

# Mexico's Land Certification Program: Rollout and Impact on Voting Behavior

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## Abstract

A cornerstone of Mexico's 1992 land reform was the land certification program, *Procede*. We describe the rollout of the program, which between 1992 and 2006 provided land certificates to smallholder farmers on about half of the Mexican territory. We analyze what factors were associated with earlier certificate acquisition and process completion. We find that the rollout was guided by both program efficiency and beneficiary demand considerations. We then explore if the certificates changed voting behavior. We find no evidence that awarding certificates resulted in less votes for the party in power, increased votes for the party that awarded the certificates, or moved voters to the right of the party spectrum. These results are remarkable. They show that, as opposed to fears of the destabilizing effects of land reform which are widely invoked not to do it except under extraordinary circumstances, massive changes in property rights can be achieved in an efficient, participatory, and politically neutral fashion.

## 1. Introduction

Formal recognition of property rights has long been proposed as a crucial component of efficient land markets. Many economic models make clear the role that property rights certificates or titles play as credible ownership signaling devices, allowing for reduced transaction costs, rentals, sales, and collateralized credit markets. They also serve an important role in reducing uncertainty of ownership over time, thus improving incentives for investment.

Nonetheless, in many places in the developing world, land is uncertified or untitled. This has led to the implementation in recent years of large scale land registration programs in many countries. In this paper we describe the rollout and implementation results of the Mexican land certification program, which between 1992 and 2006 provided land certificates to over half of the Mexican territory, representing approximately 100 million hectares.

An important characteristic in the Mexican case was that the land being certified was under a dual property regime created during the first Mexican land reform in the 1910's. Agricultural plots were held in usufruct and individually cultivated while grazing and forestry lands were held as common property resources by these same households. The solution adopted was to provide individual certificates to

individually tilled land and to residential plots, and to provide a share of ownership to all stakeholders in communally used lands.

The Mexican land certification program was part of a broad effort to overhaul land tenure in Mexico. Before the program was phased in, specialized tribunals were created and attorneys for rural land matters sworn in to solve border and ownership issues that would arise during implementation of the certification program. The reform also created a rural land registry tasked with keeping a public record of ownership of plots throughout the country.

In order to allow for a smooth implementation of the certification program, the reform gave the assembly of stakeholders in each community the legal right to vote under simple majority to allow the certification program to take place. By making the certification program voluntary, the reform was made politically acceptable because it gave communities opposed to it a peaceful way to reject the program from taking place in their community.

As we show below, in its 14 years of existence, the Mexican land certification program was extremely successful, providing certificates of ownership to over 90% of the targeted population. We also show that contrary to what the political science literature has proposed, voting behavior was not much affected by this improvement in property rights.

The paper proceeds as follows: In section 2 we briefly describe the land certification program. In section 3 we describe the data we use. Section 4 presents an empirical analysis of the rollout of the program and the correlates of the time it took to certify the land in each agrarian nucleus. Section 5 explores voting responses to certificate acquisition, and section 6 concludes.

## **2. Land reform in Mexico**

Mexico's first land reform was a continuous land redistribution program spanning the years 1917-1992. The Mexican land redistribution program consisted of awarding tracts of rural land to groups of people under a dual communal/individual property regime. The program was very large, reallocating over half of the Mexican territory (around 103 million hectares) to approximately 3.5 million landowners during its 70 years of existence<sup>1</sup> (Registro Agrario Nacional, 2002).

Ejido beneficiaries, called *ejidatarios*, had rights to use and usufruct individual plots, but faced restrictions regarding the sale and rental of land. Within an ejido, land was allocated to individually tilled

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<sup>1</sup> There were in fact two types of landholdings, *ejidos* and *comunidades*. *Comunidades* were lands returned to indigenous communities which had been taken away during the 19<sup>th</sup> century liberal reform period. They represent a small minority of landholdings (2,300 units).

plots, common use areas (forests, mountains, common pastures) and urban areas for residential use as well as schools, clinics, etc. (Brannon and Bakianoff, 1984). Beneficiaries lost rights to the land if they were not present in the ejido for two years or more. Embriz and Rojas (1999) argue that the periodical updating of the beneficiaries list provided substantial individual property insecurity in ejidos. Without a certificate of ownership, an individual could fall out of favor with ejido authorities and be arbitrarily evicted.

The tight sale and rental restrictions became increasingly onerous over time, as the original beneficiaries became elderly and could not easily rent or sell their land. These restrictions led to a black market in land rentals and sales (Olinto, 1998, and McCarthy, 1998). Although a black market for land has been documented, the restrictions are thought to have made transactions in land extremely uncertain for the parties involved and thus costly.

## **2.1 Mexico's Second Agrarian Reform**

Mexico enacted an important constitutional reform in 1992 followed by a new agrarian law, which together have been called Mexico's second agrarian reform (Cornelius). The most important aspects of the reform were: 1- It ended the old land redistribution program - providing increased certainty of tenure to privately held land; 2- It gave ejidatarios the right to rent, sell, sharecrop or mortgage their plots; 3- The reform provided a mechanism through which ejidatarios could vote to turn all or part of the ejido into full private property (dominio pleno or land titles), thus allowing for sales to non-ejidatarios; 4- It established specialized tribunals and attorneys for rural matters; 5- It created a national rural land registry; and 6-It established a national program to provide ejidatarios with land certificates (Procede).

Although the reform was enacted in 1992, the land certification program was in place for 14 years and managed to provide certificates to 92% of ejidos and comunidades. The Procede program was officially ended in 2006, and a small program was left in place to allow for certification of the 2,500 ejidos and comunidades that did not participate with Procede<sup>2</sup>.

## **2.2 The Procede Certification Program**

The Procede certification program (*Programa de Certificación de Derechos Agrarios*) was a multiagency effort tasked with solving land boundary conflicts, regularizing land tenure, and issuing property rights certificates (World Bank, 2001).

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<sup>2</sup> Called FANAR (*Fondo de Apoyo Para los Núcleos Agrarios Sin Regularizar*).

Procede opened an office in every Mexican state, and worked with human resources from INEGI (Mexican Statistical and Geographical Agency), RAN (National Agrarian Property Registry), PA (Agrarian Attorney's Office), and the SRA (Land Reform Department). Procede's objectives and reports were in terms of number of units and area certified.

The certification procedure consisted of a first visit to the ejido to gauge interest in the program. If there was interest, an ejido assembly was summoned (*Asamblea de Información y Anuencia*) in which a vote was made to allow the program to measure the ejido and create a contour map with subdivisions. Ejidatarios then cooperated with INEGI to measure and determine individual plots and who they belonged to. The measurement effort by INEGI produced a map of the ejido with the names of the usufructors of all individually tilled parcels, common lands, and residential housing plots (*solares*). With a completed map, a final assembly was summoned to vote on the agreement to partition the land (*Asamblea de Delimitación, Destino y Asignación de Tierras*). The authorized map was then sent to the public registry (RAN) to issue the certificates of ownership for every stakeholder in the community. Certificates were then awarded simultaneously for the whole ejido.

The ejido recognizes three types of stakeholders: *ejidatarios* (heads of households who have voting rights in the assemblies), *posesionarios* (heads of household who use land for agricultural purposes but do not have voting rights in the assemblies), and *avecindados* (landless heads of household who live in the ejido and are recognized by the assembly of ejidatarios).

Procede issued certificates for individual plots (*Certificados de derechos parcelarios*), and for a share of common use lands (*Certificados de derechos sobre tierras de uso común*), residential property titles (*títulos de propiedad de solares urbanos*), as well as titles if a fraction of the land was converted to private property (*Certificados de dominio pleno*).

### **3. Data**

We obtained the dates of assemblies held for all ejidos from Procuraduría Agraria. The file contains a comprehensive list of ejidos and communities, containing 31,857 ejidos and communities. By December 2006, 95% of all ejidos and communities had had their first assembly, that is, had officially begun their certification process. We also obtained from Procuraduria Agraria a record of legal conflicts that occurred during the Procede process.

The core information on land registration was obtained from Registro Agrario Nacional. The Phina (*Padrón Histórico de Núcleos Agrarios*) gives a full account of land acquisition and registration history (donations, acquisitions, expropriations, divisions, changes in land use, and registration), and the

conclusion of the certification process on registered land by use (common property, individual plots, residence) and members by category (ejidatarios, posesionarios, and *avecindados*). As of March 2010, records were available on 29,221 ejidos and 2,336 communities. We successfully matched Phina records to the assembly dates file for 28,366 ejidos and 2,290 communities, a success rate of 97%.

The office of the rural cadaster at Registro Agrario Nacional also provided us with geocoded contour maps of all ejidos certified until 2007. This allowed us to geographically match the ejidos to the 2000 locality level population census data (Iter 2000). Census data provide information on age structure, education, housing conditions, employment structure, and access to public services. A census locality was matched to an ejido if its centroid was inside of the ejido contour. For ejidos without locality, we assigned the nearest locality not in another ejido. This allowed us to obtain census information for 25,063 ejidos and 1,456 communities.

We should note that in this context geographical matching is not perfect. Whereas an ejido is defined by a land area and a defined population of beneficiaries/owners, the census information corresponds to a population settlement (or locality). While in most cases living quarters of ejido members are geographically inside the ejido, it is possible that all or some ejidatarios live in a locality situated outside the ejido perimeter, mixed with non-ejido population. It is also possible that non-ejidatario related population lives in localities within the ejido (especially in urban areas, see Gonzalez-Navarro 2009).

