Specificity of Control: The Case of Mexico's Ejido Reform

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Abstract

Over the course of 15 years, between 1992 and 2007, Mexico carried out a major land titling program that handed out certificates over usage rights for more than 90% of its communally held land (ejidos). Importantly, formally specifying usage rights through certification can reduce ambiguity in claims to property. This paper analyzes the long run impact of this program using data from 1991 and 2007, focusing on the average length of time land holdings have been certified. In order to control for selection, we take advantage of the program's peculiar implementation strategy. We find that certification decreases investment in activities that traditionally maintained tenure security. We argue that this encourages movement to non-farm activities, such as migration. While these findings stand alone as measures of outcomes of an important land reform, we view them as evidence that greater specificity improves the coordination of production plans.

JEL Classification: O10, O12
Key words: Property Rights, Specificity, Land Reform, Mexico, Ejido

1　Introduction

Many countries have implemented large-scale land reforms designed to improve the rural sector.[1] Studying these reforms is an important endeavor both from a policy perspective (Besley and Burgess 2000, de Soto 2000) and to better understand the role of institutions in economic development. We take a closer look at Mexico's ejido reform in order to evaluate one of the largest land titling programs of the recent years and to investigate the role of greater specificity in property rights in the development of Mexico's ejido sector.

In the literature on why institutions matter for development, good institutions provide the right incentives for efficient production (North 1981), usually in the form of greater individual control. However, holding the level of control fixed, greater specificity can improve the coordination of production plans by making expectations consistent. Development economists, with notable exceptions (Ostrom 2005, Alston, Harris, and Mueller 2010), have given less emphasis to the role of specificity, even though an old tradition exists that argues that increasing specificity improves ex-ante predictability (Fon and Parisi 2007). This oversight in the literature is somewhat troubling given that many land reforms attempt to increase specificity. In this paper, we find that specificity does matter for a number of land related investments. In particular, we find that greater specificity of land rights enables individual farmers to divest in agriculture while maintaining the future option to resume agricultural production. Specificity improves others' expectations of the value of this option to the farmer.

Specificity refers to how explicit the rights are in the sense of the ability of a third party to enforce the rights. To take the simplest example, if a peasant has an individual right to ejido land but the right does not have a plot demarcated then this right is less specified than one with a plot demarcated. Specificity matters because of its influence on expectations. In a real sense, lack of specificity can open the door to ex-post bargaining because it relies on first party or second party enforcement of rights. This ex-post bargaining can have significant costs in disrupting the expectations about

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[1]An incomplete list is Thailand, Vietnam, Brazil, Russia, India, China, Peru, Nicaragua, Ethiopia, Madagascar.

tenure security. Field (2007) demonstrates this effect for urban households; she shows that an urban titling program led to increased labor supply outside the home. Do and Iyer (April 2006) also show that handing out formal titles for usage rights has an impact on engaging in non-farm activities but they can not separately identify the effect of greater specificity since they can not condition on the level of control.

Of course, increasing specificity may not always translate into better predictability as Shipton (1988) and Sjaastad and Bromley (2000) demonstrate. However, this reform has good characteristics to isolate the effect of specificity on increased tenure security: participatory and democratic reform, strong pre-existing individual and communal rights, de facto land markets within ejido, etc. In addition, increases in specificity without increases in individual control happen rarely making Mexico's ejido reform an attractive reform to study.

With the reform of its constitutional article 27 in 1992, Mexico officially ended its policy of land distribution, and opened the possibility that communally held land (*ejidos*) could be converted into private property. As part of the reform, the Mexican government also set out to properly delimit and register all communal land holdings, which in turn would be a precondition for the voluntary decision to privatize land. Up to that point, each ejido's external boundaries were only loosely known, often depending on whether or not a more than half a century old document was in the possession of the ejido and in many instances a source of conflict, while the internal land division between individual ejido members (*ejidatarios*) was only known to the ejido itself. The land registration program (*PROCEDE*) that was implemented together with the reform, and only concluded in November 2006 with more than 90% of communal land covered, did not only determine an ejido's external boundaries, but would also give inalienable usage rights to individual ejidatarios over the land under their control.

This paper studies the long term effect of this certification program, comparing outcomes right before the reform in 1991 to outcomes right after its conclusion in 2007. The data used is mostly drawn from the last two rounds of the Mexican Agricultural Census, corresponding to these two years. As by 2007 more than 90% of the communal land holdings in Mexico had been cer-

tified by PROCEDE, we are not able to formulate our hypotheses based on a binary treatment (certification vs. no certification), but rather on the average effect of one additional year under certification on the outcome in question. We find that one such additional year, on average, increased the percentage of land taken out of production by around 4%, decreased the percentage of producers using improved seeds or chemical fertilizers by 3% and 5%, respectively, and, as a result, decreased the productivity of corn by 0.5 metric tons per hectare and of beans by 0.1 metric tons per hectare. The effects on productivity and land abandonment are large and economically significant while the effects on agricultural inputs are marginal. Complementarity between agricultural labor and capital inputs driven by investments in enforcement that use cultivation to maintain tenure explains these results well. Also in line with these results, we find that each such year decreased the percentage of producers using credit by almost 2%, and the percentage of producers obtaining a monetary income from their agricultural activities by 3%. In addition, we find that, as one would expect, there was considerable positive selection into the program.

We view these results as important for two reasons: as an evaluation of one of the largest land titling programs of the recent years in one of the world's biggest emerging economy, and second, as an additional piece of evidence in the broader property rights literature. We show that Mexico's ejido reform did indeed have a significant impact on a variety of outcomes of interest. This stands in contrast to the received wisdom that the reform had a very limited impact on farmers' behavior. To our knowledge, case studies apart (Bouquet 2009), the only systematic research on the reform's impact comes from a series of surveys conducted by the Mexican Ministry of Agriculture with support from the University of California, Berkeley. The baseline survey was taken in 1990, without the coming reform in mind, and followed by additional rounds in 1994 and 1997 which specifically included questions to gauge the reform's impact. de Janvry, Gordillo, Sadoulet, and Project (1997) provide a very detailed description of the evolution of the ejido sector between the first two rounds, but without a clear focus on the effect of the reform itself. Munoz-Pina, de Janvry, and Sadoulet (2003) focus on the determinants of reform participation. We use their findings to construct our controls. Using all three rounds, plus an additional survey conducted in the year 2000 by the *Procuraduria Agraria*, Deininger and Bresciani (????) and Deininger and Olinto (????) find that the reform did improve land access

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for the formerly landless, as well as, rental markets. It is also found to have reduced land related conflicts, but not to have had any effect on land sales or credit access.

Our results contribute to the understanding of Mexico's recent agrarian reform in two ways. First, we take a longer term view than the previous studies. All to often controversial policies are analyzed briefly after their implementation, and consequently evaluated only based on their short-term effects. As we believe that the effects of a fundamental change in tenure security probably need some time to materialize, during which mind frames change and new opportunities emerge, taking a second look at PROCEDE 15 years after it was initiated makes a lot of sense. This long term view comes at the cost of not having a clear binary treatment as by 2007 most of the social property was already certified. Secondly, by using data from the last two rounds of Mexico's Agricultural Census from 1991 and 2007 (a planned census in 2001 was called off due to a lack of budget), our data contains information from essentially all ejido producers in Mexico. This feature allows us to avoid criticisms of representative samples given the great extent of heterogeneity in ejidos. This again comes at a cost: Due to confidentiality reasons the Mexican National Statistical Institute (*INEGI*) is banned from making Agricultural Census data available below aggregation at the municipal level; this also implies that no micro samples from the census population are available. We therefore conduct our analysis working with data aggregated at the municipal level, but containing full information of all relevant producers in all municipalities.

The second contribution of this paper is to the broader literature on property institutions and development. The empirical literature has estimated large negative effects of tenure insecurity (Macours, de Janvry, and Sadoulet 2010, Goldstein and Udry 2008). Besley (1995) shows that increasing an individual's tenure security increases incentives to invest, access to credit and efficiency in land markets. However, despite a few bright spots (Deininger and Binswanger 1999, Do and Iyer April 2006), relatively few studies present evidence that land titling or privatization programs have had robust positive effects (Braselle, Gaspart, and Platteau 2002, Field and Torero 2004, Galiani and Schargrodsky 2005, Bandiera 2007, Migot-Adholla, Hazell, and Place 1991, Carter and Wiebe 1994). The explanations of the mixed results usually focus on issues concerning control, arguing that the dis-

tribution of de facto rights has remained unchanged or made worse amidst the de jure reform. For example, (Carter and Olinto 2003) even argue that land titling programs can translate into better outcomes for large landowners than small landowners, further aggravating rural inequality. Land titling programs have been criticized for overstepping the complicated land tenure relationships that have evolved, resulting in both confusion and less access to land for those with less power. Feder, Onchan, Chalamwong, and Hongladaron (1988) and Banerjee, Gertler, and Ghatak (2002) show that marginal improvements in control as opposed to a complete privatization overhaul can help the landless and poor landholders. Moreover, when informal individual rights function well, Jacoby and Minten (2005) argue that increases in tenure security due to land titles is likely small and not enough to induce large differences in investment incentives.

The PROCEDE program increases the specificity of property rights while holding control, more or less, fixed for those ejidos that did not privatize. One can then assess the change in tenure security due to improvements in specificity without conflating the effect of an increase in control. By doing so, one can arguably interpret the effects as improvements in the consistency of expectations concerning property relations of the ejido producers. Clearly specified rules can matter as much as the incentives determined by those rules.

The next section will describe Mexico's ejido sector and give details on the implementation of PROCEDE, section three describes our data and estimation strategy, section four presents our results and section five concludes.

