

Vote Suppression and Insecure Property Rights

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Abstract

While it is commonly understood that land is a political tool, there is surprisingly little research on how improvements in land tenure security, such as land certification, affect political outcomes. In this paper, we show how a dominant political party can use insecure property rights to ensure politically-compliant voter behavior and how this power is frustrated after the introduction of a land certification program. Without the ability to expropriate land, the party will no longer be able to threaten the opposition to stay away from the ballot box. We test our hypothesis using data on 10,000 Mexican municipal elections during the country's democratic transition. Exploiting the data's panel structure, we find that a large scale land certification program that ran in parallel during 1993-2007 had the effect of significantly raising turnout for the opposition to the former state party (PRI). Importantly, this effect disappears once the PRI has already lost at least one election in the municipality. We interpret these results as land certification limiting PRI's clientelistic powers. With these results, we contribute to the understanding of the downfall of PRI and, more generally, to the relationship between political power, institutions and resource allocation.

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1 Introduction

The role of insecure property rights as an impediment to economic development is a common theme in the development economics literature. The lion's share of these studies, however, focuses on the direct economic effects of property rights, for example, on investment incentives or access to markets. The literature on less obvious yet potentially profound effects of improvements in property rights is still quite thin. In particular, economists have given little attention to the role of insecure property rights in supporting political clientelism.

In this paper, we study the effect of land tenure security on the ability of political parties to engage in clientelism with the electorate. The presence of incomplete property rights over some asset, by default, gives some discretionary control over its redistribution by whomever holds political power. This power, in turn, can turn land into an instrument of political control by using the expropriation of land to either reward or punish desirable political behavior, further reinforcing the position of the political party. Improvements in property rights such as land certification programs remove this discretionary power and hence frustrate the clientelistic function of land. Using data on over 10,000 municipal elections in Mexico over the 1990s and early 2000s, we find extremely robust support the hypothesis that land certification played a large role in reducing the clientelistic powers of the dominant political power, the *Institutional Revolutionary Party* (PRI).

Although there is a rich literature on clientelism and redistributive politics, to our knowledge, the exact nature of this economic problem that the dominant party and the individual voter face has not received attention. As such, we formalize our

logic by building a standard voting model that incorporates the use of a discretionary asset to influence individual voter behavior. The most common, and politically most sensitive, such asset is, of course, land. We will, therefore, repeatedly refer to land rights as the concrete case since our empirical analysis focuses on the effect of land titles in Mexico. But one could alternatively apply the analysis to assets such as housing, employment or businesses. In this sense, we follow Stokes (2009)'s broad definition of clientelism as "The proffering of material goods in return for electoral support, where the criterion of distribution that the patron uses is simply: did you (will you) support me?". We show that following an initial redistribution of land to garner electoral support, land is effectively used only as a credible threat in the case of non-compliant behavior of opposition supporters. Introducing secure property rights shuts off this simple yet powerful clientelistic tool and electoral support for the opposition increases.

Putting the econometric issues aside for the moment, one can see this effect in the raw data. Figure 1 shows that the electoral support for PRI in local elections declined rapidly over the period of 1990-2007. This pattern demonstrates that two important features of the demise of PRI. First, much of this dramatic decline occurred before the presidential election in 2000 (in which PRI lost power at the federal level) but decline still gradually occurred after the election. Second, despite the loss of power, PRI still controlled 50% of the vote in local elections in 2007. The timing of the Mexico's land certification program, PROCEDE, which we will discuss in more detail later, occurring from 1993-2007 and the negative effect of land certification on PRI's clientelistic powers fits this data well.

Figure 1 here.

Furthermore, a key result of our model states that land certification should have a larger impact on those voters whose votes were suppressed by threat of land expropriation. Consistent with this result, figure 2 demonstrates that the fall in the share of votes for PRI mostly comes from greater electoral support for the opposition and not from the fall in voter turnout for PRI. With these descriptive patterns as our starting point, we will investigate the clientelistic nature of land in a rigorous manner. However, there is one important caveat. One explanation for the lack of research on this topic is that data is difficult to obtain on both ends, changes in property rights are rare as are adequate measures of clientelistic transfers. We argue that in Mexico we can credibly use voting outcomes to infer clientelistic behavior in the rural sector amidst this large-scale land-titling program of the country's communal land holdings (*ejido*).

Figure 2 here.

Using data on every single *ejido* and municipality in Mexico during the period of 1990-2007, we are able to test this vote suppression prediction. We find that, due to land certification, the probability of PRI winning a local election decreases by up to 15%. This loss is due to more votes for the opposition, due to a higher turnout for the locally strongest party in opposition to the PRI, not less votes for PRI itself. Importantly, this effect can only be observed as long as the PRI has been continuously in power. Once an opposition party wins an election there is no appreciable effect of the program its electoral fortunes any longer. Moreover, we identify the causal role of property rights by combining panel data and IV methods.

The paper proceeds in the following way. First, we discuss the relevant literature on clientelism and land and power. Next, we present the model of clientelism that incorporates the possible transfer of a discretionary asset to the individual voter. We then discuss the Mexican context in detail and show that the stylized facts are conform to the main assumptions of the model. The next section presents the data and empirical methodology, including the instrumental variable that we employ. An analysis of the empirical results follows and finally we conclude.

2 Literature Review

As far back as Malthus and Ricardo, scholars of political economy have been concerned with land as a political tool. Land reform has been linked to political incentives in many countries. Bardhan and Mookherjee (2010) argue re-election concerns drive land reform in India. Albertus and Kaplan (2011) suggest that concerns about violent conflicts drive land reform in Colombia. Land reform can also change voters' preferences according to investor class theory, making voters more conservative (Nadler 2000). Both DiTella, Galiani, and Schargrotsky (2007) and deJanvry, Gonzalez-Navarro, and Sadoulet (2011) argue that this is the case for Argentina and Mexico, respectively. This latter paper is of particular interest for us because they use the same variable of interest only for a different outcome (congressional elections).

In general, insecure property rights can increase rent-seeking ((Sonin 2003), (Keefer and Knack 2002), (Baland and Robinson 2008)) further entrenching the desire to re-

main in power. Scholars such as Engerman and Sokoloff (1997) argue more broadly that land can also play a role in determining which political institutions take hold. In fact, a central question in political economy is how resource allocation influences the distribution and persistence of power. We show that the threat of expropriation in land can manipulate electoral support. Moreover, this threat is near costless for the political party in power. Thus, insecure property rights benefit those in power even when the assets in question are of little value to those in power and democratic institutions exist.