For the voting behavior analysis we use Congressional election electoral results from 1994-2009. IFE (*Instituto Federal Electoral*) provided georeferenced electoral section maps for the whole country. The section is the most disaggregated electoral unit, and consists of a regular shape containing the homes of around 2000 registered voters. We use geographically consistent electoral sections over time for the analysis.

Additionally, for the rollout analysis we use electoral results from the 1991 Congressional election, which took place before *Procede* implementation. Electoral section maps from 1991 are not available so we use the 1991 electoral results at the municipality level as covariates of program rollout.

## **4. Empirical analysis of Land Certificate Rollout**

### **4.1 The pace of progression of *Procede* through Mexico**

Mexico has 31,857 ejidos and communities. Numbers vary a lot across states, with 3,711 in Veracruz, 2,944 in Chiapas, between 1,500 and 2,000 in many states, but only less than 200 in several states (Figure 1). Ejidos vary also in size and membership, in pressure exerted by the non-members to obtain land, in conflicts within and with neighbors, in opportunity for land development, etc., all factors that we expect may affect the difficulty with which Procede could operate and hence the pace at which it reaches its objective of certifying the ejido land in Mexico.

Procuraduria Agraria started conducting the first information assemblies in 1992 in 195 ejidos and quickly moved on to reach more than 9,000 or 29% of all ejidos and communities in 1993, and 60% in 1996. The pace slowed down, adding 2-4 % of ejidos/communities each year thereafter. By December 31, 2006, when Procede was officially declared as closed, 30,152 or 95% of all ejidos/communities had their first information assembly. The pace varied quite a bit across states. Figure 1 suggests that it is partly correlated with the sheer number of ejidos/communities a state has. The states with the lowest numbers of ejidos/communities reached 40% right the first year. By 1996, only Chiapas and Oaxaca had not reached 50%.

The pattern of progression in completion of the Procede process, marked by an assembly in which land is registered, is similar. Three years into the program, 43% of the ejidos/communities had completed the process, and 90% by 2006. States that lagged behind are Oaxaca and Chiapas, which had only certified 70-75% of their ejidos/communities by 2006. Another couple hundred ejidos/communities completed the process between 2006 and 2010 under the Fanar program, reaching 29,000, or 91% of all ejidos by 2010.

The pattern of progression was however quite different across the two types of entities, ejidos and comunidades. Table 1 suggests an overall 5 year delay in the rollout of Procede in comunidades relative to ejidos, as seen in comparing means and quantiles of starting dates. By December 2006, only 87.6% of the comunidades had had their first assembly and 72.8% had completed the Procede process, while these numbers are 95.2% and 91.7% for the ejidos. Land rights are quite different in these two types of entities, and registration and certification therefore follow different rules. Given the relatively small number of comunidades, we continue our analysis with ejidos only.

#### **4.2. Correlates of rollout**

While the rollout of the Procede in 1992-2006 proceeded in all states simultaneously, within each state it may have responded to different forces, practical and political. In this section, we seek to establish the main variables associated with the date at which RAN held the first information assembly starting the

Procede process. All regressions are run with state fixed effects since every state had a separate Procede office. All coefficients are thus estimated from within-state variation in ejido characteristics.

We group variables into ejido characteristics that may affect the difficulty of the procedure (such as size, land use, and population pressure), the economic environment affecting opportunities for ejidatarios to benefit from the land certificates (distance to city, employment structure and education in localities), indicators of poverty, indicators of conflicts - which if anticipated by RAN may have influenced when to initiate the process -, and political variables indicating the dominant party in the municipality prior to the Procede rollout. Descriptive statistics for these variables are reported in Tables 1 and 2.

#### *4.2.1 Ejido characteristics and economic opportunities*

Regression results reported in Table 3 show that efficiency considerations in program implementation affected the rollout. Procede initiated earlier in ejidos with fewer members. An additional 100 members is associated with a 3 month delay in the initial assembly. Presence of posesionarios - who are individuals cultivating land but without voting rights in the ejido - is associated with delays in the starting date. Posesionarios are often family members who do not have voting rights because, before the reform, land rights could only be inherited to a single offspring. Procede provided an opportunity to incorporate new members, and thus the presence of posesionarios with incorporation demands may complicate the process. However, only 10% of the ejidos have either posesionarios or avecindados. But when those are present their numbers can be very large, often as many or many more than the ejidatarios. Having a population of posesionarios as large as ejidatarios is associated with a 2 month delay in the certification process start date.

Large ejidos in terms of land were also attended later, but the coefficient is very small: an increase in ejido size of 10,000 ha in total, or 250 ha per capita is associated with a 1 month delay in start date. For a given size of the ejido, the more land is in parcels used for private agricultural production, the earlier Procede was started, possibly responding to higher demand from the members.

Finally Procede attended older ejidos earlier. A problem with the ejido pointed out before the reform was the advanced age of ejidatarios, who could not legally sell or rent their land as they became aged. It is therefore natural for ejidos created earlier to have had a higher demand for certification. The interquartile range in ejido establishment year is associated with an 8.5 month delay in Procede starting date.

All these parameters are partial correlates. However, they are relatively robust across specifications. An exception is the ratio of *avecindados*, which within state, is correlated with the age of the ejido. As expected, older ejidos have larger populations of *avecindados*, and this is associated with earlier attention from *Procede* managers.

The *Procede* rollout was also responsive to ejido demands. Looking at indicators of economic opportunities in the local economy, Table 3 reports that ejidos closer to a city of at least 25,000 inhabitants, with more educated population and more engaged in non-agricultural activities, started the *Procede* process earlier. A difference of 40 percentage points in the share of the population in non-agriculture is associated with a one month earlier starting date.

Poverty indicators also suggest that poorer ejidos were reached later than richer ones. As these poverty indicators are correlated with economic activity and education levels, their introduction in the regression overshadows the partial correlation of activity and education with the timing of *Procede*. Note however that partial correlation of ejido characteristics with *Procede* timing are robust to the inclusion of economic opportunity variables. In column (7), we add controls for conflicts and political affiliation (discussed in the next Table in details) to show that the partial correlation of ejido characteristics and economic opportunity variables with *Procede* timing are robust to the inclusion of conflict and political variables.

In conclusion, it seems that the progressive deployment of *Procede* reached ejidos in response to:

- Program efficiency considerations with respect to certification difficulty, treating first ejidos of smaller size, with less members, and less presence of landed non-member households (*posesionarios*).
- Responsiveness to beneficiaries' demand, as evidenced by earlier starting times for ejidos with more of their land being in privately cultivated plots rather than common property; in areas closer to a city; and those in which the population was older, had more non-agricultural activities, and was more educated. Responsiveness demonstrates the value of *Procede*'s participatory approach.
- However program efficiency considerations and demand responsiveness resulted in a clear bias against the poorer ejidos, which were considered later, as revealed by the higher marginality index and poorer dwelling conditions delaying rollout.

#### *4.2.2 Conflicts and politics*

We observe in Table 4 a positive correlation between legal conflicts, as they would unfold over time, and the date at which the first information assembly was conducted. Assuming that these were anticipated or reveal some structural conflictive relationships in the ejido, this suggests that RAN indeed rolled out the certification first in areas less prone to conflicts. A 20 dispute difference is associated with  $\frac{3}{4}$  of a month delay.

Whether political affiliation of the ejidos had any influence in the rollout is open to debate. In the early 1990s, Mexico was overwhelmingly dominated by PRI. As seen in Table 2, in 96.7% of municipalities with ejidos, PRI received the highest share of votes in the 1991 Federal Congress election. There is however some variation in the share of the votes received by PRI, with an interquartile range of 20 percentage points, and similarly of 13 and 10 percentage points for PAN and PRD, respectively. At that time, 30 of the 32 governors were from PRI. So alignment between the municipality and the governor occurred for 87.4% of the ejidos. Partial correlations between political affiliation and the rollout of *Procede* are reported in Table 4. A 20 percentage point higher PRI vote share in the 1991 Congressional election in the municipality is associated with 0.70 month earlier start, while the interquartile 13 percentage point range for PAN is associated with more than 2 months earlier certification start time. Results reported in the last column show that these partial correlations are robust to the addition of the economic opportunity and poverty variables analyzed in the previous section.

The national scope of the program, simultaneously implemented in all states, and the fact that laggard states in certification were not those with opposition governors suggest that overall politics did not play an important role in land certification. The fact that the partial correlation of PAN vote share with initiation of the program is negative goes against the hypothesis that the program managers discriminated against ejidos in municipalities with stronger opposition.

#### **4.4. Duration of the *Procede* Process: Opportunism or Learning?**

Of all the ejidos that had their first assembly before the end of December 2006, 96.3% had completed the certification process. Since that date only a handful of ejidos have further completed the certification (229 ejidos or less than 1%) under the new program (*Fanar*). For the majority of ejidos, the full procedure for certification, from the information assembly to the registration assembly, took between 3 and 18 months, but there are a few outliers that required several years (Figure 2). The mean duration is 24 months, but the median is only 13 months.

One hypothesis is that Procede managers would have opportunistically targeted first the ejidos that were faster to certify and hence that the duration of the process would increase over time. On the other hand there may have been learning in implementing the process, which would suggest a decrease of the duration over time. Regressing the duration on the starting date reveals an unconditional negative correlation, suggesting that the learning effect dominated. This is reported in Table 5, with a truncated regression in column (1) that includes ejidos that had not concluded the process by December 2006. An information assembly taking place 6 months later is associated with a shorter duration of 0.5-0.7 months. Neither the addition of a quadratic term, nor using a loglinear model qualitatively changes this result. Focusing on the ejidos that have finished the Procede process in column 2, a linear regression with state fixed effects shows an even higher decline in the duration over time, gaining one month of duration with the passing of 6 months in the starting date (results are reported for the subset of ejidos for which we have characteristics, so that they can be compared to the following columns). This increase in the coefficient is equally due to the selection in eliminating the most extreme cases that are not concluded and to the addition of state fixed effects (a linear regression without the state fixed effect gives a coefficient of -0.12).