2   Reform Background

2.1   The Ejido: Structural Characteristics

Mexico's post-revolutionary Constitution of 1917 granted in its article 27 the government far reaching rights to expropriate private land holdings in order to redistribute them to the landless. In addition, Mexico's Agricultural Law (*Ley Agraria*) limits the maximum amount of private land holdings to 100 hectares of irrigated land or its equivalent in rainfed land. The Constitution also established that all redistributed land had to be given to groups of

farmers in the form of ejidos, i.e. communal land holdings. [2] Ejidos gave its members, the ejidatarios, individual usage rights over determined plots of land, contingent on cultivation. These usage rights were hereditary, but were not guaranteed by any form of official title, nor were the rights divisible. Land conflicts between different ejidatarios had mostly to be resolved internally by the ejido's governing body (the *comisariado ejidal*), which also had far reaching authority to reallocate usage rights if an ejidatario fell foul of the rules governing land use. In addition to having to keep land under cultivation, these rules outlawed land sales or rental contracts. They also stipulated that land could not be lent to individuals outside the ejido (such as relatives living somewhere else) and limited the hiring of additional labor.

The ejido varied widely, even within municipalities. de Janvry, Gordillo, Sadoulet, and Project (1997) discuss the heterogeneity of the ejido across three important dimensions: member/non-member composition, individual/commons land distribution and internal governance. As mentioned above, hereditary rights were not divisible, meaning that ejido membership is not guaranteed for all members of a family living in an ejido. The ejido could let non-members use ejidal land but the composition of member/non-member clearly affected the local political economy of the ejido. Ejidos also differ by how much land is allocated to the commons. This characteristic could also affect the demand for and supply of certification or privatization. Finally, the comisariado ejidal also could vary both in its scope and effectiveness.

2.2   The Reform Details

Mexico's 1992 agrarian reform introduced a number of changes. First of all, it ended Mexico's land redistribution. Private land can now only be converted into social property if the land's owners decide to form an ejido. It also eased some restrictions on ejido without requiring privatization. These include that land can be rented out, sold within the ejido and the possibility to hire external labor. Secondly, it established that all ejido land needs to be properly measured and certified. This also includes that individual producers be given land titles over their usage rights. Lastly, it opened the possibility

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[2] A second form of communal land holdings is constituted by the Agrarian Communities *Comunidades Agrarias*, much smaller in number and located in mostly indigenous communities. These were also certified during PROCEDE, but not subject to the other reforms of article 27

that ejidos, once certified, democratically to decide to convert part or all of their land into private property. Only then can land be sold to third parties. It has to be pointed out that the decision to privatize any plot of land needs to be approved by the ejido assembly with a two-thirds majority and cannot simply be taken by any individual producer.

The actual measurement and certification program PROCEDE, which is this paper's primary focus, was carried out by INEGI, together with the Procuraduria Agraria and the National Agrarian Registry (RAN). We had the chance to interview one person who actively participated in PROCEDE over the course of many years in a position of responsibility, and who is currently still working at INEGI. Our principal interest is in finding exogenous determinants of how quickly an ejido was certified.

The whole process consisted of several stages, each of which was initiated by a meeting with the ejidal authorities or a general ejido assembly. The process was initiated with the Procuraduria Agraria contacting the Comisariado Ejidal in order to set up a first meeting. That meeting, if successful, resulted in the convocation of a first general assembly at which the INEGI would would also be present. The principal aim of this first assembly was to inform ejido members about PROCEDE. It had a quorum requirement of 50% plus one and took a vote on whether or not to create an auxiliary commission (*Comision Auxiliar*), which consisted of a small number of ejidatarios. It had the task to elaborate a rough draft of the ejido's external and internal boundaries, including parceled land (over which ejidatarios had individual usage rights), common lands, and housing areas. These drafts were then presented at a second assembly which took a vote, again with a 50% plus one quorum, on whether or not to accept them. If accepted, INEGI and ejido members would jointly start to carry out detailed land measurements and to generate the corresponding maps for the land registry. The final result were publicly presented for two weeks, during which complaints could be filed. Owners of land adjacent to the ejido also had to be contacted in order to give their written consent to the established external boundaries. A third and final assembly, with a 75% plus one quorum, had to accept the results which were then sent to the National Agrarian Registry. Private land titles were given out on all housing plots and sent to the municipal authorities for inclusion in the local land registry.

The voluntary nature of this process with three full assemblies means, of course, that ejidos selected into treatment. In order to tackle this substantial identification problem, one needs to look for factors that determine how quickly an ejido was certified, yet are unrelated to the characteristics that determine selection. A first point to note is that PROCEDE was effectively carried out at the state level. INEGI was staffing its existing offices in state capitals with the personnel in charge of carrying out the program. Any factor affecting INEGI's decision which ejido to measure out first would do so only relative to other ejidos within the state. IN addition to the state capital offices, PROCEDE also established local offices responsible for a sub-state area consisting of a varying number of municipalities (*jefaturas de zona*). Most of the rank and file employees were locally recruited and worked exclusively for one of the jefaturas. At its peak more than 15,000 people, divided into more than 800 groups (*brigadas*), worked for PROCEDE nationwide. This set-up provided PROCEDE with a fairly flexible workforce as jefaturas could be dismantled if the workload in its area dropped too low. The precise location and lifespan of jefaturas could give us important additional information with respect to time of treatment, but, unfortunately, to our knowledge that information is not available.

A second point to note are the severe budgetary constraints faced by the program. During the last two years of the Salinas presidential administration (1988-1994) the program was well funded, but progress was much slower than expected. The change in presidential administrations together with the currency crisis in late 1994 resulted in a much smaller budget over the coming years. In order to keep the program afloat and actually show some tangible progress it became imperative to certify the largest number of ejidos as quickly as possible, i.e. picking the low hanging fruits first. [3] According to the person interviewed, the principal factors that determined an early treatment were i) absence of internal or external land conflicts, ii) a small land area, iii) a level geography (i.e. mostly non-mountainous terrain), and iv) large proportion of external boundaries with other ejidos in the process of certification. These factors, together with the state-by-state organization of PROCEDE will provide us with the identification strategy discussed below.

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[3]Or, in the words of our interviewee *"se echaba toda la carne al asador"*

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3 Model

3.1 Model Summary

In this section, we briefly outline the model we have in mind to interpret our results. We discuss the five main components in turn.

Five Pillars of the Model:

1. Community solution to commons management a la (Ostrom 2005):

   As Elinor Ostrom and others argue, communities develop solutions to internalizing the costs of externalities in the commons. These solutions impose social sanctions or set up arrangements to exclude potential users. These solutions are not complete and may involve ex-post bargaining and ex-ante enforcement. The presence of these solutions makes possible individual de facto rights with or without individual de jure rights. These solutions also open the door for ambiguity to property claims since rights are negotiable and evolving.

2. Complementarity in labor and capital inputs.

   This complementarity is driven by the pre-reform property rights regime the require cultivation to maintain tenure. For example, one could imagine the following production function:

   $$F(K, L) = K^\alpha L^{1-\alpha}$$

   subject to minimum labor constraint, l^{min} with $F(K, L) = 0 \, for \, L < l^{min}$.

   This complementarity may not exist under the new property rights regime adopted post-reform. This leads us to the next component.

3. Uncertainty over enforcement of changes in de jure control.

   As one can see in table 1, the reform caused changes in de jure control for all ejidos, regardless of participation in PROCEDE. Even though the reform ushered in changes in control for ejido users, expectations concerning the role of second party enforcement in establishing de facto rights might influence investment decisions.

Table 1: Post-Salinas Change in De Jure Control

	Individual Plots	Common Lands
Pre-Reform	TSC, RC	TSC
Post-Reform:	TS, R, SC	TSC
Certification	TS, R, SC	TS, R, SC
Privatization	TS, R, S	TS, R, S

TS=Secure tenure; TSC=Conditional tenure security; R = Unconditional right to rent; RC=Conditional right to rent; S = Unconditional right to sell; SC=Conditional right to sell

4. Beliefs may or may not give rise to multiple equilibria a la Morris and Shin (1998).

   Given the uncertainty, one can interpret the level of potential conflicts with individual control as a fundamental. Ejido users receive a signal about this fundamental and ex-post everyone agrees on the value of this fundamental. Expectations about the fundamental may or may not give rise to multiple equilibria. The information about the fundamental is dispersed even though the true value can be determined using everyone's information. Given this dispersion, the belief about others' actions given others' signals can reduce the multiplicity of equilibria. And given the delay in payoffs, history dependence can limit the reach of the reform.

5. Certification causes increased precision of public information and congestion externalities a la Adsera and Ray (1998).

   Better public information opens the door to multiplicity again by better coordinating beliefs. Then, congestion externalities, the cost of moving from old location to new location is increasing with number of movers, permits movement from one equilibrium to another in the presence of agglomeration externalities with delayed payoffs. The PROCEDE program introduces congestion externalities because the cost of movement to the new regime of control is increasing in the number of those who have already moved. Not only do inefficient investments in enforcement through cultivation become increasingly unnecessary, the chances of staking out one's preferred claim of the distribution of the commonly owned property declines.

To summarize, we assume that ex-post, the level of control is fixed, and,

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in principle, all ejidos have the opportunity to adopt de jure individual control. That is, everyone agrees on the distribution of rights (deviations from the community solution included) ex-post. The trouble is ex-ante there may be some uncertainty on the boundaries of control rights that can lead to deviations taken that would not have been taken had this uncertainty been resolved before the action. Specificity acts to introduce congestion externalities encouraging everyone to believe that the new regime will be adopted.

