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UNTITLED:
A STUDY OF FORMAL AND INFORMAL PROPERTY RIGHTS IN URBAN ECUADOR

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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. The latter come from a variety of sources, including the activity of a local boss, or organizer. We first develop a theory of the ability to sell or rent land in which a distinction is drawn between transferable property rights (e.g., title) and non-transferable claims (e.g., length of residence). We use this theory of transactions to show that the increase in price that follows the granting of title may be an overestimate of the households' utility gain. In our empirical work 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. For example, the value of property owned by a newly established household with no adult males can increase by 46% with the acquisition of title. These findings suggest that titling programs should be targeted at young disorganized communities if they are to have much effect.

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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. The importance of these formal institutions in influencing economic behaviour and welfare depends, though, on the availability of *informal* sources of property rights. 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.[1] In this paper, we model and assess empirically the relative effects of formal and informal rights and their interactions with each other. We find that informal sources of property rights confer many of the same advantages as formal rights. Thus, as a policy matter, it is not possible to assess the importance of formalizing rights without scrutinizing the other sources of rights available to owners.

One approach to quantifying the utility conferred by a particular type of ownership right is to compare the sale value of a property with that right to that of a similar property which differs from the first only in that it does not have the same property right associated with it (via hedonic price regressions). For example, this strategy has been used to compare the value of titled versus untitled land. We develop a model of property transactions to show that the sale value of a property is a function not only of the utility conferred by ownership of the property, but also the confidence of buyers that a commitment to sell will be honored. Where there is transactions uncertainty, market prices will understate the utility derived from property ownership.

[1] 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 to ranchers on the American plains (see, for example, Ellickson, 1991, on the latter). Gambetta (1993) gives a fascinating account of the role of the Mafia as a private source of property rights in Sicily.

Formalizing rights may reduce this uncertainty, thereby lessening the degree to which prices understate utility. Thus, in environments characterized by such uncertainty, this effect must also be considered when interpreting a price change as a measure of the welfare gain associated with formal property rights.

Our investigation centers on land ownership in low-income communities in Guayaquil, Ecuador. 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.[2] With an overlay of community, organizer, and formally supported ownership rights, these communities are a particularly interesting setting in which to consider the interaction of multiple sources of property rights.

There is also a policy rationale for focusing on this setting, given that in recent years titling programs have been proposed, and implemented, as development projects. Since 1992 the Municipality of Guayaquil has itself run a titling program to formalize the rights of untitled squatters. There are numerous benefits expected from such a program. Granting households title could increase their tenure security. This is valued by households because it helps them avoid the potential disruption associated with sudden eviction. In addition, long term tenure security allows a household to capture the benefit of long term durable investments in housing quality and to contribute to the

[2] As noted below, organizers are typically politicians. 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.

creation and maintenance of community assets. By clarifying ownership rights and making those rights transferable, titling is expected to lower transactions costs in the land market. This is clearly useful to households with an interest in moving to another location--but is also important to new arrivals in the city who are themselves searching for low cost housing. Even for households who never intend to sell, the ability to alienate property may permit the use of land as collateral for formal loans. Thus, granting title not only would 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.[3] 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. We investigate both households' security of tenure and the operation of property markets. Our model of property transactions demonstrates that it is important to recognize that ownership claims differ in an important sense: some are transferable and others are not. The key, and counter-intuitive, result of the theoretical model is that 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

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[3] A well-known Peruvian advocate of property rights, Hernando de Soto, has pursued the idea that, given the expanded markets that the titling of squatter neighborhoods would create for banks and utility companies, it might be possible to enlist their aid in underwriting some of the costs of titling (*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).

after a ‘sale’, potential buyers face greater contract uncertainty when transacting with households that have strong non-transferable rights. 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 provide evidence that transaction uncertainty does, in fact, impede the operation of the land market, and thus that this theoretical distinction is important in understanding the role of formal property rights. The empirical evidence is based on the idea that some household characteristics, such as wealth, education, and demographic structure, may improve the ability of a household to use informal mechanisms to support its ownership claims. These household characteristics are clearly non-transferable. We identify households with only females and children as being more vulnerable, in the sense of having low levels of such authority-based, non-transferable rights, and find that non-transferable rights have the predicted, differing, impacts on the ability to transact in the sale and rental markets.

We also estimate hedonic price equations to capture the aggregate effect of different types of rights on welfare. Typically, the estimation of hedonic price equations requires dealing with both unobservable quality characteristics and the endogenous nature of title. With 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.

Recognizing that changes in property rights affect both utility and the level of transactions uncertainty, our results suggest that households in these low-income communities obtain, on average, only a moderate increase in utility from owning a property which is titled (an upper bound improvement of 23.5%). However, 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. (Households in communities only one year old and with no organizer gain as much as 47.3 percentage points more from title 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 positive distributional effects resulting from titling programs. Together, these 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 welfare.

Thus, the results shed light on the type of communities and households which would benefit most from a policy of formalizing rights. However, even when positive, such that a titling programs would appear, on the face of it, an attractive option, it must be recognized that obtaining title is not costless to households, nor is establishing an effective system of formal property rights.[4] We present evidence about the time taken to obtain a title and the costs to squatter households, and find the latter to be equivalent, on average to annual per capita consumption. Social costs are also not negligible. In recent reviews of World Bank-funded titling projects the authors emphasize the consistent underestimation by project managers of the substantial investments in institution building, and the political will, required for the task, a fact leading to substantial cost overruns on all projects (see, for example, Wachter and English, 1992; Holstein, 1993, and the evaluation reports cited therein). Thus, policymaking requires empirical information about when the size of the benefits might be large enough to justify efforts to accelerate titling.

[4] Observers of the African experience suggest that one cannot assume that 'benefits' will 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.

Previous empirical studies of the role of formal property rights have typically not taken into account the complex interaction between formal and informal systems of rights, lacking measures which capture the variety of sources of ownership claims. [5] However, 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, *et. al.* (1991), and Carter, Wiebe and Blarel (1994). It is formalized in Alston, Libecap and Schneider (1996) who interact title with distance from a market in land value estimations; and in Carter and Olinto (1996) who allow household characteristics to influence credit constraints in a multiple equation model of investment. The latter emphasize that household characteristics, notably wealth, may affect the value of title (and they estimate a positive interaction). However, their argument centers on the influence that these characteristics have in determining credit access--it is not through any effect on informal property rights. [6]

In estimates of the effect of land rights on investment in Africa, Besley (1995) includes, in addition to formal title, both household and plot characteristics which might affect the degree of control over property. However, he does not allow for

[5] 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, et. al., *1988*, and see also Hoy and Jimenez, 1997).

[6] Classifying households which use suboptimal levels of variable inputs as credit constrained, López (1995) also finds that such constraints are less likely to be a problem for households which are titled, and, in his data, for households where the head is well-educated. He evaluates the increase in income obtained by the increase in the probability that optimal levels are used times the associated increase in agricultural income. Although he does not calculate it explicitly, title will have different effects for households of different education levels. But again, the interaction between the household characteristic and title comes through the operation of the credit market rather than through any effect on alternative sources of property rights.

interactions between formal and informal sources of rights. All of these studies have focused exclusively on rural areas.

Jimenez (1984) and Fridman, Jimenez and Mayo (1988) estimate hedonic price regressions for urban areas of the Philippines which are closest to those presented here. 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 ours, support this contention. They do not, however, go any further to explore other features of communities which might affect property rights. As here, they also find that household characteristics affect the price premium associated with of title, but their rationale for this finding is quite different from that suggested here. 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. Given that many of our households obtained their properties in invasions, and that they tend to have had long periods of tenure, the type of sorting implied in the locational choice model may be less relevant in our context. It is, however, not possible to distinguish between these two interpretations of the effect of household characteristics on value based 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.

In the following section we develop a model of land transactions. We use the model to investigate the theoretical links between different types of property rights in influencing both the ability to transact in property and the market value of property. In

Section III we discuss the data in some detail and, in particular, 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 IV to VI 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. In Section VII we examine the costs to residents of titling, and Section VIII concludes with a discussion of the welfare and policy implications of the survey results.

II. A Model of Property Transactions

In this section we develop a model of property transactions. We first present the model under the assumption that each household has at most one property and expects to engage in a single property transaction. We 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 improvements in property rights. We then discuss how the results would differ for a rental market. Next we consider how improvements in formal property rights might change the price at which transactions occur. In the final subsection we allow for the fact that households may have occasion to want to sell and rent other properties or goods. Then, a household's behaviour during one transaction may affect its ability to transact elsewhere as well informed buyers respond to past actions. Assuming that households are aware of the spillover across markets, they will adjust their behaviour in the market for the first property accordingly. We show that this extension re-

enforces the comparative static results found in the one property, one transaction, model. Most of the calculations have been relegated to a technical appendix.

The Model

Consider a (single) property-owning household. In order for the household to sell its property, it must be able to find an acceptable buyer. We assume that there is a flow of potential buyers into the household's community and consider the probability that a transaction will be possible between the household and any random potential buyer. A transaction will be deemed 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, $\overline{P}$.

