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The Deregularization of Land Titles

Abstract: In the last years, several countries implemented policy interventions to entitle urban squatters, encouraged by the results of studies showing large welfare gains from entitlement. We study a natural experiment in the allocation of land titles to very poor families in a suburban area of Buenos Aires, Argentina. Although previous studies on this experiment have found important effects of titling on investment, household structure, educational achievement, and child health, in this article we document that a large fraction of households that went through a situation at which formalization was challenged (death, divorce, sale/purchase), ended up being de-regularized. The legal costs of remaining formal seem too high relative to the value of these parcels and the income of their inhabitants.

1 Introduction

In recent decades, many governments throughout the developing world have launched land titling programs as part of their poverty alleviation and urbanization policies. Typically, these programs involve issuing titles of public (or sometimes private) tracts of land to their current occupants. Empirical studies of land titling have found that these programs have large effects. A partial listing includes Jimenez (1984), Alston et al. (1996) and Lanjouw and Levy (2002) on real estate values; Besley (1995), Field (2005), Goldstein and Udry (2008) and Do and Iyer (2008) on investment; Banerjee et al. (2002) and Libecap and Lueck (2008) on agricultural productivity; Field (2007) on labor supply; Galiani and Schargrodsky (2004) and Vogl (2007) on child health; Di Tella, Galiani and Schargrodsky (2007) on the formation of beliefs; and Galiani and Schargrodsky

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(2010) on investment, household structure and educational attainment. However, in most cases, these interventions have not been accompanied by regulatory policies that ease the burden represented by the cost of registering future ownership changes. Thus, as time goes by, and as the beneficiary title-holders pass away, divorce or migrate, if these poor households cannot afford the costs entailed in remaining formal, we will observe a gradual process of deregularization that will eventually lead to a new need for costly public interventions.

The story of Griselda, who lives in the neighborhood under study, sadly illustrates the process and social costs of deregularization. The parcel where she lives was titled to her mother-in-law years ago. When her mother-in-law passed away, Griselda's husband could not afford to go through the costly inheritance process. Later on, the couple separated due to the husband's frequently violent behavior towards her. However, they could not afford the legal costs of divorce proceedings either. Thus, they currently all live on the same parcel: she lives in a house in the front with their two children, while he lives in another room built further back on the same plot of land, and he still sometimes hits her. She cannot go elsewhere to live, nor evict him, and they cannot afford to legally split the parcel or its sale value, as it still is under the name of his deceased mother.

In this paper we document this deregularization process by exploiting a natural experiment in the allocation of land titles to very poor families in a suburban area of Buenos Aires, Argentina. We find that 28.8 % of the titled parcels have become deregularized due to unregistered intra-family (death, divorce, etc.) or inter-family (informal sales, occupation, etc.) transactions, between 21 to 12 years after titling. Moreover, irregular tenure arrangements are being used in 77.9 % of the properties that have changed owners. This figure seems surprisingly high, given that these families have fought tenaciously for legal land ownership, and that both our previous studies (Galiani and Schargrodsky 2004, 2010) and the literature on other cases point to the presence of strong positive effects from legal titling.

One plausible explanation is that the legal costs of remaining formal are high relative to the low value of these parcels (and the low income of these families). Moreover, a family may need to incur these costs more than once over time. Thus, one possibility is that the (potentially repeated) cost of remaining formal is too high in relative terms. In short, these poor families may not be able to afford formality.

The rest of this paper is organized as follows. Section 2 describes the natural experiment and summarizes our previous results. Section 3 documents the process of deregularization. In Section 4, we present a simple model for the choice of whether or not to regularize, and discuss the role played by the cost of

formalization. Section 5 outlines alternative legal schemes that may help lessen the burden of these costs. Finally, the conclusions are presented in Section 6.

2 A natural experiment on land titling and its effects

This section describes the process involved in providing title to parcels located on an unused tract of land on the outskirts of Buenos Aires. It will also summarize the main results reported in our previous related studies. This process began in 1981 when a group of about 1,800 families took over a tract of unoccupied land in San Francisco Solano, approximately 16 miles south of the City of Buenos Aires. The squatters' move to the area was organized by a Catholic parish priest. The land was divided into small urban-shaped parcels in order to help ensure that it did not become a shantytown. Although the squatters believed that the land belonged to the government at the time of the occupation, it in fact consisted of thirteen tracts of privately owned land.

During the time that the country was ruled by a military government, several attempts were made to evict the squatters. However, with the return of democracy, the Congress of the Province of Buenos Aires passed Expropriation Law No. 10.239 of 1984. Under the terms of that law, the government was to expropriate the land, compensate its owners and then allocate the parcels to the squatters. The law also prohibited the squatters from selling the property within the first ten years of having received the title to it.