3.2   The Model in Detail

Consider an ejido community with N individuals, M of which are ejido members. WLOG, order the community members such that the first M are ejido members. Each agent is endowed with a standard utility function increasing and concave in consumption. Each user is endowed with one unit of labor per period that can be split between agricultural work and non-farm activities. Let L track the amount of agricultural labor. Suppose there is an agricultural production function, $F(K, L) = K^\alpha L^{1-\alpha}$, and an uncertain outside option $w(1 - L)$, where w follows a Markov process. In the simplest case, K fully depreciates each period (variable inputs). We will relax this assumption later. For the moment, consider ejido membership as equivalent to access to the agricultural production function (fixed stock of land). We characterize the ejido rules using a constraint on the minimum amount of agricultural labor that the ejido member chooses to supply. If agricultural labor falls below this minimum, the claim on ejido land is forfeited. Thus, we have the following dynamic program:

$$
\begin{aligned}
\underset{C,K,L}{\text{maximize}} \quad & E_0 \sum_{t=0}^{\infty} \beta^t U(C_t) \\
\text{subject to} \quad & C_t + K_t = Y_t, \\
& Y_{t+1} = \mathbf{1}[L_s \geq L_{min}, \ \forall s < t+1](K_t^\alpha L_t^{1-\alpha}) + w_{t+1}(1 - L_t), \\
& w_{t+1} = \rho w_t + \eta_{t+1}, \\
& 0 \leq L_t \leq 1.
\end{aligned}
\tag{1}
$$

To solve this program, we use the standard techniques. First, we set up the Bellman equation for a modified version of the above program that assumes that there is no minimum labor constraint. This program would solve

the original problem if the optimal path has $L_t^* > L_{min} \forall t$. The remaining solution will result in two cut-offs points for $w_s > w'$, resulting in $L^* = L_{min}$, and $w_s > w''$, resulting in $L^* = 0$.

What should be clear from this model is that a reduction in L to below the labor constraint will result in a reduction in K to zero. Thus, if it becomes optimal to drop below the constraint, one should also drop L to zero.

When the reform occurs, this minimum labor constraint is lifted de jure but not necessarily de facto. There are two possible property regimes, the status quo and the alternative, post-reform, regime. Which property regime is in place is not common knowledge. Thus, on top of the basic labor allocation decision, the individual must form a belief about which property regime is in place. Since the alternative regime is the de jure one, it is feasible only if it is, in fact, adopted in practice. Each agent can choose to attack or not attack the status quo by choosing $L < $ or$\geq L_{min}$. Denote this action by a_i where $a_i = 1$ if agent attacks. All agents move simultaneously. After the agents take their actions, the status-quo regime survives or not. We track this outcome with $R = 0$ if status quo survives. The status quo is abandoned is enough agents attack it. That is, $R = 1$ if and only if $A \geq \theta$ where $A = \int a_i di$ denotes the mass of agents attacking and we discuss θ below.

We get:

$$\underset{C,K,L}{\text{maximize}} \quad E_0 \sum_{t=0}^{\infty} \beta^t U(C_t)$$

$$\text{subject to} \quad C_t + K_t = Y_t,$$
$$Y_{t+1} = ((1 - R_{t+1})\mathbf{1}[L_s \geq L_{min}, \ \forall s < t + 1])(K_t^\alpha L_t^{1-\alpha}) + w_{t+1}(1 - L_t),$$
$$R_{t+1} = \mathbf{1}[\int_{i \in M} \mathbf{1}[L_t^i < L_{min}] \geq \theta],$$
$$w_{t+1} = \rho w_t + \eta_{t+1},$$
$$0 \leq L_t \leq 1.$$

$$(2)$$

We rely on θ to track the conflict undercurrent that reflects the amount of individual control that exists within the ejido. A more coordinated attack is required in ejidos with higher conflict possibilities. Those with low θ require only a few ejido users to attack the status quo to instigate regime change. The potential conflicts are too weak to prevent change. One interpretation of θ is how entrenched the status quo is.

We introduce both a public, μ_z, and private, μ_v, signals of θ with vari-

ances, σ_z and σ_v, respectively, representing the precision of the signal in the spirit of Morris and Shin (1998). The private signal comes from the agent's interactions with neighbors and personal assessment of the ejido's situation. The public signal occurs during the ejido assemblies, meetings concerning the certification program and the reform, etc. In this context, certification will improve the precision of the public signal and if the new regime is adopted will serve to facilitate third-party enforcement of that regime (while it may marginally improve third-party enforcement of the status quo).

For the moment, assume that the precision of the private signal is unaffected by certification, allowing us to isolate the third-party effect of specificity. Improving the public signal permits the coordination of beliefs that gives rise to multiplicity.

> Proposition 0 (Morris and Shin (1998)): A reduction in public noise, holding the private noise fixed, results in an increase in the range of θ where multiple equilibria exist such that the status quo survives and the corresponding optimal labor allocation for $R = 0$ is one equilibrium and another is the alternative regime is adopted and the corresponding optimal labor allocation for $R = 1$.

In the above model, the main complementarity is realized with delay. The value of access to the ejido in the future is contingent on the actions of the present. Such models exhibit history dependence as shown in Proposition 1 of Adsera and Ray (1998). In the present context, this means that the status quo will likely survive even after the de jure change in control if θ is above (a possibly low) threshold. Thus, the multiplicity that certification opened up is only a mirage. Coordination of beliefs is possible but unless payoffs occur instantaneously, the agents can not coordinate on the new regime (unless θ is small enough that one single agent's attack can usher in the new regime).

A movement from second-party enforcement to third-party enforcement that relies on certification involves congestion externalities. In the particular context of certification, congestion externalities stem from the fact that once on the books, the possessor of the right is protected, whether or not, there is a valid claim against the rightsholder by another party. This means if boundaries are drawn in a particular way that benefits one neighbor over the other, the benefiting neighbor will keep the specified right (although it is possible the land registry will compensate the other neighbor) if no conflict

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is raised before certification is finalized. This system creates incentives to grab as much as one reasonably can in hopes that others will not voice competing claims. We should mention that congestion externalities not only function among individuals within an ejido but also among individuals that share boundaries with the ejido. Thus, the cost of moving is increasing in the number of others who have already moved to third-party enforcement.[4] In the language of Adsera Ray, community participants could "migrate" to report fixed boundaries but the costs of doing are non-increasing without third party enforcement because they can be adjusted after reporting. Certification by not allowing ex-post adjustment gives rise to congestion costs.

3.3   Summary of Hypotheses

We start with the main hypothesis one finds in the literature, formally characterized by Besley (1995):

> **Main hypothesis in the literature:** Increased tenure security in land increases land-specific investments.

Since land tenure is complex, we would like to go beyond this simple formulation. Specifically, we would like to highlight the distinction between greater control and greater specificity in investigating increases in tenure security. First, the ejido reform increased tenure security by increasing individual control rights to permit renting, hiring labor and not requiring cultivation for control. This aspect of the reform did not depend on whether or not the ejido participated in the certification program and hence we will not focus on the effects of this increase in control.

Second, following Barzel (1997) and Alston, Harris, and Mueller (2010), we argue that who specifies individual usage rights can have an impact on tenure security, and consequently on land-specific investment decisions. The ejido reform through the PROCEDE program offered a means by which the ejido could increase the specificity of the rights of its users. We believe that both changes in control and specificity took some time to completely occur. Moreover, the expectations concerning the changes in control are influenced by the changes in specificity as shown in the previous section.

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[4]In our particular context, delaying certification may also result in additional cost since the reform fully subsidized the certification process.

We will take advantage of the fact that certain individual rights were well-developed and enforceable before the reform, provided that ejido rules were followed. As mentioned above, one of these rules is that the ejido producer must cultivate the land over which the producer has the usage right. Thus, one corollary is that little or no effect will appear for certification on investments tied to cultivation since expectations surrounding increased control should not have changed much.

> **Hypothesis 0:** Since tenure security contingent on cultivation existed before the reform, certification should not increase investments tied to cultivation.

The next hypothesis we derive from the fact that certification can influence expectations. Ejidos that formally certify their usage rights should suffer relatively less from the uncertainty concerning the enforcement of the increase in control. The increased predictability of the enforcement of claims to property, ex-ante, decreases the need to rely on more traditional means of enforcing claims through cultivation. Thus, we should see divestment in activities related to cultivation in certified ejidos relative to those who were not certified.

> **Hypothesis 1:** Since certification increased specificity, investments in enforcement through cultivation should decrease.

The reform implementation was a voluntary process, and we have already raised concerns of selection; however, we can be more specific and derive a third hypothesis: there is positive selection. That is, those ejidos with better economic conditions are more likely to enter the program sooner.

> **Hypothesis 2:** We expect to find positive selection.

The issue of positive selection is slightly more complicated when strong individual rights exist, although not formalized, in some ejidos and not others. Here, selection can occur on those ejidos with stronger individual rights pre-reform. If this is the case, then not controlling for selection may give the impression that the reform had little effect. The problem of this type of

selection is made worse by the fact that all conflicts should be resolved before participation in the reform can occur, putting pressure on ejidos with weaker individual rights to prematurely resolve conflicts. Since we do not observe individual de facto rights pre-reform, we can only offer our interpretation of positive selection as the following:

> **Interpretation of positive selection**: Due to the heterogeneity in pre-existing de facto rights, we would expect the reform to have a greater impact on those ejidos with less de facto rights pre-reform.

We believe it is important to highlight this interpretation of positive selection because development scholars are becoming increasingly aware of the autonomy of locally established rights to land. However, this localness carries a well-known drawback of limiting the extent of the market. But little is known about how much the autonomy of these local rights limits the market. The reform of the ejido in Mexico presents an opportunity to investigate this important issue. One could hypothesize that if strong local governance and well-established individual rights give the greatest effect of the reform, then, indeed, the evolved local autonomy did limit the market. If, however, the reform had little to no effect on these ejidos while a strong effect on those ejidos with weak local governance and less compatible local rights to formalization, then local individual rights did not necessarily limit the market.

4 Data

According to our data, provided by the Mexican National Agrarian Registry (RAN), 1962 out of Mexico's almost 2500 municipalities had at least one of the country's 29,259 ejidos [5]. This data reports the exact date at which each ejido became certified by the RAN after approving the results produced by PROCEDE. It therefore allows us to construct for each municipality an index that measures the average monthly proportion of ejidos that have been certified between 1993 and 2007. This index would be equal to one if all the ejidos in a municipality were certified in January 1993, and equal to zero if none had been certified in December 2006. Our estimates on the treatment effect have to be interpreted in light of how this treatment variable has been constructed.