Let U_h be the discounted expected stream of utility that household h derives from a given property. U_h is defined in monetary units and is assumed to be separable from income and other goods. The level of expected utility will depend upon the qualities, Q, of the individual property, and of the community in which it is situated. Greater ownership security will also increase the utility derived from property: 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 a household is able to maintain its ownership claims against the government, neighbors, and family.

This 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.[7] This may be a function of various household characteristics, the support it receives from an organizer and its formal rights to the property. Although all of these sources of ownership claims, *C*, contribute to security, they differ in an important sense. Some of them are transferable and others are not. For example, if a household is able to assert its authority because it is headed by a wealthy, well-educated male, or because it has been resident on the property for many years, its security of ownership may be strong. The household would not, however, be able to convey these ownership advantages to a buyer of its property. Further, not only can a household not give these advantages to a buyer, it can also cannot commit to forsaking the use of its advantages to reassert its rights over the property after a 'sale'. The fear of a previous occupant reasserting a claim might be particularly worrisome to a household considering the purchase of an untitled property if a titling program is actively underway in the community, since these efforts may lead to the previous occupants' claims being given an official status, and quickly. At the other extreme lie claims derived from having a formal property title, which are relatively easy to transfer credibly. Rights derived from an organizer lie somewhere in between. If the organizer does not support a transfer then they are non-transferable claims, which we shall denote C^N, while if he agrees to a transfer then these rights are, like title, transferable, C^T.

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

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

[7] Formal and informal sources of claims will contribute to security only if they are both available and 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. The importance of this consideration is suggested by the fact that even in our formally settled and titled communities at least 15% of respondents named the mediation of a community leader as the primary mode of dispute resolution. Of course, a title deed may contribute to *informal* rights if makes community recognition more likely, even if the cost of formal enforcement is prohibitive.

and expected utility as:

$$U_h = U(S_h(C_h^N, C^T), e_h; Q) = n(C_h^N, C^T; Q)\, e_h, \text{ where} \qquad (2)$$

e_h captures any unobservable factors which contribute to the utility that household h derives from the property, and is assumed to have a proportionate effect.

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

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 will 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 the utility that each party would derive from the property. If property rights were perfect, this utility would depend only on attributes of the property - location, size, amenities, and so on. With imperfect property rights, we consider two additional factors that enter a household's valuation of a property. First, there is the probability that it 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 q. In a one property, one transaction, world, a selling household will, with probability one, *try* to reassert its claims (a feature which goes away once we allow for reputational concerns below). 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 qS_h.

In the following discussion we assume that full payment is made by a buyer at the time of sale in order to focus attention on the buyer's uncertainty about whether the seller will be successfully in his attempt to reclaim the property after the transaction. Success will be determined in part by the types of observable claims that each party can bring to bear on the property, both transferable and non-transferable. It will also depend on unobservable factors which affect the seller's ability to reclaim property. Let R_S be an indicator, assumed to be uniformly distributed between zero and one, of a selling household's (unobservable) reliability in making transactions.[8] Define q_{SB} as the probability that a transfer of property between seller *S* and buyer *B* will be honored. Let $\underline{q}_{SB}$ be the lowest level that q_{SB} can take on, given the observed characteristics of the buyer and seller. That is, $q_{SB} = \underline{q}_{SB}$ when $R_S = 0$. q_{SB} is modeled as follows:

$$q_{SB} = R_S(1 - \underline{q}_{SB}) + \underline{q}_{SB} \qquad (3)$$

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

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

Assumptions Set 2: $\dfrac{\partial \underline{q}}{\partial C^T}$ *and* $\dfrac{\partial \underline{q}}{\partial C_B^N} > 0$, $\dfrac{\partial \underline{q}}{\partial C_S^N} < 0$ *and* $\dfrac{\partial^2 \underline{q}}{\partial C^T \partial C_S^N} > 0$.

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[8] 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, as sellers are far more likely to have hidden information about the history of the property and the community which is of relevance to determining ownership claims.

Thus, for example, 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 $\underline{q}$. When $\underline{q} = 1$, a property transaction will be honored with certainty.

With this in hand, we now consider the minimum price that would be acceptable to a selling household and then the maximum price that would be offered by a potential buying household. These bounds are used to determine the probability that two households are able to transact.

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, $(1-q)U_S$, is at least as high as the utility it receives from retaining the property:

$$(1 - q)U_S + P \geq U_S . \qquad (4)$$

It follows that the minimum sale price which would be acceptable to the seller is $\underline{P} = qU_S$. 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, $E[q]$, is greater than the price. Thus, the potential buyer will be willing to purchase the property if and only if:

$$E[q]U_B - P \geq 0. \qquad (5)$$

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

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 q. The second type of potential buyers are outsiders (O) who do not know the unobservable reliability of the seller household and thus do not know q. These buyers must form an expectation of q 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 $\underline{P} \leq \overline{P}$, 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:

$$U_B \geq g^i U_S, \quad i = F, O. \tag{6}$$

where the superscripts F and O represent friends and family and outside buyers, respectively. $g^F = 1$ and $g^O(R_S, \underline{q}) \geq 1$. (See the Appendix for the formula for g^O.) g 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.[9] 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*. The reason is that any uncertainty can be accommodated, to the buyer's and seller's mutual satisfaction, by adjusting the price. The size of g^O is decreasing in the amount of uncertainty and, as $\underline{q} \to 1$, $g^O \to g^F$. This result highlights one of the advantages of being able to commit credibly to

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[9] Transactions costs would increase the minimum distance between U_S and U_B required for a sale, adding to g such that $g^i > 1$, all i. As a result, with transactions costs 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 tend to be strengthened by the inclusion of transactions costs in the analysis.

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 g^O, we assume in the Appendix that $e_S = 1$, all S. Maintaining this assumption, inserting the definition of expected utility in (2) into condition (6), and taking logs of both sides:

$$q = 1 - F[lnn(C_S^N, C^T) - lnn(C_B^N, C^T) + lng^i], \qquad (7)$$

where F[] is the cumulative density function of lne_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, g. It is increasing in the observable utility, n, 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 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 them.

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 - $\overline{P}$, the highest price that the buyer is willing to pay and $\underline{P}$, the lowest price that the seller would accept. We are agnostic about where in the interval $P \hat{I} [\underline{P}, \overline{P}]$ the transaction price will lie.

In the Appendix we show that $\underline{P}$ will unambiguously increase with C^T, since both U_S and $\underline{q}$, and thus q, increase with more formal property rights. When we consider $\overline{P}$, 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 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.[10] 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.

Multiple Transactions

We now relax the assumption that households expect to engage in, at most, one property transaction. For simplicity, assume that each household *S* has, in addition to its first property, one other property (or durable good) which it may wish to sell. Ownership of this second property gives it a discounted stream of utility U_{S2} (all variables pertaining to the second property will be subscripted by '*2*') The same security considerations which apply to sales of the original property also apply to sales of this second property.

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 the buyer after a sale, it is punished by being blocked from engaging in further property transactions with friends and family. This is regardless of whether it is ultimately successful in its efforts to reclaim the first property.[11] Because transactions in the market for the

[10] 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.

[11] We assume that this information is known only to friends and family, but clearly information about attempts to reclaim could be more widespread in the community,

original property now have implications for the sale of other goods, it may no longer be optimal for every seller to attempt to reclaim its first property. If it tries to reclaim and is successful it gains the original property, but this behaviour now has a cost: the household is not able to sell other pieces of property to friends and family members. [12] If the property market is such that at least some of the surplus generated by an exchange is allowed to stay with the seller, then being closed out of these markets may entail giving up gains from trade. We examine the tradeoff when it is most acute -- when all potential buyers are friends or family so that an attempt to reclaim closes off all possibility of future trade. To the extent that there is a pool of uninformed outside buyers available, the incentive to maintain good behaviour would be correspondingly diminished.

We consider a sellers' market, where transactions occur at price $\overline{P}$. When a household tries to reclaim its first property, it receives the payment from the buyer, $\overline{P}$. It also obtains utility from owning the first property if it is successful in reclaiming it, which occurs with probability *(1-q)*. Finally, since by this behaviour it is unable to sell its second piece of property, it obtains utility U_{S2} from continuing to own it. Thus, the household's expected total returns are,

$$\overline{P} + (1-q)U_S + U_{S2}. \qquad (8)$$

If the household does *not* try to reclaim its first property, its expected returns are

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making it of greater importance to the seller to behave honestly.

[12] The equilibrium described is not subgame perfect, as some F members may wish to transact with a seller who has attempted to reclaim. Punishment is supportable in an infinite repeated game which includes other interactions among the parties. The exact punishment is not critical to our results, just that there is one and that it increases in the potential gains from trade in property.

$$\overline{P} + E[\max\{U_S, \overline{P_2} + (1\text{-}q)\, U_{S2}\}]. \qquad (9)$$

The household gives up the first property for the payment $\overline{P}$, but now may gain some surplus from a sale of the second. (Here, with only two goods, the household has no reason to refrain from trying to reclaim after the second transaction.)