However, the titling process turned out to be asynchronous and incomplete. Although the offers made by the government were similar in terms of price per square meter, the owners of eight tracts of land accepted the offer in 1986 but the rest did not. As a result, the first eight tracts of land were transferred to the squatters who were living on them, and those occupants acquired titles to the land in 1989 and 1991. In previous studies, these people have been referred to as the "early treatment group". The rest of the owners brought legal action in Argentina's slow-moving courts in the hope of obtaining larger buyouts. One of these trials was concluded in 1998, and the squatters on the corresponding parcels obtained legal tenure of the land; these people have been called the "late treatment group" in the previous studies. The remaining squatters have not obtained titles to the land they occupy and therefore constitute the control group.

Importantly, the squatters did not know which owners would surrender their land at the time that they settled on it (in fact, they did not even know that the

land was privately owned). Moreover, the squatters did not participate in the lawsuits and could not have any influence over whether or not the former owners would choose to accept the offer made by the government. Titling was strictly a consequence of whether the former owners decided to accept or to challenge the offer made by the government.

Still, a potential cause of concern is that the decision of some of the original landowners to challenge the government's compensation offer may have been based on differences in land quality. However, Galiani and Schargrodsky (2010) have shown that this was not the case. They demonstrate that there are no systematic differences in observed land characteristics or pre-treatment household characteristics between the treatment and the control groups. Thus, the allocation of land titles was exogenous to the squatters' behavior, and to the squatters' and land characteristics.

The area affected by Expropriation Law No. 10.239 encompasses a total of 1,839 parcels. 1,082 of these 1,839 parcels are located in a contiguous set of blocks. The occupants of 419 of these parcels were awarded land titles in 1989, and an additional 173 occupants were given titles in 1998. However, land titles are not available to the families living on the 410 parcels located on tracts of land that have not been surrendered to the government in the course of the expropriation process. Finally, there are 80 parcels (non-compliers) that were not titled because the squatters occupying them had not fulfilled some of the registration requirements, had moved or had died by the time the titles were made available, even though the original owners had surrendered these pieces of land to the government.

The law also covered another non-contiguous (but nearby) land that is currently called the San Martin neighborhood, which comprises 757 parcels. These parcels belonged to one owner who accepted the expropriation compensation package without suing, and titles were offered to the squatters on this land in 1991. 712 of these parcels were titled, while the other 45 were occupied by non-compliers. For those who obtained titles, the ten-year restriction on the sale of the land expired in 1999 and 2008 for those in the main area and in 2001 for the San Martin parcels.[1]

Naturally, this setting allows for causal identification of the effects of land titling. The first study to make use of this natural experiment (Galiani and Schargrodsky 2004) focuses on the effect of titling on child health. In that

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1 In our previous studies dealing with this natural experiment, we did not have the opportunity to analyze the process of deregularization because the ten-year sale restriction imposed by the expropriation law had not expired for some of the parcels at the time the data for those studies was collected.

study, we found that titling has an impact on the Weight-for-Height Z-Score, which is a short-term indicator of child health, but essentially no impact on the Height-for-Age Z-Score, which is a long-term health indicator. Nevertheless, we did find that titling notably reduces the teenage pregnancy rate, which is a serious concern for the population under study.

In Galiani and Schargrodsky (2010) we found that titling has significant and sizable effects on different types of housing investment, such as quality of walls and roofs, amount of floor space, likelihood of there being a concrete sidewalk, and overall household appearance. Furthermore, treatment has a significant effect on household structure. Titled homes have, on average, almost one member fewer. This is primarily due to the fact that there are fewer non-nuclear family members in the household, but titled household heads also have fewer offspring. In addition, we find that children in titled households achieve better educational results; for example, the probability of finishing secondary school is twice as great for children in the treatment group than for those in the control group. These results indicate that titling is likely to have a long-term impact on the welfare of future generations. Nevertheless, we find that titling has very little impact on access to mortgage credit and no effect on access to other types of credit and labor income.

Meanwhile, Di Tella, Galiani and Schargrodsky (2007) find that titling has a large and significant effect on people's beliefs. Individuals who hold title to their properties are more likely to have more individualistic and materialistic beliefs which fit in with the workings of a market economy. In fact, that effect is so large that the beliefs of treated individuals are similar to the average of those of the population of the greater Buenos Aires metropolitan area, despite the large differences that exist between these two groups.

3 Deregularization

The above-mentioned results appear to indicate that the prospects of success for land titling interventions are bright. The policy used by the government has succeeded in achieving its ultimate goal: increasing the welfare of the poor. However, as this section will show, there were many instances at which, after the policy intervention, intra-family and inter-family transactions were not formalized, and these events slowly led to lower rates of legal ownership. We refer to this process as "deregularization".

