b>8</b>               | <b>21.1 %</b>                        | <b>54.3 %</b>         |

Note: <sup>a</sup> Percentage of squatter households who paid a boss.

**Table 3**  
**Household and Community Characteristics**

|   | <u>Purchasers</u>               | <u>Squatters</u> |                 | <u>Non-Owners</u> |                  |
|---|---------------------------------|------------------|-----------------|-------------------|------------------|
|   |                                 | <u>Titled</u>    | <u>Untitled</u> | <u>Titled</u>     | <u>Untitled</u>  |
| <i>Mean:</i>  |                                 |                  |                 |                   |                  |
| <b>Age of Community</b>                               | 25.6 yrs<br>(10.6)              | 23.5<br>(12.1)   | 14.8<br>(7.3)   | 33.2<br>(14.8)    | 25.9<br>(12.2)   |
| <b>Distance from City Center</b>                      | 5.6 km<br>(3.0)                 | 5.2<br>(2.0)     | 7.7<br>(3.0)    | 3.5<br>(2.4)      | 5.4<br>(2.5)     |
| <b>Age of Household Head</b>                          | 52.3 yrs<br>(17.4)              | 50.9<br>(13.5)   | 43.7<br>(11.8)  | 39.2<br>(12.4)    | 35.2<br>(12.5)   |
| <b>Per-capita Expenditure<br/>(1996 U.S. dollars)</b> | \$134.8<br>(111.8)              | 75.1<br>(84.6)   | 53.9<br>(32.1)  | 101.8<br>(92.3)   | 65.3<br>(48.9)   |
| <b>Household Assets<br/>(Non-Property, \$100s)</b>    | \$65.3<br>(119.2)               | 20.3<br>(46.2)   | 9.1<br>(16.9)   | 22.6<br>(44.3)    | 6.7<br>(6.7)     |
| <b>Lot Size</b>                                       | 255.7 m <sup>2</sup><br>(493.9) | 146.6<br>(72.8)  | 137.1<br>(68.8) | 183.1<br>(119.4)  | 173.0<br>(357.4) |
| <b>Years of Residence<br/>on Property</b>             | 16.2 yrs<br>(10.4)              | 17.7<br>(10.7)   | 10.5<br>(6.7)   | 7.3<br>(8.2)      | 6.9<br>(7.1)     |
| <b>Years Expect to<br/>Remain Resident</b>            | 36.0 yrs<br>(14.6)              | 32.5<br>(15.7)   | 35.2<br>(16.4)  | 15.5<br>(18.2)    | 15.5<br>(17.4)   |
| <i>Percent of Households with:</i> <sup>b</sup>       |                                 |                  |                 |                   |                  |
| <b>Education of Head<br/>&gt; Primary</b>             | 73.9 %                          | 38.4             | 31.7            | 76.7              | 51.5             |
| <b>Urban Origin of Head</b>                           | 91.3 %                          | 96.4             | 86.6            | 87.7              | 78.8             |
| <b>Adult Males</b>                                    | 87.0 %                          | 92.9             | 89.4            | 89.0              | 81.8             |

Notes: <sup>a</sup> Standard deviations are in parentheses.

<sup>b</sup> Urban origin equals one if the household head came to the property from either of the two main cities, Guayaquil or Quito; zero otherwise. Adult Males include males from 18 to 65, or older if designated the head of household.

**Table 4**  
**Contributions to the Security of Untitled Squatters**

**Panel A: The Contribution of an Outside Organizer**

| <u>The Likelihood of Eviction<br/>in the Next Year is:</u> | <u>All<br/>Untitled Squatters</u> | <u>In Community<br/>with an Organizer</u> | <u>Without</u> |
|--|-----------------------------------|---|----------------|
| Sure or Very Possible                                      | 0.0 %                             | 0.0 %                                     | 0.0 %          |
| Possible   | 3.5                               | 3.5                                       | 3.0            |
| Not Very Probable  | 19.0                              | 13.5                                      | 39.0           |
| Impossible   | <u>77.5</u>                       | <u>83.0</u>                               | <u>58.0</u>    |
|  | 100.0 %                           | 100.0 %                                   | 100.0 %        |
| Number of Respondents                                      | 142                               | 111                                       | 31             |

**Panel B: Probit - Eviction is Impossible versus Other**

| <u>Variable</u>                             | <u>Coefficient</u> | <u>S.E.<sup>a</sup></u> | <u>P-Value</u>  | <u>dF/dX</u> |
|---|--------------------|-------------------------|-----------------|--------------|
| ln(age)                                     | -0.13              | 0.26                    | 0.61            | -0.03        |
| <b>distance</b>                             | <b>0.16</b>        | <b>0.06</b>             | <b>&lt;0.01</b> | <b>0.04</b>  |
| <b>percent paid boss<br/>(community)</b>    | <b>0.26</b>        | <b>0.04</b>             | <b>&lt;0.01</b> | <b>0.06</b>  |
| formal enforcement <sup>b</sup>             | 0.24               | 0.33                    | 0.46            | 0.06         |
| <b>ownership document</b>                   | <b>0.65</b>        | <b>0.38</b>             | <b>0.09</b>     | <b>0.19</b>  |
| invasion resisted                           | 0.23               | 0.38                    | 0.54            | 0.05         |
| <b>private land</b>                         | <b>-0.68</b>       | <b>0.37</b>             | <b>0.06</b>     | <b>-0.16</b> |
| <b>paid boss (household)</b>                | <b>-0.59</b>       | <b>0.32</b>             | <b>0.06</b>     | <b>-0.16</b> |
| <b>ln(years resident)</b>                   | <b>0.46</b>        | <b>0.17</b>             | <b>&lt;0.01</b> | <b>0.39</b>  |
| <b>ln(assets)</b>                           | <b>0.23</b>        | <b>0.11</b>             | <b>0.03</b>     | <b>0.20</b>  |
| education > primary                         | 0.31               | 0.42                    | 0.46            | 0.07         |
| <b>adult males</b>                          | <b>-0.81</b>       | <b>0.47</b>             | <b>0.08</b>     | <b>-0.14</b> |
| Number of observations                      |                    |                         | 141             |              |
| Observed/predicted probability at the means |                    |                         | 0.77 / 0.84     |              |
| Percent correct predictions                 |                    |                         | 0.78            |              |