The household will try to reclaim its first property if and only if its expected returns from doing so, Equation (8) are greater than it returns from refraining, Equation (9), or whenever,

$$(1\text{-}q)U_S > \int_{-\infty}^{\infty} \int_{D}^{\infty} q\{n_{B2}e_{B2} - U_{S2}\} dF(\ln e_{B2})\; dH(C_B^N). \qquad (10)$$

(See the Appendix for details.) The LHS of (10) measures the expected gain to trying to regain the first property, while the RHS measures the expected gains from trade of the second good available if the household preserves its reputation for reliability.

This inequality may or may not hold. Thus, an important implication of the extension to multiple goods is that it is no longer *necessarily* optimal for all households to try to reclaim their property after a sale. In fact, it may be a rare occurrence. This would be particularly true if households have many goods, providing opportunities for gains from trade. The costs of a poor reputation would also be particularly severe if there was a high probability of U_{S2} becoming small, for example, because of the household moving to another location and being unable to take its property along.

Whether the inequality in (10) holds will depend, like q, on the ownership claims of the seller. Let $l(C_S^N, C^T)$ denote the probability that the inequality holds, making an attempt to reclaim the optimal strategy. Then the probability that a selling

household both tries, l, and is successful, $(1-q)$, in reclaiming its first property after a sale is $l(1-q)$.

Derivations of transactions probabilities and prices in this multi-good case follow those in the simple, one property, model, with q replaced by $[(1-l) + lq]$.[13] It follows that, if the effect of ownership claims on l has a sign opposite to that of the effect of ownership claims on q, all of the results for the single property model go through and are simply accentuated by the introduction of reputation effects. In the Appendix we discuss the derivatives of l in detail, and their interpretation. Here we simply note the results:

We find that $\frac{\partial l}{\partial C_S^N} > 0$, which is the opposite sign to $\frac{\partial q}{\partial C_S^N} \leq 0$.

We find that $\frac{\partial l}{\partial C^T} \gtrless 0$, but $\frac{\partial l}{\partial C^T} < 0$, which is again opposite in sign to $\frac{\partial q}{\partial C^T} \geq 0$, in situations where concern about tenure security in the absence of formal rights is low. This seems to most closely correspond to the empirical results presented below.

We find that $\frac{\partial l}{\partial C^T \partial C_S^N} < 0$, which again is opposite in sign to $\frac{\partial q}{\partial C^T \partial C_S^N} \geq 0$.

Based on these findings, we can conclude the following. When households have an interest in selling multiple goods, they have a reason to be concerned about how buyers might respond to their actions. As a result, not all households will find it optimal to *try* to take back property after it has been sold, even if they stand some

[13] It is perhaps worth noting that, although its level does not effect the decision whether to try to reclaim, $\overline{P}$ increases in value relative to the one property case. Buyers become more confident of being able to keep purchased property because they know that sellers have reason to care about their reputations.

chance of actually being successful if they were to try. Different types of ownership claims affect the likelihood that an attempt to reclaim will be made. Changes which lower the likelihood of success (increasing q) tend to lower the probability that a household will try (decreasing l). Specifically, when considering the effects of non-transferable claims, C_S^N, introducing reputational concerns unambiguously re-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.

III. The Data: Measures of Property Rights

In this section we describe the household and community surveys fielded in Guayaquil and present some descriptive statistics. We then discuss various measures of rights, bearing in mind that the strength of property rights has several distinct aspects: the clarity of the boundary definitions (what is "the property"?); clarity regarding who has ownership claims to the property, C^T and C_S^N together; and, finally, the extent to which the ownership claims may be transferred to others, C^T.

The Sample and Survey

The data analyzed in this paper derive from household and community surveys designed specifically to address the property rights issues described in the introduction. One section of the household survey is devoted to questions regarding tenure security, the ability to make property transactions, and property 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, there are several parts of the household survey closely adapted from the 1995 Ecuadorian LSMS (*Encuesta de Condiciones de Vida,* ECV) which 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 (such as whether it was originally settled by an invasion and whether an organizer was involved); as well as further details about current community characteristics.[14]

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. Table 1 indicates that, among sample households where title status is known, 45 percent were untitled at the time of the survey. The mean age of our communities is 23 years, where age is measured from the time of first settlement. These are comparable to the (unweighted) average of 53 percent of properties untitled in the population of low and middle-income communities and an average community age of

[14] 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.

21 years. [15]

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.

Sample Descriptive Statistics

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 begin their occupancy, whether on public or private land, as squatters without title. This was the case for 255, or 92 percent, of our sampled property owners. Over time they may proceed to obtain title. Almost half of the squatters in our sample were titled at the time of the survey. [16] 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.

In Table 1 we see that 116, or 82 percent, of untitled owners were in the process

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[15] 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.

[16] 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.

of trying to obtain title at the time of the survey. (This number may sound high, but since no minimum action was specified, 'trying' need not entail very active efforts.) All but two of these 116 households gave as the primary or secondary reason for their efforts the positive effect that title would have on their security of tenure.[17] This is somewhat surprising given that, as we shall see below in Section IV, most of these untitled households also stated that they viewed the likelihood of receiving an eviction notice in the coming year as very low. Together these responses suggest that, while untitled owners may not feel immediately threatened by government actions, lack of title makes them less confident of their longer term safety from the government or from losing their properties through informal pressure.

The role of title in enhancing ownership claims is also suggested in Table 1 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: 35 and 19 percent, respectively (where title status is known). 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. Breaking down the non-owners into those who pay rent and those who do not, with the latter presumably more likely to be relatives or friends of the owner, one finds that only 24 percent of those paying rent occupy untitled properties, while 37.5 percent of those not paying rent are occupying untitled properties.[18] Although this difference is not statistically significant with the small sample size (standard errors of 6.0 and 6.5 percentage points, respectively) it nevertheless suggests 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

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[17] 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.

[18] 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.

properties to relatives and friends rather than to rent them to strangers. This is consistent with two of our results in Section II: in the presence of transfer uncertainty households are more able to rent to friends and family than to outsiders, and the titling of property broadens the rental market.

Only eight households explicitly mentioned wanting a title for collateral purposes, although an additional six households stated an interest in having a formal document of ownership, quite possibly for the purpose of mortgaging the property. Only three households mentioned trying to obtain title for the purpose of selling their properties. This is consistent with a long expected residence reported by the sampled households (see below, Table 3).

Twenty-three of the untitled owners not attempting to obtain a title to their properties gave a reason for their lack of action. Of these, fourteen stated that they were either uninterested, that they did not have sufficient time or money, or, typically, both. Two additional households stated that they were not trying because the municipality was not actively encouraging titling in their community. Since having a survey done by the municipality is one step in the titling process, having to initiate this process themselves raises residents' titling costs. It was illegal for three of the households to obtain title, in two cases because they owned other properties which disqualified them from further purchases of invaded land. Interestingly, two of the 23 respondent households stated that their reason for not seeking title was a problem with multiple claimants (family), and another two expressed a reluctance to seek title because of concerns about the response of the organizer.[19] The latter indicates that rights associated with having a community boss may sometimes be non-transferable, as discussed in Section II. Since some owners with disputed claims or potentially

[19] 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).

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, drawn primarily from the community questionnaire. 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 was a politician. 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, payments which 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 in each community which paid a boss.[20] This measure of the presence of a community authority differs from the dummy variable for the presence of 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

[20] 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.

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 which were not settled by an invasion, are encroachments by smaller numbers of squatters on fringe areas of formal 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. As one would expect, untitled squatters tend to own properties in younger communities and those which are further from the city center. The size of the lots obtained when squatting on land are far smaller than purchased, titled, properties. Households on untitled properties have heads who are only slightly younger than those on titled property. However they 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 indicator of household origin is rather a surprise given the popular conception that the source of land invasions is migration from the surrounding countryside. Just 3.5% of households owning squatted, titled, property are headed by someone who came from a rural area, while such households represent 12.3% of those

renting titled property. A similar difference exists for untitled properties. It appears that most squatters come from elsewhere in Guayaquil (or from Quito) and that, in fact, the most common source of housing for rural migrants is the rental of property. Finally, the last line of the table indicates that about 90% of the sampled households have adult male members, a characteristic which is shown to be important in the empirical results which follow.

Measures of Property Rights

Characteristics which Influence the Strength of Property Rights

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

The data include a multitude of variables which 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, such as household tenure security or titling costs, we focus attention on the limited set of variables listed above. 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 which may contribute to a household's authority or claims. These characteristics may help households assert their

rights individually. For example, we expect that households with adult males may be more able to assert their ownership claims. These variables may also indicate that the household has greater ability to access other mechanisms of property rights enforcement (via better information, media attention, contacts, bribes). For example, having been resident for a long period may improve a household's expectation of being able to call upon the informal or formal system. All of these variables are indicators of stronger but non-transferable ownership claims, C_S^N.

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.[21] 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 established, in addition, perhaps, to indicating the extent to which any specific household has claims to a particular piece of property. As discussed in Section II, 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.

III. Security

In this section we investigate how different household and community characteristics contribute to a household's feeling of tenure security or insecurity (see 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

[21] 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.