To explore this process, we use detailed information on legal ownership obtained from the Office of the Under-Secretary for Land of the Province of

Buenos Aires. We know all these parcels were occupied at the very same time in 1981. We also know the exact year titles were awarded. In addition, we carried out a survey in late 2010 on a random sample of 368 parcels which had been offered titles in 1989–91 (early titled), or 1998 (late titled).[2] The survey respondents were asked to identify the persons currently considered to be the "real" owners of the parcel. In cases where the original and current owners, or the legal and current owners differed, the respondents were asked to answer a series of questions designed to provide information about the motives for these discrepancies and the formalization of potential transactions (formal sales, informal sales, death intestate, divorce, separation without divorce, further squatting, etc.). The deregularization process is then analyzed on the basis of a comparison of *de facto* vs. *de jure* ownership information.

Some families, of course, have left the neighborhood after treatment, and the process of attrition is actually one of the outcomes of interest for this study. Thus, we do not drop the parcels where the occupants have changed over time from the sample. On the contrary, the survey respondents were also asked about the full history of transactions of each parcel. The responses to the questionnaire therefore indicate whether the occupants purchased, rented, squatted, inherited, etc. and whether they completed the necessary legal procedures for these transactions.

Informal transactions, however, are not totally paperless. Information provided by a real estate office located near the study area indicates that the documentation used to prove possession in the informal transactions which that office frequently processes include addresses in the national ID, children's school enrolment records, public utility bills, bills of purchase of construction materials, and signed statements by witnesses. When transactions are informal, rather than entering the transfer of title in the Land Registry (*escritura*), the seller and buyer sign alternative documents (such as a *cesión de la mejora*, which transfers what is built above a parcel, thereby acknowledging the lack of ownership of the land itself, or a *boleto de compra-venta*, which is akin to a bill of sale for movable property).

In total, we have a sample of 368 responses, which are presented in the form of a decision tree in Figure 1.[3] In 63 % (232) of the cases, there has been no

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2 Gestion Urbana, an NGO that works in this area, carried out the surveys utilized for this research and for our previous studies (see Galiani and Schargrodsky 2010).
3 Detailed information on titling status for the full sample, early-titled sample and late-titled sample is presented in Annex 1.

Full sample	Ownership	Family	Reason

Same owners (n=232)

Status	n	%
Regularized	232	100.0
Deregularized	0	0.0

Death (n=72)

Status	n	%
Regularized	10	13.9
Deregularized	62	86.1

Full sample (n=368)

Status	n	%
Regularized	262	71.2
Deregularized	106	28.8

Titled (n=97)

Status	n	%
Regularized	17	17.5
Deregularized	80	82.5

Divorce (n=23)

Status	n	%
Regularized	6	26.1
Deregularized	17	73.9

Different owners (n=136)

Status	n	%
Regularized	30	22.1
Deregularized	106	77.9

Other (n=2)

Status	n	%
Regularized	1	50.0
Deregularized	1	50.0

Purchase (n=33)

Status	n	%
Regularized	13	39.4
Deregularized	20	60.6

Different family (n=39)

Status	n	%
Regularized	13	33.3
Deregularized	26	66.7

Squatting (n=6)

Status	n	%
Regularized	0	0.0
Deregularized	6	100.0

Figure 1: The deregularization process.

change in ownership since title had been awarded. In the other 136 cases, there were changes in ownership. Of these 136, in 97 cases there has been changes in ownership within the same family, and in 39 the family occupying the parcel has changed.

The 97 intra-family ownership changes break down into 72 changes in ownership upon death, 23 changes upon divorce, and 2 due to other reasons. When our survey respondents were asked whether the families involved had followed the necessary procedural steps to legally transfer ownership in these cases, it turned out that legal procedures were followed in only 13.9 % (10 changes) of the cases of death, 26.1 % (6 changes) of the divorce cases, and one of the other two cases. Thus, 82.5 % of the intra-family transactions were not legally processed.

Of the 39 cases of changes in the owner family, 33 were described as purchases and 6 were cases of squatting. Only 13 of the 33 purchases were legally documented. Thus, 60.1 % of the inter-family ownership changes have not been formalized.