Notes: <sup>a</sup>The estimation allows for community random effects. S.E. are robust estimated standard errors. The marginal effects, dF/dX, are calculated as discrete changes in the case of dummy variables. Boldface type indicates significance at  $\alpha = 0.10$ .

<sup>b</sup>Formal enforcement is a dummy variable which is one if the household responds that courts, judges or the municipality settle community disputes; zero otherwise.

**Table 5**  
**Probit - The Ability to Contract with Strangers (*Either Rent or Sell*)<sup>a</sup>**

| <u>Variable</u>                              | <u>Coefficient</u> | <u>S.E.</u> | <u>P-Value</u>  | <u>dF/dX<sup>b</sup></u> |
|--|--------------------|-------------|-----------------|--------------------------|
| <b>ln(age)</b>                               | <b>1.32</b>        | <b>0.41</b> | <b>&lt;0.01</b> | -                        |
| <b>community organizer</b>                   | <b>1.55</b>        | <b>0.51</b> | <b>&lt;0.01</b> | -                        |
| formal enforcement                           | -0.23              | 0.27        | 0.40            | -0.09                    |
| <b>invasion resisted</b>                     | <b>-0.52</b>       | <b>0.16</b> | <b>&lt;0.01</b> | <b>-0.20</b>             |
| private land                                 | 0.08               | 0.12        | 0.51            | 0.03                     |
| <b>title</b>                                 | <b>3.56</b>        | <b>1.13</b> | <b>&lt;0.01</b> | -                        |
| ownership document                           | -0.30              | 0.39        | 0.45            | -0.12                    |
| <b>title*age</b>                             | <b>-0.11</b>       | <b>0.01</b> | <b>&lt;0.01</b> | -                        |
| <b>title*organizer</b>                       | <b>-1.68</b>       | <b>0.71</b> | <b>0.02</b>     | -                        |
| <b>organizer*age</b>                         | <b>-0.12</b>       | <b>0.04</b> | <b>&lt;0.01</b> | -                        |
| <b>govt titling prgm<sup>c</sup></b>         | <b>-0.62</b>       | <b>0.16</b> | <b>&lt;0.01</b> | <b>-0.24</b>             |
| paid boss (household)                        | -0.44              | 0.23        | 0.06            | -0.17                    |
| ln(years resident)                           | -0.03              | 0.13        | 0.80            | -0.01                    |
| <b>ln(assets)</b>                            | <b>0.22</b>        | <b>0.10</b> | <b>0.02</b>     | <b>0.09</b>              |
| education > primary                          | 0.23               | 0.24        | 0.34            | 0.09                     |
| <b>adult males</b>                           | <b>-1.17</b>       | <b>0.36</b> | <b>&lt;0.01</b> | <b>-0.42</b>             |
| title*adult males                            | -0.16              | 1.16        | 0.89            | -0.06                    |
| Number of observations                       |                    |             | 250             |                          |
| Observed/ predicted probability at the means |                    |             | 0.42 / 0.40     |                          |
| Percent correct predictions                  |                    |             | 0.72            |                          |

Notes: <sup>a</sup> See notes to Table 4.

<sup>b</sup> Marginal effects are calculated as discrete changes for dummy variables. Those for interacted variables are in Table 6.

<sup>c</sup> Government titling program is a dummy variable which is one if the community respondent indicated that there had been a government program to encourage titling in the community in the past two years.

**Table 6**  
**Effects of Title, Organizers and Time on the Ability to Contract**

| <u>Predicted Probability<sup>a</sup></u> | <u>Title</u> | <u>Organizer</u> | <u>Community Age</u> |
|--|--------------|------------------|----------------------|
| 0.16                                     | No           | No               | 8 yrs                |
| 0.98                                     | Yes          | No               | 8 yrs                |
| 0.35                                     | No           | Yes              | 8 yrs                |
| 0.85                                     | Yes          | Yes              | 8 yrs                |
| 0.53                                     | No           | No               | 18 yrs (mean)        |
| 0.93                                     | Yes          | No               | 18 yrs               |

Note: <sup>a</sup>Calculated using the estimates in the first column of Table 5. Eight years is the mean age of 18 minus one standard deviation. All other variables are at their means.