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[5]This excludes municipalities that had agrarian communities, but no ejido

Our outcome variables and some control variables come from the 1991 and 2007 Mexican Agricultural Censuses, and are also aggregated at the municipal level. These aggregates are taken over all producers (not ejidos) in a given municipality that declare to be producing on ejido land (but we are unaware whether or not the producer actually is an ejidatario). The nature of this data source will, unfortunately, introduce some measurement error due to misalignment with the treatment variable. Ejidos constitute a parallel political and administrative system, directly underneath the federal level and are therefore not necessarily contained within a single municipality's boundaries. The National Agrarian Registry nonetheless assigns each ejido to a single municipality[6], while the Agricultural Census assigns individual producers to ejidos based on the location of their plots, but irrespective of the ejido the land belongs to.

The 1991 census only reports data on ejido producers for 1839 municipalities, somewhat restricting the scope of our analysis. The more than 100 municipality difference is likely mostly due to newly formed municipalities between 1991 and 2007. But we cannot rule out that the 1991 census may have produced some under-counting, or mismatches, especially in very small municipalities. The total number of ejido producers between the two censuses increased from 1,165,560 to 2,609,244, which is roughly in line with the increase in Mexico's total population. At the same time, the total area belonging to these producers increased from 15,070,990 hectares to 15,774,470. As the total area should have stayed constant, this points to some under-counting in 1991. More importantly, there is huge variation in the percentage change of producers between the two years, indicating that the assignment of individual producers to municipalities is somewhat imprecise. Moreover, given the general large improvements in data quality in Mexico over the course of the last two decades, it seems fair to assume that most mismatches stem from the 1991 data. The percentage change in the number of producers has a highly skewed distribution with a mean of 1.01 (i.e. 101%), a median of 0.11 and a standard deviation of 7.28. In addition, in a small number of these municipalities, information on some variables is missing. While our data is, in theory, complete, we have to be aware of some gaps and potential

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[6]One single ejido was assigned to two different municipalities and therefore excluded from the data.

measurement error.

Additional control variables are taken from the 2001 and 2007 Ejido Census and the 2005 Mini Census (*Conteo de Poblacion y Vivienda*). The data from the latter simply accounts for a number of characteristics of the entire municipality. The Ejido Census, on the other hand, consisted of one interview per ejido, usually with a person belonging to the Comisariado Ejidal, asking for ejido specific characteristics. Here we face the same problem as with the Agricultural Census in that ejidos cannot be unambiguously assigned to one single municipality. So there are some inevitable misalignments between these controls and the treatment variable when aggregated up to the municipal level. We believe them to be minor though, as the simple correlation between number of ejidos in a municipality between the RAN data and the Ejido Census is larger than 0.97.

In this paper we will look at outcomes related to land specific investments and the extent of markets. Tables (**??**)-(**??**) provide the summary statistics for the outcomes examined. All variables are proportions of either land area or number of ejido producers over their respective totals for the two census years. As the year 2007 census is far more detailed than the 1991 one, some of the outcomes are only available for the former year. We look at the area left to fallow during the the spring/summer crop cycle, the number of producers that have an irrigation system on at least part of their land, the use of fertilizer and other productive technologies, the proportion of agricultural land that has been taken out of production, the proportion of the agricultural area sown with corn, as well as, the proportion planted with perennials. In table (**??**) we show statistics for the proportion of ejidos that have sales of land within the ejidos and to outsiders, the proportion of land that is rented out, and the proportion of producers that use credit and its different sources (which are only available in a detailed manner for 2007). The next table shows statistics for the productivity of corn and beans (measured in metric tons per hectare), and the proportion of producers that derive income from their agricultural activity, receive international remittances, and have another income generating activity.

Tables (**??**) and (**??**) show summary statistics on the treatment and control variables. The first table shows our treatment variable PROCEDE and an number of controls at the ejido level. Important controls taken from

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the ejido census are the proportion of common land, the percentage of non-ejidatarios living on the ejido, the percentage of ejidos reporting internal conflicts or external conflicts with neighbors and the percentage of ejidos that have opted for, at least, some privatization of their lands. The included municipality control variables are its total population in 2005, the proportion of the indigenous population, the proportion of the labor force employed in agriculture, the distance to the closest big city (defined as more than 100,000 inhabitants), an index for the ruggedness of the municipality's terrain, our instrumental variable, and the average number of *ejidatarios* and *posesionarios* per ejido.

4.1   Estimation Strategy

Despite the concern about measurement errors, the advantages of the data are that it contains information on essentially every producer in the country and that its structure allows for a clear identification of the reform's long term effects. First, it allows for a before/after comparison as the baseline data in 1991 was collected one year before the (unexpected) constitutional change was legislated and two years before the first ejido received certification. Second, since we are able to observe the average time a municipality's ejidos have spent under certification in 2007, we also have variance in our treatment variable. This is important as by 2007 more than 90% of ejidos had been certified, virtually only leaving those with severe land conflicts and/or distrust of the government. The structure of the treatment variable, by its very nature, will not pick up any short-term effects of the certification program, as these will be unaffected by the length of time since treatment has been received. It will, on the other hand, capture long-term effects of the reform since these are more salient in ejidos that have been under certification for a longer period of time.

An additional advantage of our data is that we observe aggregates for almost all municipalities in each of Mexico's 31 states. As the changes in the outcome variables between the two census years may depend on a number of regional factors and policies, we will allow for state level fixed effects. Our basic model to be estimated would therefore be:

$$\Delta y = \alpha + \gamma PROCEDE_{is} + \zeta y_{is91} + u_s + \epsilon_{is}$$

, where u_s is the state level fixed effect. Since we want to control for the initial level of the outcome in 1991, the specification can be formulated equivalently:

$$y_{is07} = \alpha + \gamma PROCEDE_{is} + \phi y_{is91} + u_s + \epsilon_{is}$$

, where $\phi = 1 + \zeta$ and which will yield the same parameter of interest γ. To the extent that the change in the outcome variable over the course of 16 years may have also been affected by a number of ejido and municipal characteristics, a number of additional cross-sectional variables are included. The general specification is then:

$$y_{is07} = \alpha + \gamma PROCEDE_{is} + \phi y_{is91} + X_{is}\beta + X_{is}^{ejido}\psi + u_s + \epsilon_{is}$$

As mentioned before, the 2007 round of the Agricultural Census had a much more detailed questionnaire than the 1991 round. Of special interest to us are questions that deal with the irrigation technology used and the source of credit obtained. For these particular outcomes we will present results only for the cross-sectional specification:

$$\tilde{y}_{is07} = \alpha + \gamma PROCEDE_{is} + \phi y_{is91} + X_{is}\beta + X_{is}^{ejido}\psi + u_s + \epsilon_{is}$$

, where $\tilde{y}_{is07}$ is the detailed outcome in 2007 and y_{is91} is the basic outcome in 1991, when available, that is kept as a control variable. Here, state level fixed effects and ejido and municipality characteristics have to be interpreted as affecting the level of the outcome variable.

4.2 Identification

As explained in more detail in the previous section, the decision to get certification had to be taken voluntarily by each ejido. This necessarily implies that our treatment variable will be affected by an unknown number of unobservable characteristics that determine early treatment, as well as, the outcome of interest. At the same time, certification was seriously slowed down by externally imposed budget constraints and the laborious nature of the entire process. To a large extent, the year in which an ejido would finally be measured lay outside its control and was determined by people at INEGI. Fortunately, we know the principal determinants of that decision.

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Given that the process was carried out at the state level, an ejido was more likely to be certified earlier if its characteristics favored it relative to the other ejidos in the state. Our instrument is therefore a normalized ranking of all included municipalities in a state with respect to the the average number of *ejidatarios* plus *posesionarios* (henceforth *users*) per ejido according to the 2001 ejido census. The municipality with the smallest average number gets a value equal to zero and the municipality with largest average is assigned a value equal to one. In between, all other municipalities in the state will be evenly spaced according to their value.

The reasoning behind the instrument is as follows: We know that smaller ejidos were certified earlier than larger ones, and a smaller number of land users in an ejido will imply, ceteris paribus, a smaller total land area. Unlike using a measure based on land area directly, the average number of users is unlikely to be correlated with unobservable characteristics related to land productivity, but rather captures the mere subdivision of agricultural land into different ejidos. The use of an index captures the fact that only an ejido's relative rank, and not the actual number of users, determined the timing of certification. It also allows us to rule out any direct effect of ejido size on the outcomes by using the average number of *ejidatarios* and *posesionarios* as additional control variables.

Figures (1) and (2) provide a graphical impression of the instrument. The first figure shows that there is indeed considerable variance in average number of ejido users per municipality. The second figure depicts the instrument's relation with our treatment variable, using a linear approximation, as well as, a kernel estimator. As expected, ejidos in municipalities with a lower rank in their state were, on average, certified later. It also stands out that the kernel estimator follows the linear approximation fairly closely, which bodes well for instrument strength.