Considering both intra and inter-family ownership changes, only a few years after legal titling, the legal owners of 28.8 % of the parcels (106 of 368 parcels) were no longer the real owners. Figure 2 summarizes this information; also splitting the sample between early-titled and late-titled parcels. For the early-
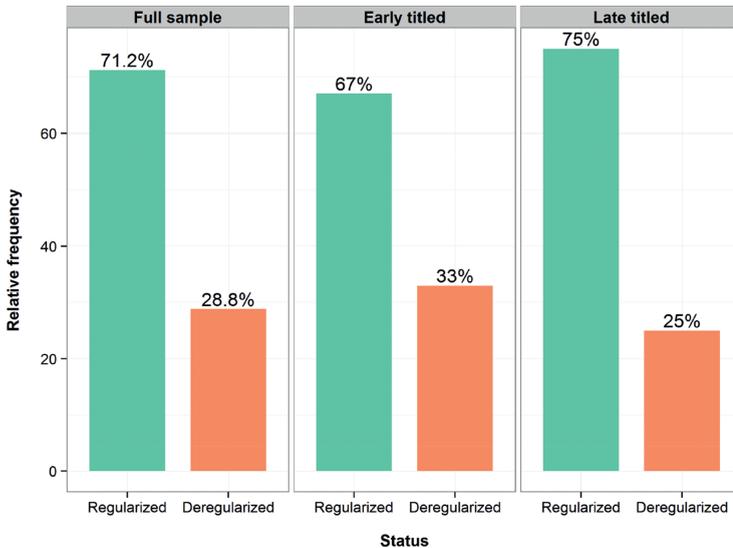
Figure 2: Deregularization rates.

treated families, who received their titles in 1989–91, 32.95 % had become deregularized by 2010. For the late-treated households, who received their titles in 1998, one quarter (25 %) of them were deregularized by 2010. As expected, there is a larger share of deregularized cases among the early-treatment group, as more time has elapsed since titling.

Figure 3 shows that, considering only the 136 cases for which there was a change in ownership, 106 of them (77.9 %) became deregularized. This percentage is similar for the early and late titled. Thus, the difference between these two groups observed in Figure 2, was due to a smaller percentage of transfers, not to higher formalization when those transfers occurred.

At first sight, the results in terms of deregularization are somewhat surprising. Previous evidence has shown that significant gains are associated with the possession of legal titles. Moreover, as it has been documented in previous studies, squatters have fought hard for the land that they are living on and have resisted attempts to evict them. Viewed from the perspective of public policy, the phenomenon of deregularization raises an important question that has a strong bearing on the evaluation of policy effectiveness. It has generally been assumed that titling can have long-lasting effects; however, if legal ownership is lost, some of these effects may vanish.
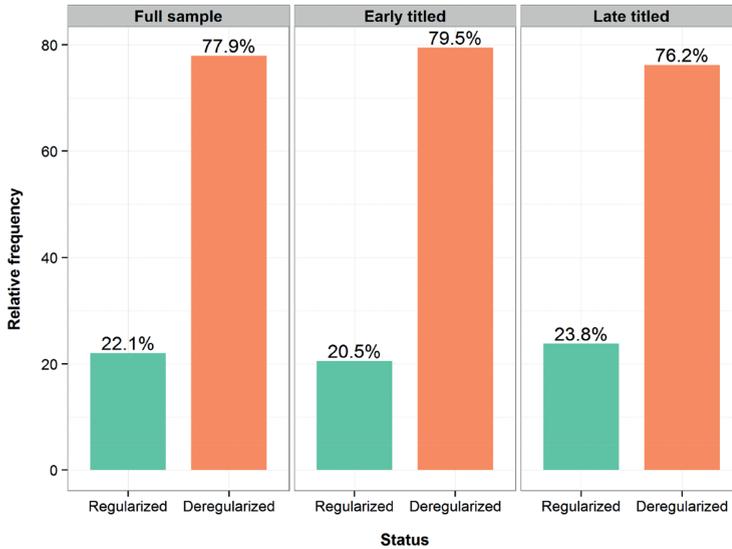
Figure 3: Deregularization rates for parcels with ownership change.

4 A simple model of regularization choice and the cost of formalization

Our next objective is to describe the process of deregularization using a formal model of regularization decisions. Our model has the following characteristics. We consider risk-neutral owners who acquired their houses from legal title-holders and thus can regularize their tenure at any point in time. Time is therefore continuous and indexed by t > = 0 We assume the value of the services provided by a titled home at any point in time to be v, and regularization has a one-time cost of $c \in \left(0, \frac{v}{r}\right)$, where r is the interest rate. Additionally, the decision to regularize is irreversible.

First, we assume that the distribution of properties which have been transferred is $\delta(t)$, with $\delta(0) = 0$, $\lim_{t \to \infty} \delta(t) = 1$. In our study, $\delta(t)$ is the probability that a sale, death, divorce, or any other event that implies transmission of property has occurred for a given parcel. For simplicity, we assume that once a parcel has been transferred it will not be transferred again. Additionally, we assume that at the time property is transferred, parcels are randomly assigned a draw of the random variable x with support $[\underline{x}, \bar{x}] \subset \Re$ and a cumulative density function

$F(x)$ which satisfies $F(\underline{x}) = 0$ and $F(\bar{x}) = 1$. Under informality, owners enjoy only a portion $p(x, s) \in [0, 1]$ of the services provided by the house, where $s > 0$ is the time that elapsed since the property was transferred. This function captures the costs associated with informal tenure.