**Table 7**  
**Probit - The Ability to Contract with Strangers**

| <u>Variable</u>                      | <u>Can Sell Property</u> |             |                 | <u>Can Rent Whole House</u>    |             |                 |
|--------------------------------------|--------------------------|-------------|-----------------|--------------------------------|-------------|-----------------|
|                                      | <u>Coefficient</u>       | <u>S.E.</u> | <u>P-Value</u>  | <u>Coefficient<sup>b</sup></u> | <u>S.E.</u> | <u>P-Value</u>  |
| <b>ln(age)</b>                       | <b>0.73</b>              | <b>0.27</b> | <b>&lt;0.01</b> | <b>0.64</b>                    | <b>0.32</b> | <b>0.05</b>     |
| <b>community organizer</b>           | <b>0.84</b>              | <b>0.51</b> | <b>0.10</b>     | 0.07                           | 0.65        | 0.92            |
| formal enforcement                   | -0.27                    | 0.27        | 0.32            | 0.11                           | 0.31        | 0.72            |
| <b>invasion resisted</b>             | -0.21                    | 0.18        | 0.24            | <b>-0.32</b>                   | <b>0.18</b> | <b>0.07</b>     |
| <b>private land</b>                  | -0.01                    | 0.13        | 0.94            | <b>0.49</b>                    | <b>0.18</b> | <b>&lt;0.01</b> |
| <b>title</b>                         | 1.58                     | 1.03        | 0.13            | ++                             | .           | <b>&lt;0.01</b> |
| ownership document                   | -0.10                    | 0.41        | 0.81            | -0.05                          | 0.52        | 0.92            |
| <b>title*age</b>                     | <b>-0.06</b>             | <b>0.02</b> | <b>&lt;0.01</b> | <b>-0.09</b>                   | <b>0.02</b> | <b>&lt;0.01</b> |
| <b>title*organizer</b>               | -0.82                    | 0.53        | 0.12            | <b>-1.77</b>                   | <b>0.60</b> | <b>&lt;0.01</b> |
| <b>organizer*age</b>                 | <b>-0.09</b>             | <b>0.02</b> | <b>&lt;0.01</b> | -0.02                          | 0.04        | 0.62            |
| <b>govt titling prgm<sup>c</sup></b> | <b>-0.28</b>             | <b>0.13</b> | <b>0.03</b>     | <b>-0.83</b>                   | <b>0.19</b> | <b>&lt;0.01</b> |
| paid boss (household)                | -0.31                    | 0.22        | 0.17            | -0.36                          | 0.26        | 0.16            |
| <b>ln(years resident)</b>            | -0.07                    | 0.13        | 0.58            | <b>0.64</b>                    | <b>0.32</b> | <b>0.05</b>     |
| <b>ln(assets)</b>                    | <b>0.16</b>              | <b>0.09</b> | <b>0.09</b>     | <b>0.26</b>                    | <b>0.13</b> | <b>0.04</b>     |
| education > primary                  | 0.24                     | 0.24        | 0.31            | -0.02                          | 0.24        | 0.95            |
| <b>adult males</b>                   | <b>-1.19</b>             | <b>0.37</b> | <b>&lt;0.01</b> | ++                             | .           | <b>&lt;0.01</b> |
| <b>title*adult males</b>             | 0.66                     | 1.08        | 0.54            | --                             | .           | <b>&lt;0.01</b> |

Observed/ predicted probability at the means

0.33 / 0.36

0.22 / 0.23

Percent correct predictions

0.76

0.84

Number of observations

250

229

Notes: <sup>a</sup> See notes to Table 5

<sup>b</sup> The full set of coefficients on gender/title categorical variables are unestimable as no untitled household without males can rent. Therefore, entries only indicate signs of the effects.

**Table 8**  
**Expected Impact of Title on Property Value<sup>a</sup>**

| <u>Variable</u>                                    | <u>Coefficient</u>        | <u>S.E.<sup>b</sup></u>          | <u>P-Value</u>  |
|--|---------------------------|----------------------------------|-----------------|
| constant   | <b>1.86</b>               | <b>0.55</b>                      | <b>&lt;0.01</b> |
| ln(age)  | <b>-0.17</b>              | <b>0.07</b>                      | <b>0.03</b>     |
| distance   | <b>0.04</b>               | <b>0.01</b>                      | <b>&lt;0.01</b> |
| percent paid boss (community)                      | <b>-0.26</b>              | <b>0.12</b>                      | <b>0.04</b>     |
| formal enforcement                                 | <b>-0.28</b>              | <b>0.08</b>                      | <b>&lt;0.01</b> |
| paid boss (household)                              | 0.00                      | 0.06                             | 0.99            |
| ln(years resident)                                 | <b>-0.16</b>              | <b>0.09</b>                      | <b>0.09</b>     |
| ln(assets)   | -0.05                     | 0.04                             | 0.21            |
| education > primary                                | -0.04                     | 0.07                             | 0.62            |
| adult males  | <b>-0.63</b>              | <b>0.21</b>                      | <b>&lt;0.01</b> |
| males*ln(yrs resident)                             | <b>0.24</b>               | <b>0.08</b>                      | <b>&lt;0.01</b> |
| inverse Mills ratio                                | -0.10                     | 0.16                             | 0.53            |
| Number of observations                             |                           | 51                               |                 |
| R <sup>2</sup>                                     |                           | 0.67                             |                 |
| Sample Mean Expected Change (s.d.)                 |                           | 23.5% (5.0)                      |                 |
| <b><u>Predicted Change in Value from Title</u></b> | <b><u>Adult Males</u></b> | <b><u>Years of Residence</u></b> |                 |
| 40.9 %   | No                        | 5 yrs                            |                 |
| 24.5   | No                        | 14 yrs (mean)                    |                 |
| 16.0%  | Yes                       | 5                                |                 |
| 24.1   | Yes                       | 14                               |                 |

Notes: <sup>a</sup>The dependent variable is the difference of the value (in logs) that a household believes it could obtain for its property with a title without a title. The inverse Mills ratio is included to allow for the restriction of the sample to households who indicate that they can sell in both states. WLS estimates allow for heteroscedasticity across communities.