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. These two findings may be reconciled by noting that low income households may be very risk averse, making even a low probability of eviction costly in utility terms (a point formalized in Feder, *et. al.*, 1988). These subjective assessments of the risk of eviction are consistent with the recent history in Guayaquil. There have been no evictions under the current municipal administration (thus for over five years).

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, so a positive coefficient implies that a variable increases the household's feeling of security of tenure. Two of the household authority and claims variables are positive and significant (*years of residence* and *assets*). The number of years that a household has been resident has a substantial effect: a one standard deviation increase in years (6.7) increases the probability by about seven percentage points. It should be noted that the positive effect that long years of residence has on a household's declared feeling of security could have two interpretations. The length of physical possession could increase rights because of community recognition, as suggested above. However, it could also have no effect on rights but rather indicate a selection process at work. Suppose, for example, that households in the population have differing, and exogenous, probabilities of eviction in any year, because of either some household or community characteristic. Then one would expect that the households remaining after many years would tend to be those with the low eviction probabilities. In other words, in this interpretation, years of residence does not indicate an increase in a household's rights due to the passage of time, but rather signals the presence of some other feature which enhances the security

of that household.

Community age and the *formal enforcement* of disputes are both insignificant. While one would expect the clarity of property boundaries to contribute to overall security of ownership, the question analyzed here is very specifically about short-term security from government eviction. The result suggests that, for the latter, the issue is not the clarity of individual plot boundaries but whether squatters are likely to be tolerated as 'owners' of property in an area at all. The effect of having an *ownership document* on security is marked, increasing the probability that eviction is considered impossible by 17 percentage points. Like years of residence, an *ownership document* may either confer greater security or be a proxy for some unobservable characteristic related to security.[22]

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 the representation of politicians in their ranks). Although it is not quite significant, it is worth noting here 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 in above in Section III. 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

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[22] This 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 documents (Caroline Moser, personal communication.)

remaining in the protective good graces of the boss). Thus *paid boss* also enters Set I, the measures of household authority, but negatively.[23] The point 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.*

Controlling for the characteristics above, which increase informal rights and therefore security, squatter households feel significantly more vulnerable in communities where an invasion occurred on private land. Private property owners are more likely to fight in the courts to have invaders evicted.[24]

Finally, we note that invasions are characterized by large numbers of participants in order to raise the political costs of eviction (see Jimenez, 1985, for a model of optimal number, where this benefit is balanced against congestion problems associated with size). In our data we do not find any evidence that community size matters for perceived security, although this may simple be due to the fact that all of our communities are quite large. They range from 500 to 9,000 members, with a

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[23] 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 even remotely significant in this analysis so the interpretation given appears appropriate.

[24] This may seem entirely obvious but it is not: it has been noted elsewhere that 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. This would be consistent with our finding that the lot sizes in invaded communities are considerably smaller than those in communities that were formed otherwise.

median size of 2,750.

V. The Ability to Contract

One of the theoretical benefits of having a formal property title highlighted in Section II is that it facilitates 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; rent the entire house; rent rooms or make additions. 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 were viewed as hierarchical so a positive response finished the questioning.

If a household ever responded that it was able to sell, it was asked if permission was necessary in order to do so.[25] About 18 percent of the households responded that they would need permission to sell their properties, but, surprisingly, they were evenly split between titled and untitled owners. This suggests that having title to a property does not imply that the person claiming ownership has complete control over its disposal. How can one explain this? Although the numbers here are small, two pieces of evidence suggest that the distribution of decision-making power within households may be important. Eighty percent of title recipients are women (interview, Ab. Jose Javier Varas Calvo).[26] In our sample over half of the households in which the

[25] In studies using data from Africa, more freedom from requirements to obtain lineage approval for sales was used as a measure of the strength of transfer rights (Place and Hazell, 1993; Besley, 1995).

[26] Unfortunately, we do not know which family member is named in the title document

respondent claimed to need permission to sell were headed by women (compared to the one-quarter headed by women in the total sample of households) and, further, all of the female-headed households where the respondent claimed to require permission to sell were households in which an adult male was present. Thus, it appears likely that the titled households claiming to need permission to sell are either households which are headed by a male but have the property deed in the name of a woman in the household, or female-headed households where the permission of male family members must be sought for a sale.

Transactions with Friends and Family and Outsiders

We first look to see whether simple patterns in responses to questions about transactions with different parties fit the predictions of the model in Section II. Only on 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 sell to an outsider; family or friends; or to no one. We identify 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, C_S^N. If this identification is correct, the model leads to the following predictions. 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, 58% of households without males reported that they would be able to sell their property to a friend or family member versus 41% of households with an adult male. The difference grows to 58% versus 35% when asked about sales to outsiders. A second pair of predictions is that, as with sales, households with no males should

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in our sample of titled households. However, we do know that, among 103 untitled households who have some other ownership document, all of those headed by females, and one-third of those headed by males, have the document in the name of a woman in the household.

find it easier to rent--when the person renting is a friend or family member. On the other hand, 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.[27] But when asked about rental to outsiders, the advantage of female-only households disappears: 19% say that it is possible, versus 21% for households with males. The fact that the pattern of household responses matches (in point estimate) that predicted by the model, supports the inclusion of transfer uncertainty as a feature of the environment which is important to understanding the ability of households to engage in land transactions. It also supports our identification of female-only households as having weaker non-transferable ownership claims.

Transferable Claims and the Ability to Transact

We next ask how property rights affect whether a household will be able to transfer rights to its property in any form: that is either by renting out the entire house (a transfer of usage rights) or by selling it (a transfer of complete ownership rights). This is the relevant question from the point of view of a household which would like to move to another part of the city, for instance if some member has found new employment in a distant location or because the household has become wealthier over time and would like to move to a better neighborhood. In all, only 39 percent of the sampled property owners reported that they would be able to contract, either by sale or rental, with an outside buyer, and only an additional 14 percent said that they could contract with a relative or friend. Thus, while our sampled households appear to have a quite strong sense of security of tenure (Table 4), almost half of them do not think

[27] We focus here on 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.

that they would be able to transfer their rights to others, even to relatives.

Table 5 presents results of a probit in which the dependent variable takes on the value one if the household responded *either* that it could sell to an outsider or that it could rent to an outsider, or both. The title status of a property is endogenous, both because households can choose to apply for title and because the government can support or impede the process.[28] Since it is possible that unobservable characteristics of households or communities which facilitate or hinder land transfers might also influence the likelihood that a household has obtained title, we compared results with and without instrumenting for title in a linear probability model.[29] The qualitative results were very similar so we present only the probit results here.

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. When a community is eight years old (one standard deviation below the mean age), having title increases the probability of being able to

[28] This is well recognized. Besley (1997) 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.

[29] Identifying variables--distance, year of expected residence, home business ownership, and business and property tax levels-were jointly significant at $a < 0.01$. We also tested for exogeneity of title more formally using a procedure developed in Rivers and Vuong (1989) for probit models with an endogenous independent variable (discussed in Brasselle, Gaspart and Platteau, 1998, in a context similar to ours.) This involved including the residuals from a linear probability model of title as a regressor in our transactions probit model, and then testing for their significance. We fail to reject the null hypothesis of exogeneity (p-value = 0.79). It should be noted, however, that a condition required for the method to be valid is that, given title status, the disturbances in the probit model be normally distributed. Using tests based on skewness and kurtosis, we cannot reject the latter for untitled households. However, we can for titled households which suggests treating the result with some caution.

transfer by 72 percentage points! The size of this effect suggests that when a community has recently been established there is *considerable* uncertainty about property boundaries. (Note that we are controlling for the number of years that the household has been resident so the age of the community is not a proxy for uncertainty about a specific household's claims.) Title continues to have a substantial effect even when the community is 18 years old (the mean community age). Comparing the last two sets of probabilities, we see that the effect of title falls dramatically in communities which were established as organized invasions. At the mean community age, having had a *community organizer* lessens the positive effect of title by 81% (25 percentage points).

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 which 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.[30] One would expect, therefore, that having had a 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

[30] 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.

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. Because rental requires being able to re-establish rights after being absent from the property, it requires the strongest ownership claims. On this account, it might be expected if a household was able to rent it would be able to sell, but not necessarily vice versa. However, this is not the case. In fact, as the chart below indicates, there is almost no hierarchy--14 percent of the sample can sell but not rent, but there are also eight percent who say that they can rent but not sell. This finding indicates the importance of considering the potential *buyer's* interests, as in the model of Section II. While a renter has no particular reason to be concerned about the property owner's individual claims (aside from a general desire not to be occupying a property which is served by an eviction notice), this is not true of a buyer. He does care about the property owner's claims and, in particular, absent title he is likely to want the current owner's rights to be *weak.* When rights are formal, an owner can commit to giving up all of his claims to ownership by transferring the title deed--the commitment is backed by the government. On the other hand, an owner with strong informal rights may not be able to commit effectively to honoring the transfer of rights after a 'sale'.