We assume the function $p(.)$ is continuous and differentiable with $\lim_{s \to \infty} p(x, s) = 0$, $p(x, 0) = 1$, $\partial p / \partial s(.) < 0$, and $\partial p / \partial x(.)|_{s>0} > 0$. Thus, the variable x could be interpreted as an indicator of how risky an occupant's tenure over a parcel is under informality: a very low x would denote a very adverse situation and indicate that the property is at risk, while a high value signals the presence of relatively secure possessory rights. Furthermore, the partial derivative of $p(.)$ with respect to s can be interpreted as signaling an increasing level of risk in time. We believe this assumption is reasonable given that the probability of ownership disputes is likely to increase over time, since it may become harder to prove ownership as time goes by because previous owners and evidentiary documentation may be more difficult to find.

We can now develop an expression for the value of a home which has been transferred at time t and is regularized at time s at the moment of transfer, which we will call V^s. This expression is simply the present discounted value of the services provided by the house:

$$V^s = \int_t^s p(x, s') v e^{-rs'} ds' + \int_s^{+\infty} v e^{-rs'} ds' - c e^{-rs}$$

Our first result is what determines the proportion of regularized homes. This result is presented in Proposition 1.

Proposition 1: Each household has a value t^* which indicates the moment at which the property is transferred, and a value s^* which indicates the amount of time after transfer that must elapse before the parcel is regularized. At a given point in time, a household will have regularized tenure if $t^* + s^* < t$.

Proof: Given that $\delta(0) = 0$ and $\lim_{t \to \infty} \delta(t) = 1$, all properties must be transferred at some time. We refer to this moment as t^*.

Next, conditional on the parcel having been transferred, the owners must decide when to regularize their tenure. Since the owner is risk-neutral, s/he is interested in choosing s^* such that s/he will maximize the value of V^s. Taking the derivative with respect to s^* yields:

$$\frac{\partial V^s}{\partial s^*} = p(x, s^*) v e^{-rs^*} - v e^{-rs^*} + r c e^{-rs^*}$$

We will consider interior solutions. Therefore, the condition that determines time of regularization is:

$$p(x, s^*) = 1 - \frac{c}{v/r} \tag{1}$$

Furthermore, the second-order condition is:

$$\frac{\partial^2 V_{t^*}}{\partial s^{*2}} = -r\left[p(x, s^*)v - v + rc\right]e^{-rs^*} + \frac{\partial p(x, s^*)}{\partial s}ve^{-rs^*}$$

The bracket is zero because of condition (1). Therefore, the previous expression is negative, and the second-order condition for a maximum is met.

Given that $c \in \left(0, \frac{v}{r}\right)$, the right-hand side of condition (1) must be between zero and one. Since $p(x, 0) = 1$, $\lim_{s \to \infty} p(x, s) = 0$ and $p(.)$ is continuous, we must have at least one solution s^* for the previous expression. Furthermore, since $p(.)$ is strictly decreasing in time, the solution is unique. The assumptions also rule out $s^* = 0$ and s^* being arbitrarily large.

We note that according to condition (1) the moment in which the person decides to regularize depends only on the draw x and on the magnitude of $\frac{c}{v/r}$. We have already discussed the nature of x. On the other hand, the value $\frac{c}{v/r}$ is a new element with a rich interpretation. If a person has an asset from which she accrues interest v at any point in time and this asset is held in perpetuity, then the present value of this asset is v/r. Hence, the denominator is the value of the house when property rights are full. The magnitude $\frac{c}{v/r}$ thus expresses the cost of regularization relative to the value of the household. Now, we can re-interpret condition (1) in these terms: this condition states that the time of regularization depends negatively on the ratio $\frac{c}{v/r}$. That is, people are more likely to remain irregular when the cost of regularization is high in terms of the value of the house.

Corollary 1: The proportion of regularized parcels out of the total parcels transferred at the moment t is:

$$\frac{\int_0^t F\left(x^*(t - t')\right)d\delta(t')}{\delta(t)}$$

where the function $x^*(s)$ is the inverse of $s^*(x)$, as defined by condition (1).

The preceding results indicate that only a portion of the owners will have secured their property rights to their houses at any given point in time. Proposition 1 also yields some intuition as to why owners may not regularize their tenure following changes in ownership: they will not do so if their

possession is secure enough, that is, if their $p(x, s^*)$ is high. According to our model, differences in the proportion of regularized households between populations depend on the time since property was transferred but also on the draws x of both populations. Given that the proportion of irregular ownership is 82.5 % for intra-family transfers and 60.6 % for inter-family transfers, we may speculate that intra-family transfers carry a lower level of risk (a higher draw of x) than inter-family transfers.