<sup>b</sup>S.E. are estimated robust standard errors. Bold typeface indicates significance at  $\alpha = 0.10$ .

### References

Akerlof, George (1970) "The Market for Lemons," *Quarterly Journal of Economics*. Vol. 84, pp. 488-500.

Alston, Lee J., Gary D. Libecap and Robert Schneider (1996) "The Determinants and Impact of Property Rights: Land Titles on the Brazilian Frontier," *Journal of Law, Economics and Organization*. Vol. 12, no. 1, pp. 25-61.

Alston, Lee J., Gary D. Libecap and Robert Schneider (1995) "Property Rights and the Preconditions for Markets: The Case of the Amazon Frontier," *Journal of Institutional and Theoretical Economics*. Vol. 151, no. 1, pp. 89-107.

Anderson, Terry L. and Dean Lueck (1992) "Land Tenure and Agricultural Productivity on Indian Reservations," *The Journal of Law and Economics*. Vol. XXXV. pp. 427-454.

Besley, Timothy (1995) "Property Rights and Investment Incentives: Theory and Evidence from Ghana," *Journal of Political Economy*. Vol. 103, no. 5, pp. 903-937.

Brasselle, Anne-Sophie, Frédéric Gaspard and Jean-Phillippe Platteau (1998) "Land Tenure Security and Investment Incentives: Further Puzzling Evidence from Burkina Faso," Working Paper no. 201, CRED, Facultés Universitaires Notre-Dame de la Paix, Namur.

Bruce, John, Shem E. Migot-Adholla and Joan Atherton (1994) "The Findings and Their Policy Implications: Institutional Adaptation or Replacement." Chapter 11 in Bruce and Migot-Adholla (eds.) *Searching for Land Tenure Security in Africa*. (Dubuque, Iowa: Kendall/Hunt Publishing Company.)

Carter, Michael and Pedro Olinto (1996) "Getting Institutions Right for Whom? The Wealth-Differentiated Impact of Property Rights Reform on Investment and Income in Rural Paraguay," Mimeo. University of Wisconsin.

Carter, Michael, Keith D. Wiebe and Benoît Blarel (1994) "Tenure Security for Whom?: Differential Effects of Land Policy in Kenya," Chapter 7 in Bruce and Migot-Adholla (eds.) *Searching for Land Tenure Security in Africa*. (Dubuque, Iowa: Kendall/Hunt Publishing Company.)

de Soto, Hernando (1989) *The Other Path*. (Harper and Row, Publishers.)

Ellickson, R.C. (1991) *Order without Law: How Neighbors Settle Disputes*. (Cambridge, MA: Harvard University Press.)

Feder, Gershon, Tongroj Onchan, Yongyuth Chalamwong and Chira Hongladarom.(1988) *Land Policies and Farm Productivity in Thailand*. (Baltimore: Johns Hopkins University Press, for the World Bank).

Friedman, Joseph, Emmanuel Jimenez and Stephen Mayo (1988) "The Demand for Tenure Security in Developing Countries" *The Journal of Development Economics*. pp. 185-198.

Gambetta, Diego (1993) "The Sicilian Mafia: The Business of Protection." (Cambridge, MA: Harvard University Press).

Holstein, Lyn (1993) "Review of Bank Experience with Land Titling and Registration," Mimeo. Environmental and Socially Sustainable Development Unit, LAC. World Bank, Washington, D.C.

Hoy, Michael and Emmanuel Jimenez (1997) "The Impact on the Urban Environment of Incomplete Property Rights," Policy Research Department Working Paper no. 14, The World Bank.

Jimenez, Emmanuel (1984) "Tenure Security and Urban Squatting," *Review of Economics and Statistics*, pp. 556-567.

Jimenez, Emmanuel (1985) "Urban Squatting and Community Organization in Developing Countries," *Journal of Public Economics*. Vol. 27, pp. 69-92.

Johnson, Omotunde E.G. (1972) "Economic Analysis, the Legal Framework and Land Tenure Systems," *The Journal of Law and Economics*. Vol. 15, no. 1. pp. 259-276.

Kanazawa, Mark (1996) "Possession is Nine Points of the Law: The Political Economy of Early Public Land Disposal," *Explorations in Economic History*. Vol. 33, pp. 227-49.

Lanjouw, J.O. and Philip Levy (1999) "Untitled: A Study of Formal and Informal Property Rights in Urban Ecuador" (forthcoming World Bank Working Paper).

Larson, Janelle (1996) "An Analysis of the Land Titling Project in Honduras," Mimeo, Department of Agricultural Economics, Pennsylvania State University.

Lastarria-Cornhiel, Susana and Grenville Barnes (1995) "Assessment of the Praedial Property Registration System in Peru," Report to GTZ. The Land Tenure Center, University of Wisconsin-Madison.

Libecap, Gary D. (1989) *Contracting for Property Rights*. (New York: Cambridge University Press.)

Midot-Adholla, Shem, Peter Hazell, Benoît Blarel and Frank Place (1991) "Indigenous Land Rights Systems in Sub-Saharan Africa: A Constraint on Productivity?" *The World Bank Economic Review*. Vol. 5, no. 1. pp. 155-175.

Place, Frank and Peter Hazell (1993) "Productivity Effects of Indigenous Land Tenure Systems in Sub-Saharan Africa," *American Journal of Agricultural Economics*. pp. 10-19.