Results reported in columns (3)-(5) show that the process takes more time for larger ejidos with more members. Controlling for size, it is shorter when there is more parceled land. The number of posesionarios (or their ratio to the number of members) increases the length of the process. Conflicts also lengthen the process. Twenty more conflicts are associated with almost 2 extra months in Procede duration. The relationship between duration and starting date remains similar, even after adding these controls.

All in all, the attainment of 91% of landholdings certified in all of Mexico by Procede can be considered a great success. This important overhaul in rural land tenure may be the source of important economic benefits in the future.

## **5. Land Certification and Voting Behavior**

We now explore the effects of the Procede program on voting behavior to test three different hypotheses on the effects of improvement of property rights on political behavior. First, we test if the system in which the land was not certified provided a means of vote control for the party in power. There is a large literature in political science on Mexico arguing that the ejido system was designed to exercise control over the votes of ejidatarios. By restricting private property rights, the ejidatario could not use his land as collateral in the credit market. This left the ejido dependent on government development agencies for seed, fertilizer, and credit. The political science literature argues that the 1992 reform together with the

land certificate distribution played an important role in reducing the hold of PRI on the Mexican rural sector. We test this hypothesis by comparing voting behavior of ejidos before and after certificate acquisition.

Second, we test if certificates generated goodwill towards the political party that awarded it. By awarding a land certificate, the party can be thought of as providing an important benefit to the landowner, which can in turn increase goodwill towards the party. There is a long literature on the allegiance of New Deal beneficiaries towards the democratic party in the US. In the context of Mexico, we test if the party that awarded the certificate enjoyed a short and/or long term boost in its voting outcomes.

Lastly, we test if Procede certificates induced beneficiaries to vote for more for procapitalist policies (parties of the right) and less for parties more interested in redistribution (parties of the left).

### **5.1 Mexican Congressional Elections**

Elections for Federal Congress take place every three years. Mexico was under the rule of a single party (the PRI) from the 1920s until the 1990s. The demise of single party rule began when the left leaning members of the PRI splintered in 1988 and created the PRD, which established itself as the major party representing the left. Secondly, there was a major political reform in 1996 which created an independent electoral authority allowing for fair elections. In the 1997 election PRI lost the majority in Congress for the first time. Furthermore, in the 2000 election, the party of the right (PAN) won the Presidency and thus ended the PRI's 70 year old hegemony.

Figure 3 shows the vote share in ejidos for all political parties. It shows that the PRI is experiencing a secular decline from the start (partially reverted in the 2009 election). On the other hand, both PAN and PRD were increasing their average vote share (Partially reverted for PRD in the 2009 election). Although Mexico has multiple political parties, vote share is highly concentrated among the three large parties. The small political parties tend to disappear after one or two elections.<sup>4</sup>

Figure 4 shows a comparison of vote share for the three major parties between ejidos and non-ejidos. The similitude of vote shares by ejido status for each party are striking. Ejidos vote more for PRI than non-ejidos, whereas ejidos vote less for PAN than non-ejidos. For the PRD ejidos and non-ejidos

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<sup>4</sup> Some small parties have created coalitions with major parties to avoid losing government funding. This is the case of the "Partido Verde Ecologista de Mexico (PVEM)" which went in coalition with PAN for the 2000 election. After the 2000 election, the PVEM allied itself with PRI. Up to 2006, coalitions appeared as a single option in ballots.

vote very similarly. The differences are stable over time; however, the PAN vote share difference between ejidos and non-ejidos falls over time.

## 5.2 Empirical Strategy

The data used in this analysis consist of electoral sections GIS-matched to locality centroids from the 2000 population census. The locality centroids were then matched to ejido geocoded maps created during the Procede rollout. The observation unit is thus a locality, and we created a panel with electoral results for 1994-2009.

### 5.2.1 The Ejido as a Vote Control Mechanism

We look for evidence that the ejido system was in fact a vote control mechanism. We understand vote control as a way to induce votes for the party in power. Under this hypothesis, the Procede certificate erodes the vote control mechanism by giving the individual landowner more certainty regarding property of the land. A landowner who is less worried about being evicted from his land can show more independence regarding who he votes for. In particular, if the certificate eroded the ejido system as a vote control mechanism, we expect to find evidence that ejidos with certificates voted less for the party in power.

A test of this hypothesis is provided by comparing the share of votes for the party in power between ejidos certified just before and just after an election. This comparison minimizes selection concerns, because in any given election year both groups are certified around the same time, and by the same party.<sup>5</sup> Figure 5 provides a simple comparison for the 1994, 1997, 2003, and 2006 election years. *Certified by election day* refers to the group of ejidos that would be certified within a year of the election, but were not certified as of the election day. *Certified before election day* refers to the group of ejidos certified within a year before the election.

Evidence of vote control would be a higher vote share for the party in power among the uncertified ejidos, as in the top left graph. In 1994, uncertified ejidos gave PRI 62.5% of their votes, whereas certified ones voted a bit less for PRI, around 62%.

However, the reverse pattern occurred in 1997 (for PRI), and 2003 and 2006, when PAN was in power. The magnitudes are small, except for ejidos certified around 2006, in which the certified ejidos voted more than 10 percentage points *more* for the party in power.

If the window is set to 6 months before or after the election, or 1.5 years before or after the election, the results are very similar. The magnitude of the differences are overall small, except for the 2006 election, but even in that year the difference is opposed to what the vote control hypothesis

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<sup>5</sup> For this hypothesis, we ignore year 2000 elections, in which the president's party changed.

suggests.

The regression analysis confirms this result<sup>6</sup>. Given the possible selection of ejidos into program participation over time, the empirical strategy we propose is to compare the voting behavior of ejidos certified around the same time window, by the same party, with an election falling at the midpoint of the window. Specifically, we select ejidos certified either a year before or after an election (1994, 1997, 2003 and 2006), and compare voting outcomes by certification status for the party in power. Given that we use only one electoral result for each ejido, we do not use a fixed effects estimation. Rather, our design is closer to a regression discontinuity design. This solves the issue of selection because we are comparing electoral results for ejidos certified around the same time in the rollout of the program. This approach only tests for short term (given the two year window) responses in voting to the certificate acquisition. Specifically, for three different dependent variables of interest we estimate:

$$y_i = \alpha_{1t} + \beta_1 \textit{Procede}_i + e_{1i}$$

where  $y_i$  can be either a party's vote share, a dummy for winning, or the margin with respect to the maximum of the other parties.  $\alpha_{1t}$  is an election year  $t$  dummy coefficient, and  $\textit{Procede}_i$  is an indicator for the ejido being certified. Evidence for the ejidos as a vote control mechanism would be given by negative sign of  $\beta_1$ .

The first three columns in Table 6 show that the signs on the *Procede* coefficient do not behave as proposed by the vote control story. They are insignificant for vote share and winning, and significant for president's party margin, by 1.8pp. The last three columns represent heterogenous effects by election year. In the PRI era, (1994 and 1997 elections), acquisition of the land certificate did not affect votes for PRI. However, during PAN era, it is quite stark that in the 2006 election ejidos that had just obtained their certificates voted significantly more for PAN. The president's party share was 12pp higher, and had a 23pp higher probability of winning in the section. The statistical evidence thus suggests that land certificates did not reduce votes for the party in power. If anything, it increased vote share, as evidenced from the 2006 election.

An alternative empirical strategy uses two electoral results for each ejido: the 1994 election results as baseline and the second electoral result around the year the ejido was certified. This way we can use a fixed effects estimation strategy. The results of this alternative strategy are extremely similar to those reported above, and are left unreported.

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<sup>6</sup> The 2009 election is excluded because the titling program had concluded at the end of 2006, so no ejidos were titled after the 2009 election.

### 5.2.2 Reciprocity: Party that Awards the Certificate Increases its Vote

The previous section provided a test of reciprocity in the short term. The results were insignificant for all but the 2006 election, in which newly certified ejidos voted significantly more for the party in power, PAN. In a sense, those results suggest there may be some reciprocity in the short term towards the party that gave the land certificate.

In this section we provide a test of reciprocity in the medium term towards the party that was in power when the certificate was awarded. Ejidos certified around the 2000 election were certified either by PRI (before December 1<sup>st</sup> 2000), or by PAN (after December 1<sup>st</sup> 2000). Given that this set of ejidos were certified around the same time, selection into the program is addressed. What this sample allows us to test is whether those ejidos certified by PRI had a higher vote share for PRI than those certified by PAN. Vice versa, we expect those ejidos certified by PAN to have a higher vote share for PAN in future elections. Given that we compare ejidos in elections when they are fully certified, we are no longer comparing treated to untreated ejidos.

As graphical evidence we plot the share of votes for PAN and PRI according to whether they were certified by PAN or PRI around the 2000 change of power (+1 year window). However, only in 2009 do we find evidence that ejidos voted more for the party that awarded them the certificate. The opposite occurs in the 2003 and 2006 elections.