The literature on clientelism exists both in political science and political economy literatures. While vote-buying is attractive in competitive elections, the benefits are less clear in autocratic regimes. However, there is a literature on hegemonic party survival that places an importance on electoral support. (Magaloni 2006). Vote-buying theory classifies several different types of vote-buying (Nichter 2008). In the standard model, political parties target “swing constituencies” Lindbeck and Weibull (1987), Dixit and Londregan (1996). Another strand of literature looks at discretionary transfers. Diaz-Cayeros, Magaloni, and Weingast (2006), looking at the Mexican case, show that revenue sharing can lead to clientelistic transfers. Diaz-Cayeros, Magaloni, and Weingast (2006) is actually a special case of our model. Alesina, Baqir, and Easterly (2000) argues that when direct transfers are politically costly, distributing public employment is an alternative. Finally, Albertus (2010) applies the standard model to investigate whether land transfers target swing voters.

In all clientelistic literature, there is a commitment problem, either on behalf of the voter or the political party (Stokes 2009, Keefer and Vlaicu 2005). Alber-

tus (forthcoming) argues that irreversible transfers are used to target swing voters because they do not suffer from the commitment problem whereas public projects go to core voters because there is a long-term relationship. In our model, discretionary assets can be used as a clientelistic transfer only if the party can commit to maintain the asset transfer strategy, something it can not do once elections become competitive.

3 Model

In this section, we develop a model based on a standard voting model modified to allow for clientelistic transfers. It is well-known that clientelistic transfers suffer from commitment problems. We assume that the dominant party can commit to redistribute land as long as two conditions hold: 1) Elections are not competitive in the sense that the opposition has never won in previous elections and 2) Land tenure insecurity gives scope for discretionary land transfers. The government's problem is, given a land distribution and a distribution of voter preferences, how should land redistribution occur such that the new allocation of land and individual-specific clientelistic arrangements generate the maximum margin of victory.

Important for understanding how our model relates to the empirical analysis is the fact that the government party acts at the local level. The central government delegates the authority to oversee discretionary transfers to local governments. Not only are land transfers costly to make across localities but there is no mechanism in place to coordinate transfers across localities. Thus, the central government is in the

background of the analysis and land transfers happen locally. We do not claim that land transfers can not be coordinated at higher levels of government, only that we do not focus on these types of transfers.

3.1 Model Setup

We assume that two parties are exogenously located in a one-dimensional policy space over the interval $[0, 1]$. The two parties are defined to be the governing party, given by the fixed policy position, x^G , and the opposition given by x^O . Without loss of generality, we assume $x^O > x^G$. Voters are distributed uniformly over this space and are defined by their preferred policy position $x_i \in [0, 1]$. We assume the existence of ballot secrecy, but that the government is able to observe who turns out to vote. We also assume that each voter's ideological position x_i is observable to the government.

The governing parties interest is to maximize the winning margin. Following roughly (Nichter 2008), we discuss three different strategies "Turnout Buying", "Vote Buying" and "Negative Turnout Buying". This last strategy being the one that gives the vote suppression result. Only the governing party is able to engage in clientelistic arrangements, through the control over an asset which it can redistribute to voters. However, the asset does not come with enforceable property rights and can therefore be taken away by the government at will. The existence of an asset with insecure property rights allows the government to exercise its clientelistic powers in two different ways: i) it can influence voters' preferences in its own favor, and ii) it can threaten voters that have received an asset transfer with expropriation in order

to elicit compliant behavior.

Utility from voting for party j consists of the ideological position of voter i vis-a-vis party j and additively the asset transfer received (which will be equal to zero if $j = O$):

$$U(v = j) = b - |x_i - x^j| + \alpha \Delta l_i^j,$$

where only G can redistribute the asset and the utility from abstention is normalized to zero. The parameter $0 \leq \alpha \leq 1$ captures the idea that voter i 's preference is influenced by receiving an asset, but that this effect is less than the actual value of the asset itself.

The conditions for either strategy to work are the following. For (negative) turnout buying the government only has to make sure that the allotted asset is big enough to compensate the voter for the loss in utility from (not) voting. That is:

$\Delta l_i^G \geq b - |x_i - x^G| + \alpha \Delta l_i^G$ for turnout buying. $\Delta l_i^G \geq b - |x_i - x^O|$ for negative turnout buying.

For vote buying, the transfer has to be big enough to change the voter's political preference or to elicit her to vote, whichever is bigger:

$$b - |x_i - x^G| + \alpha \Delta l_i^G \geq b - |x_i - x^O| \text{ AND } b - |x_i - x^G| + \alpha \Delta l_i^G \geq 0$$

Assuming a binding budget constraint for the government (i.e. the total amount of the asset that can be distributed is limited) there will be some maximum transfer it is able to pay. The government will not engage in clientelism with voters with a required transfer payment above that level. The bold lines in figure (3) show the initial utility of voting for G of voter i . We will refer to this graph when discussing

G 's margin maximizing strategy.

Figure 3 about here

3.2 Analysis

We start with the government's decision about how to initially redistribute land. First, we look at those voters who support party G . The government has no interest in redistributing the asset to any voter who would vote for it anyway. These voters have an x_i such that they would receive positive utility from voting for G , and belong from some point up to the indifferent voter. Voters located further to the left need to be induced to turn out to vote for G either by increasing their utility so far that they will do so voluntarily, or by giving them enough of the asset so that the threat of a loss is big enough to have them turn out to vote. In the latter case the government can be assured that the vote will be in its favor given the ideological preferences of the voter. For voters to the right of the indifferent one, the government has the same two options, it can either give them enough of the asset so that they will prefer party G to party O , or, alternatively, it can give them the asset only to threaten expropriation. In the second case, the government would demand abstention as the compliant political behavior, given that it cannot control the actual vote being cast. Note that in the former case the voting margin would increase by two votes, while in the latter it would do so only by one. Lastly, to the very right of the diagram we have voters who would prefer party O to G , but are so far removed from either that they would not bother to turn out to vote. Here the government only has the option to give them the transfer necessary to have them vote in its favor.

Given the voters' utility function, it can easily be shown that for voters with very low x_i the government would only transfer small amounts of assets and threaten expropriation in case of abstention. For voters who would vote for O , but are very close to the indifferent voter it would switch their votes by means of a transfer. This result is consistent with (Albertus forthcoming) but for a different reason since these transfers are reversible. But since the cost of actual vote buying increases quickly relative to negative turnout buying, this group will be relatively small.

Table (1) shows the necessary transfer payments necessary to increase the voting margin by one vote implied by this model. One can see immediately that which strategy the government will pursue depends upon the parameters. However some generalizations can be made. First, unless G is close to the median (unlikely for a hegemonic party) or b is very small, turnout buying is a little used strategy. If $b \geq x^G$ it would disappear completely. Second, unless the policy positions of G and O are relatively close (unlikely for an opposition party under an autocratic regime), negative turnout buying will be the preferred strategy except for a few swing voters. Even for the limiting case of $\alpha = 1$, as long as $b \leq \frac{x^O - x^G}{2}$ at least the same number of voters will be subject to negative turnout buying as to vote buying.