In order to rule out any correlation with the error term, we will also control for the number of ejidos per municipality, the total land area occupied by ejidos, average plot size of ejido producers (taken from the agricultural census), and the *total* number of *ejidatarios* and *posesionarios*. One potential concern is that the instrument is based on data taken from the 2001 ejido census. At that point in time, more than half of Mexico's ejidos had been

Figure 1: IV Construction
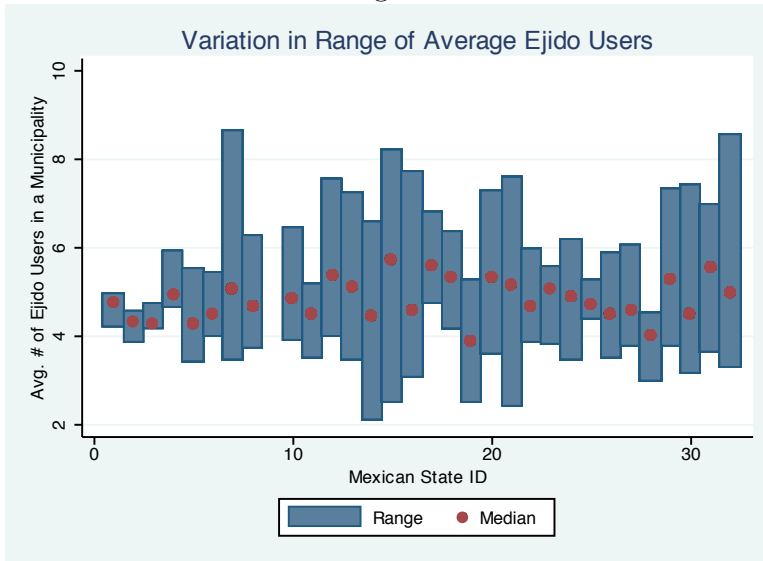
Figure 2: Graphical Relationship
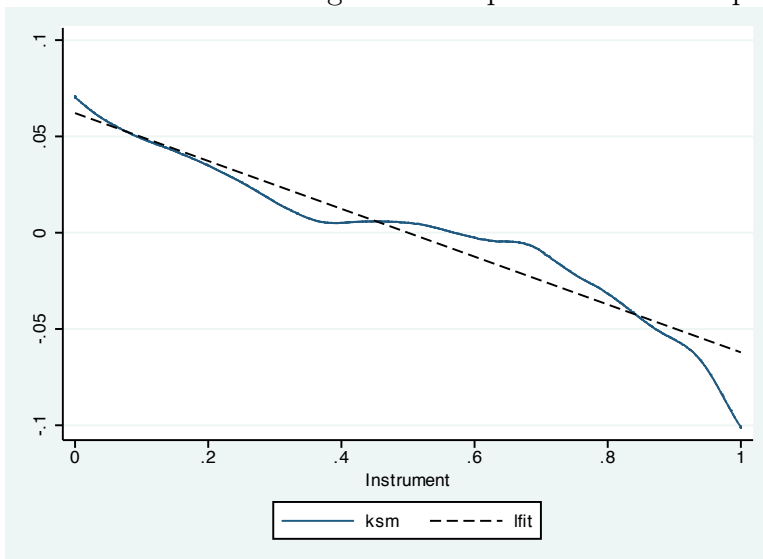
certified and additional ejidatarios may have been admitted in the process. While this is a valid point, it would only affect our identification strategy to the extend that it it substantially changes a municipality's ranking within its state. In addition, any person given new *ejidatario* status in the course of PROCEDE must have been a *posesionario* before and will therefore not affect the average number of users.

Thus, since it is possible that $Corr(\epsilon_{is}, PROCEDE_{is}) \neq 0$, we instrument for our treatment variable resulting in the following system of equations:

$$y_{is07} = \alpha + \gamma PROCEDE_{is} + \phi y_{is91} + X_{is}\beta + X_{is}^{ejido}\psi + u_s + \epsilon_{is}$$

$$PROCEDE_{is} = \alpha^{iv} + \gamma^{iv}Z_{is} + \phi^{iv}y_{is91} + X_{is}\beta^{iv} + X_{is}^{ejido}\psi^{iv} + u_s^{iv} + v_{is}$$

where we assume that $Cov(Z, \epsilon_{is}) = 0$ and $Corr(Z, PROCEDE_{is}) \neq 0$.

Table (7) reports the first stage regressions for the treatment variable using the full set of controls, state fixed effects and the 1991 main outcome variables, share of area taken out of production (abandoned), share of area rented, and yields in metric tons of corn and beans per hectare. The instrument is negative and significant as expected, and the first-stage F statistic is well above 10 in all cases. In the results tables, we will report the Cragg-Donald statistic to check for weak instruments in all the two-stage results.

5   Results

Tables 8-12 present our regression results. In all cases we provide point estimates for most of the included variables and standard errors in parentheses. On the bottom of each table we furthermore report the log-likelihood (e(ll)), the root mean squared error (e(rmse)), the Cragg-Donald statistic (e(widstat)), which for strong instruments should be higher than 16, and the F-statistic.

Starting with land use, table (8) shows results on the proportion of agricultural land that is taken out of production (i.e. not cultivated and not left fallowing). The fist three columns show OLS with state level fixed effects and different sets of control variables: A basic set, including only municipal level controls, an extended set, adding a number of controls related to the

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municipality's ejido sector, and, for sake of comparison, a final specification that adds a number of control variables necessary for the IV model. These results would imply that each year under certification reduces the percentage of land taken out of production by around 0.6 percentage points, with very high statistical significance. The total size of the ejido sector, as measured by total land area and total number of ejidatarios, significantly reduces the percentage of abandoned land as well. The last two columns show the IV results for the basic and extended set of controls. The estimated effect of certification changes drastically, implying now that a land title increases the percentage of land not in production by around 3 percentage points for each year under certification. In line with the results on the first stage in table (7), this points to very strong positive selection into PROCEDE on part of ejidos. More importantly, it is consistent with the notion that producers are willing to pursue outside options once they do not have to keep their land under production in order to defend their property rights. In addition to the total size of the ejido sector, total population is now positive and significant. A larger ejido sector may imply less outside options for employment, while a bigger population may imply more.

Moving on, table (9) presents estimation results on a variety of different productive inputs. In line with the results in the previous table, all such inputs decline as a result of certification. Moreover, the results are not statistically significant for inputs that constitute long term investments, such as planted perennials or having an irrigation system. Given its higher marginal product of labor, it is also less likely that land with such investments will be taken out of production. For inputs that need to be provided in each crop cycle, such as improved seeds or chemical fertilizer, the results are negative and strongly significant. They imply a reduction in the percentage of producers using improved seeds by around 2.5 percentage points, and for chemical fertilizer by more than five percentage points. Tractors may constitute an intermediate case, as they depreciate fairly quickly over time and may not be replaced (or sold within the same municipality, which would result in an underestimate of the effect of PROCEDE). Our estimates are negative and borderline statistically significant. Lastly, the total size of the ejido sector and total population act in the same way as in the previous table.

A lower use of productive inputs should be associated with a lower demand for credit. The results in table (10) support that idea. Each year

under PROCEDE reduces the percentage of producers that use some kind of credit by 1.6 percentage points. It has to be pointed out that this occurred against the backdrop of a huge reduction in credit between 1991 and 2007 overall, most likely due to the re-privatization of the banking sector in the early 1990s. This drop is particularly pronounced in credit from the banking sector. In terms of the source of credit, we find negative point estimates for all sources with a particularly large effect for credit obtained from an agricultural trust fund (*fira*) administered by the Mexican Central Bank.

Next, table (11) confirms what one would expect given the results on the use of inputs. It shows that productivity, measured as yield in metric tons per hectare cultivated, for corn and beans (two most important staple crops) declined in response to the certification process. The first and the third column show results for the OLS specification using all controls and show no statistically significant effect. Columns two and four, on the other hand, show a statistically significant significant negative effect on productivity for both crops.

Given these results we can take a preliminary look at their deeper underpinnings.Firstly, we hypothesized that producers in response to having a secure title over their usage rights reallocate their labor away from tending their land and towards some better paying outside option. In table (12), we test this idea directly with data from the 2007 agricultural census. This is a purely cross-sectional exercise, as no comparable data exists from the 1991 round. The 2007 questionnaire asked whether the producer obtained income from a variety of different sources, allowing for multiple answers. The results confirm that land titling resulted, in the IV specification, in a statistically significant decrease in the percentage of producers that generate an income from their agricultural activity (by around three percentage points per year under full certification). On income coming from international remittances and other activities, we find results with the expected sign, but no significance. This might be because the producers who give up agriculture had a migrant household member or engaged in another activity all along.

Secondly, we are interested in whether land plots lie idle because producers are unable to sell them, which would constitute a great economic inefficiency, or whether they choose to hold on to them as a form of insurance. If there is a lot of variability in the value of the outside options (i.e.

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the wage rate or the probability of being employed), producers may want to return to their land in periods when the outside option is not attractive. This behavior would be an economically efficient response to imperfect labor markets and a lack of income insurance. Tables (13) and (14), look at the working of land markets. In the first table we compared, as before, 1991 to 2007. But since we do not have data on land sales by ejidos for 1991, in table (14) we compare data from the 2007 ejido census to data from 2001. Here our treatment variable is, therefore, the difference in the proportion of certified ejidos between 2001 and 2007. We show the corresponding first stage regression as a separate column.

Table (13) shows, somewhat surprisingly, that certification decreased the incidence of rental contracts. This result makes sense, though, if rental contracts acted as a means to keep land under cultivation or as a substitute for land sales. Table (14) reinforces the last point, showing that land sales between ejido members did indeed increase in response to land titling, possibly making rental arrangements superfluous. But they did not have any significant impact on sales to non-members. Taken together, these results at least suggest that producers would have the possibility to sell their land to fellow *ejidatarios* if they wanted to. This implies that they may hold on to their land as a form of income insurance. In order to explore this issue further, we would need either disaggregate data at the producer level or obtain information on the distribution of land within municipalities.

6   Conclusion

Although economists have been finding mixed evidence concerning the effects of land reforms, a clearer picture of the role of property institutions is beginning to emerge. In more recent analysis of property institutions, economists appeal to informal institutions that influence de facto rights. This innovation has proved fruitful: we have learned that formalization of property claims is not always appropriate because formalization often does not improve control of those with pre-existing claims. These results are troubling for those in support of land reforms given that the literature commonly resorts to focusing on control in explaining why institutions matter. However, this finding points to another important innovation, to separate the notions of specificity and control. Our results suggest formalization can improve specificity in the

context of Mexico's ejidos where strong individual control rights existed before the reform and that improving specificity can have important economic effects.