Table 7 presents results for reciprocity towards the party that awarded the certificates. It uses the sample of ejidos certified 1 year before and after the 2000 change of power (Dec 1<sup>st</sup> 2000). We correlate the electoral outcomes for PRI to whether the ejido was certified by PRI in panel A. The estimation includes electoral results for 1994, 1997, 2003, 2006 and 2009. The equation being estimated is:

$$y_{it} = \alpha_i + \alpha_t + \beta \text{Certified\_by\_PRI}_i * \text{Procede}_{it} + e_{it}$$

where  $\beta$  captures the difference in voting outcomes for PRI in ejidos certified by PRI as opposed to ejidos certified by PAN. Given that all ejidos in the sample are not certified in 1994 and 1997, but all are certified in 2003-2009, the year dummies account for the uncertified status of ejidos before the 2003 elections.

As the table shows, there is very limited evidence of reciprocity either for PAN or PRI. In fact, the only significant signs appear for PRI voting outcomes in the 2006 election, in which ejidos certified by PRI voted significantly *less* for PRI. None of the estimates for PAN are significant. This leads us to conclude that there is little evidence of reciprocity towards the party that awarded the certificate.

### 5.2.3 *Shift to the Right: Do Certified Ejidatarios Vote More for the Right and less for the Left?*

Figure 7 shows PRI vote share for each election year by months certified (on a window of 3 years before and after *procede*). The graph clearly shows PRI vote share falling with each consecutive election, but there is no clear association to *Procede* certification. Figure 8 shows demeaned PAN vote share and months since *Procede* on a 2 year window around the election year. Again there is no clear pattern from the graph. Finally, figure 9 shows PRD vote share with similar results.

Regression analysis for this hypothesis is presented in Table 8. The dependent variables are (*PAN share – PRD share*), and (*PAN wins – PRD wins*), and the hypothesis is that the coefficient on *Procede* is positive. The first 2 columns show that certificate acquisition did not shift ejido voters to the right. The last 2 columns consider the subsample of years in which PRI was in power (1994-2000). The results are similar around this time period.

## 6. Conclusion

In this paper we describe the large scale Mexican land certification program *Procede*, implemented between 1992-2006. During its existence, *Procede* gave certificates to 91% of the 31,857 ejidos and comunidades, encompassing almost half of the Mexican territory. This is undoubtedly one of the largest land reform programs in the world to have occurred in recent years.

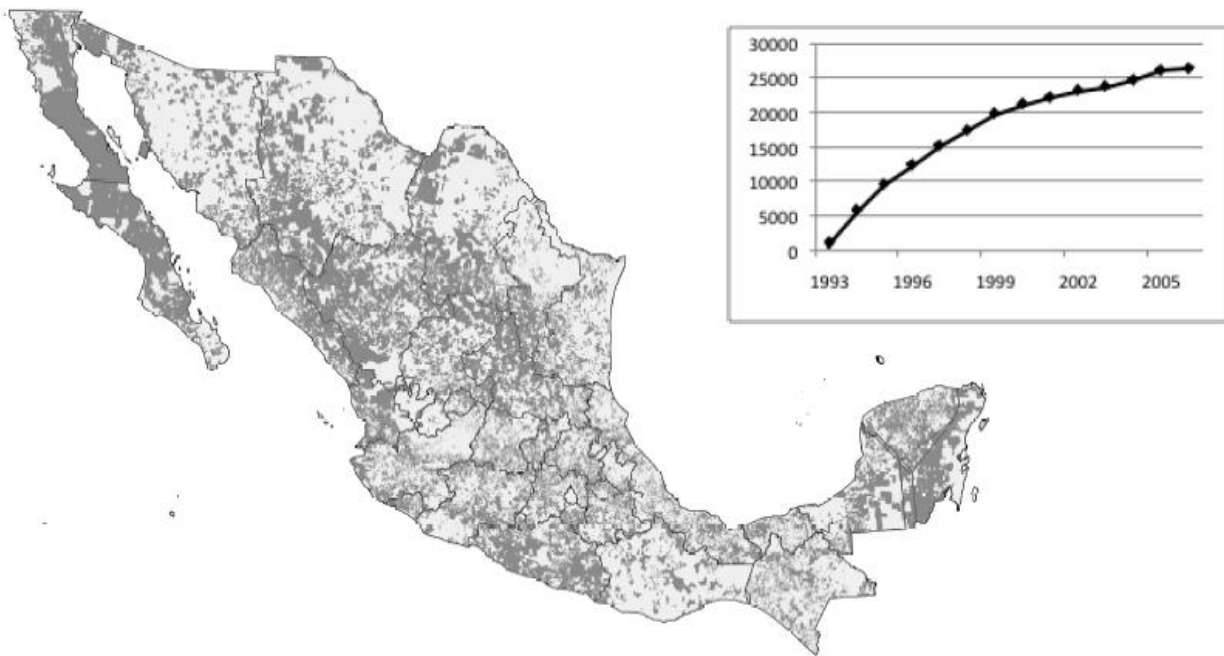
The certification process was not done in a random manner. The rollout was guided by program implementation efficiency concerns and in response to the participatory demands of beneficiaries. We find that land certificates were delivered first to ejidos and a few years later to the indigenous comunidades. We also find that certificates were offered first to ejidos with less members and with a larger share of individually allocated land. Boundary conflicts in the ejido delayed both program initiation, and the time it took to finish the measurement of the land. Beneficiaries' economic interests were also correlated with *Procede* initiation. Older ejidos (as measured by year created) were offered the program earlier than more recently established ones. Ejidos located closer to urban areas started the program sooner, as well as those with a wealthier, more educated population. The equity cost of this efficiency and demand-driven approach was that poorer ejidos were attended later.

We tested for impacts of land rights on voting behavior. We did not find evidence that awarding property rights certificates resulted in fewer votes for the party in power. We also did not find evidence that the certificates generated long term increases in votes for the party that implemented the program. The hypothesis that awarding property rights moves landowners to vote for parties of the right of the political spectrum was not borne out in the data.

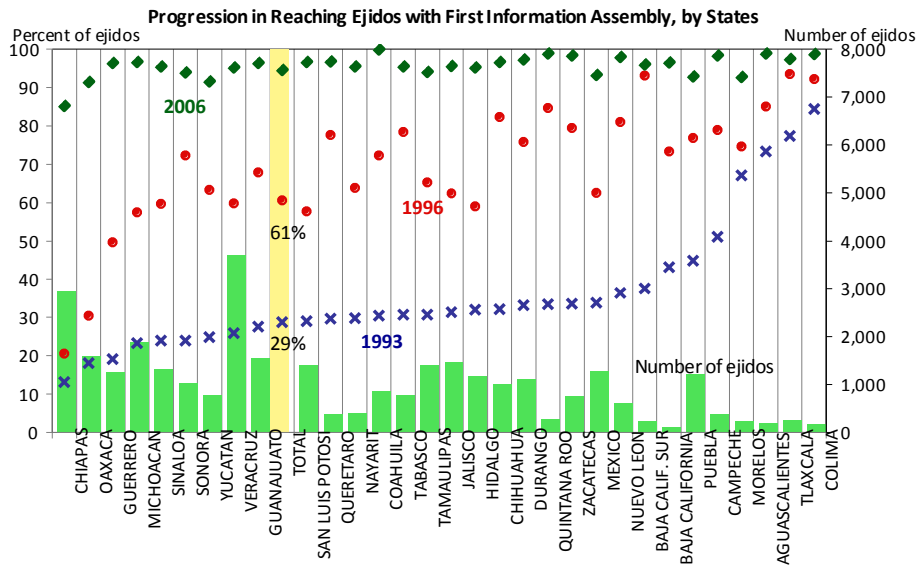
The main empirical finding in our analysis of voting behavior in ejidos is how similar they voted to non-ejido localities, as they followed the same time trends. The Procede certification program did not change the preexisting higher vote share for PRI in ejidos versus non-ejido localities, nor the lower vote share for PAN in ejidos relative to non-ejido localities. Both of which were considered important stylized facts suggesting the ejido was an important vote control mechanism in the Mexican countryside.

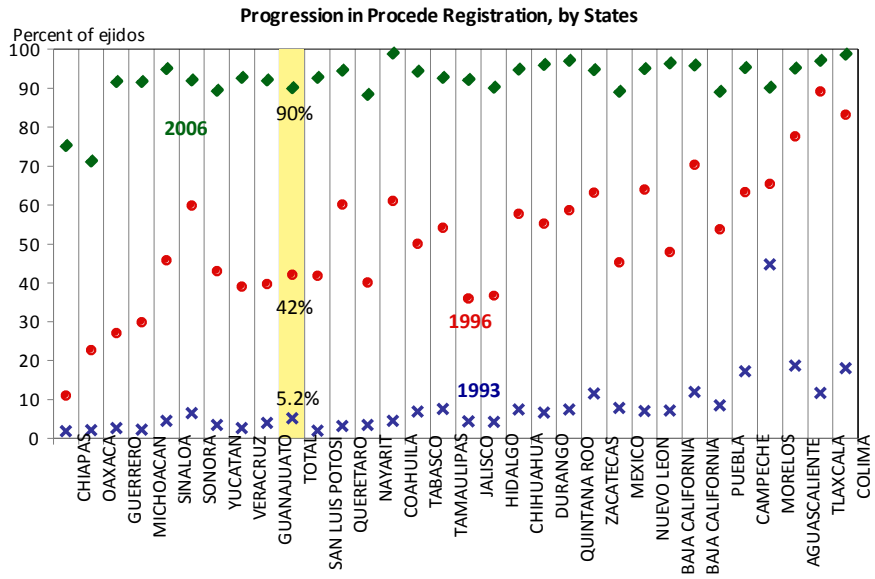
The Procede experience is thus quite remarkable in demonstrating that large scale land reform can still be efficiently implemented and without political backlash in modern times, contrary to politicians' fears worldwide. Furthermore, the program did not seem to be driven by clientelistic considerations. Rather, concerns with program efficiency and stakeholder participation were central to the rollout. While poorer beneficiaries were benefited later, the program was able to assign property rights speedily to almost all the concerned farm population, most of whom are among Mexico's poorest households.