Figure (4) shows these transfers graphically as a function of x_i , under the assumption that $\alpha = 0.5$. The darkly shaded area to the right corresponds to turnout buying from voter ideologically close to G , but who would not turn out in the absence of the transfer. The lightly shaded area shows voters whose votes are switched in favor of G , and the two intermediately shaded areas show the extend of negative turnout buying. In figure (3), the dotted lines show how the utility from voting for

G is affected by these transfers (the utility from voting for O is unaffected).

Figure 4 about here

We now turn to what happens when land certification is imposed by the central government. The unexpected imposition of secure tenure over previously acquired assets therefore will significantly increase turnout for the opposition party because the threat of expropriation no longer can keep them away from the ballot box. Land certification should also, *ceteris paribus*, decrease somewhat the turnout for the government since some of the abstainers have been threatened to show up to vote. The most singular case perhaps is those voters whose preferences will have switched towards the government permanently. Land certification will have no effect on them.

3.3 Discussion

Given the main empirical prediction, why would governing party at the federal level ever implement land certification? There are several reasons but all of them, of course, are outside the domain of the model since land certification is exogenously implemented by the federal level. The first is a simple cost-benefit calculation. The federal level may view the land certification as a benefit to voters and hope that the program will improve its chances of winning at the federal level, even at the expense of losing at the local level. In a power-driven, hierarchical system, the federal level is the most important to maintain. Related to the first, the second is simply a matter of tied hands. Some exogenous force could have required land certification in order for some other benefit that the federal level values to occur. The third is based on imperfect information. Given the history of vote suppression and the information

asymmetries between the local and federal levels, local officials could misrepresent the size of the opposition to the federal level especially if the federal level rewards them for core supporters.

Before moving on, we would also like to discuss two issues related to the model and its empirical implications. First, while the model does not rule out the turnout buying strategy nor its implications for the effect of a land certification program, there are several reasons that make the empirical relevance of these implications negligible. First, the exogenous parameters that would make this group targeted by the turnout buying strategy significant in size are not very realistic in the dominant party set-up. Second, the no longer needed funds for costly land transfers could funnel into monetary transfers or other types of transfers which would lessen the impact of land certification on these voters because they will be cheapest to influence.

Second, this simple model did not fully exploit several characteristics of land that under certain institutional environments might matter, such as the spatial nature of land. We have assumed that the distribution of voter preferences is independent of the initial land distribution. When this is not the case, the use of land transfers as a clientelistic transfer may be even more restricted. For example, if these two distributions are positively correlated, it will be too costly for the political party to make certain redistributive transfers that occur in the model above. However, we speculate that this will only work to strengthen the vote suppression prediction since threatening to expropriate may be the only effective strategy.

4 The Mexican Context

Mexico combines two important characteristics that make it an ideal case to study the effect of property rights on clientelism. Starting in 1993, following a constitutional amendment governing communally held land the previous year, the country carried out a large scale land titling program which only concluded in 2007. Importantly, the titles awarded did not constitute an outright privatization of the land, but only made existing land rights enforceable by a third party. In parallel, Mexico went through an important democratization process that culminated in the year 2000 with the defeat of the dominant PRI candidate in a presidential election for the first time in more than 70 years. It is commonly recognized that one of the principal factors in the PRI's demise can be found in its waning clientelistic powers (e.g. Klesner and Lawson (2001)). The task at hand is therefore to show how changes in land tenure security contributed to this process.

Born in 1929 as a result of the Mexican Revolution, the PRI quickly established itself as the country's de-facto state party. For sixty years it controlled practically every electoral office in the country, and won them with overwhelming electoral majorities. Only in 1989 did it lose an election for state governor for the first time. At the municipal level, the PRI's dominance was equally crushing. According to Krauze (1997), between 1946 and 1970 it lost less than 40 out of more than 27,000 mayoral elections. According to our own data, in 1990, at the beginning of our analysis, less than 10% of municipalities ever have be governed by some other party than the PRI. Around the year 2000, this number has decreased to around 50% and almost 40% of elections are won by other parties (see tables (2) and (3)). It

would be wrong, however, to assume that the PRI's dominant position ended with the 2000 presidential elections at every level of government . The data used in this paper shows that even during the first decade of the 2000s it continued to win more than half of all electoral contests at the municipal level, and that in the second half of the decade one quarter of all towns had not been governed by any other party. Many authors, furthermore, argue that the PRI was able to perpetuate its old power structures at the municipal level, or even created new ones (Lawson (2000), Bizberg (2003), Snyder (1999)).

Despite its dominant position, the PRI conducted elections at all levels of government, that were contested by at least one opposition party, on a rigid schedule. Mexico was by no means the only country to combine an autocratic system with the appearance of democratic elections, but due to the system's longevity it became an ideal setting to study the workings of what is called an "electoral authoritarianism" (Magaloni 2006) or "dominant party system" (Greene 2007). The first author lists four reasons why authoritarian parties would hold elections at all. These are: i) As a method to share power within the ruling elite, ii) to disseminate public information about the regime's strength, iii) to provide information about supporters and opponents of the regime, and iv) to give the opposition a non-violent means to oppose the regime (Magaloni 2006). Another notable feature of such systems is that they strive to win elections by overwhelming majorities (i.e. to maximize the winning margin), and that they need to co-opt large parts of the electorate through patronage and/or repression (Greene 2007) in order to sustain such majorities. Outright electoral fraud, however, is a rather rare occurrence (Greene 2007). Diaz-Cayeros, Magaloni,

and Weingast (2006) analyze how a dominant party can maintain large majorities by means of patronage and credible threats of punishment, and show that the PRI's allocation of funds to municipal governments largely followed this strategy. Diaz-Cayeros and Magaloni (2003) show a similar result for projects awarded through a community based, but federally administered, public works program (PRONASOL) in the early 1990s.

Mexico has two types of communal land holdings. The first and most important one, being the subject of the 1992 land reform, consists of 29,259 *ejidos* that together cover more than 50% of the country's territory. The second sector, consisting of 2,334 *comunidades agrarias*, entered the land certification program only in 1998. But as all its land is communally held, their members did not receive any individual titles (Appendini 2010).

The ejido is one of the most significant results of Mexico's 1910 revolution. The country's Constitution of 1917 in its article 27 granted, until its reform in 1992, the government the right to expropriate and redistribute land in favor of the landless population. The corresponding Agricultural Law (*Ley Agraria*), furthermore, outlaws landholdings in excess of 100 hectares of irrigated land or its equivalent in land of lesser quality. In order to be given land, communities of at least 20 landless (or extremely land poor) peasants had to petition the government. If granted, the petitioners were to form an ejido. Part of the ejido land was given to its members, the *ejidatarios* (of which there are roughly 3.5m), as individual plots over which they held hereditary usage rights. Under the pre-reform law, this land could not be left without cultivation for more than two years, could not be sold nor rented, and had

to be cultivated by the person to who the usage right was given. However, these rights were not properly documented which made them not enforceable by a third party (see (Sanderson 1984) for a detailed history of the Mexican ejido).