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Table 2: Summary Stats of Investments

Variable	Mean	Std. Dev.	Min.	Max.	N
fallows_propeji91	0.1	0.12	0	1	1839
fallows_propeji07	0.04	0.06	0	0.74	1851
irrignum_propeji91	0.23	0.28	0	1	1835
irrignum_propeji07	0.22	0.27	0	1	1851
usedtechnum_propeji91	0.73	0.21	0	1	1835
usedtechnum_propeji07	0.42	0.31	0	1	1853
functractorsnum_propeji91	0.05	0.08	0	0.85	1835
functractorsnum_propeji07	0.04	0.07	0	0.61	1853
abandonareas_propeji91	0.13	0.13	0	0.98	1839
abandonareas_propeji07	0.15	0.14	0	0.99	1851
cornsows_propeji91	0.36	0.26	0	1.03	1839
cornsows_propeji07	0.39	0.26	0	1.29	1851
perennialarea_propeji91	0.15	0.25	0	1.3	1839
perennialarea_propeji07	0.23	0.27	0	1.46	1851

Table 3: Summary Stats of Markets

Variable	Mean	Std. Dev.	Min.	Max.	N
num_buyselleji_prop2007	0.55	0.3	0	1	1856
num_buyselleji_prop2001	0.56	0.31	0	1.33	1853
num_buysellother_prop2007	0.35	0.3	0	1	1856
num_buysellnoeji_prop2001	0.35	0.29	0	1.33	1853
rentedareas_propeji91	0.01	0.04	0	0.83	1826
rentedareas_propeji07	0.03	0.05	0	0.62	1852
creditnum_propeji91	0.21	0.2	0	2.67	1826
creditnum_propeji07	0.04	0.07	0	0.79	1853
bankcreditnum_propeji91	0.07	0.1	0	0.84	1826
bankcreditnum_propeji07	0	0.01	0	0.15	1853
sofolcreditnum_propeji07	0.02	0.07	0	1	1659
ruralfincreditnum_propeji07	0.1	0.15	0	1	1659
crdunioncreditnum_propeji07	0.07	0.12	0	1	1659
othercreditnum_propeji07	0.62	0.28	0	1	1659
firacreditnum_propeji07	0.12	0.18	0	1	1659
unknowncreditnum_propeji07	0.37	0.26	0	1	1659

Table 4: Summary Stats of Income

Variable	Mean	Std. Dev.	Min.	Max.	N
cornprods_propeji07	2.3	1.94	0	14.48	1835
cornprods_propeji91	1.04	0.61	0	4.44	1821
beansprods_propeji07	0.65	0.62	0	4.39	1722
beansprods_propeji91	0.4	0.32	0	4.27	1769
cornprods_propeji07	2.3	1.94	0	14.48	1835
agriinc_propeji07	0.8	0.18	0	1	1853
remitinc_propeji07	0.05	0.06	0	0.46	1853
othactivinc_propeji07	0.28	0.18	0	1	1853

Table 5: Summary Stats of Ejido Characteristics

Variable	Mean	Std. Dev.	Min.	Max.	N
PROCEDE	0.5	0.16	0	0.8	1856
Ejido Producers \ %	0.07	0.06	0	0.45	1856
(sum) area	43984.58	146654.76	3.76	4025159.87	1856
(mean) num_eji	14.43	19.45	1	170	1856
_eji Tab15_07_5	8499.18	14479.58	0	238385.77	1856
Ejido Producers Total	1405.84	1781.76	0	14808	1856
total_eji_2001	1832.37	2214.77	0	22445	1856
total_pos_2001	480.87	1267.73	0	24885	1856
Common Land 07	0.45	0.32	0	1	1856
Internal Conflict 07	0.16	0.19	0	1	1856
Internal Conflict 01	0.16	0.19	0	1.33	1853
External Conflict 07	0.23	0.24	0	1	1856
External Conflict 01	0.27	0.25	0	1.33	1853
Privatized \ %	0.23	0.27	0	1	1841

Table 6: Summary Stats of Control Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
poptot_05	47563.68	127554.75	242	1688258	1856
indig05	0.13	0.25	0	1	1856
empl_agri00	0.4	0.22	0	0.94	1856
Distance Big City	50.71	42.45	0	242.98	1856
Ruggedness	57.02	46.68	0.03	263.04	1856
Instrument	0.5	0.29	0	1	1856
av_ejidat2001	170.27	268.89	8.33	5611.25	1853
av_pos2001	42.87	100.88	0	1551	1853

Table 7: First Stage Results for the Main Outcome Variables

	abandon	rentarea	landsale	cornprod	beanprod
	(1)	(2)	(3)	(4)	(5)
instr-avejiposrelstate	-.092***	-.090***	-.101***	-.084***	-.082***
	(.019)	(.019)	(.019)	(.018)	(.020)
abandonareas-propeji91	-.093***				
	(.032)				
rentedareas-propeji91		.145			
		(.105)			
num-buyselleji-prop2001			.052**		
			(.021)		
cornprods-propeji91				-.006	
				(.007)	
beansprods-propeji91					-.011
					(.013)
av-ejidat2001	-.0000317	-.0000292	-.0000305	-.0000301	-.0000259
	(.0000234)	(.000024)	(.0000244)	(.0000245)	(.0000231)
av-pos2001	-.0000762***	-.0000823***	-.0000816***	-.0000846***	-.0000895***
	(.0000241)	(.0000246)	(.0000235)	(.000024)	(.0000231)
poptot-05	-1.74e-07***	-1.76e-07***	-1.74e-07***	-1.78e-07***	-1.77e-07***
	(4.39e-08)	(4.44e-08)	(4.37e-08)	(4.31e-08)	(4.54e-08)
indig05	-.023	-.028	-.012	-.028	-.023
	(.019)	(.019)	(.024)	(.018)	(.018)
empl-agri00	-.016	-.017	-.026	-.015	-.018
	(.036)	(.037)	(.032)	(.038)	(.036)
dist-bigcity	-.000084	-.0001	-.0001	-.0001	-.0001
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
Ruggedness	-.0006***	-.0006***	-.0006***	-.0006***	-.0006***
	(.0000961)	(.0000928)	(.0000923)	(.0000878)	(.000099)
numejirel-07	-.108	-.083	-.077	-.089	-.067
	(.089)	(.090)	(.082)	(.090)	(.093)
area-eji	-2.34e-08	-1.77e-08	-9.20e-09	-1.95e-08	-2.22e-08
	(2.73e-08)	(2.58e-08)	(2.61e-08)	(2.61e-08)	(2.57e-08)
num-eji	-.0001	-.0002	-.0002	-.0001	-.0000185
	(.0004)	(.0004)	(.0004)	(.0004)	(.0004)
totareaeji-07	-7.49e-07	-7.76e-07	-9.28e-07*	-8.02e-07	-7.58e-07
	(4.90e-07)	(4.88e-07)	(4.85e-07)	(4.99e-07)	(4.95e-07)
totnumeji-07	-8.62e-06**	-8.08e-06*	-8.93e-06**	-8.45e-06*	-8.13e-06*
	(4.23e-06)	(4.40e-06)	(4.24e-06)	(4.44e-06)	(4.31e-06)
total-eji-2001	.000015***	.0000152***	.0000161***	.0000151***	.0000142***
	(4.56e-06)	(4.71e-06)	(4.81e-06)	(4.84e-06)	(4.81e-06)
total-pos-2001	-8.46e-08	-2.02e-07	5.08e-07	-2.80e-07	-5.04e-07
	(2.57e-06)	(2.80e-06)	(2.60e-06)	(2.84e-06)	(2.79e-06)
Common Land 07	-.047***	-.046***	-.027*	-.047***	-.049***
	(.015)	(.015)	(.015)	(.015)	(.015)
Privatized %	.028**	.030**	.026**	.032***	.037***
	(.012)	(.012)	(.012)	(.012)	(.014)
Internal Conflict 07	-.031**	-.023*	-.029**	-.021	-.023*
	(.013)	(.013)	(.011)	(.014)	(.013)
External Conflict 07	-.099***	-.105***	-.094***	-.111***	-.114***
	(.018)	(.018)	(.019)	(.017)	(.019)
Obs.	1825	1813	1839	1808	1757
e(ll)	1240.22	1238.772	1254.31	1240.059	1221.251
e(rmse)	.123	.123	.123	.123	.121
F statistic	24.048	22.705	28.592	20.864	17.211

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Land taken out of production

	i	ii	iii	iv	v
	(1)	(2)	(3)	(4)	(5)
PROCEDE	-.076***	-.094***	-.098***	.483***	.559***
	(.029)	(.032)	(.034)	(.132)	(.179)
abandonareas-propeji91	.244***	.227***	.228***	.268***	.282***
	(.066)	(.065)	(.065)	(.038)	(.039)
av-ejidat2001			4.64e-06	-4.82e-06	.000039*
			(.0000164)	(.0000101)	(.0000203)
av-pos2001			-.0000687	.0000646*	.0000327
			(.0000439)	(.0000384)	(.0000425)
poptot-05	3.54e-08	4.78e-08	4.75e-08	1.17e-07***	1.60e-07***
	(3.36e-08)	(3.67e-08)	(3.64e-08)	(3.91e-08)	(5.04e-08)
indig05	-.071***	-.055*	-.053**	-.053***	-.037*
	(.026)	(.028)	(.027)	(.018)	(.019)
empl-agri00	.0002	.006	.004	.021	.004
	(.022)	(.023)	(.023)	(.022)	(.026)
dist-bigcity	.000069	.0000497	.0000461	.0002*	.000093
	(.0002)	(.0002)	(.0002)	(.0001)	(.0001)
Ruggedness	.0004***	.0004***	.0004***	.0008***	.0008***
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
numejirel-07		-.033	-.019		.098
		(.065)	(.066)		(.107)
area-eji		1.38e-07***	1.38e-07***		1.60e-07***
		(2.48e-08)	(2.51e-08)		(3.05e-08)
num-eji		.0006***	.0006**		.0003
		(.0002)	(.0002)		(.0003)
total-eji-2001		-6.99e-06**	-7.46e-06**		-.0000151***
		(3.34e-06)	(3.38e-06)		(3.94e-06)
total-pos-2001		6.22e-07	4.30e-06		4.49e-06
		(1.98e-06)	(2.70e-06)		(3.24e-06)
Common Land 07		-.015	-.016		.013
		(.020)	(.020)		(.019)
Privatized %		.003	.003		-.015
		(.013)	(.013)		(.016)
Internal Conflict 07		-.012	-.012		.018
		(.013)	(.013)		(.027)
External Conflict 07		-.021	-.018		.051*
		(.016)	(.016)		(.030)
Obs.	1836	1822	1822	1835	1822
e(ll)	1298.263	1315.182	1316.958	999.916	957.718
e(rmse)	.12	.118	.118	.142	.144
e(widstat)				75.669	40.02
e(jp)					
F statistic	9.566	32.208	27.324	11.817	6.986