**Figure 1. Cumulative Area Certified by January 2007**



**Figure 1. The Pace of Progression of Procede through the States of Mexico**

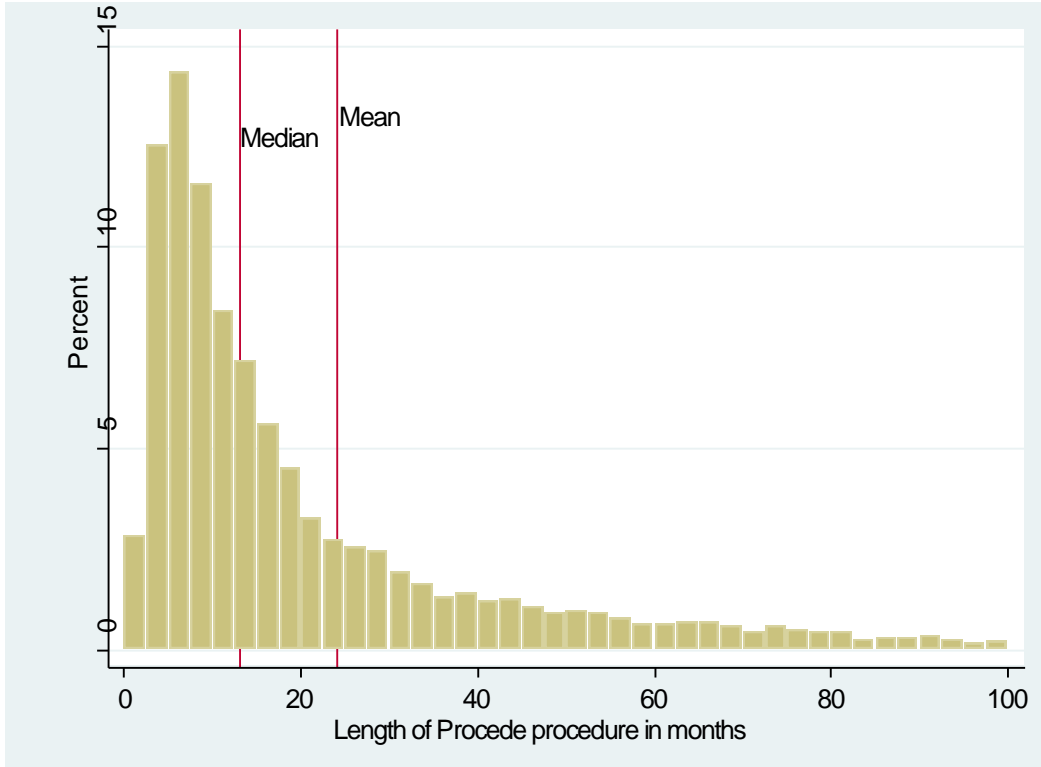




States are ordered according to the percentage of their ejidos having the first information assembly in 1993.

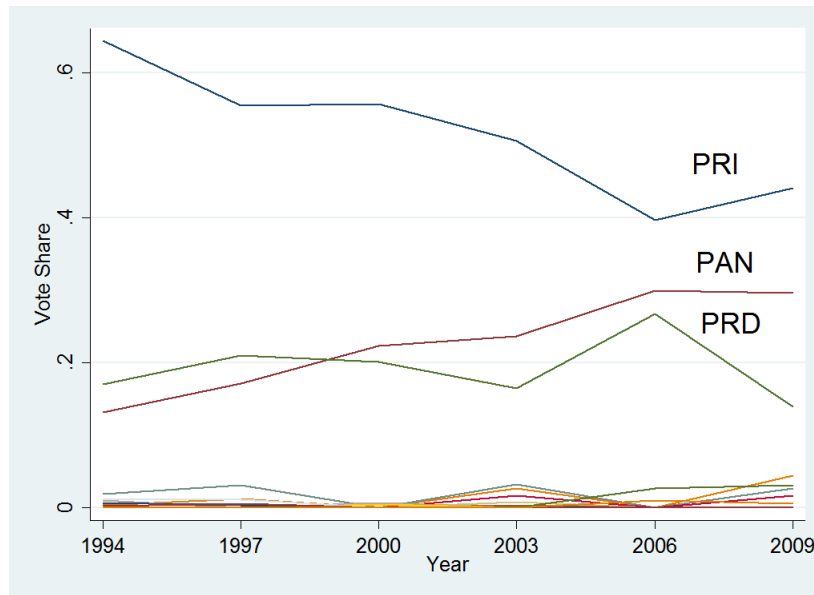
Data source: Procuraduria Agraria, December 2006.

**Figure 2. Duration of the Procede Procedure**

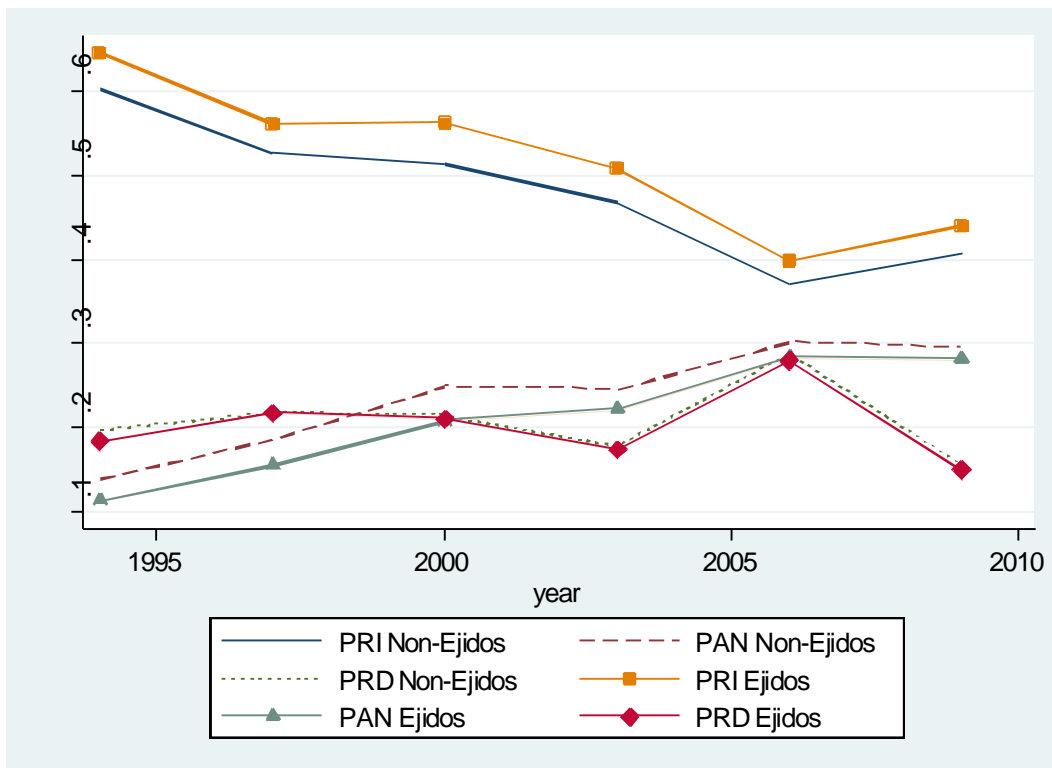


Histogram for the 26,010 ejidos which had completed the process in less than 100 months by the end of 2006. 940 ejidos had completed the process in more than 100 months and 2,448 had not completed it by the end of 2006.

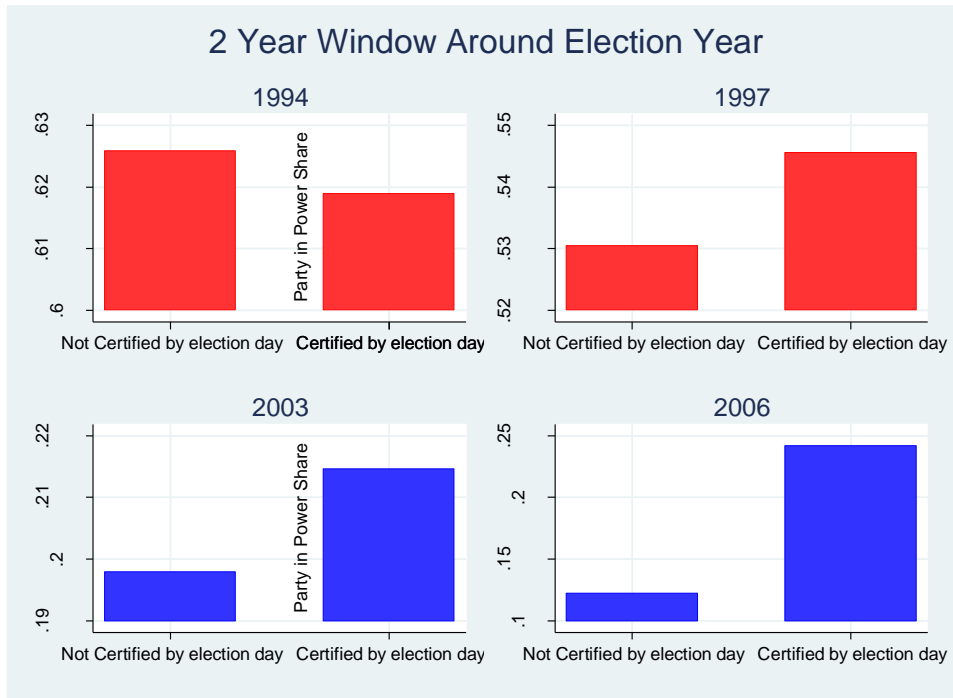
**Figure 3: Congressional Election Vote Share in Ejidos 1994-2009**