Platteau, Jean-Philippe (1992) "Formalization and Privatization of Land Rights in Sub-Saharan Africa: A Critique of Current Orthodoxies and Structural Adjustment Programmes," STICERD Working Paper no. 34, London School of Economics.

Rivers, D. and Q.H. Vuong (1988) "Limited Information Estimators and Exogeneity Tests for Simultaneous Probit Models," *Journal of Econometrics*. Vol. 39, no. 3, pp 347-66.

Roth, Michael, Jon Unruh and Richard Barrows (1994) "Land Registration, Tenure Security, Credit Use, and Investment in the Shebelle Region of Somalia," Chapter 9 in Bruce and Migot-Adholla (eds.) *Searching for Land Tenure Security in Africa*. Dubuque, Iowa: Kendall/Hunt Publishing Company.

Wachter, Daniel (1992) "Land Titling for Land Conservation in Developing Countries?" Environment Department, Policy and Research Divisional Working Paper No. 1992-28. Washington D.C.: The World Bank.

Wachter, Daniel and John English (1992) "The World Bank's Experience with Rural Land Titling," The Environment Department, Policy and Research Divisional Working Paper No. 1992-35. Washington D.C.: The World Bank.

World Bank (1994) *World Development Report*. Washington, D.C.

## Appendix

Using the model described in Section III, we first derive outside buyers' expectations about a seller's level of  $\theta$ , a characteristic which is, to them, unobservable. We use this to determine the maximum price,  $\bar{P}$ , that an outsider buyer would pay for the seller's property. Using the assumption that a transaction is possible whenever  $\underline{P} \leq \bar{P}$ , we then find the necessary wedge between  $U_S$  and  $U_B$  needed for a trade to occur. This is denoted  $\gamma^{\rho}$ . In the second and third subsections we examine the comparative static effects of changes in ownership claims on the probability of being able to transact, and on transaction prices.

### *The Calculation of $E[\theta]$ and $\gamma^{\rho}$*

As discussed in Section III, the maximum price that an outside buyer would be willing to pay for a property is  $\bar{P} = E[\theta]U_B$ . To determine this price, the buyer must form an expectation of  $\theta$ . As in a 'Lemons' model (Akerlof, 1970), because of adverse selection the average quality of the seller households which would agree to sell at a given price  $P$  is itself a function of the price. Specifically, at  $P$ , the maximum level of  $\theta$  that a household could have and still be willing to sell is  $\theta^* = \min[\frac{P}{U_S}, 1]$  (see Equation 4). For expositional simplicity we assume here that  $\varepsilon_S = 1$ , for all  $S$ , so that  $U_S$  depends only on observables, allowing us to write:

$$E[\theta | P, U_S] = \int_{\underline{\theta}}^{\theta^*} \theta u(\theta) d\theta = \begin{cases} \frac{1}{2} [\underline{\theta} + 1] & \text{if } U_S < P \\ \frac{1}{2} [\underline{\theta} + \frac{P}{U_S}] & \text{if } U_S \geq P, \end{cases} \quad (\text{A.1})$$

where  $u(\cdot)$  is a uniform distribution from  $\underline{\theta}$  to 1. When  $U_S < P$  there is no selection - the buyer knows that even the most reliable sellers would be in the market at this price. These definitions of  $E[\theta]$  generate two definitions of  $\bar{P}$ ,  $\bar{P}_1$  and  $\bar{P}_2$ , as follows:

$$\bar{P} = \begin{cases} \bar{P}_1 = U_B \frac{(1 + \underline{\theta})}{2} & \text{if } U_S < \bar{P}_1, \text{ and} \\ \bar{P}_2 = U_B \frac{(\underline{\theta} U_S)}{2U_S - U_B} & \text{if } U_S \geq \bar{P}_2. \end{cases} \quad (\text{A.2})$$

$$\text{Now, } \begin{aligned} U_S < \bar{P}_1 &\Rightarrow U_S < \bar{P}_2 \\ U_S > \bar{P}_1 &\Rightarrow U_S > \bar{P}_2 \\ U_S = \bar{P}_1 &\Rightarrow U_S = \bar{P}_2, \end{aligned}$$

which together imply that, for a given  $U_B$  and  $\underline{\theta}$ , there exists a unique  $\bar{P}$  for each  $U_S$ . It is defined as  $\bar{P} = \min[\bar{P}_1, \bar{P}_2]$ .<sup>32</sup>

Assuming that a trade will occur whenever  $\underline{P} \leq \bar{P}$ , it follows from this definition that a transaction is possible with a buyer who is an outsider whenever

$$U_B \geq \left[ \frac{2\theta}{\underline{\theta} + \theta} \right] U_S = \left[ \frac{2\underline{\theta} + 2R_S(1-\underline{\theta})}{2\underline{\theta} + R_S(1-\underline{\theta})} \right] U_S = \gamma^\rho U_S. \quad (\text{A.3})$$

### ***Comparative Statics: The Ability to Transact***

We consider first the effect of an increase in the strength of non-transferable claims on the probability,  $q$ , of being able to sell a property to a potential buyer of type  $i$  (see Equation 7 for the definition of  $q$ ):

$$\frac{\partial q}{\partial C_S^N} = -f(\cdot) \left[ \frac{\partial \ln v(C_S^N, C^T)}{\partial C_S^N} - \frac{\partial \ln v(C_B^N, C^T)}{\partial C_S^N} + \frac{\partial \ln \gamma^i}{\partial \underline{\theta}} \frac{\partial \underline{\theta}}{\partial C_S^N} \right] < 0. \quad (\text{A.4})$$

The first term in the square brackets is positive, but the second is always zero: buyers do not get security benefits from increases in the non-transferable claims of the seller. The third term is zero for  $F$  buyers but is positive for outside buyers: with the claims of the seller increasing relative to those of the buyer, the transfer uncertainty of the buyer rises (see Assumptions Set 2). In any matching of buyers and sellers the likelihood that they will be able to contract will fall in the non-transferable claims of the current owner.