One interesting result is that the model suggests that a failure to regularize tenure at the outset does not necessarily mean that owners will not regularize their title in the future. Thus, in the context of this model, we should view this decision as one of *postponement*, since, in fact, all owners in the model will regularize their tenure at some point in the absence of further transfers, though this is not necessarily a noteworthy result.[4]

We should also note that this result depends on the assumption that $p(.)$ decreases over time. If this were not the case, then there would be a single value x^* such that owners would regularize if and only if $x < x^*$. In this setting, families would choose either to regularize at the time of transfer or would never regularize at all. Nevertheless, there would still be a portion of $1 - F(x^*)$ of properties with irregular ownership, although this segment would be time-independent.

As it was mentioned in the previous sections, there are different kinds of situations that lead property owners to fail to regularize their tenure of their homes. If these owners no longer have the chance to regularize, then we should expect to see no further welfare effects from titling. However, if owners still have the chance to regularize their tenure in the future, then this may become an additional source of welfare. To explore this avenue, we compute the decision of when to regularize and incorporate this option into the value of services provided by the parcel at time $t \epsilon [t^*, t^* + s^*]$:[5]

$$V_t^{OP} = \int_t^{t^* + s^*} p(x, t') v e^{-r(t' - t)} dt' + \int_{t^* + s^*}^{+\infty} v e^{-r(t' - t)} dt' - c e^{-r(t^* + s^* - t)}$$

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4 The assumptions that guarantee that full regularization will occur eventually are $\lim_{s \to \infty} p(x, s) = 0$ and $\partial p / \partial s (.) < 0$. The former is used to prove existence, while the latter is used to prove uniqueness. However, these two conditions are sufficient but not necessary for the proof. Hence, full regularization is not necessarily a feature of a more elaborate model.

5 Note that $t > t^*$ implies that property has already been transferred. Hence, the values presented in this section are conditional on the transfer having taken place.

However, a house that was not titled by the government in the first place (and whose owner therefore does not have the option to regularize it) has a value of:

$$V_t^{NT} = \int_t^{+\infty} p(x,t')ve^{-r(t'-t)}dt'$$

The titling premium can be calculated as the difference between the previous two values. The difference between an owner who acquired a house that was titled to the former legal owner and someone who acquired a house by other means is essentially that the former can regularize while the latter cannot. Thus, the option value measures the welfare gain produced by the opportunity to regularize. Moreover, if the shock x is known, a person who wants to acquire the property should be willing to pay V_t^{OP} if the house can be titled, while the person should be willing to pay V_t^{NT} if the house cannot be titled. Therefore, the titling premium would give us an idea of the size of the welfare gains associated with the possession of title.

That being said, we expect the size of the welfare gain to decrease with the cost of regularization. This is because higher costs ultimately deter the owners from regularizing their title and therefore should decrease the benefits of doing so. Proposition 2 shows that this is effectively so.

Proposition 2: The welfare gain delivered by the option to regularize decreases in relation to the cost of regularization.

Proof: We start the proof by writing the expression of the titling premium:

$$V_t^{OP} - V_t^{NT} = \int_t^{t^*+s^*} p(x,t')\,v\,e^{-r(t'-t)}dt' + \int_{t^*+s^*}^{+\infty} + V\,e^{-r(t'-t)}\,dt' - c\,e^{-r(t^*+s^*-t)}$$
$$- \int_t^{+\infty} p(x,t')\,v\,e^{-r(t'-t)}dt'$$

$$V_t^{OP} - V_t^{NT} = \int_{t^*+s^*}^{+\infty} v(1-p(x,t'))e^{-r(t'-t)}dt' - c\,e^{-r(t^*+s^*-t)}$$

Now, we take the derivative of the previous expression with respect to c, taking into account that s^* is an implicit function of c given by condition (1) in proof of Proposition 1. This gives:

$$\frac{\partial(V_t^{OP} - V_t^{NT})}{\partial c} = \left[-v(1-p(x,t^*+s^*)) + rc\right]e^{-r(t^*+s^*-t)}\frac{\partial s^*}{\partial c} - e^{-r(t^*+s^*-t)}$$

Note that if we consider s^* as an implicit function of costs in condition (1), we get $ds^*/dc > 0$. Nevertheless, the bracket is zero because of this condition. Thus the titling premium decreases as the cost of regularization rises. ∎

Hence, the preceding result states that if the cost of regularization is high, the welfare gains afforded by the ability to regularize title will be limited. Although this result was intuitive, looking into the derivative shown in the previous proof gives us an idea of why this is so. We see that there is a direct effect, given the higher cost of regularization, which is $-e^{-r(t^*+s^*-t)}$. There is also an indirect effect, since the decision to regularize title is actually postponed. However, this effect is second-order small, since the bracket is zero. This deferral will lead to lower rates of regularization at any given point in time, although it does not affect welfare.