As a result, the local ejido leaders (*comisariado ejidal*) held considerable power over the allocation of usage rights. There exists a rich qualitative literature that illustrates how these these local strongmen (*caciques*) acted as local power brokers for the PRI (Roniger (1987), Holzner (2003), Paré (1975)). They were given the discretionary power to wield carrots and sticks in order to ensure political compliance with the state party. Mackinlay and Otero (2004) argue that "*Among others, their task was to administer the resources and social welfare programmes that were channeled through the Ejido Commissariats*" (pg.80). Martínez-Vázquez (1975) documents how unconditional support for the PRI was a precondition to be recognized as an ejido member, and how the ejido commissariats used their discretionary power to grant and take away individual plots in order to maintain that support. In many cases, *caciques* were able to enrich themselves by redistributing land in their favor (Martínez-Vázquez 1975), or by controlling local commerce vital to farmers (Roniger 1987).

The ejido sector has been consistently plagued by low agricultural productivity and persistently high poverty, which was seen as a consequence of the small size of plots and the low levels of capitalization (Cornelius and Myhre 1998). In response, the market friendly Salinas administration (1988-1994) passed the 1992 constitutional change in the hope of ushering in a process of rapid modernization, consisting of land consolidation and investment. Among some other changes, the reform did away with

the cultivation requirement, allowed for land to be rented out, to hire labor for its cultivation, and it gave individual ejidatarios titles over their usage rights through a large scale certification program (*Procede*). It also opened the door for land to be privatized if the ejido assembly approved of it with a two-thirds majority. While this last option is contingent upon having concluded the certification process, all other legal changes took effect immediately and prior to any land titles being handed out. Obtaining such a title, therefore, only changes tenure security (i.e, it makes land rights enforceable by a third party), but does not effectively change control rights over land.

Procede was a largely voluntary process, carried out jointly by three government agencies: the National Statistical Institute (*INEGI*), the National Agrarian Registry (*RAN*), and the *Procuraduría Agraria* (PA, the federal government's arbitration body for rural conflicts). The process was initiated by the PA with a first informational meeting (*Asamblea de Informació y Anuencia*). It was followed by a three step process in which the land was measured out and maps were created by INEGI officials. The results in each step had to be approved by the ejido assembly, and the final results were transferred to the RAN, which issued the land titles.

The voluntary nature of this process meant, of course, that the timing of certification depended to a large extent on ejido characteristics. Furthermore, in order to be certified by *Procede*, ejidos had to resolve first all internal and external land conflicts. A last factor that affected the timing of the process resided in the programs own budget constraints. The process proved to be much more drawn out than originally expected and the change in the administration in 1994 and the subsequent

currency crisis severely curtailed the funds available. At the same time, the agencies involved in the program faced strong political pressure to produce results as quickly as possible. The optimal response was to pick the low hanging fruits first in order to quickly certify the largest numbers of ejidos possible. Our own conversation with officials at INEGI who were actively involved in Procede we were told that the criteria for early certification were that ejidos had a small land area, a leveled terrain and/or shared boundaries with other ejidos already certified. Teams of officials were assigned to individual states and were based in their respective capitals. The date an ejido was certified, once it had approved of the process and had solved its land conflicts, therefore depended on its position relative to their ejidos in its state.

It has to be kept in mind that the reform was entirely the result of decisions taken at the federal level, with no official input from lower tiers of government. As pointed out by Cornelius and Myhre (1998), the reform was mostly driven by modernizing technocrats within the administration, whose principal aim was to recapitalize the sector and increase its export potential in the context of the just negotiated North American Free Trade Agreement (NAFTA). Another faction within the government (dubbed *Campesinistas* by the authors) explicitly "*saw its mission as that of transforming the ejido from a mere instrument of political control into a vehicle for autonomous expression of peasants' needs and democratic participation*" (Cornelius and Myhre (1998), page 4). In short, there is no evidence that the reform's architects took the potential negative effects on the ruling party's clientelistic potential into account. That said, deJanvry, Gonzalez-Navarro, and Sadoulet (2011) hypothesize that the government may have hoped that peasants would reward the

PRI at the ballot box for a popular reform. In any case, it seems safe to assume that given the PRI's crumbling patronage machine, its recent division and that a large part of the ejido sector sympathized with the newly formed left-wing PRD, and the fact that Mexico was already a very urbanized country, the reform's effects on municipal elections were not a big concern to its creators.

5 Data

Our data come from three principal sources: All data on electoral outcomes are taken from the database on municipal elections maintained by the Mexico City think tank CIDAC ¹. This data is publicly accessible and contains results of all municipal elections in Mexico since 1980. The data on ejido certification was given to us by the Mexican National Agrarian Registry (*RAN*, by its Spanish acronym), and consists of the exact dates land titles were issued for each ejido. Lastly, data on population were taken from the Mexican censuses and mini censuses (*Conteos*) over the time period 1990-2010. As in the United States, Mexico conducts a general census at the start of every decade. In addition, it also conducts a mini census at mid-decade (i.e. in years ending in five). The difference between the general census and the mini-census resides in the number of characteristics captured, as both are administered to the entire population.

Data on the total population are therefore available every five years (1990, 1995, 2000, 2005, and 2010). In order to fill in the for the years in between, we assumed a constant growth rate over the five yearly period between censuses. Of particular

¹www.cidac.org

interest here is of course the total population of voting age, that is of 18 years and older. Mexico does require voters to register and the Federal Electoral Institute (*IFE*) issues a national voter ID that has to be presented at the polling stations. The state level electoral institutes, while in charge of all elections below the federal level, do not require a separate registration. Alas, while data on registered voters does exist at the municipal level, we prefer to use data on the population of voting age for a number of reasons.

First and foremost, the national voter ID only became mandatory voter identification in 1997, after a couple of years of initial roll-out. Reliable data are therefore only available from 1997 onwards. Secondly, after its introduction, the voter ID became very quickly a de-facto national identification card, similar to the role of driver licenses in the U.S., necessary for all kinds of daily transactions. As a result, its adoption has become almost universal. This implies that practically the entire adult population in each municipality can be expected to be a registered voter, allaying concerns that the population 18 years of age or older may substantially overestimate the actual size of the electorate. But, on the other hand, this also means that many people do not bother to change their registration when they move, which adds an additional concern about using voter registry data. In fact, one of the authors (Pfütze (2012)) found in a different paper that for the period 2000-2002, the municipal population of 18 years of age or older tracked the voter registry data very closely once the latter was adjusted for international emigration.

We are interested in four different outcomes. The first is the binary outcome whether or not the formerly dominant state party PRI wins a municipal election.