Now consider the effect of an increase in transferable claims,  $C^T$ , on the probability of being able to sell a property:

$$\frac{\partial q}{\partial C^T} = f(\cdot) \left[ \frac{\partial \ln v(C_S^N, C^T)}{\partial C^T} - \frac{\partial \ln v(C_B^N, C^T)}{\partial C^T} + \frac{\partial \ln \gamma^i}{\partial \underline{\theta}} \frac{\partial \underline{\theta}}{\partial C^T} \right] > 0. \quad (\text{A.5})$$

Both of the first two terms in the square brackets are now positive. The seller is more demanding as his security increases, but now the buyer is willing to pay more since he too would receive the utility benefit of greater security. Their relative size depends on  $C_S^N$  and  $C_B^N$ . If  $C_S^N = C_B^N$  then the first two terms cancel. To go further, recall that an increase in one type of ownership claim has a lesser effect when other claims are stronger (see Assumptions Set 1). Thus, if the seller has non-transferable claims which are lower than the median level for potential buyers, an increase in

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<sup>32</sup> If one relaxes the assumption that  $\varepsilon_S = I$ , the outside buyer can condition only on the observable characteristics of the seller's utility,  $v_S$ , when forming his expectation of  $\theta$ , and  $\varepsilon_S$  is integrated out. This leads to the following form for  $\bar{P}$ , which is an average of  $\bar{P}_1$  and  $\bar{P}_2$ :

$$\bar{P} = \bar{P}_1 G \left[ \frac{\bar{P}_1}{v_S} \right] + \int_{\bar{P}_1/v_S}^{\infty} \bar{P}_2(\varepsilon_S) dG(\varepsilon_S), \text{ where}$$

Where  $G(\cdot)$  is the cumulative distribution function for  $\varepsilon_S$ . Derivations become notationally cumbersome and no additional insights are obtained from this more general formulation, so we maintain the assumption that  $\varepsilon_S = I$  in the text.

$C^T$  will have a more pronounced impact on the seller than on most buyers and the first term will, more than half the time, dominate the second: perversely, the likelihood of a transaction with a randomly arriving potential buyer will fall. If the selling household has strong non-transferable claims the second term will most often dominate: the likelihood of a transaction will rise. The third term captures the change in transfer uncertainty. It is zero for  $F$  buyers but positive for outside buyers, facilitating exchange (Assumptions Set 2).

To contrast the effect of enhanced transferable claims on the ability to sell of households with differing levels of non-transferable claims consider:

$$\frac{\partial^2 q}{\partial C^T \partial C_s^N} = -f(\cdot) \left[ \frac{\partial^2 \ln v(\cdot)}{\partial C^T \partial C_s^N} + \frac{\partial^2 \ln \gamma^i}{\partial C^T \partial C_s^N} \right] > 0. \quad (\text{A.6})$$

The cross-partial is strictly positive. Together with the comments under (A.4), this suggests that an increase in  $C^T$  will have a positive effect on the probability of being able to sell among households with strong  $C^N$ . There will be a lesser effect of  $C^T$  on the ability to sell among households with weak  $C^N$ , possibly even negative within families.

We analyze the rental market similarly (but only sketch out the results here). The important distinction between the markets is that a rental contract is for a temporary transfer. As a result, the concern about transfer uncertainty switches to the seller, who expects to retrieve his property after the rental period. Letting  $\theta$  continue to represent the probability that a transaction is honored, a condition like Equation (6) again applies, with  $\gamma \geq 1$  and decreasing in  $\theta$ . The sole difference is that  $\theta$  is now increasing in  $C_s^N$ , that is, a stronger seller improves the chance that a contract is honored. The comparative static results of changes in  $C^T$  and  $C_s^N$  on the probability of being able to rent are the same as those discussed above for the probability of being able to sell, except for the third, transfer uncertainty, term. The effect of  $C^T$  working through the third term continues to be positive but, unlike for sales, having transferable claims increases the probability of being able to rent more for households who have weak non-transferable rights. The effect of  $C_s^N$  working through the third term switches signs to become positive.

### ***Comparative Statics: Transactions Prices***

What happens to observed transactions prices when formal rights,  $C^T$ , are increased?<sup>33</sup> Taking logs of the price equation, we can write the resulting percentage change in the price between the household and a given buyer as follows:

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<sup>33</sup> Equations (A.7) and (A.8), which follow, describe changes in the transaction price between the household and a given buyer. In general, determining the change in the expected price requires us to consider also changes in the pool of buyers: that is, those who satisfy the criterion in Equation (6). When price is the seller's price, the distribution of  $U_B$  in the pool does not matter so (A.7) and (A.8) capture all effects. For  $\bar{P}$ , changes in  $C^T$  and  $C_s^N$  imply changes in the composition of buyers making a transaction. We assume that this 'selection effect' is small as its inclusion requires integrating over all unknown distributions of claims.

$$\frac{\partial \ln \underline{P}}{\partial \underline{C}^T} = \frac{\partial \ln \theta}{\partial \underline{\theta}} \frac{\partial \underline{\theta}}{\partial \underline{C}^T} + \frac{\partial \ln U_s}{\partial \underline{C}^T} > 0. \quad (\text{A.7})$$