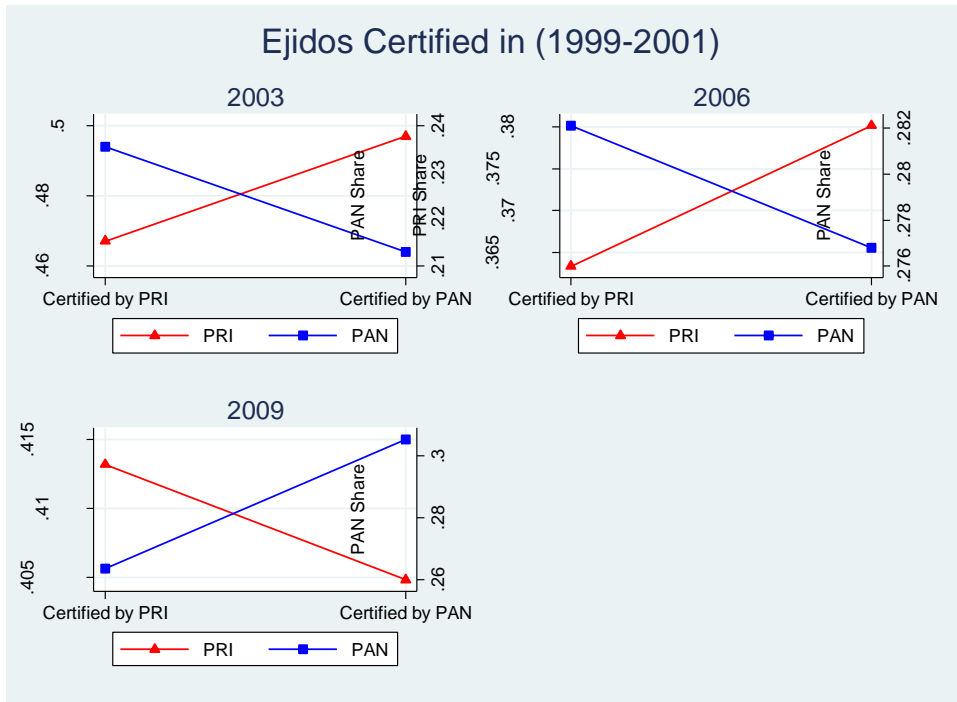
**Figure 4: Ejido and Non-Ejido Vote Share**



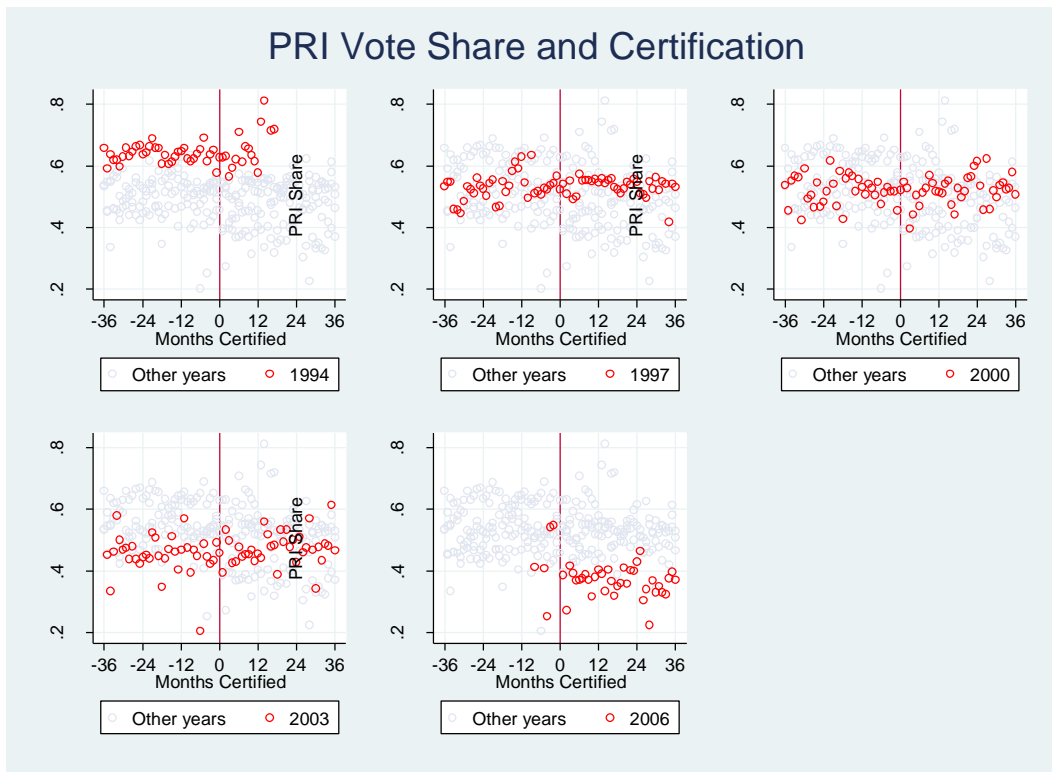
**Figure 5: Evidence for Vote Control**



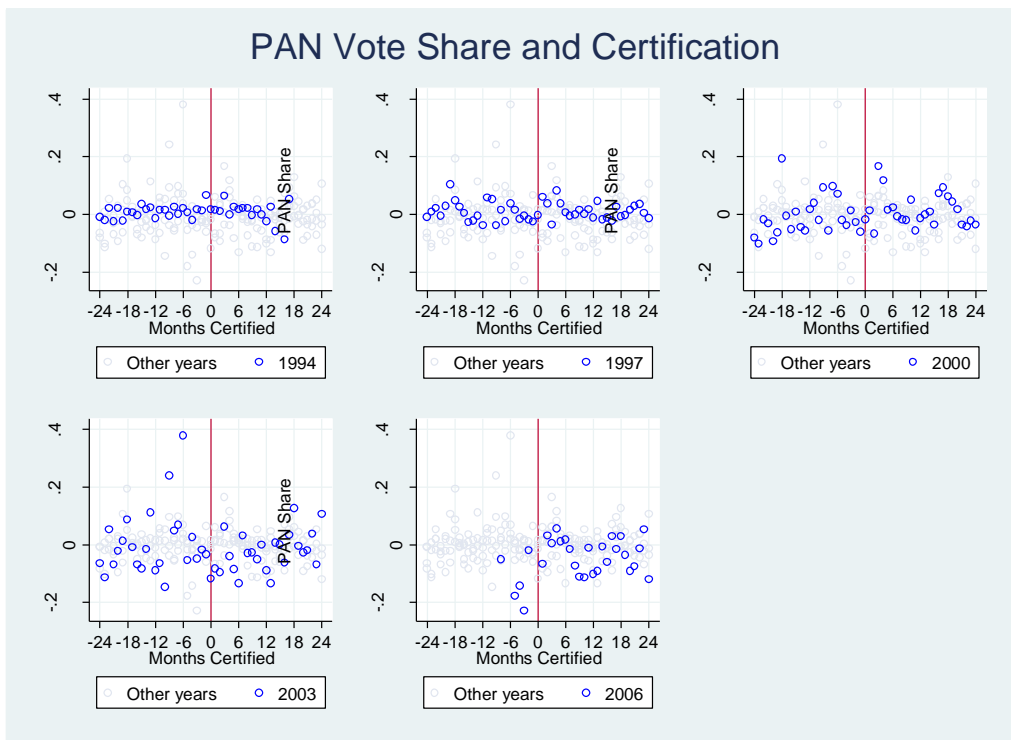
**Figure 6: Reciprocity Toward Party That Certified**



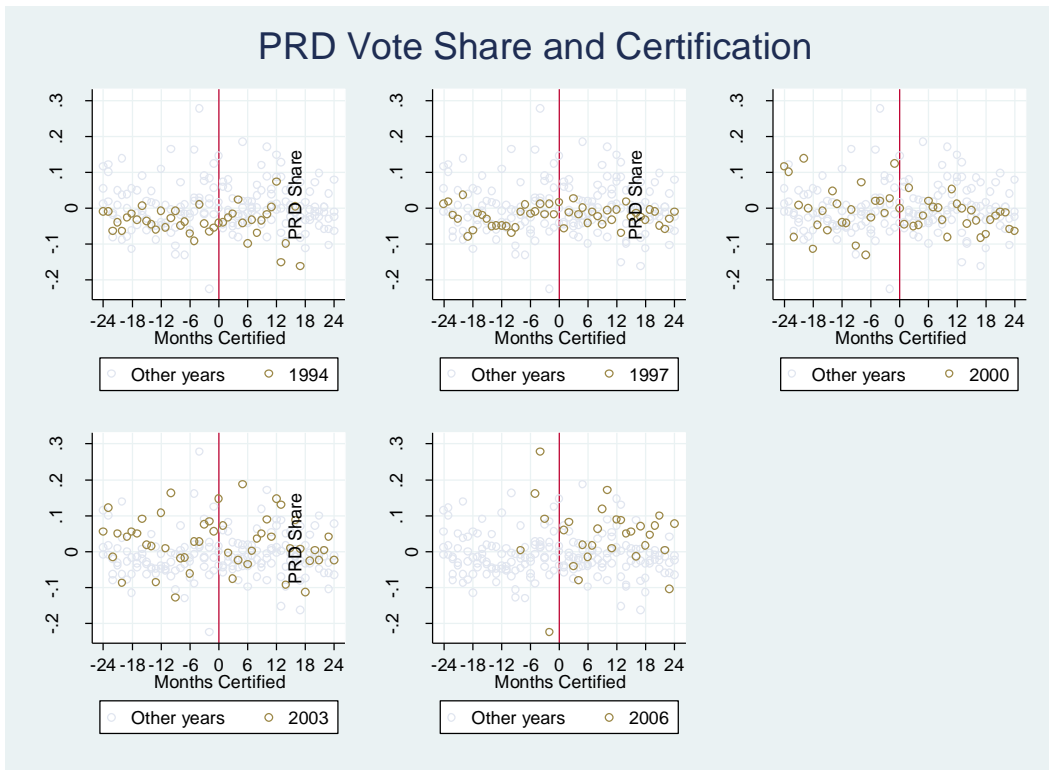
**Figure 7: PRI Vote Share and Certification**