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9: Inputs

	i	ii	iii	iv	v
	(1)	(2)	(3)	(4)	(5)
PROCEDE	-.064	-.096	-.432***	-.765***	-.103*
	(.194)	(.161)	(.161)	(.242)	(.053)
perennialarea-propeji91	.773***				
	(.024)				
irrignum-propeji91		.812***			
		(.016)			
improvseedsnum-propeji91			.349***		
			(.023)		
chemfertilnum-propeji91				.607***	
				(.021)	
functractorsnum-propeji91					.518***
					(.060)
av-ejidat2001	.0000202	4.09e-06	-.0000286	-.0000417	-.0000103**
	(.0000193)	(.0000101)	(.0000193)	(.0000361)	(5.13e-06)
av-pos2001	-.0000534	-.0000731*	-.0000676	-.0000429	-.0000171
	(.0000594)	(.0000378)	(.0000418)	(.0000927)	(.000011)
numejirel-07	-.363***	-.313***	.074	.339**	-.015
	(.084)	(.071)	(.090)	(.145)	(.023)
area-eji	-3.81e-08**	2.38e-09	-4.02e-08*	-1.02e-08	-2.91e-08**
	(1.92e-08)	(2.32e-08)	(2.31e-08)	(3.44e-08)	(1.43e-08)
poptot-05	1.82e-10	-7.51e-08	-1.24e-07***	-2.82e-07***	-9.38e-09
	(3.84e-08)	(5.24e-08)	(3.98e-08)	(6.07e-08)	(1.56e-08)
indig05	-.072***	-.031**	-.003	-.093***	.0001
	(.021)	(.013)	(.015)	(.028)	(.004)
empl-agri00	.102***	-.005	-.022	-.143***	-.0006
	(.028)	(.019)	(.023)	(.038)	(.007)
dist-bigcity	.0001	-.0001	-.0002**	-.0005***	-.0001***
	(.0001)	(.0000897)	(.0000944)	(.0001)	(.0000425)
Ruggedness	-.0002	-.0001	-.0007***	-.001***	-.0002***
	(.0002)	(.0001)	(.0001)	(.0002)	(.0000448)
num-eji	-.0003	-.0003	.001***	.001**	-.0002*
	(.0003)	(.0003)	(.0004)	(.0005)	(.0001)
total-eji-2001	1.39e-06	1.72e-06	9.58e-06**	.0000214***	4.38e-06***
	(4.57e-06)	(2.87e-06)	(4.51e-06)	(6.48e-06)	(1.26e-06)
total-pos-2001	1.66e-07	5.24e-06**	-2.63e-06	1.45e-06	-1.01e-08
	(3.06e-06)	(2.29e-06)	(2.57e-06)	(6.53e-06)	(9.14e-07)
Common Land 07	-.028	-.010	-.048***	.022	-.018***
	(.020)	(.015)	(.016)	(.024)	(.005)
Privatized %	-.014	-.016	-.007	.026	.003
	(.016)	(.014)	(.014)	(.021)	(.004)
Internal Conflict 07	.013	-.015	-.032	-.040	-.003
	(.026)	(.021)	(.025)	(.041)	(.007)
External Conflict 07	-.017	-.001	-.024	-.083**	-.005
	(.034)	(.025)	(.024)	(.038)	(.007)
Obs.	1822	1818	1820	1820	1820
e(ll)	868.666	1376.347	1071.432	417.883	3270.145
e(rmse)	.152	.114	.135	.194	.04
e(widstat)	38.149	38.312	40.843	39.2	40.309
e(jp)					
F statistic	82.004	175.706	19.128	64.531	33.027

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 10: Use of credit

	i	ii	iii	iv	v	vi
	(1)	(2)	(3)	(4)	(5)	(6)
PROCEDE	-.227***	-.019**	-.362*	.024	-.045	-.452**
	(.077)	(.008)	(.207)	(.170)	(.084)	(.230)
creditnum-propeji91	.119***		.054**	.023	.009	.167***
	(.015)		(.024)	(.022)	(.011)	(.034)
bankcreditnum-propeji91		.009*				
		(.005)				
av-ejidat2001	-.0000177*	-1.85e-06*	-3.89e-06	-.0000153	-5.88e-06	-.0000129
	(.0000106)	(9.94e-07)	(.0000154)	(.000012)	(5.38e-06)	(.0000162)
av-pos2001	-.000016	-3.95e-06**	-.0000376	8.59e-06	-.0000155	-.0002***
	(.0000154)	(1.77e-06)	(.0000513)	(.0000391)	(.0000211)	(.0000578)
numejirel-07	-.096**	.0004	-.070	-.024	-.014	.012
	(.039)	(.005)	(.090)	(.083)	(.045)	(.116)
area-eji	-1.70e-08	-2.46e-09*	-9.49e-09	-2.66e-08	-9.27e-09	-5.01e-08
	(2.10e-08)	(1.31e-09)	(4.10e-08)	(1.88e-08)	(1.46e-08)	(3.64e-08)
poptot-05	-7.63e-08***	-5.44e-09***	-4.42e-08	-2.24e-09	-9.67e-09	-1.14e-07**
	(2.04e-08)	(1.82e-09)	(4.48e-08)	(3.26e-08)	(1.65e-08)	(4.78e-08)
indig05	-.017**	-.0002	-.042**	-.041**	-.0003	-.056**
	(.006)	(.0009)	(.019)	(.017)	(.013)	(.022)
empl-agri00	.005	-.0000955	.010	.057**	.031**	.014
	(.011)	(.001)	(.029)	(.024)	(.014)	(.034)
dist-bigcity	-.0003***	-.0000164**	-.000063	.0000145	-.0000163	-.0001
	(.0000525)	(6.49e-06)	(.0001)	(.0001)	(.0000516)	(.0001)
Ruggedness	-.0003***	-.0000175**	-.0006***	-.0000619	-.0000276	-.0009***
	(.0000615)	(7.96e-06)	(.0002)	(.0001)	(.0000847)	(.0002)
num-eji	.0008***	.0000204	.0003	-.0001	-.0000565	.0004
	(.0002)	(.0000147)	(.0003)	(.0003)	(.0000984)	(.0004)
total-eji-2001	8.26e-06***	4.97e-07*	9.35e-06**	3.98e-06	1.45e-06	7.67e-06
	(2.77e-06)	(2.91e-07)	(4.18e-06)	(3.59e-06)	(1.21e-06)	(4.68e-06)
total-pos-2001	-2.47e-06**	-8.81e-08	-1.79e-06	-8.65e-07	7.16e-07	1.59e-07
	(1.21e-06)	(1.07e-07)	(3.28e-06)	(2.15e-06)	(1.07e-06)	(3.28e-06)
Common Land 07	-.028***	-.001	-.059***	-.014	-.003	-.047**
	(.007)	(.0009)	(.019)	(.015)	(.009)	(.021)
Privatized %	.005	.0004	-.008	-.008	.003	.022
	(.006)	(.0007)	(.017)	(.013)	(.008)	(.022)
Internal Conflict 07	-.006	.003*	-.002	.004	.013	.025
	(.009)	(.002)	(.028)	(.021)	(.009)	(.032)
External Conflict 07	-.023**	-.003**	-.051	.020	-.008	-.074*
	(.011)	(.001)	(.038)	(.031)	(.014)	(.043)
Obs.	1813	1813	1636	1636	1636	1636
e(ll)	2557.43	6466.629	773.446	1175.274	2158.06	603.009
e(rmse)	.06	.007	.152	.119	.065	.169
e(widstat)	38.983	37.67	33.909	33.909	33.909	33.909
e(jp)						
F statistic	6.919	2.618	3.928	2.078	1.116	6.17

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 11: Productivity

	i	ii	iii	iv
	(1)	(2)	(3)	(4)
PROCEDE	.115	-7.661***	-.047	-1.542**
	(.270)	(2.142)	(.076)	(.757)
cornprods-propeji91	1.630***	1.539***		
	(.167)	(.107)		
beansprods-propeji91			.586***	.568***
			(.082)	(.087)
av-ejidat2001	-.0000205	-.0004	.0000887	.0000268
	(.0002)	(.0003)	(.0000738)	(.0000509)
av-pos2001	.0005	-.0007	-.0002	-.0004**
	(.0005)	(.0005)	(.0002)	(.0002)
poptot-05	-3.53e-07	-1.70e-06***	-1.22e-08	-2.79e-07
	(2.36e-07)	(5.77e-07)	(2.04e-07)	(2.67e-07)
indig05	.058	-.157	-.155***	-.205***
	(.140)	(.192)	(.046)	(.071)
empl-agri00	-.570**	-.588**	.135	.135
	(.269)	(.299)	(.122)	(.117)
dist-bigcity	-.002**	-.003**	-.0007	-.0008**
	(.0009)	(.001)	(.0007)	(.0004)
Ruggedness	-.007***	-.012***	-.001***	-.002***
	(.002)	(.002)	(.0005)	(.0006)
numejirel-07	.971	-.272	-.465	-.644*
	(1.307)	(1.087)	(.386)	(.368)
area-eji	-4.95e-07	-7.00e-07**	1.03e-07	4.10e-08
	(3.64e-07)	(2.98e-07)	(8.87e-08)	(9.32e-08)
num-eji	.005*	.009**	-.0007	.0001
	(.003)	(.004)	(.001)	(.001)
total-eji-2001	.0000339	.0001**	-9.79e-06	6.91e-06
	(.0000633)	(.0000528)	(.0000142)	(.0000155)
total-pos-2001	-.0000476	-.0000512	.0000353***	.000034**
	(.0000314)	(.0000435)	(.0000124)	(.0000142)
Common Land 07	-.254	-.618***	-.165**	-.225***
	(.219)	(.217)	(.080)	(.077)
Privatized %	.076	.308*	.038	.091
	(.109)	(.184)	(.059)	(.071)
Internal Conflict 07	-.063	-.331	-.035	-.090
	(.209)	(.280)	(.090)	(.098)
External Conflict 07	.085	-.844***	.061	-.116
	(.172)	(.328)	(.104)	(.136)
Obs.	1793	1793	1661	1661
F statistic	20.898	20.333	44.794	7.828