The fall in transfer uncertainty associated with formal rights means that, in expectation, ‘more’ of the property is being sold (the first term). The enhanced security conferred by formal rights also makes the seller more demanding (the second term). For both reasons, price increases in formal rights. However, it is not clear from the model how the importance of formal rights will change with the strength of non-transferable rights:

$$\frac{\partial^2 \ln \underline{P}}{\partial \underline{C}^T \partial \underline{C}_s^N} = \frac{\partial^2 \ln \theta}{\partial \underline{C}^T \partial \underline{C}_s^N} + \frac{\partial^2 \ln U_s}{\partial \underline{C}^T \partial \underline{C}_s^N} > < 0. \quad (\text{A.8})$$

To the extent that transfer uncertainty is an issue, the first term in (A.8), which is positive, suggests that more authoritative households will find formal rights particularly useful in attaining high prices for their properties. The second term is negative, however. Strong households experience less of an increase in their security when they obtain formal rights and so become, relatively, less demanding.

We now consider the upper bound for the transactions price,  $\overline{P}$ , where the seller obtains all of the surplus from transactions. This price is either  $\theta U_B$ , if it is an  $F$  buyer, or as defined above, if an outside buyer. Under this alternative assumption about the division of the surplus we have, for  $F$ :

$$\frac{\partial \ln \overline{P}}{\partial \underline{C}^T} = \frac{\partial \ln \theta}{\partial \underline{\theta}} \frac{\partial \underline{\theta}}{\partial \underline{C}^T} + \frac{\partial \ln U_B}{\partial \underline{C}^T} > 0, \text{ and} \quad (\text{A.9})$$

$$\frac{\partial^2 \overline{P}}{\partial \underline{C}^T \partial \underline{C}_s^N} = \frac{\partial^2 \ln \theta}{\partial \underline{C}^T \partial \underline{C}_s^N} \geq 0.$$

Again price is increasing formal rights. In this case, we also have the unambiguous result that formal rights will have a greater effect on the sale price for households with strong non-transferable rights because the two types of rights only interact in the reduction of transfer uncertainty.

For outside buyers, the change in price depends on whether  $\overline{P}_1$  or  $\overline{P}_2$  applies:

$$\frac{\partial \ln \overline{P}_1}{\partial \underline{C}^T} = \left( \frac{\underline{\theta}}{1 + \underline{\theta}} \right) \frac{\partial \ln \theta}{\partial \underline{C}^T} + \frac{\partial \ln U_B}{\partial \underline{C}^T} > 0, \text{ and} \quad (\text{A.10})$$

$$\frac{\partial \ln \overline{P}_2}{\partial \underline{C}^T} = \frac{\partial \ln \theta}{\partial \underline{C}^T} + \frac{\partial \ln U_B}{\partial \underline{C}^T} + \delta \left[ \frac{\partial \ln U_B}{\partial \underline{C}^T} - \frac{\partial \ln U_s}{\partial \underline{C}^T} \right] > < 0,$$

$$\text{where } \delta = \frac{U_B}{2U_s - U_B} \geq 1.$$

$$\text{Both } \frac{\partial^2 \ln \bar{P}_1}{\partial \mathcal{C}^T \partial \mathcal{C}_S^N} \text{ and } \frac{\partial^2 \ln \bar{P}_2}{\partial \mathcal{C}^T \partial \mathcal{C}_S^N} > 0.$$

When  $\bar{P}_1$  applies, increasing formal rights unambiguously increases the transactions price. When  $\bar{P}_2$  applies it is less clear cut.<sup>34</sup> The first two terms in the derivative are positive. However, the effect of formal rights on price is also sensitive to the relative change in the utilities of buyer and seller (the value in square brackets). The reason for this is that a fall in  $U_S$  relative to  $U_B$  ensures a better quality pool of sellers (with lower  $U_S$  they lose less from giving up their properties, so more reliable sellers remain in the market). This lessens the asymmetric information problem and thereby raises the maximum offer of the buyer. The sign of the term in square brackets is positive or negative as the observable part of the buyer's utility,  $v_B$ , is less or greater than that of the seller,  $v_S$  (because of the negative cross-partial - see Assumptions Set 1). Thus, as in the previous subsection, if the non-transferable claims of the seller are higher than the median buyer, this term will most often be positive. If lower, then it will most often be negative. On this account, for a given set of buyers, formal rights will have a larger impact on price among more authoritative selling households. In neither case is it possible to sign the second derivative.

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<sup>34</sup> Relaxing the assumption that  $\varepsilon_S = 1$ , as in the previous footnote, we have

$$\frac{\partial \ln \bar{P}}{\partial \mathcal{C}^T} = \frac{\bar{P}_1}{\bar{P}} \left\{ G \left[ \frac{\bar{P}_1}{v_S} \right] + \frac{\partial \ln \bar{P}_1}{\partial \mathcal{C}^T} \right\} + \int_{\bar{P}_1/v_S}^{\infty} \frac{\bar{P}_2(\varepsilon_S)}{\bar{P}} \frac{\partial \ln \bar{P}_2(\varepsilon_S)}{\partial \mathcal{C}^T} dG(\varepsilon_S).$$

| <b>Table A.1<br/>Comparative Statics</b>                         |                |                  |                |                  |
|--|----------------|------------------|----------------|------------------|
|  | <b>Sales</b>   |                  | <b>Rental</b>  |                  |
|  | <b>F&amp;F</b> | <b>Outsiders</b> | <b>F&amp;F</b> | <b>Outsiders</b> |
| $\frac{\partial q}{\partial C_s^N}$                              | -              | --               | -              | 0?               |
| $\frac{\partial q}{\partial C^T}$                                | 0?             | +?               | 0?             | +?               |
| $\frac{\partial^2 q}{\partial C^T \partial C_s^N}$               | +              | ++               | +              | 0?               |
| $\frac{\partial \ln \underline{P}}{\partial C^T}$                | +              | +                |                |                  |
| $\frac{\partial \ln \underline{P}}{\partial C^T \partial C_s^N}$ | 0?             | 0?               |                |                  |
| $\frac{\partial \ln \bar{P}}{\partial C^T}$                      | +              | 0?               |                |                  |
| $\frac{\partial \ln \bar{P}}{\partial C^T \partial C_s^N}$       | +              | 0?               |                |                  |