**Figure 8: PAN Vote Share and Certification (Demeaned)**



**Figure 9: PRD and Certification (Demeaned)**



**Table 1. Descriptive statistics on ejidos and communities**

|                                      | Mean     | Median     | 25th percentile | 75th percentile |
|--------------------------------------|----------|------------|-----------------|-----------------|
| <b>Ejidos</b>                        |          |            |                 |                 |
| Starting date                        | May-96   | October-94 | October-93      | November-97     |
| Duration of Procede process (months) | 24.4     | 13.4       | 6.9             | 30              |
| Total area (ha)                      | 2,855    | 966        | 387             | 2,491           |
| Parcel area (ha)                     | 950      | 399        | 109             | 945             |
| Common area (ha)                     | 1,784    | 105        | 0               | 1,018           |
| Ejidatarios                          | 92.6     | 56         | 31              | 106             |
| Posesionarios                        | 20.7     | 0          | 0               | 6               |
| Avecindados                          | 17.2     | 0          | 0               | 0               |
| Area per member (ha)                 | 37.8     | 13.6       | 6.7             | 30              |
| Creation date                        | 1950     | 1940       | 1935            | 1967            |
| Number of members at creation        | 81       | 49         | 30              | 88              |
| <b>Communities</b>                   |          |            |                 |                 |
| Starting date                        | March-01 | January-00 | June-98         | June-04         |
| Duration of Procede process (months) | 18.0     | 9.2        | 5.5             | 20              |
| Total area (ha)                      | 7,331    | 2,372      | 799             | 6,574           |
| Parcel area (ha)                     | 460      | 0          | 0               | 165             |
| Common area (ha)                     | 4,474    | 701        | 0               | 3,670           |
| Ejidatarios                          | 289.3    | 116        | 0               | 292             |
| Posesionarios                        | 2.7      | 0          | 0               | 0               |
| Avecindados                          | 4.6      | 0          | 0               | 0               |
| Area per member (ha)                 | 42.2     | 9.0        | 3.7             | 28              |
| Creation date                        | 1973     | 1975       | 1961            | 1984            |
| Number of members at creation        | 235      | 130        | 52              | 261             |

**Table 2. Descriptive statistics on opportunities, conflicts, and politics in ejidos**

|   | Mean  | Median | 25th percentile | 75th percentile |
|---|-------|--------|-----------------|-----------------|
| <b>Opportunities in localities associated with ejido</b>                        |       |        |                 |                 |
| Active population as share of labor force                                       | 0.42  | 0.42   | 0.35            | 0.48            |
| Share of occupied population in agriculture                                     | 0.35  | 0.30   | 0.14            | 0.54            |
| Share of population with superior education                                     | 0.02  | 0.00   | 0               | 0.02            |
| Share of population with high school  | 0.04  | 0.02   | 0.003           | 0.06            |
| Marginality index   | -0.23 | -0.28  | -0.89           | 0.40            |
| Average persons per room  | 2.4   | 2.0    | 2               | 3               |
| <b>Conflicts</b>  |       |        |                 |                 |
| Disputes received   | 29.4  | 14.0   | 5.0             | 33.0            |
| <b>Politics - 1991 Federal deputies elections results at municipality level</b> |       |        |                 |                 |
| PRI share   | 0.690 | 0.698  | 0.595           | 0.782           |
| PAN share   | 0.096 | 0.049  | 0.018           | 0.148           |
| PRD share   | 0.081 | 0.036  | 0.008           | 0.107           |
| PRI wins  | 0.967 | 1.0    | 1.0             | 1.0             |
| Aligned with governor   | 0.874 | 1.0    | 1.0             | 1.0             |

**Table 3. Procede rollout**

|  | Date of the Information Assembly (in months since Jan 1, 1992) |                     |                     |                     |                      |                     |                        |                     |
|--|--|---------------------|---------------------|---------------------|----------------------|---------------------|------------------------|---------------------|
|  | (1)  | (2)                 | (3)                 | (4)                 | (5)                  | (6)                 | (7)                    | (8)                 |
| <b>Ejido size and endowment</b>  |  |                     |                     |                     |                      |                     |                        |                     |
| Members  | 0.0068<br>(3.77)**   | 0.0196<br>(11.40)** | 0.032<br>(16.34)**  | 0.0287<br>(15.07)** | 0.0291<br>(15.27)**  | 0.0294<br>(14.92)** | 0.021<br>(9.74)**      | 0.0258<br>(12.86)** |
| Total area (ha)  | 0.0001<br>(5.39)**   |                     |                     |                     |                      |                     |                        |                     |
| Total area/member (ha)   |  | 0.0039<br>(2.04)*   | 0.0056<br>(3.23)**  | 0.0024<br>(1.33)    | 0.0023<br>(1.27)     | 0.0033<br>(1.76)    | 0.0034<br>(1.85)       | 0.0004<br>(0.20)    |
| Share in common  |  | 0.095<br>(1.40)     | 0.1134<br>(1.86)    | 0.0791<br>(1.38)    | 0.0734<br>(1.29)     | 0.0802<br>(1.40)    | 0.0773<br>(1.36)       | 0.0466<br>(0.79)    |
| Share in parcels   |  | -0.1657<br>(3.22)** | -0.1771<br>(3.69)** | -0.16<br>(3.31)**   | -0.1452<br>(3.01)**  | -0.2795<br>(4.03)** | -0.2565<br>(3.68)**    | -0.2359<br>(3.30)** |
| Ratio posesionarios/members  |  | 1.3816<br>(4.93)**  | 2.4876<br>(9.75)**  | 2.185<br>(8.92)**   | 2.2454<br>(9.18)**   | 2.1302<br>(8.52)**  | 1.8964<br>(7.55)**     | 2.005<br>(8.06)**   |
| Ratio avecindados/members  |  | -0.7104<br>(4.24)** | -0.1476<br>(0.98)   | -0.1285<br>(0.90)   | -0.0637<br>(0.45)    | -0.0686<br>(0.48)   | -0.1269<br>(0.89)      | 0.1602<br>(1.09)    |
| Year of first dotation   |  |                     | 0.2682<br>(23.45)** | 0.2566<br>(23.12)** | 0.243<br>(21.41)**   | 0.2127<br>(17.62)** | 0.2075<br>(16.95)**    | 0.2224<br>(18.65)** |
| Number of members at creation  |  |                     | 0.0138<br>(5.58)**  | 0.0116<br>(4.85)**  | 0.0124<br>(5.18)**   | 0.0135<br>(5.25)**  | 0.0083<br>(3.08)**     | 0.0148<br>(5.58)**  |
| <b>Opportunities, characterized by the localities associated to ejidos</b> |  |                     |                     |                     |                      |                     |                        |                     |
| Distance to nearest city (pop > 25,000)                                    |  |                     |                     | 0.0023<br>(4.20)**  | 0.0021<br>(3.94)**   | 0.0017<br>(2.93)**  | 0.0019<br>(3.26)**     | -0.0013<br>(2.49)*  |
| Share active in labor force  |  |                     |                     |                     | -0.3778<br>(0.21)    | -1.7667<br>(0.89)   | -2.7045<br>(1.34)      | -7.677<br>(4.02)**  |
| Share non ag. in occupied population                                       |  |                     |                     |                     | -2.2976<br>(2.39)*   | -0.912<br>(0.84)    | -1.4392<br>(1.32)      | -6.1902<br>(5.97)** |
| Share of population with more than high school                             |  |                     |                     |                     | 11.145<br>(1.59)     | 18.1751<br>(2.02)*  | 12.7724<br>(1.41)      | 27.5742<br>(2.98)** |
| Share of pop. with high school   |  |                     |                     |                     | -20.5442<br>(4.03)** | -8.7086<br>(1.40)   | -13.9341<br>(2.22)*    | -2.5456<br>(0.42)   |
| <b>Poverty</b>   |  |                     |                     |                     |                      |                     |                        |                     |
| Locality marginality index   |  |                     |                     |                     |                      | 2.2146<br>(5.91)**  | 2.1029<br>(5.57)**     | 3.3106<br>(9.11)**  |
| Average number of inhabitants per room                                     |  |                     |                     |                     |                      | 0.7734<br>(2.24)*   | 0.6653<br>(1.92)       | 1.472<br>(4.57)**   |
| Observations   | 27,553   | 26,219              | 24,803              | 23,422              | 23,365               | 21,911              | 21,225                 | 21,911              |
| State FE   | 31   | 31                  | 31                  | 31                  | 31                   | 31                  | 31                     | No                  |
| Other controls   |  |                     |                     |                     |                      |                     | Conflicts and politics |                     |

Absolute value of t statistics in parentheses. \* significant at 5%; \*\* significant at 1%