The second is total electoral participation, and the third and fourth are turnout for the PRI and its locally strongest opponent, respectively. For the latter two, "turnout" refers to the total number of votes cast in favor of the respective party divided by the total population of voting age. We only focus on the locally strongest opponent for two reasons. The first one is strategic: In accordance with our model presented above (which explicitly assumes the existence of only two parties), the dominant party cares only about its winning margin with respect to its closest opponent. Votes cast for also-rans are therefore of no strategic importance and can be excluded from the analysis. The second reason is that in Mexico most elections are competitive between only two parties. These are almost always the PRI, which to this day is the only party that is competitive in all regions, the PAN in most of the north, west and some regions in the center, and the PRD in the south, east and some other regions in the center. In a few cases, some other party may be the PRI's principal opponent at the municipal level. Competitive three way races are extremely rare, however. This pattern was all the more pronounced during the 1990s, which constitute the largest share in our data, a time when the PRI started to face strong competitors at the sub-national level.

As far as independent variables are concerned, our variable of interest is the proportion of certified ejidos in each election year (*Procede*), which is directly computed from the data provided by the National Agrarian Registry. Our identification strategy, explained below, requires to interact this treatment variable with an indicator whether or not a municipality has been continuously ruled by the PRI since 1980 (*PRI Only*), which almost certainly implies that it has been ruled by it since the

1930s.

We will be estimating a very parsimonious model without many control variables. The reason is that we believe that the effect of almost any variable potentially of interest would be differenced away in our empirical strategy described below. Most such variables are only observable every ten years in the general census. Assuming a constant growth rate over the course of the decade will not allow for sufficient variance in the differenced data. The only control variables included are derived from the population data described before, which is available every five years, plus a measure of municipal finances, which is available yearly.

The population controls are the size of the electorate (i.e. the population 18 years of age or older), proportion of new voters (i.e. who turned 18 since the last election) in the total population of voting age, and the proportion of female voters in that population. These are meant to control for the most important demographic changes. The total size of the electorate can be expected to closely track the total population, while the proportion of new voters and the proportion female should be a good proxy for the intensity of international migration (for which data is only available for the year 2000). We control for municipal finances by including a measure for municipal revenue (*Revenue*), which consists of transfers from the federal and state level, as well as, municipal taxes and may act as an omitted variable. For one, higher municipal revenue should bolster the party in government, but, at the same time, land titling could increase local tax collection (by adding new dwellings to the registry and by potentially increasing incomes), or transfers could increase to make up for the loss in clientelistic control.

For our instrumental variable strategy, we use a similar instrument as in deJanvry, Gonzalez-Navarro, and Sadoulet (2011). The *Procuraduría Agraria* provided us with the dates of the first informational meetings that it carried out in each ejido in order to initiate the certification process. In our personal conversation with officials at the agency, we were assured that the order of these meetings followed no particular strategy in response to ejido characteristics. Agency employees were simply moving from one ejido to the next, possibly creating a spatial pattern and moving into more remote regions at a later date. This is partly confirmed by the results in table (4), explained below. Our instrument, therefore, corresponds closely to the variable it is meant to instrument for. Instead of the proportion of ejidos per municipality certified, it measures the proportion of ejidos that had had the first informational meeting by the end of the year prior the the election.

Lastly, it is important to note that municipal elections in Mexico take place every three years, but the precise year depends on the state. We therefore include a set of year specific dummy variable, plus another pair dummy variable in order to control for the electoral schedule each state is on. Tables (2) and (3) shows summary statistics for all our variables with exception of the dummy variables just described. As already mentioned, each municipality holds elections roughly every three years. Over the period 1990-2007, we therefore observe 6 elections in each municipality, with the exception of the state of Yucatan for which we observe 7 elections (due to one shorter interval between elections). The table presents the summary statistics for the total average and for each electoral cycle separately.

We have consistent data on roughly 1,750 municipalities. This somewhat lower

number than the current total (close to 2,500) stems from the fact that we excluded municipalities not yet formed in 1990, and those that opted for a non-party based local administration based on traditional institutions (*usos y costumbres*). There are close to 500 such municipalities, mostly in the southern state of Oaxaca. Lastly, we excluded the 16 boroughs (*delegaciones*) that make up the Federal District of Mexico City and excluded those municipalities that have an interrupted record of elections, which may be the case due to annulled elections or coding errors.

When interpreting the numbers in tables (2) and (3), it has to be kept in mind that these are not national averages, but rather representative of the average, unweighted, municipality. Nonetheless, some important trends can be spotted. The proportion of elections won by the PRI during the period under study decreased from more than 90% to little more than one half. The mirror image of this trend is that the proportion of municipalities that have never seen a different local government decreased from 90% in 1990 to 25% in 2007. Looking at turnout, it becomes clear that total participation has steadily increased. This trend appears to be mostly driven by the increase in turnout for the major opposition party, while, at the same time, turnout for the PRI decreased slightly. This can also be appreciated visually in figure (2). The average number of opposition victories since 1980 prior to each election (*OPP. Wins*), which will be used in the robustness checks section, increased from a negligible 0.04 to 1.2.

The proportion of certified ejidos naturally increases over time from zero during the first round of elections to more than 90% in 2007. The total population of 18 years of age or older (*Total Voters*) increased from an average of 21,456 to 31,937 over

the period under study. When interpreting the results it has therefore to be kept in mind that the average municipality is a fairly rural place, where peasants and their dependents form a large part of the electorate. New voters make up a non-negligible proportion of the total electorate (around 10%), with a slightly decreasing trend over time. The proportion of females is, as would be expected, around 50% on average. Municipal revenue per capita increases consistently from 9.2 Pesos (at 2010 prices) to more than 30 Pesos. These number are strikingly low, and the data on municipal finances needs to be taken with a huge grain of salt as it is likely to come with a large measurement error and underreporting.

Finally, our instrument leads the variable on certification substantially. The pattern between the two is, however, quite similar. The biggest increases occurred during the 1990s and tapered off during the 2000s. Table (4) asserts that the rollout of the first informational meeting was largely uncorrelated with municipal baseline characteristics in the early 1990s. These characteristics are our outcome variables during the first electoral cycle under study (prior to the reform), a number of municipality level fixed characteristics, a battery of socioeconomic characteristics, and a number of characteristics for the ejido sector. In the table, the first column shows results for a regression of the mean value of the instrument across all electoral cycles on the baseline variables. As suspected, variables that are associated with a higher degree of isolation, such as euclidean distance to the closest city with more than 100,000 inhabitants (*Distance City*), or a measure of the ruggedness of a municipality's territory, are associated with a later date of the informational meeting. Most of the other significant regressors, the proportion of the population speaking an indigenous

language, and the illiteracy and unemployment rates (also measured as proportions), can also be interpreted as acting as proxies for geographic isolation. The only significant outcome variable from the 1990-92 electoral cycle is turnout for the biggest opposition party. The binary variables indicating the actual election year during the first electoral cycle (*Elections in 90/91*) essentially proxy for certain groups of states that move faster through the process. We would expect none of these characteristics to have a significant effect in first differences with and without fixed effects. The following five columns regress the change in the instrument (i.e. the variable used in the first differenced model) in each electoral cycle on the same baseline variables. A later meeting would mean a larger difference in a later cycle. Therefore, some of the variables associated with geographic isolation exert some effect in a few periods. More importantly, none of the baseline electoral results has any consistent effect (out of 25 estimated parameters, one is significant at the 5% and one at the 10% levels).