**Table A.2**  
**Instrumental Variable Probit<sup>a</sup>**  
**The Ability to Contract with Strangers (*Either Rent or Sell*)**

| <u>Variable</u>                                    | <u>First Stage Regression</u> |             | <u>Second Stage Probit</u> |             |
|--|-------------------------------|-------------|----------------------------|-------------|
|  | <u>Coefficient</u>            | <u>S.E.</u> | <u>Coefficient</u>         | <u>S.E.</u> |
| <b>ln(age)</b>                                     | <b>0.19</b>                   | <b>0.09</b> | <b>1.23</b>                | <b>0.53</b> |
| <b>community organizer</b>                         | -0.01                         | 0.22        | <b>1.48</b>                | <b>0.84</b> |
| formal enforcement                                 | -0.02                         | 0.07        | 0.11                       | 0.36        |
| <b>invasion resisted</b>                           | -0.10                         | 0.08        | -0.44                      | 0.28        |
| private land                                       | -0.03                         | 0.07        | -0.02                      | 0.25        |
| title  |                               |             | 2.68                       | 1.72        |
| <b>ownership document</b>                          | <b>0.33</b>                   | <b>0.08</b> | -0.24                      | 0.43        |
| <b>title*age</b>                                   |                               |             | <b>-0.11</b>               | <b>0.03</b> |
| <b>title*organizer</b>                             |                               |             | <b>-1.99</b>               | <b>1.06</b> |
| <b>organizer*age</b>                               | -0.00                         | 0.01        | <b>-0.11</b>               | <b>0.06</b> |
| <b>govt titling prgm</b>                           | -0.05                         | 0.08        | <b>-0.75</b>               | <b>0.28</b> |
| <b>paid boss (household)</b>                       | 0.01                          | 0.07        | -0.18                      | 0.26        |
| ln(years resident)                                 | <b>0.08</b>                   | <b>0.04</b> | -0.15                      | 0.14        |
| <b>ln(assets)</b>                                  | 0.01                          | 0.02        | <b>0.20</b>                | <b>0.08</b> |
| education > primary                                | -0.01                         | 0.06        | 0.27                       | 0.22        |
| <b>adult males</b>                                 | 0.07                          | 0.10        | <b>-1.31</b>               | <b>0.51</b> |
| title*adult males                                  |                               |             | 1.07                       | 1.31        |
| years expect to stay                               | 0.00                          | 0.00        |                            |             |
| household size                                     | -0.01                         | 0.01        |                            |             |
| <b>rooms in house</b>                              | <b>0.05</b>                   | <b>0.02</b> |                            |             |
| <b>ln(ppty tax)<sup>b</sup></b>                    | <b>-0.02</b>                  | <b>0.01</b> |                            |             |
| business tax                                       | 0.08                          | 0.27        |                            |             |
| home business                                      | -0.02                         | 0.06        |                            |             |
| home business income                               | 0.01                          | 0.05        |                            |             |
| res <sup>c</sup>                                   |                               |             | -1.43                      | 2.12        |
| <b>res*age</b>                                     |                               |             | <b>0.08</b>                | <b>0.04</b> |
| res*organizer                                      |                               |             | 1.93                       | 1.20        |
| res*adult males                                    |                               |             | -1.25                      | 1.56        |
| Adjusted R <sup>2</sup>                            | 0.34                          |             |                            |             |
| F-test of identifying variables                    |                               |             | 3.37 (p-value < 0.01)      |             |
| $\chi^2(4)$ - H <sub>0</sub> : exogeneity of title |                               |             | 6.72 (p-value = 0.15)      |             |

**Table A.2 Continued**  
**Notes**

<sup>a</sup>The first stage is a linear probability model for title, the second a probit for the ability to contract. Consistency of this 2SCML estimator requires that, given title status, the disturbances in the probit model be iid and normally distributed. A Shapiro-Francia test based on skewness and kurtosis gives p-values for the null hypothesis of normality of 0.052 and 0.33 for titled and untitled households, respectively. F-tests of the significance of community dummy variables in explaining the squared residuals give p-values of 0.06 and 0.13 for titled and untitled households, respectively. There is no evidence of a positive correlation in the disturbances coming from a community random effect – the point estimate for the intra-community correlation in residuals is -0.06. Thus, we cannot reject that the required conditions hold for both groups of households at  $\alpha=0.05$ , although the results for titled households are not strong. The marginal effects are calculated as discrete changes for dummy variables. Bold typeface indicates significance at  $\alpha=0.10$ . S.E. are estimated standard errors which take into account the two-staged procedure.

<sup>b</sup>Tax variables are actual taxes if titled and 'expected taxes if titled' for untitled households.

<sup>c</sup> Residual and residual interactions from the first-stage regression for title.