In our natural experiment, we can compare the cost of formalization (after death, divorce or sale/purchase) relative to the value of these parcels. During the process of data collection, we hired a real estate office located near the study area to measure valuations of the dwellings at the parcel level.[6] The average value of the parcels in our sample was AR\$ 46,824 (about US\$ 11,700, at the time of the survey). According to this local realtor, the price difference between houses in this area with and without legal titles is of approximately 20 %.[7] Moreover, information was sought from lawyers operating in Quilmes County regarding the costs of various sorts of legal transactions. The cost of processing the inheritance of an asset valued at US\$ 11,700 is about US\$ 2,300. The cost of the legal purchase procedure for such an asset is about US\$ 3,184. The legal cost of a divorce with this asset is about US\$ 2,440. The fact that a family might need to incur these costs more than once over time also has to be taken into consideration. Thus, these legal costs are very significant relative to the parcels value (i. e., c is high relative to v, in terms of our model).

These legal costs are also high relative to the income levels of these households. The average monthly household head's income in our survey is \$AR 1,277 (about US\$ 320), and the average total household income is \$AR 1,763 (about US \$ 440). Likely, these families do not have other sources of liquidity to afford the costs of formalization than their own income.

In sum, titling costs are effectively very large in terms of average property value, titling premium, and average income. Thus, one possibility is that the

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6 This local real estate agency provided a valuation in Argentine pesos of each parcel. The valuation was not performed in the San Martin parcels.

7 Note that it is very difficult to properly estimate the land titling premium. First of all, there are few real transactions so as to have enough degrees of freedom available. Second, because land titling cause investments, it is needed to control for them to isolate the land titling premium, something also very difficult since investments are themselves endogenous variables in a housing value equation.

(potentially repeated) costs of remaining formal simply outweigh the welfare benefits and titling premium, and that therefore formalization may not be worthwhile. Legal and transactions costs may be one of the main reasons for the high rates of deregularization found in our sample.

A similar argument may account for the low level of access to mortgage credit. In theory, the possession of formal property rights could allow the use of land as collateral, improving the access of the poor to the credit markets (Feder et al. 1988; De Soto 2000). However, the high legal cost of carrying out an eviction and of mortgage execution may preclude the use of these parcels as collateral (together, of course, with the difficulties faced by this population in meeting the associated credit requirements regarding individual documentation and formal employment). Galiani and Schargrodsky (2010) showed that these families enjoy little access to formal credit, and a very modest effect of land titling on mortgage credit.

The costs of formalization may also be a relevant factor in other similar types of interventions. When property rights are transferred to very poor people, preserving legal tenure will likely entail onerous expenses in the form of attorney and public notary fees, and court costs. In addition, these charges are higher in relatively terms in very unequal societies where the gap between the poor and the relatively well-off is wider. In view of these concerns regarding the high costs of regularization, the next section is devoted to a discussion of alternative titling schemes that can ameliorate these effects.

5 Alternative titling systems

A large body of literature has documented the sizable positive effects associated with land titling (see, for example, Shavell 2004, and the survey by Galiani and Schargrodsky 2011). However, the evidence presented here shows that there is a tendency for owners not to maintain the legal title to their property. This is a concern because the process of deregularization can thus constrain some of the beneficial effects of titling. Furthermore, as it has been shown in the preceding section, the costs associated with the legal transfer of property are potentially one of the major reasons for the high rates of deregularization found among our sample.

This section will focus on legal alternatives which can lower the costs of transferring and holding property and thus boost the benefits of these policy interventions. In practice, claims on property can be documented in a registry that is actually *public* and therefore widely accessible. According to Shavell

(2004), the benefits of such a system are that they provide assurance of ownership which has several advantages like discouraging theft, and reducing information asymmetries in sales or when using property as collateral.

Regarding the formats these systems can take, Arruñada (2012) discusses two alternative systems for the provision of public information on property rights. The first system is the recordation of deeds, whereby a public registry provides information regarding the claims associated with a property. Given that some of the information in these registries may be redundant or contradictory, the records must be purged in order to determine who the right-holder is. This task is carried out by professionals who thoroughly examine the claims and issue a report that evaluates the quality of the property. If there are proper incentives for recording claims, title reports will be accurate and the acquirer's information asymmetry will be reduced. Moreover, courts will allocate property on the basis of essentially the same process in the event of litigation.

The next alternative discussed by Arruñada (2012) is the registration of rights. While recordation provides information regarding claims, this information has to be processed in order for it to become clear who the owner is. In contrast, registration directly defines who the right-holder is. In order to do this, registration officials conduct mandatory purges of the claims to a property before registering the rights to it. If a transaction does not affect the rights of others, or if these other parties give their consent, then the transaction is registered and the acquirer becomes the legal right-holder.