(Table (2) about here)

(Table (3) about here)

(Table (4) about here)

6 Estimation Strategy

Our aim is to estimate the causal effect of land certification through *Procede* on different electoral outcomes. These are, a PRI victory, total participation and turnout

for the PRI and its principal opponent. We furthermore hypothesize that clientelistic effects are only present, or at least much more pronounced, in municipalities that have been under continuous PRI rule. We estimate a linear probability model on the binary outcome of a PRI win, and also apply linear specifications to the fractional outcomes. In a cross-sectional specification our general empirical model is:

$$y_{it} = \beta_0 + \beta_1 \text{Procede}_{it} + \beta_2 \text{PRIonly}_{it} + \beta_3 \text{Procede}_{it} * \text{PRIonly}_{it} + X'_{it} \alpha + u_{it} \quad (1)$$

Where y_{it} is any of our outcomes of interest and X_{it} represents the whole set of control variables including a linear time trend in addition to dummies for year and electoral cycle. We also include in a dummy variable for whether or not the incumbent government is PRI, except for the binary dependent variable case, in which this would be the lagged dependent variable.

It is obvious that one is concerned about municipality level fixed effects. Given the panel structure of our data we can define $u_{it} = e_i + \epsilon_{it}$. The first differenced (FD) version of our model is then:

$$\Delta y_{it} = \alpha_0 + \beta_1 \Delta \text{Procede}_{it} + \beta_2 \Delta \text{PRIonly}_{it} + \beta_3 \Delta (\text{Procede}_{it} * \text{PRIonly}_{it}) + \Delta X'_{it} \alpha + \Delta \epsilon_{it} \quad (2)$$

The FD specification comes naturally at this point, as it seems reasonable to assume that the idiosyncratic error terms ϵ_{it} are highly serially correlated. Results for model (2) will be presented with standard errors computed to allow for autocorrela-

tion in the differenced idiosyncratic error term. Given that we observe all outcomes prior to 1990, we do not lose any time period by first differencing.

As municipal authorities did not take part in *Procede*, we do not believe that there are any concerns regarding reverse causation in the sense that a change in the municipal government had any effect on ejidos becoming certified. But in order to allow for this possibility, we estimate an additional specification of (2) that includes the lagged dependent variable. This specification will by construction induce an element of non-contemporaneous endogeneity, and the parameter estimate on the lagged dependent variable will, therefore, need to be taken with a grain of salt. The importance of this exercise resides in that in the absence of any effect of the outcome variable on certification (and no lagged effect of the independent variables), the inclusion of the lagged dependent variable will not affect the parameter estimates of interest.

As it cannot be ruled out that the $\Delta\epsilon_{it}$ in (2) are correlated with the first-differenced independent variables, we present results for a number of additional specifications. The first makes the additional assumption that $\Delta\epsilon_{it} = \mu_i + \varepsilon_{it}$. This assumption means that we allow the error term to include a fixed, municipality specific time trend, plus an idiosyncratic error term. If μ_i is correlated with the municipality specific time trend in any of the included independent variables, the specification in (2) would still suffer from omitted variables bias. We therefore estimate (2) using municipality level fixed effects. If the first-differenced model in (2) does not suffer from omitted variables bias, we would expect that allowing for fixed effects does not substantially alter our results. As before, we correct standard errors for potential

serial correlation in ε_{it} .

Lastly, we estimate the all three specifications (simple first differences, with lagged dependent variable, and with fixed effects) instrumenting for the treatment variable *Procede* and its interaction with *PRIonly*. As before, if the specification in (2) correctly identifies the parameters of interest, we would not expect results to differ substantially.

7 Empirical Results

Tables (7)-(10) present the principal estimation results. The first one shows results for the linear binary dependent variable model on a PRI victory as the dependent variable. The other three use continuous proportions as the dependent variables: Table (8) shows results on total participation, table (9) on turnout for the PRI's strongest opponent, and lastly, (10) on turnout for the PRI. Some marginal effects may appear to be fairly large, but one has to keep in mind that they represent the estimated effect of a change from no certification to complete certification.

Before moving to the main results, table (5) shows results for the first stage regressions, excluding the lagged dependent variable specifications. The two pairs of columns show regression results on the certification variable *Procede* and its interaction term with the binary variable indicating a continuously PRI ruled municipality. The first two columns corresponds to the model in first differences, and the second pair to first differences with fixed effects. As can be seen, the instrument and its interaction term are highly significant and enter with the expected sign. It is striking

how little the results changes once fixed effects are controlled for, which further alleviates concerns about instrument validity. The F-Statistic is always very large. The value of the Cragg-Donald statistic to test for instrument weakness can be found in the corresponding output tables, but it can already be inferred that weak instruments are not a concern.

We start by showing results for our model in levels, corresponding to expression (1) above, in table (6). Here the data's panel structure is taken into account using random effects. The benefit from this exercise is twofold: Firstly, it allows us to reconcile potentially counterintuitive point estimates in first differences. In addition, we would expect to get similar results in the IV specification as in first differences, assuming that the instrument is exogenous in levels. Table (6) shows results for our four outcomes of interest without the lagged dependent variable. As will be the case in all the following tables, the variables of interest are always the first two. That is, the effect of *Procede* in municipalities that already had a non-PRI government, and the difference of that effect in municipalities that have been constantly PRI governed. For the specifications without instruments, it can be seen that results differ quite substantially in significance and magnitude (but not in sign) from the first differenced results in tables (7)-(10), implying that invariant municipal characteristics do act as omitted variables. For the IV versions, however, the results are more aligned in the case of the three fractional outcomes, strengthening confidence in our identification strategy. Perhaps more importantly, the point estimate on the binary variable indicating a continuously PRI ruled municipality enters with the expected sign in a statistically significant manner and large magnitude.

Moving to our principal results in tables (7)-(10). For each outcome six specifications are presented: The first three columns correspond to the model in first differences, first differences with a lagged dependent variable, and with fixed effects. Each of these three specifications is then estimated using instrumental variables, results for which are presented in columns (4)-(6). For the IV specifications we report the Cragg-Donald statistic to test for weak instruments (see Stock and Yogo (2002) for a detailed discussion of this test). Given the consistently high values of this statistic, it can be safely concluded that instrument weakness is not of concern.