Ability to Contract: Observed Probabilities

Number of squatters / Pct. of sample (s.d.)		Can Sell Yes	Can Sell No
Can Rent	Yes	17 % (2.4)	8 % (1.7)
	No	14% (2.2)	61 % (3.1)

Table 7 gives two sets of 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. The difference in effect across these two probits of having a titling program underway in a community is striking. *Government titling program* is a dummy variable which takes on the value one if the community representative indicated that the government had been in some why actively promoting titling in the community in the past two years. It has no effect on the probability that a household feels able to sell its property, but a pronounced negative effect on its reported ability to rent. The existence of such a program lowers the latter probability by 17 percentage points. Households clearly do not want to be absent from their properties when the government is allocating formal claims. This finding lends support to the idea that physical possession of a property is an important contributor to establishing rights to ownership.

Focusing on the characteristics representing household authority, which appear in the final group of variables in Table 7, there are two very robust results. First, 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 II, 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. The strong positive effect of non-transferable rights is consistent with the prediction of the model in situations where transfer uncertainty is important and most renters are outsiders. [31]

The pattern of interaction effects with title is also consistent with the predictions of the model. In both the sales and the rental market, title is predicted to be most important for households with strong non-transferable rights. This is confirmed in the probit for the ability to sell by the fact that the estimated effect of title for male households is positive and significant (1.91, estimated standard error, 0.56). This is also confirmed for the rental market. In unreported probit estimates, where the data were restricted to include only households with males, we find that title increases the probability that such households are able to rent by 69 percentage points (coefficient 2.87, p-value < 0.01). On the other hand, title is predicted to have an ambiguous effect for households with weak non-transferable rights, but positive if transfer uncertainty is important, and particularly in the rental market. Here we see the ambiguity with respect to the sales market, where the effect of title for female-only households is positive but insignificant. 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 household thought itself able to rent *unless* it had title. A general implication of these sets of results is that transfer uncertainty is a real concern of households trying to engage in property transactions in this environment.

VI. Title and Property Value

[31] Note that the switch in signs rules out another explanation for the reported greater ability to sell among female-only households: that women respondents are culturally more predisposed to respond 'yes' to questions.

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 question. For each household which 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.[32] 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.[33]

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

[32] We were careful always to ask a household whether something was possible before asking them to estimate a price. This was to avoid forcing respondents to put meaningless values on transactions that they do not view as reasonable. Our view is that the resulting loss of observations is made up for in higher quality information.

[33] 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%.

Thus, the 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.

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 noiser 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, $\P P/\P C^T$, was predicted to be positive (see Section II). 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 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).[34]

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 influencial: the impact of title is 40 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.[35] The impact of title is seven 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.[36] The coefficient

[34] Two related results, for rural areas, are reported in Alston, *et. al.* (1995) and in Feder, *et. al.* (1988). The former find that title increased the value of land 40 km from market by an estimated 72% in Brazil, while the latter find increases of 25, 56, 113 and 133% in each of four provinces in Thailand.

[35] This confirms the result in Friedman , *et. al.* (1988) where they find a 50% price premium for titled properties among those newly settled, falling to a 33% premium after ten years.

[36] In light of this finding we can comment on a potential selection problem. If there are characteristics of households or communities which affect claims and which are unobservable to us but observable to potential buyers, then having restricted ourselves to a sample of households which can sell in any state could mean that we have selected

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 the expected sale value of a property owned by a female-only household in a newly established neighborhood increases, on average, 46% with title. The only model of price determination which is consistent with this finding is one where price is the minimum acceptable to sellers (see Appendix, Equation A.8). In that case, title has two positive effects: it lowers transfer uncertainty and raises minimum acceptable prices. 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 second effect dominates (that is, $\P q^{\Pi} \P C^{T} \P C_{S}^{N} > 0$ small, and $\P U_{S}^{\Pi} \P C^{T} \P C_{S}^{N} << 0$). 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.)

VII. The Costs and Duration of Titling

Having derived quantitative estimates of some of the benefits that households gain from having formal title, we turn in this section to an examination of the costs of titling. Each squatter household which had obtained title by the time of the survey

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households with either high levels of these unobservables if they are transferable or low levels if they are non-transferable. Given that the former would bias the estimated effect of title downwards, and the latter, given the results just presented, would bias the estimated effect of title upward, there is no clear prediction about the direction in which a selection bias would go.

was asked how long it had taken it to obtain title and the cost. Squatter households remaining untitled were asked to estimate these values, as were the community respondents in those communities with squatters. We restrict our attention to the sample of 142 households providing estimates, so as not to combine inconsistent data.[37] Summary statistics of the responses are in Panel A of Table 9.

The first two columns in Panel A give sample statistics for the number of months it takes to obtain title. Although anecdotal evidence suggests that titling may take a very long time, the median values given by the households and thirteen community respondents are similar and quite short: 6 and 4 months respectively. [38] There is, however, considerable variation in views among the household respondents. Their expectations about the time it would take to obtain a title range from zero to almost 15 years. The bottom two rows of Panel A indicate how many of the respondents answered zero, and gives the mean after dropping these respondents. Here this makes little difference and the mean is close to two years.

The third and forth columns of Panel A give the same information, but for estimates of the cost of titling. Including the 29 households who expect titling to be costless, the mean value is $44 with a median of $29. Again there is considerable

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[37] The actual, historical, figures are very substantially larger than those estimated by untitled households. There are two reasons for thinking that this is an artifact of our incorrectly adjusting for inflation. First, the timing of payments was not known precisely and had to be estimated. Second, some of the respondents may have converted to current values in giving their responses, making our conversion to 1996 an over-adjustment. Durations over 15 years and costs over $500 were treated as outliers and deleted from the data presented here. This removed one household for each question.

[38] Obtaining title requires that the property be surveyed, that title be approved by the Directorate of Properties and Parroquial Services, signed by the Director of Properties, the Chief of Legalization of Parcels, the Municipal Secretary, and the Mayor, and then registered in the cadastre by the Department of Urbanization, Valuation and Registry.

variation, from zero to $286. The community respondents demonstrate a similar variation in estimates, although they tend to be more sanguine about costs overall with a mean estimate of $29 and median of $11. In this case, dropping the zeros has a noticeable effect on the mean, and is probably appropriate since the municipality does charge households for the land when they are titled, as well as a small ($0.71) administrative fee. The official cost of an average plot, not including payments to lawyers, and so on, ranges from $1.3 to $29.3, depending on the community (interview, Ab. Jose Javier Varas Calvo). Our figures are consistent with these fees reported by the municipality. They are also close to titling costs reported by Alston, Libecap and Schneider (1995) for a small sample of seven squatters in rural Parà, Brazil. Their estimates of the total costs of obtaining title, including the opportunity cost of time, range from $12 to $60, with a median value of $24 (1992 US dollars).

Panel B of Table 9 presents regression results which help to explain some of the large variation in the estimates of the duration and cost of titling reported by households (although the R^2's indicate that much of the variation remains unexplained). Squatters in more distant communities expect to face dramatically lower costs of titling. A one standard deviation increase in the distance from the city center lowers expected costs by 90%. A striking finding is the importance in the titling process of whether the land invaded was originally privately or publicly owned. Squatters on private land expect titling to be both much faster (by almost two years), and much more expensive (a one hundred percent increase in price). The fact that there was resistance during an invasion does not, as one might expect, suggest to squatters that titling will take more time, and further, it *lowers* their estimate of costs. When the municipality is running a titling program in a community it naturally lowers the residents' expectations about how long it will take to get a title, although not the costs. Finally, we see from the coefficient on the size of the property that the costs of titling increase with lot size. However, a 10% increase in square meters increases expected costs by just 5%, indicating that there are large economies of scale, with relatively higher costs faced by the smaller property owners. None of the variables

related to the activities of community organizers, or to household characteristics, were significant determinants of the expected duration, or costs, of titling.

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 types of ownership claims available to them. Using a variety of empirical indicators, we have identified multiple sources of informal rights which appear to be important in urban Ecuador. These include household characteristics which influence its individual authority or its ability to access other sources of rights. For example, 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.[39] 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 have the positive effect of contributing to security, rights derived from household authority or claims 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 is it possible to commit to not exercising them after an agreed transfer. As a result, informal, 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 allowing parties to commit to agreed transactions. When selling property it is households with males who stand to gain the most from formal property rights. When renting property it is households without males who gain the most.

Given that most of the surveyed households expect to remain on their properties for a very long time, a more important welfare consideration may simply be the increase in security that households derive from living on a property over which they

[39] In our data, families range from one up to thirteen members.

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 which 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. This means that our estimated mean price change of 23.5% is an upper bound on the household gain in the utility of property ownership.

We have focused on benefits, but titling is not free and it is important to consider also costs. To put those presented in Section VII in perspective, it is useful to compare them to the resources available to households. We find that the estimated cost of obtaining a title represents, on average, 102% (s.d. 12.4) of household annual, per capita, consumption. 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 is an expense which pays off. Among the 47 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%.[40] 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. This may explain why 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. These do not necessarily correspond to their implications for social welfare. 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 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. 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.