**Table 4. Procede rollout: Conflicts and politics**

|   | Date of the Information Assembly (in months since Jan 1, 1992) |                     |                     |                         |
|---|--|---------------------|---------------------|-------------------------|
|   | (1)  | (2)                 | (3)                 | (4)                     |
| <b>Ejido size and endowment</b>   |  |                     |                     |                         |
| Members   | 0.0196<br>(11.40)**  | 0.0143<br>(7.02)**  | 0.0185<br>(11.00)** | 0.021<br>(9.74)**       |
| Total area/member (ha)  | 0.0039<br>(2.04)*  | 0.0046<br>(2.46)*   | 0.0045<br>(2.43)*   | 0.0034<br>(1.85)        |
| Share in common   | 0.095<br>(1.40)  | 0.0887<br>(1.34)    | 0.0666<br>(1.06)    | 0.0773<br>(1.36)        |
| Share in parcels  | -0.1657<br>(3.22)**  | -0.1567<br>(3.09)** | -0.1315<br>(2.56)*  | -0.2565<br>(3.68)**     |
| Ratio posesionarios/members   | 1.3816<br>(4.93)**   | 1.3438<br>(4.79)**  | 1.2156<br>(4.48)**  | 1.8964<br>(7.55)**      |
| Ratio avecindados/members   | -0.7104<br>(4.24)**  | -0.6927<br>(4.22)** | -0.5332<br>(3.39)** | -0.1269<br>(0.89)       |
| <b>Conflicts</b>  |  |                     |                     |                         |
| Dispute received  |  | 0.038<br>(6.78)**   |                     | 0.0615<br>(10.88)**     |
| <b>Politics - 1991 Federal deputies elections results at municipality level</b> |  |                     |                     |                         |
| PRI share   |  |                     | -3.44<br>(1.43)     | -7.54<br>(3.24)**       |
| PAN share   |  |                     | -17.10<br>(5.01)**  | -13.04<br>(3.94)**      |
| Observations  | 26219  | 25069               | 24034               | 21225                   |
| State FE  | 31   | 31                  | 31                  | 31                      |
| Other controls (from Table 2)   |  |                     |                     | Opportunities & poverty |

Absolute value of t statistics in parentheses. \* significant at 5%; \*\* significant at 1%

**Table 5. Duration of the Procede process**

|                             | Length of Procede procedure in months |                       |                       |                       |                       |                       |
|-----------------------------|---------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                             | (1)                                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   |
| 1rst assembly date (months) | -0.086<br>(0.0044)**                  | -0.1606<br>(0.0043)** | -0.1696<br>(0.0043)** | -0.1733<br>(0.0043)** | -0.1727<br>(0.0043)** | -0.1733<br>(0.0044)** |
| Total area (ha)             |                                       |                       | 0.0002<br>(0.0000)**  | 0.0002<br>(0.0000)**  |                       |                       |
| Total area/member (ha)      |                                       |                       |                       |                       | 0.0108<br>(0.0013)**  | 0.0109<br>(0.0013)**  |
| Total members               |                                       |                       | 0.0321<br>(0.0012)**  | 0.0345<br>(0.0012)**  | 0.0377<br>(0.0012)**  | 0.0223<br>(0.0014)**  |
| Share in common             |                                       |                       |                       | 0.055<br>(0.047)      | 0.057<br>(0.047)      | 0.063<br>(0.046)      |
| Share in parcels            |                                       |                       |                       | -0.1254<br>(0.0353)** | -0.126<br>(0.0354)**  | -0.1244<br>(0.0352)** |
| Ratio posesionarios/members |                                       |                       |                       | 3.173<br>(0.1926)**   | 3.168<br>(0.1929)**   | 2.581<br>(0.1951)**   |
| Ratio avecindados/members   |                                       |                       |                       | -0.059<br>(0.115)     | -0.060<br>(0.115)     | -0.207<br>(0.114)     |
| Disoute received            |                                       |                       |                       |                       |                       | 0.092<br>(0.0040)**   |
| Observations                | 27999<br>Trncated reg.                | 26554<br>State FE     | 26554<br>State FE     | 26164<br>State FE     | 26164<br>State FE     | 25024<br>State FE     |

Standard errors in parentheses. \* significant at 5%; \*\* significant at 1%  
col (1): Truncated regression on all ejidos that have started the process  
cols (2) - (6): Regression on ejidos having finished the process.

**Table 6: Certification Reduces Vote Control in Ejidos**

|                       | Presidents Party | President's Party | President's Party | Presidents Party    | President's Party  | President's Party   |
|-----------------------|------------------|-------------------|-------------------|---------------------|--------------------|---------------------|
|                       | Vote Share       | Wins              | Margin            | Vote Share          | Wins               | Margin              |
| Procede               | 0.006<br>(0.007) | 0.02<br>(0.015)   | 0.018*<br>(0.011) | -0.007<br>(0.014)   | -0.001<br>(0.015)  | 0.003<br>(0.016)    |
| Procede*1997 Election |                  |                   |                   | 0.022<br>(0.016)    | 0.035<br>(0.032)   | 0.018<br>(0.022)    |
| Procede*2003 Election |                  |                   |                   | 0.024<br>(0.023)    | 0.038<br>(0.051)   | 0.05<br>(0.035)     |
| Procede*2006 Election |                  |                   |                   | 0.126***<br>(0.033) | 0.23***<br>(0.031) | 0.139***<br>(0.032) |
| Observations          | 20154            | 20154             | 20154             | 20154               | 20154              | 20154               |
| Mean                  | 0.5              | 0.68              | 0.16              | 0.5                 | 0.68               | 0.16                |
| Standard Deviation    | 0.22             | 0.47              | 0.38              | 0.22                | 0.47               | 0.38                |

Sample is the electoral results of ejidos certified within a year of a given election. Population weighted regressions, year dummies included.

\* Significant at the 10% confidence level, \*\* Significant at the 5% confidence level, \*\*\* Significant at the 1% confidence level

**Table 7: Reciprocity Towards Party That Certified Land**

| <b>Panel A: PRI</b>                     | PRI Vote Share    | PRI Wins         | PRI's Margin      | PRI Vote Share      | PRI Wins            | PRI's Margin       |
|---|-------------------|------------------|-------------------|---------------------|---------------------|--------------------|
| Procede*PRI Certified                   | -0.001<br>(0.016) | 0.012<br>(0.036) | -0.004<br>(0.025) |                     |                     |                    |
| Procede*PRI Certified<br>*2003 Election |                   |                  |                   | 0.009<br>(0.029)    | 0.066<br>(0.062)    | 0.02<br>(0.05)     |
| Procede*PRI Certified<br>*2006 Election |                   |                  |                   | -0.023**<br>(0.012) | -0.101**<br>(0.046) | -0.043*<br>(0.026) |
| Procede*PRI Certified<br>*2009 Election |                   |                  |                   | 0.011<br>(0.014)    | 0.072<br>(0.058)    | 0.011<br>(0.024)   |
| Observations                            | 20106             | 20108            | 20106             | 20106               | 20108               | 20106              |
| Mean                                    | 0.48              | 0.63             | 0.12              | 0.48                | 0.63                | 0.12               |
| Standard Deviation                      | 0.18              | 0.48             | 0.33              | 0.18                | 0.48                | 0.33               |

| <b>Panel A: PAN</b>                     | PAN Vote Share   | PAN Wins        | PAN's Margin     | PAN Vote Share    | PAN Wins          | PAN's Margin      |
|---|------------------|-----------------|------------------|-------------------|-------------------|-------------------|
| Procede*PAN Certified                   | -0.002<br>-0.013 | -0.01<br>-0.025 | -0.002<br>-0.026 |                   |                   |                   |
| Procede*PAN Certified<br>*2003 Election |                  |                 |                  | 0.009<br>(0.027)  | 0.026<br>(0.054)  | 0.016<br>(0.054)  |
| Procede*PAN Certified<br>*2006 Election |                  |                 |                  | -0.014<br>(0.016) | -0.068<br>(0.046) | -0.022<br>(0.024) |
| Procede*PAN Certified<br>*2009 Election |                  |                 |                  | -0.001<br>(0.014) | 0.014<br>(0.049)  | 0.001<br>(0.021)  |
| Observations                            | 20106            | 20108           | 20106            | 20106             | 20108             | 20106             |
| Mean                                    | 0.22             | 0.18            | -0.31            | 20106             | 20108             | 20106             |
| Standard Deviation                      | 0.17             | 0.38            | 0.3              | 0.22              | 0.18              | -0.31             |

Sample is ejidos certified within a year of the 2000 change of power. Those certified between dec/1/1999 and dec/1/2000 were certified by PRI, whereas those certified between dec/1/2000 and dec/1/2001 were certified by PAN. Population weighted regressions, year dummies included.

\* Significant at the 10% confidence level, \*\* Significant at the 5% confidence level, \*\*\* Significant at the 1% confidence level

**Table 8: Certification Moves Voters to the Right**

|                    | PAN-PRD vote share    | PAN wins - PRD wins | PAN-PRD vote share | PAN wins - PRD wins |
|--------------------|-----------------------|---------------------|--------------------|---------------------|
|                    | PRI years [1994-2000] |                     |                    |                     |
| Procede            | 0.003<br>(0.005)      | 0.005<br>(0.015)    | 0.001<br>(0.009)   | -0.009<br>(0.021)   |
| Observations       | 217779                | 217802              | 108401             | 108424              |
| Mean               | 0                     | -0.02               | -0.06              | -0.07               |
| Standard Deviation | 0.31                  | 0.58                | 0.29               | 0.48                |

\* Significant at the 10% confidence level, \*\* Significant at the 5% confidence level, \*\*\* Significant at the 1% confidence level