Therefore, the registration of rights is intended to reduce information problems to a minimum. However, registration systems are often seen as entailing large fixed costs. On the other hand, systems of recordation are generally regarded as being less expensive than registration but may involve greater uncertainty. Hence, the choice between recordation and registration depends on the trade-off between fixed costs and reliability. Arruñada and Garoupa (2005) build a formal model along these lines that compares the two systems in the presence of an outside option. Landowners have incentives to pick the outside option for low-value land, recordation for mid-value land, and registration for high-value land. When only one of the systems is available, their results show that recordation leads to the under-assurance of high-value land, while registration generates either under-assurance or over-assurance in the case of mid-value land. The optimal choice between these two systems ultimately depends on how these trade-offs stack up.

The Arruñada and Garoupa (2005) model offers some important lessons for our land titling intervention in relation to the subsequent deregularization process. In the case under study, the prevalent system is one of registration and the outside option is that of deregularization. Given that the parcels in

question are of relatively low value, it seems natural for people to prefer deregularization. However, in the presence of a recordation system, many of these properties would be legally recorded, and socially costly under-assurance would be avoided.

Some authors have challenged the idea that recordation is less costly than registration and contend that the former system identifies rights more clearly (see Arruñada 2012). However, these objections do not target the systems *per se*; they are rather case-specific and partly attributable to shortcomings in system design. We will therefore disregard these caveats here.

We do not, of course, propose that the entire registration system be changed to address problems that are specific to a subgroup of the population. However, specific property right systems can be designed to target the problems faced by the poor. Regarding targeted interventions, the Commission on Legal Empowerment of the Poor (CLEP 2008) emphasized that:

> Some countries have adopted simple, locally administered processes to confer legal land rights as alternatives to conventional land titling. They are practical, inclusive, benefiting growing populations of the rural poor, and are being increasingly used to enhance urban land tenure security.

For example, in the experiment studied here, the squatters' ownership of the parcels at the time of treatment was guaranteed by the specific expropriation law. Subsequent transfers of property are likely to have involved unsophisticated forms of documentation, and bank claims, such as mortgages, are rare. Thus, identifying right-holders should be relatively straightforward as long as the transfers have been documented. In addition, institutions can use paralegals, law students and recent graduates as a means of running the registry at a lower cost.[8] They can also provide complementary services that will simplify and reduce the cost of procedures such as those involved in processing an inheritance or a divorce. These kinds of approaches could potentially be used to help build a legal framework that is better suited to the needs of the poor.

6 Conclusions

In this study we have tracked the outcomes of an intervention in which property rights were granted to poor people living on the outskirts of Buenos

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8 See CLEP (2008) for further ways to provide affordable legal services to the poor.

Aires. When 12 to 21 years had elapsed since titling, 28.8 % of the parcels allocated to the squatters became occupied under irregular tenure arrangements due to unregistered intra-family transactions (death, divorce, other) or inter-family transactions (informal sales, occupation, etc.). This figure seems surprisingly high, given that these families fought tenaciously to obtain legal title to the land and the presence of strong positive effects from legal titling, as studied on this natural experiment in our previous papers (Galiani and Schargrodsky 2004, 2010) and by the literature on other cases. Why have so many of these families allowed their title to their parcels to become deregularized?

One main reason may be that the legal costs of remaining formal are too high relative to the value of these parcels (and the income of these households). Thus, we looked into the question as to whether lower-cost means of formalization could be achieved through alternative legislation. Although we cannot provide definitive answers, it is likely that a registration system would be unsuitable for the poor, given that low-value properties tend to go unregistered. A system of recordation, on the other hand, could deliver cost reductions which would ultimately boost the rate of regularization and enhance legal protection. All in all, it is likely that complementary reforms aimed in this direction can increase the welfare of the poor, and make the benefits of land titling more durable.

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Annex 1: Titling status for our full sample.

Group	Full sample (%)	Early titled (%)	Late titled (%)
Regularized	**71.20**	**67.05**	**75.00**
Titled family	67.66	63.07	71.88
Same owners	63.04	58.52	67.19
Death	2.72	3.41	2.08
Divorce	1.63	1.14	2.08
Other	0.27	0.00	0.52
Different family	3.53	3.98	3.13
Purchase	3.53	3.98	3.13
Deregularized	**28.80**	**32.95**	**25.00**
Titled family	21.74	24.43	19.27
Death	16.85	18.75	15.10
Divorce	4.62	5.68	3.65
Other	0.27	0.00	0.52
Different family	7.07	8.52	5.73
Purchase	5.43	6.82	4.17
Squatting	1.63	1.70	1.56