[40] This is a somewhat higher percentage than that found by Feder, *et. al.* (1988) for rural Thailand, where they estimate total costs to farmers of obtaining title at less than 1% of the value of the untitled land. However, given the small size of urban plots, and the economies of scale in titling, the findings are not inconsistent.

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 will tend to overestimate 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. In sum, 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.[41]

[41] This raises the important question of whether such a policy would create an (unwanted) incentive for more rapid migration into the city onto fringe areas not intended for settlement. It nevertheless remains that targetting older communities to avoid this potential problem may confer few benefits on the residents.

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Appendix

Using the model described in Section II, and under the single property assumption, we first derive outside buyers' expectations about a seller's level of q, a characteristic which is, to them, unobservable. We use this to determine the maximum price, $\overline{P}$, that an outsider buyer would pay for the seller's property. Using the assumption that a transaction is possible whenever $\underline{P} \leq \overline{P}$, we then find the necessary wedge between U_S and U_B needed for a trade to occur. This is denoted g^O. 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 final subsection extends the model to a world where owners may have more than one property.

The Calculation of E[q] and g^O

As discussed in Section II, the maximum price that an outside buyer would be willing to pay for a property is $\overline{P} = E[q]U_B$. To determine this price, the buyer must form an expectation of q. 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 q that a household could have and still be willing to sell is $q^* = min[\frac{P}{U_S}, 1]$ (see Equation 4). For expositional simplicity we assume that $e_S = 1$, for all S, so that U_S depends only on observables, allowing us to write:

$$E[q|\, P, U_S] = \int_{\underline{q}}^{q^*} q u(q) dq \quad = \frac{1}{2}[\underline{q} + 1] \qquad \text{if } U_S < P \qquad \text{(A.1)}$$

$$= \frac{1}{2}[\underline{q} + \frac{P}{U_S}] \qquad \text{if } U_S \geq P,$$

where $u(.)$ is a uniform distribution from $\underline{q}$ 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 $E[q]$ generate two definitions of $\overline{P}$, $\overline{P}_1$ and $\overline{P}_2$, as follows:

$$\overline{P} \quad = \overline{P}_1 = U_B \frac{(1+\underline{q})}{2} \qquad \text{if } U_S < \overline{P}_1, \text{ and} \qquad \text{(A.2)}$$

$$= \overline{P}_2 = U_B \frac{(\underline{q} U_S)}{2U_S - U_B} \qquad \text{if } U_S \geq \overline{P}_2.$$

Now, $U_S < \overline{P}_1 \quad \Rightarrow \quad U_S < \overline{P}_2$

$U_S > \overline{P}_1 \quad \Rightarrow \quad U_S > \overline{P}_2$

$$U_S = \overline{P}_1 \quad \text{Þ} \quad U_S = \overline{P}_2,$$

which together imply that, for a given U_B and $\underline{q}$, there exists a unique $\overline{P}$ for each U_S. It is defined as $\overline{P} = min[\,\overline{P}_1\,, \overline{P}_2\,]$.[42]

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

$$U_B \ \text{³} \ \left[\frac{2q}{q+q}\right] U_S = \left[\frac{2\underline{q} + 2R_S(1-q)}{2\underline{q} + R_S(1-\underline{q})}\right] U_S = g^O\, U_S. \qquad \text{(A.3)}$$

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):

$$\frac{\P q}{\P C_S^N} = -f(.)\left[\frac{\P \ln n(C_S^N, C^T)}{\P C_S^N} - \frac{\P \ln n(C_B^N, C^T)}{\P C_S^N} + \frac{\P \ln g^{\,i}}{\P \underline{q}} \frac{\P \underline{q}}{\P C_S^N}\right] \ < \ 0. \qquad \text{(A.4)}$$

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). Both effects would become less important in situations where there are strong transferable rights associated with the property. However, regardless of the characteristics of the property and the parties, 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.

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[42] If one relaxes the assumption that $e_S = 1$, the outside buyer can condition only on the observable characteristics of the seller's utility, n_S, when forming his expectation of q, and e_S is integrated out. This leads to the following form for $\overline{P}$, which is an average of $\overline{P}_1$ and $\overline{P}_2$:

$$\overline{P} = \overline{P}_1 G\left[\frac{\overline{P}_1}{n_S}\right] + \int_{\overline{P}_1/n_S}^{\infty} \overline{P}_2(e_S)\, dG(e_S)\,, \ where$$

Where $G(.)$ is the cumulative distribution function for e_S. Derivations become notationally cumbersome and no additional insights are obtained from this more general formulation, so we maintain the assumption that $e_S = 1$ in the text.

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

$$\frac{\partial q}{\partial C^T} = -f(.)\left[\frac{\partial \ln n(C_S^N, C^T)}{\partial C^T} - \frac{\partial \ln n(C_B^N, C^T)}{\partial C^T} + \frac{\partial \ln g^i}{\partial \underline{q}}\frac{\partial \underline{q}}{\partial C^T}\right] \gtrless 0 . \qquad \text{(A.5)}$$

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 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:

$$\frac{\partial^2 q}{\partial C^T \partial C_S^N} = -f(.)\left[\frac{\partial^2 \ln n(.)}{\partial C^T \partial C_S^N} + \frac{\partial^2 \ln g^i}{\partial C^T \partial C_S^N}\right] > 0. \qquad \text{(A.6)}$$

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 q continue to represent the probability that a transaction is honored, a condition like Equation (6) again applies, with $g \geq 1$ and decreasing in $\underline{q}$. The sole difference is that $\underline{q}$ 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?[43] 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:

$$\frac{\partial \ln \underline{P}}{\partial C^T} = \frac{\partial \ln q}{\partial \underline{q}} \frac{\partial \underline{q}}{\partial C^T} + \frac{\partial \ln U_S}{\partial C^T} \quad > 0. \tag{A.7}$$

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:

$$\frac{\partial^2 \ln \underline{P}}{\partial C^T \partial C_S^N} = \frac{\partial^2 \ln q}{\partial C^T \partial C_S^N} + \frac{\partial^2 \ln U_S}{\partial C^T \partial C_S^N} \quad \begin{matrix} > \\ < \end{matrix} \; 0. \tag{A.8}$$

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 qU_B, if it is an *F* buyer, or as defined above, if an outside buyer. Under this alternative assumption

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[43] 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 $\overline{P}$, 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.

about the division of the surplus we have, for F:

$$\frac{\partial \ln \overline{P}}{\partial C^T} = \frac{\partial \ln q}{\partial q}\frac{\partial q}{\partial C^T} + \frac{\partial \ln U_B}{\partial C^T} \quad > 0, \quad and \tag{A.9}$$

$$\frac{\partial^2 \overline{P}}{\partial C^T \partial C_S^N} = \frac{\partial^2 \ln q}{\partial C^T \partial C_S^N} \quad \geq 0.$$

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:

$$\frac{\partial \ln \overline{P_1}}{\partial C^T} = \left(\frac{q}{1+q}\right)\frac{\partial \ln q}{\partial C^T} + \frac{\partial \ln U_B}{\partial C^T} \quad > 0, \ and \tag{A.10}$$

$$\frac{\partial \ln \overline{P_2}}{\partial C^T} = \frac{\partial \ln q}{\partial C^T} + \frac{\partial \ln U_B}{\partial C^T} + d\left[\frac{\partial \ln U_B}{\partial C^T} - \frac{\partial \ln U_S}{\partial C^T}\right] \quad > 0,$$

$$where \ \ d = \frac{U_B}{2U_S - U_B} \quad \geq 1.$$

$$Both \ \frac{\partial^2 \ln \overline{P_1}}{\partial C^T \partial C_S^N} \ \ and \ \frac{\partial^2 \ln \overline{P_2}}{\partial C^T \partial C_S^N} \quad \begin{matrix} > \\ < \end{matrix} \ 0.$$

When $\overline{P_1}$ applies, increasing formal rights unambiguously increases the transactions price. When $\overline{P_2}$ applies it is less clear cut.[44] 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

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[44] Relaxing the assumption that $e_S = 1$, as in the previous footnote, we have

$$\frac{\partial \ln \overline{P}}{\partial C^T} = \frac{\overline{P_1}}{\overline{P}}\left\{G\left[\frac{\overline{P_1}}{n_S}\right] + \frac{\partial \ln \overline{P_1}}{\partial C^T}\right\} + \int_{\overline{P_1}/n_S}^{\infty} \frac{\overline{P_2}(e_S)}{\overline{P}}\frac{\partial \ln \overline{P_2}(e_S)}{\partial C^T} dG(e_S).$$

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, n_B, is less or greater than that of the seller, n_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.

Multiple Transactions

We now assume that each household S has a second property (or durable good) which it may wish to sell. Transactions occur at maximum price that the seller will offer. We assume that all buyers are friends and family members, who are perfectly informed about the actions of the seller and use the following strategy:

In determining $\overline{P}$, assume (correctly) that the probability that a seller will *try* to renege on a sale is $l(C_S^N, C^T)$, so that the probability a transaction is honored becomes $[(1-l) + lq]$. If the seller ever does try to renege, refuse to purchase any subsequent properties from him.