Table (7) shows results for the binary dependent variable of a PRI victory. In all specifications, *Procede* increases the odds of a PRI victory significantly in municipalities that already have been governed by a non-PRI party. Full certification is estimated to increase the probability of a PRI victory by 10%-20% without instruments, and almost twice that amount once instruments are used. In the continuously PRI governed places, however, *Procede* lowers the probability of such an event by around 15% (the sum of the first two parameter estimates) for the specifications without instrument, and by a much smaller amount (1%-5%) when the treatment is instrumented for. Note, however, that the point estimates on the interaction term, which is our variable of primary interest, vary only marginally between specifications. This pattern will hold for all our results. Including the lagged dependent variable (columns (2) and (5)) changes our estimates in no significant manner, implying that non-contemporaneous reverse causation is not a big concern.

The only control variable that enters significantly is the proportion of new voters, indicating that municipalities with a younger population (which implies that they

are lagging in their demographic transition) tend to favor the PRI. At first sight, it may appear striking that the dummy variable denoting a continuously PRI ruled municipality enters significantly with a negative point estimate (as does the lagged dependent variable). One has to keep in mind, however, that the model is estimated in first differences, eliminating all the time invariant factors that possibly determine the entrenchment of the PRI. As seen before, we find the expected sign if the model is estimated in levels. The proper interpretation of this estimate is that once voters have experienced a non-PRI government for the first time, they are more likely to vote the PRI back into office than voters that have been continuously ruled by the PRI, keeping all other factor constant.

Table (8) shows that full certification increases participation by an additional 3-4% in municipalities that have been consistently PRI ruled. The effect in the baseline group is statistically insignificant if treatment is assumed to be exogenous, but increases significantly under IV estimation to an estimated effect of 5%-8%. Again, controlling for the lagged dependent variable does not change these results.

Tables (9) and 10) shed more light on the nature of these increases. In the specifications without instruments, in accordance with the results in table (8), there is no statistically significant effect on the turnout for either party in municipalities that have not been constantly PRI ruled. In the ones that have never seen any other party in government, on the other hand, turnout for the PRI's principal opponent increases significantly by roughly 4-6%. No such statement can be made for turnout for the PRI, as Procede is still found to be mostly statistically insignificant. The point estimate of the interaction term is consistently negative, but of fairly small

magnitude.

For the IV estimations, this picture remains the same for continuously PRI governed municipalities, where changes are marginal at best. However, it changes quite drastically for municipalities that already had some other party in power. Here the estimates now suggest a movement of voters from the opposition to the PRI, or, alternatively, PRI voters coming out of abstention, of a magnitude of 3%-5% of the total electorate. It is this movement that drives the corresponding results on total participation and the likelihood of a PRI victory.

To summarize, it can be safely concluded that the results on the interaction term consistently support our principal hypothesis. Improved tenure security has the effect of significantly increasing the turnout for the PRI's locally strongest opponent in municipalities where the PRI continues to be dominant (in the sense of never having lost an election). Once the PRI's dominance is broken, this effect disappears. In addition, the IV results support the idea that the PRI benefitted electorally from the policy. This suggests that voters did reward the PRI to a certain extent. The overall effect is a stronger turnout for the PRI in all municipalities, but in continuously PRI governed places this was offset by the effect on turnout for the opposition. It can therefore be said that our results strongly support the notion that land titles help to alleviate vote suppression.

7.1 Robustness

Our identification strategy depends in part on the assumption that clientelistic practices are primarily carried out by the PRI, and in places where it continues to be the

dominant political force. One may object that over time in many places former opposition parties were able to replace the PRI as the locally dominant political force. If so, we would expect to find that certification also weakens other parties once they have become entrenched. We address this concern by adding an additional control variable for the number of opposition victories prior to the election, *Num Opposition*, and its interaction term this with *Procede*. If our hypothesis is correct, we would expect to find results of opposite sign in the two interaction terms.

Table (11) presents results for this exercise. As in table (6), we only present results for the first difference model without a lagged dependent variable. The results on the first interaction term become stronger: a strong negative effect on the binary outcome of a PRI win, a big positive effect on turnout for the major opposition party, and a small negative one for PRI turnout. The parameter on *Procede* has now to be more carefully interpreted, as it captures the effect of already having had a non-PRI government independent of the number of non-PRI administrations. The second interaction term shows that the effect of the number of opposition victories always has the opposite sign than the first interaction term. Furthermore, the two almost always have the same level of significance. That is, the marginal effect of land certification on the probability of a PRI victory and vote losses for the opposition is larger the more dominant the opposition had been in a municipality. Using instruments only changes one result: the positive effect on PRI turnout does not depend on the number of non-PRI victories any longer.

8 Conclusion

We have shown that land is a simple yet powerful political tool that can be used to suppress votes for the opposition. This theory is strongly supported by the empirical analysis of Mexico's major land titling program, PROCEDE, carried out during the 1990s and 2000s. We find that, while the program, overall, electorally benefitted the country's long time ruling party PRI in the form of a sizable shift of votes from other parties in its favor, it also increased turnout for the locally strongest opposition party in places that had been continuously ruled by the PRI. Voters therefore appear to have rewarded the party for a popular policy, even though this policy accelerated the party's decline in clientelistic control. We believe our results contribute to understanding why the downfall of PRI occurred and serve to complement the existing explanations.

The model and empirical results also speak more broadly on the relationship between political power, property rights and resource allocation. According to the general consensus, governments should have an intrinsic interest in land certification programs. Land certification improves the government's capacity to tax, provides tenure security and improves land markets and access to credit. However, this line of reasoning largely ignores the incentives to maintain insecure property rights if land is used as a clientelistic tool. These results are important to better understand governments' incentives in implementing land titling programs often advocated by developed country donors. Even though they may be very popular with the citizenry, rulers will not be interested in their success as long as they perceive that the loss in political control outweighs the electoral and economic benefits. In addition, our find-

ings broaden the focus of the existing literature on the political economy of property rights which mostly discusses the role of land redistribution in rewarding political loyalties and creating coalitions of interest groups. But, as we argued in this paper, its potential use for clientelistic ends goes far beyond these group-centered strategies. If the government has discretionary powers over the reallocation of property rights, it can reward and punish individual voters in quite the same manner as with traditional clientelistic transfers but without necessarily incurring the opportunity costs of public funds.

Our results also shed further light on the differing nature of clientelistic arrangements in different institutional contexts. We have shown that our proposed mechanism works in the context of formally democratic elections with a secret ballot. Future research should investigate how tenure insecurity affects political arrangements in different, probably less democratic, contexts.

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Figure 1: The average share of votes for PRI in municipal elections from 1990 - 2007.