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 12: Source of income

	i	ii	iii	iv	v	vi
	(1)	(2)	(3)	(4)	(5)	(6)
PROCEDE	.067**	-.459**	-.031*	.082	.005	.051
	(.031)	(.192)	(.016)	(.061)	(.032)	(.173)
av-ejidat2001	8.56e-08	-.0000265	2.16e-06	7.89e-06*	1.72e-07	2.49e-06
	(.0000182)	(.0000249)	(4.86e-06)	(4.27e-06)	(.0000177)	(.0000185)
av-pos2001	4.92e-06	-.0000799	-.0000235**	-5.28e-06	-1.99e-06	5.40e-06
	(.0000616)	(.0000487)	(.000011)	(.0000145)	(.0000431)	(.000043)
poptot-05	-2.46e-09	-9.56e-08*	-2.44e-08***	-4.34e-09	-1.15e-09	6.97e-09
	(6.22e-08)	(5.48e-08)	(6.12e-09)	(1.22e-08)	(5.63e-08)	(4.12e-08)
indig05	-.050	-.065***	-.039***	-.036***	.057	.059***
	(.052)	(.025)	(.011)	(.006)	(.049)	(.023)
empl-agri00	.298***	.296***	.037***	.037***	-.344***	-.344***
	(.034)	(.029)	(.014)	(.009)	(.046)	(.027)
dist-bigcity	.0004	.0003**	.0001**	.0001***	-.0006**	-.0006***
	(.0002)	(.0001)	(.0000559)	(.0000367)	(.0003)	(.0001)
Ruggedness	-.0003	-.0006***	7.62e-06	.0000765	.0002	.0002*
	(.0002)	(.0002)	(.0000659)	(.0000534)	(.0002)	(.0001)
numejirel-07	-.012	-.096	-.014	.004	.143	.151
	(.105)	(.099)	(.040)	(.036)	(.152)	(.100)
area-eji	-1.53e-08	-3.11e-08	-2.31e-08*	-1.97e-08**	9.05e-09	1.04e-08
	(2.87e-08)	(2.70e-08)	(1.20e-08)	(8.28e-09)	(2.76e-08)	(2.10e-08)
num-eji	.001***	.001***	.0002	.0002**	-.001***	-.001***
	(.0004)	(.0004)	(.0002)	(.0000979)	(.0004)	(.0003)
total-eji-2001	-6.10e-06	2.70e-07	-1.99e-07	-1.57e-06	5.05e-06	4.50e-06
	(4.03e-06)	(4.24e-06)	(9.41e-07)	(1.23e-06)	(3.67e-06)	(3.68e-06)
total-pos-2001	-9.31e-06***	-9.23e-06**	2.88e-06***	2.86e-06***	5.67e-06**	5.67e-06*
	(2.61e-06)	(3.83e-06)	(9.30e-07)	(1.07e-06)	(2.64e-06)	(2.96e-06)
Common Land 07	-.034	-.055***	.023***	.028***	.018	.020
	(.027)	(.021)	(.009)	(.006)	(.024)	(.019)
Privatized %	-.010	.004	-.003	-.006	.001	.000063
	(.016)	(.018)	(.006)	(.005)	(.017)	(.016)
Internal Conflict 07	.013	-.009	-.015**	-.010	.017	.019
	(.021)	(.029)	(.006)	(.007)	(.018)	(.026)
External Conflict 07	.019	-.035	-.002	.010	-.010	-.006
	(.021)	(.031)	(.007)	(.009)	(.019)	(.029)
Obs.	1837	1837	1837	1837	1837	1837
F statistic	39.585	14.046	22.037	7.526	86.564	25.44

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 13: Land rental markets

	i	ii	iii	iv	v
	(1)	(2)	(3)	(4)	(5)
PROCEDE	.020*	.007	.005	-.119***	-.242***
	(.011)	(.009)	(.010)	(.043)	(.067)
rentedareas-propeji91	.333***	.334***	.334***	.344**	.362***
	(.075)	(.077)	(.077)	(.139)	(.138)
av-ejidat2001			-.0000118	-4.18e-06	-.0000239**
			(7.61e-06)	(3.85e-06)	(.0000107)
av-pos2001			7.33e-06	-.0000542***	-.0000321*
			(.000013)	(.0000131)	(.0000164)
poptot-05	-1.39e-08	-2.78e-08***	-2.94e-08***	-3.42e-08***	-7.24e-08***
	(1.17e-08)	(1.03e-08)	(1.06e-08)	(1.09e-08)	(1.73e-08)
indig05	.011*	.013*	.013*	.008	.006
	(.006)	(.007)	(.007)	(.006)	(.008)
empl-agri00	.002	.012	.011	-.004	.011
	(.011)	(.011)	(.011)	(.008)	(.010)
dist-bigcity	-.0002**	-.0001**	-.0001**	-.0002***	-.0002***
	(.0000746)	(.0000599)	(.0000599)	(.000047)	(.0000455)
Ruggedness	-.0002***	-.0001***	-.0001***	-.0003***	-.0003***
	(.0000537)	(.0000466)	(.0000469)	(.0000505)	(.0000566)
numejirel-07		-.066***	-.065***		-.103***
		(.025)	(.024)		(.033)
area-eji		-1.70e-08	-1.73e-08		-2.45e-08***
		(1.44e-08)	(1.44e-08)		(8.76e-09)
num-eji		.0003*	.0002*		.0003**
		(.0001)	(.0001)		(.0001)
total-eji-2001		4.11e-06	5.69e-06*		8.59e-06***
		(2.61e-06)	(3.25e-06)		(2.52e-06)
total-pos-2001		-2.62e-06***	-3.38e-06***		-3.45e-06**
		(6.93e-07)	(7.28e-07)		(1.47e-06)
Common Land 07		-.016***	-.016***		-.027***
		(.006)	(.006)		(.007)
Privatized %		-.001	-.002		.006
		(.004)	(.004)		(.006)
Internal Conflict 07		.009	.010		-.0000654
		(.008)	(.008)		(.010)
External Conflict 07		-.008	-.008		-.035***
		(.007)	(.006)		(.011)
Obs.	1826	1813	1813	1826	1813
e(ll)	3098.204	3115.247	3117.568	2966.636	2750.575
e(rmse)	.044	.044	.044	.048	.054
e(widstat)				71.216	38.83
e(jp)					
F statistic	11.176	18.184	18.974	9.424	4.723

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 14: Land sales market

	i	ii	iii	iv
	(1)	(2)	(3)	(4)
procede-diff0107	-.019		.805***	-.008
	(.029)		(.280)	(.201)
num-buyselleji-prop2001	.334***	-.036	.347***	
	(.028)	(.026)	(.035)	
num-buysellnoeji-prop2001				.339***
				(.028)
av-ejidat2001	9.91e-06	.0000441	-.0000497	-2.18e-06
	(.0000368)	(.0000483)	(.0000393)	(.0000267)
av-pos2001	-.0000695*	.0001	-.0002*	6.75e-06
	(.0000399)	(.0000799)	(.0001)	(.0000852)
poptot-05	-6.62e-08	1.13e-07**	-1.58e-07**	2.24e-08
	(7.54e-08)	(4.81e-08)	(7.59e-08)	(4.90e-08)
indig05	-.083	.023	-.107**	-.085***
	(.059)	(.034)	(.048)	(.030)
empl-agri00	.036	-.030	.079	-.071
	(.048)	(.030)	(.058)	(.045)
dist-bigcity	.0002	.0003	-.0000594	-.0003*
	(.0003)	(.0002)	(.0002)	(.0002)
Ruggedness	-.0006**	.0008***	-.001***	-.0007***
	(.0003)	(.0002)	(.0003)	(.0002)
numejirel-07	-.021	.342***	-.388*	-.462***
	(.179)	(.104)	(.232)	(.156)
area-eji	-6.88e-08	-3.27e-08	-5.68e-08	-1.67e-08
	(4.65e-08)	(2.87e-08)	(4.60e-08)	(2.30e-08)
num-eji	-.0007**	.001	-.001*	-.0004
	(.0004)	(.0008)	(.0006)	(.0003)
total-eji-2001	-7.07e-06	-.0000161*	2.23e-06	-8.01e-06*
	(6.62e-06)	(8.30e-06)	(6.64e-06)	(4.65e-06)
total-pos-2001	2.10e-06	1.43e-06	6.87e-07	-9.88e-06**
	(3.51e-06)	(4.13e-06)	(6.85e-06)	(4.96e-06)
Common Land 07	-.219***	.028	-.245***	-.154***
	(.038)	(.021)	(.039)	(.028)
Privatized %	-.024	-.007	-.018	.099***
	(.028)	(.021)	(.036)	(.026)
Internal Conflict 07	-.008	.057	-.069	.100*
	(.039)	(.037)	(.061)	(.058)
External Conflict 07	.080*	.088***	-.0000513	.048
	(.044)	(.026)	(.057)	(.047)
instr-avejiposrelstate		.127***		
		(.029)		
Obs.	1839	1839	1839	1839
e(ll)	-17.459	318.222	-378.278	178.417
e(rmse)	.246	.205	.3	.221
e(widstat)			25.448	24.703
e(jp)				
F statistic	258.865	64.336	20.078	44.398

Notes: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

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