Below we derive the condition for it being the optimal strategy for a household to choose to try to reclaim its first property after a sale, despite the fact that this behaviour prevents it from selling the second good to a friend or family member. Then we examine how ownership claims affect the likelihood that the condition is fulfilled.

The equilibrium, as stated, is not subgame perfect, since, if a seller does try to reclaim the first property, there may be friends and family who so value the second property that they would like to deviate from punishment in the second market and still transact with the seller. We assume that this finite period, property transactions, game is just one component of an infinite repeated game going on among this connected group. In this larger game, the group can devise strategies in which members are punished if they do not adhere to the above strategy and punish a deviant. [45]

[45] An alternative approach would be to model the property market itself as an infinitely repeated game (or finite with an uncertain endpoint). The strategy of the friends and family in this case is to assume that the seller will try, with probability λ, to renege if he has not yet done so, and that he will try with probability one otherwise. In this case, deviants can still transact in subsequent markets, but are punished by obtaining a lower price in all future transactions. The equilibrium is subgame perfect because, on the one hand, it is optimal for sellers to try to reclaim all properties after the first given the strategy of buyers, and, on the other, those buyers who wish to transact with a seller, given that he will try to renege, are free to do so. Because the optimal strategy of the seller in this case depends on several differences in expected maximums (over the choices of not selling, selling honestly, and selling and trying to cheat) it is

Expected total returns if the household attempts to reclaim are,

$$\overline{P} + (1\text{-}q)U_S + U_{S2}. \qquad \text{(A.11)}$$

If the household does *not* try to reclaim its first property, its expected returns are

$$\overline{P} + E[\, max\{U_{S2},\ \overline{P_2} + (1\text{-}q)\, U_{S2}\}]. \qquad \text{(A.12)}$$

In order to specify the expected gains from trade term, recall that a transaction with a potential F buyer occurs whenever $U_B > U_S$, or, equivalently, whenever $lne_B > lnn_S - lnn_B$ (Equation 7 in the text). Denoting the RHS of this inequality by D, we have,

$$E[max\{U_{S2}, \overline{P_2} + (1\text{-}q)U_{S2}\}] = \int_{-\infty}^{\infty} \left[\ U_{S2}F(D) + \int_{D}^{\infty} \{qn_{B2}e_{B2} + (1-q)U_{S2}\} dF(\ln e_{B2})\ \right] dH(C_B^N), \qquad \text{(A.13)}$$

where $H(.)$ is the cumulative distribution of non-transferable claims in the population of buyers. Thus, the household will try to reclaim its first property if and only if,

$$(1\text{-}q)U_S > \int_{-\infty}^{\infty} \int_{D}^{\infty} q\{n_{B2}e_{B2} - U_{S2}\} dF(\ln e_{B2})\ dH(C_B^N). \qquad \text{(A.14)}$$

Let $l(C_S^N, C^T)$ denote the probability that the inequality holds, making an attempt to reclaim the optimal strategy. We turn now to an examination of the derivatives of l. Their being opposite in sign to the derivatives of q is a sufficient condition for the comparative static results in the one good case to go through.

Consider first changes in the non-transferable claims of the seller, C_S^N, on l. To interpret the effect of a change in the strength of these claims, we use the following relationships,

$$\frac{\partial q}{\partial C_S^N} \leq 0, \quad \frac{\partial U_S}{\partial C_S^N}, \frac{\partial U_{S2}}{\partial C_S^N} > 0, \quad \frac{\partial n_B}{\partial C_S^N} = 0, \quad \frac{\partial D}{\partial C_S^N} > 0.$$

It follows from these relationships that the LHS of the inequality in (A.14) is strictly increasing in the non-transferable claims of the seller. Retaining the property becomes more valuable, and success in reclaiming becomes more likely, both of which make

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notationally cumbersome to derive comparative static results. Thus, we stay with the simpler (and perhaps more plausible given the limited assets of households) situation described in the text.

the strategy of trying to reclaim more attractive. On the other hand, the value on the RHS of (A.14) is strictly decreasing. The potential gains from exchange fall as the seller's own utility from the second good goes up. At the same time, as $\underline{q}$ and, thus q, go down, the buyer and seller effectively exchange a smaller part of the second good and less of the potential gains from trade are captured by the seller. This, of course, makes the ability to access this market less interesting. Thus,

$\frac{\partial l}{\partial C_S^N} > 0$, which is the opposite sign to $\frac{\partial q}{\partial C_S^N} \leq 0$.

Now consider changes in the transferable claims, C^T, on l. Now we refer to the relationships:

$$\frac{\partial q}{\partial C^T} \geq 0, \quad \frac{\partial U_S}{\partial C^T}, \frac{\partial U_{S2}}{\partial C^T} > 0, \quad \frac{\partial n_B}{\partial C^T} > 0, \quad \frac{\partial D}{\partial C^T} \gtrless 0.$$

Here the results are more ambiguous. If security concerns are minimal and transactions uncertainty important, even in the absence of formal rights, as supported by the empirical results in this paper, then the LHS of the inequality in (A.14) will decrease in C^T. As the likelihood of success fades, trying to reclaim sold property becomes a less attractive strategy. On the RHS, $\frac{\partial D}{\partial C^T} < 0$ and any increase in q will tend to dominate any small changes in potential gains from exchange. That is, a larger part of the second property is, in effect, 'traded', allowing the seller to capture more of the gains from trade. Thus, the RHS is likely to increase. Together, $\frac{\partial l}{\partial C^T} < 0$, which is again opposite in sign to $\frac{\partial q}{\partial C^T} \geq 0$.

However, when transaction uncertainty is less important, so that $\frac{\partial q}{\partial C^T}$ is small, and the main effect of transferable rights is through the greater utility attained by household from enhanced security, we may obtain the opposite result. This situation is most likely to arise when the *non*-transferable rights of the seller are low, since this makes the effect of increased transferable rights on q weaker, and on U_S and U_{S2} stronger. In this situation, the effect of C^T on the LHS of the inequality in (A.14) may be positive. This will go hand in hand with $\frac{\partial D}{\partial C^T}$ on the RHS becoming positive, as well as a fall in the potential gains from trade as U_{S2} increases, both effects rendering

the RHS smaller. Thus, $\frac{\P l}{\P C^T}$ could be positive. Although it is difficult to *sign* the effect of transferable rights on the probability that a selling household will try to reclaim its first property after a sale, we can say that it is less negative (or more positive) when non-transferable rights are weak. That is,

$\frac{\P l}{\P C^T \P C_S^N} < 0$, which again is opposite in sign to $\frac{\P q}{\P C^T \P C_S^N} \gtrless 0$.

Table 1
Numbers of Households: by Type and Title Status

Household Type	Total	Title Status		
		Titled	Untitled	Unknown
Purchasers	22	22	--	--
Squatters	255	113	142	--
Have tried to obtain title[a]	229	113	116	--
Not trying	26	--	26	--
Non-owners[b]	123	73	33	17
All Households	**400**	**210**	**175**	**17**

Notes: [a] Includes squatter households who have either obtained title or responded that they are in the process of trying to obtain a title.
[b] Includes 64 households paying rent to the property owner.

Table 2
Characteristics of the Communities

Community No.	Age	Established by Invasion	with an Organizer	with Resistence	on Private Land	Percent Paid Boss[a]	Percent Titled
1	42 yrs	-	-	-	-	0.0 %	95.0 %
2	19	-	-	-	-	25.0	94.7
3	18	-	-	-	-	0.0	95.0
4	52	-	-	-	-	14.3	82.4
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	7	Y	-	Y	Y	0.0	81.2
10	32	Y	-	Y	Y	76.5	35.0
11	27	Y	-	Y	Y	13.3	38.9
12	20 yrs	Y	Y	-	-	43.8 %	30.0 %
13	17	Y	Y	-	-	78.6	21.1
14	18	Y	Y	-	-	65.0	35.0
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	4	Y	Y	Y	Y	11.1	40.0
20	13	Y	Y	Y	Y	11.1	0.0
Totals:		**16**	**9**	**9**	**8**	**21.1 %**	**54.3 %**

Note: [a] Percenatge of squatter households who paid a boss.

Table 3
Household and Community Characteristics

	Purchasers	Squatters		Non-Owners	
		Titled	Untitled	Titled	Untitled
Mean:					
Age of Community	25.9 yrs (10.8)	23.4 (12.0)	14.8 (7.3)	33.2 (14.8)	25.9 (12.2)
Distance from City Center	5.7 km (3.1)	5.2 (2.0)	7.7 (3.0)	3.5 (2.4)	5.4 (2.5)
Age of Household Head	53.5 yrs (16.6)	50.6 (13.7)	43.7 (11.8)	39.2 (12.4)	35.2 (12.5)
Per-capita Expenditure (1996 U.S. dollars)	$137.8 (113.5)	75.0 (84.2)	53.9 (32.1)	101.8 (92.3)	65.3 (48.9)
Household Assets (Non-Property, $100s)	$68.1 (121.3)	20.2 (46.0)	9.1 (16.9)	22.6 (44.3)	6.7 (6.7)
Lot Size	260.0 m^2 (505.0)	146.7 (72.5)	137.1 (68.8)	183.1 (119.4)	173.0 (357.4)
Years of Residence on Property	16.4 yrs (10.6)	17.6 (10.7)	10.5 (6.7)	7.3 (8.2)	6.9 (7.1)
Years Expect to Remain Resident	36.7 yrs (15.0)	32.6 (15.7)	35.2 (16.4)	15.5 (18.2)	15.5 (17.4)
Percent of Households with: [b]					
Education of Head > Primary	77.3 % (42.9)	38.1 (48.8)	31.7 (46.7)	76.7 (42.6)	51.5 (50.8)
Urban Origin of Head	90.9 % (29.4)	96.5 (18.6)	86.6 (34.2)	87.7 (33.1)	78.8 (41.5)
Adult Males	86.4 % (35.1)	92.9 (25.8)	89.4 (30.8)	89.0 (31.5)	81.8 (39.2)

Notes: [a] Standard deviations are in parentheses.
[b] 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

The Likelihood of Eviction in the Next Year is:	All Untitled Squatters	In Community with an Organizer	Without
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	77.5	83.0	58.0
	100.0 %	100.0 %	100.0 %
Number of Respondents	142	111	31

Panel B: Probit - Eviction is Impossible versus Other

Variable	Coefficient	S.E.[a]	P-Value	dF/dX	S.E.
ln(age)	-0.12	0.34	0.72	-0.03	0.08
distance	**0.17**	**0.06**	**<0.01**	**0.04**	**0.01**
percent paid boss (community)	**2.60**	**0.79**	**<0.01**	**0.62**	**0.18**
formal enforcement[b]	0.24	0.33	0.46	0.06	0.09
ownership document	**0.64**	**0.31**	**0.04**	**0.17**	**0.09**
invasion resisted	0.26	0.41	0.54	0.06	0.10
private land	**-0.69**	**0.39**	**0.08**	**-0.16**	**0.08**
paid boss (household)	-0.57	0.36	0.11	-0.15	0.10
ln(years resident)	**0.46**	**0.19**	**0.01**	**0.11**	**0.04**
ln(assets)	**0.23**	**0.12**	**0.05**	**0.05**	**0.03**
education > primary	0.31	0.32	0.33	0.07	0.07
adult males	-0.78	0.60	0.19	-0.13	0.06
Number of observations				141	
Observed/predicted probability at the means				0.77 / 0.84	
Pseudo R^2				24.6	

Notes: [a]S.E. are estimated standard errors. The marginal effects, dF/dX, are calculated as discrete changes in the case of dummy variables.
[b]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)

Variable	Coefficient	S.E.[a]	P-Value	dF/dX
ln(age)	**1.10**	**0.40**	**<0.01**	**-**
community organizer	1.18	0.77	0.12	-
formal enforcement	0.06	0.25	0.80	0.03
invasion resisted	-0.28	0.27	0.29	-0.11
private land	-0.08	0.22	0.73	-0.03
title	**2.32**	**1.02**	**0.02**	**-**
ownership document	-0.15	0.27	0.58	-0.06
title*age	**-0.08**	**0.02**	**<0.01**	**-**
title*organizer	**-0.82**	**0.50**	**0.10**	-
organizer*age	**-0.11**	**0.05**	**0.02**	**-**
govt titling prgm[b]	**-0.73**	**0.26**	**<0.01**	**-0.28**
paid boss (household)	-0.20	0.23	0.38	-0.08
ln(years resident)	-0.10	0.13	0.45	-0.04
ln(assets)	**0.18**	**0.07**	**0.02**	**0.07**
education > primary	0.25	0.21	0.22	0.10
adult males	**-1.05**	**0.38**	**<0.01**	**0.39**
title*adult males	0.20	0.86	0.81	0.08

Number of observations	251
Observed/ predicted probability at the means	0.42 / 0.43
Pseudo R^2	24.9

Notes: [a]S.E. are estimated standard errors. The marginal effects are calculated as discrete changes for dummy variables. For marginal effects for interacted variables see Table 6.
[b]Government titling program is a dummy variable which is one if the community respondant 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

Predicted Probability[a]	Title	Organizer	Community Age
0.22	No	No	8 yrs
0.94	Yes	No	8 yrs
0.55	No	No	18 yrs (mean)
0.86	Yes	No	18 yrs
0.24	No	Yes	18 yrs
0.30	Yes	Yes	18 yrs

Note: [a]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

Variable	Can Sell Property Coefficient	S.E. [a]	P-Value	Can Rent Whole House Coefficient[b]	S.E	P-Value
ln(age)	0.52	0.38	0.17	0.38	0.46	0.41
community organizer	0.52	0.77	0.50	-0.45	1.07	0.68
formal enforcement	-0.08	0.24	0.73	0.12	0.29	0.69
invasion resisted	-0.08	0.27	0.77	-0.18	0.31	0.56
private land	-0.11	0.23	0.63	0.40	0.28	0.15
title	1.12	0.81	0.17	++	.	**<0.01**
ownership document	-0.07	0.29	0.81	-0.07	0.38	0.85
title*age	**-0.05**	**0.02**	**<0.01**	**-0.07**	**0.02**	**<0.01**
title*organizer	-0.49	0.45	0.28	**-1.47**	**0.54**	**<0.01**
organizer*age	-0.07	0.05	0.12	0.01	0.06	0.92
govt titling prgm[c]	-0.31	0.26	0.23	**-0.82**	**0.35**	**0.02**
paid boss (household)	-0.20	0.24	0.40	-0.26	0.30	0.38
ln(years resident)	-0.06	0.14	0.68	0.04	0.19	0.82
ln(assets)	**0.16**	**0.07**	**0.02**	**0.24**	**0.09**	**<0.01**
education > primary	0.24	0.20	0.23	-0.05	0.25	0.83
adult males	**-1.19**	**0.39**	**<0.01**	++	.	**<0.01**
title*adult males	0.79	0.68	0.25	--	.	**<0.01**
Observed/ predicted probability at the means			0.33 / 0.31			0.22 / 0.14
Pseudo R^2			0.20			0.37

Notes: [a]S.E. are estimated standard errors.
b The full set of coefficients on gender/title categorical variables are unestimable as no untitle household without males can rent. Therefore, entries only indicate signs of the effects.
[c]See fn c of Table 5.

Table 8
Expected Impact of Title on Property Value [a]

Variable	Coefficient	S.E.[b]	P-Value
constant	**1.75**	**0.58**	**<0.01**
ln(age)	**-0.15**	**0.06**	**0.03**
distance	**0.04**	**0.01**	**<0.01**
percent paid boss (community)	**-0.24**	**0.13**	**0.07**
formal enforcement	**-0.30**	**0.07**	**<0.01**
paid boss (household)	-0.01	0.06	0.84
ln(years resident)	**-0.17**	**0.09**	**0.07**
ln(assets)	-0.04	0.04	0.28
education > primary	-0.02	0.05	0.77
adult males	**-0.70**	**0.17**	**<0.01**
males*ln(yrs resident)	**0.24**	**0.08**	**<0.01**
Number of observations		51	
Adjusted R^2		0.66	
Sample Mean Expected Change (s.d.)		23.5% (5.0)	

Predicted Change in Value from Title	Adult Males	Years of Residence
45.9 %	No	5 yrs
28.1 %	No	14 yrs (mean)
15.5	Yes	5
22.9	Yes	14

Notes: [a]The dependent variable is the difference (in logs) of the value that a household believes it could obtain for its property with a title without a title. Only households who indicate that they can sell in both states, at least to a relative, are included. WLS estimates allow for heteroscedasticity across communities.
[b]S.E. are estimated robust standard errors.

Table 9
The Expected Costs of Obtaining Title: Time and Money

Panel A: Summary Statistics

	Number of Months		Cost of Titling (1996 U.S. Dollars)	
	Household	**Community**	**Household**	**Community**
mean	20.6	4.8	$43.7	$28.9
standard deviation	32.7	2.9	53.1	26.5
25th percentile	2	3	3.4	1.4
median	**6**	**4**	**28.6**	**11.4**
75th percentile	24	6	57.1	42.9
number with zero	7	0	29	3
mean w/o zeros	21.7	4.8	55.1	34.7

Panel B: Probit Results

	Number of Months			Ln Cost (1996 U.S. Dollars)		
Variable	**Coefficient**	**S.E.**	**P-Value**	**Coefficient**	**S.E**	**P-Value**
distance	-0.26	0.80	0.74	**-0.30**	**0.04**	**<0.01**
invasion resisted	12.41	8.29	0.14	**-0.61**	**0.30**	**0.04**
private land	**-22.17**	**8.12**	**<0.01**	**0.97**	**0.32**	**<0.01**
ownership document	-5.42	6.62	0.41	-0.11	0.20	0.56
government titling program	**-20.68**	**7.13**	**<0.01**	-0.20	0.29	0.48
ln(**lot size)**	**16.50**	**8.41**	**0.05**	**0.47**	**0.25**	**0.06**
Number of observations			138			110
Adjusted R^2			0.16			0.39

Notes: [a]S.E. are estimated standard errors.