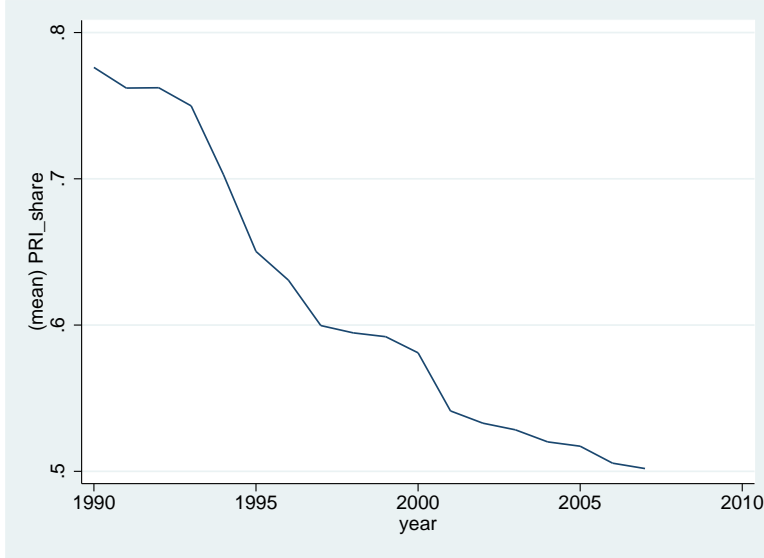


Figure 2: The average turnout in municipal elections from 1990 - 2007.

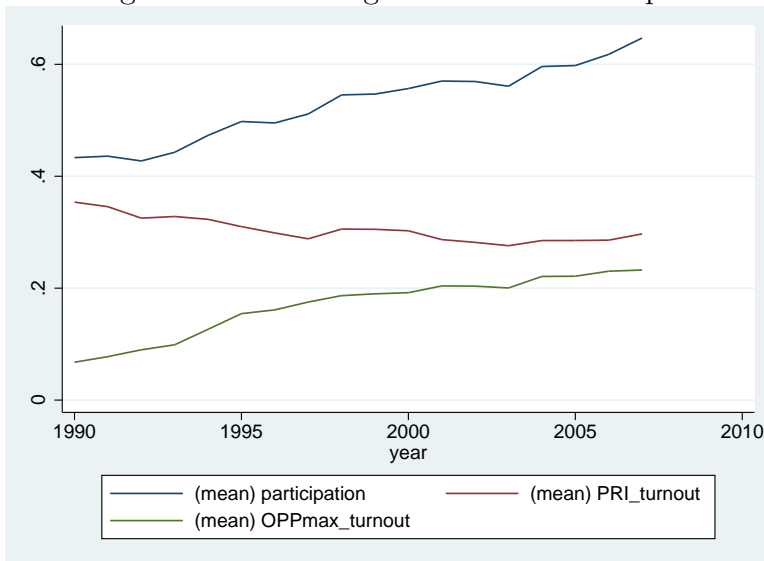


Figure 3: Voter Preferences

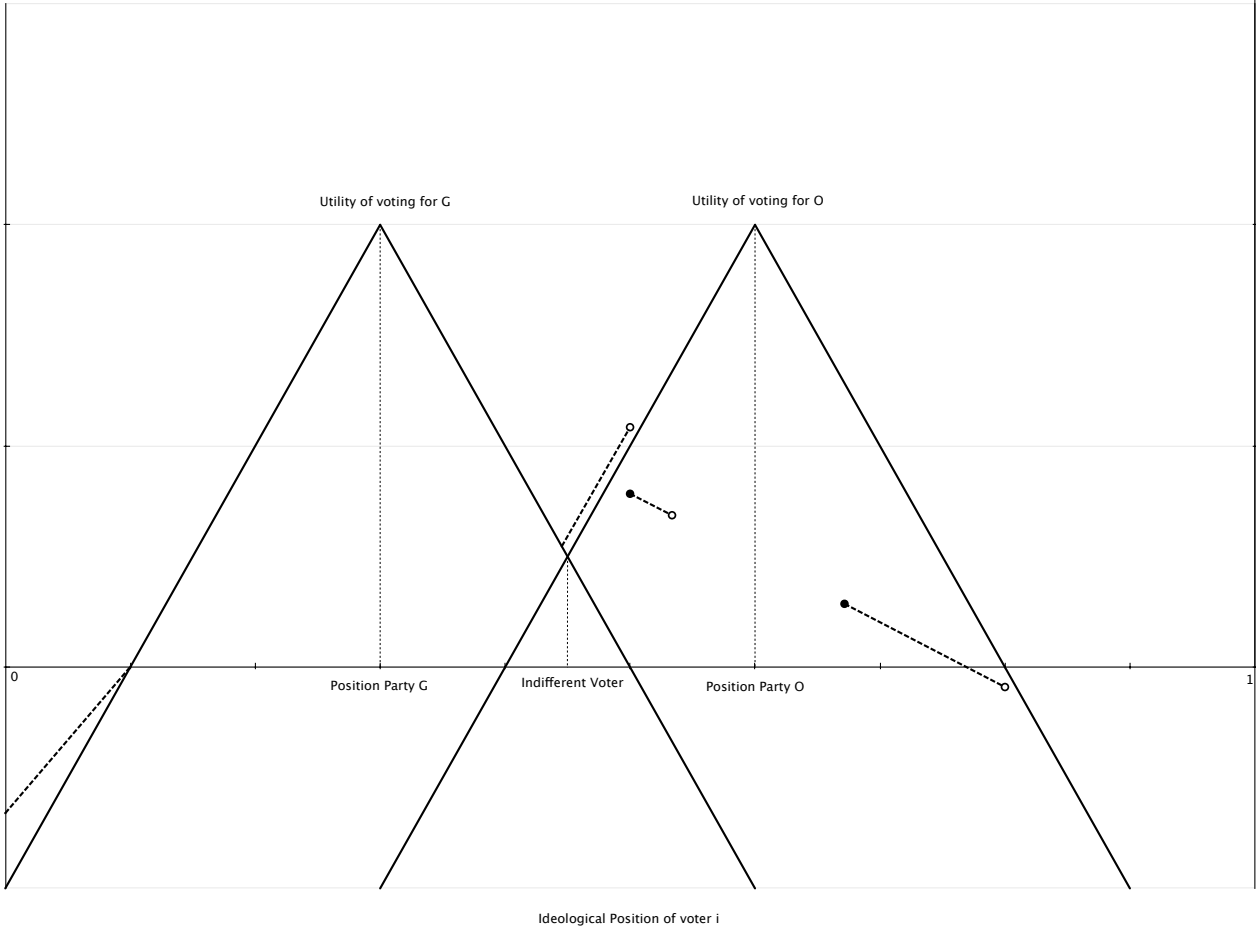


Figure 4: Transfers to be paid to increase vote margin by one.

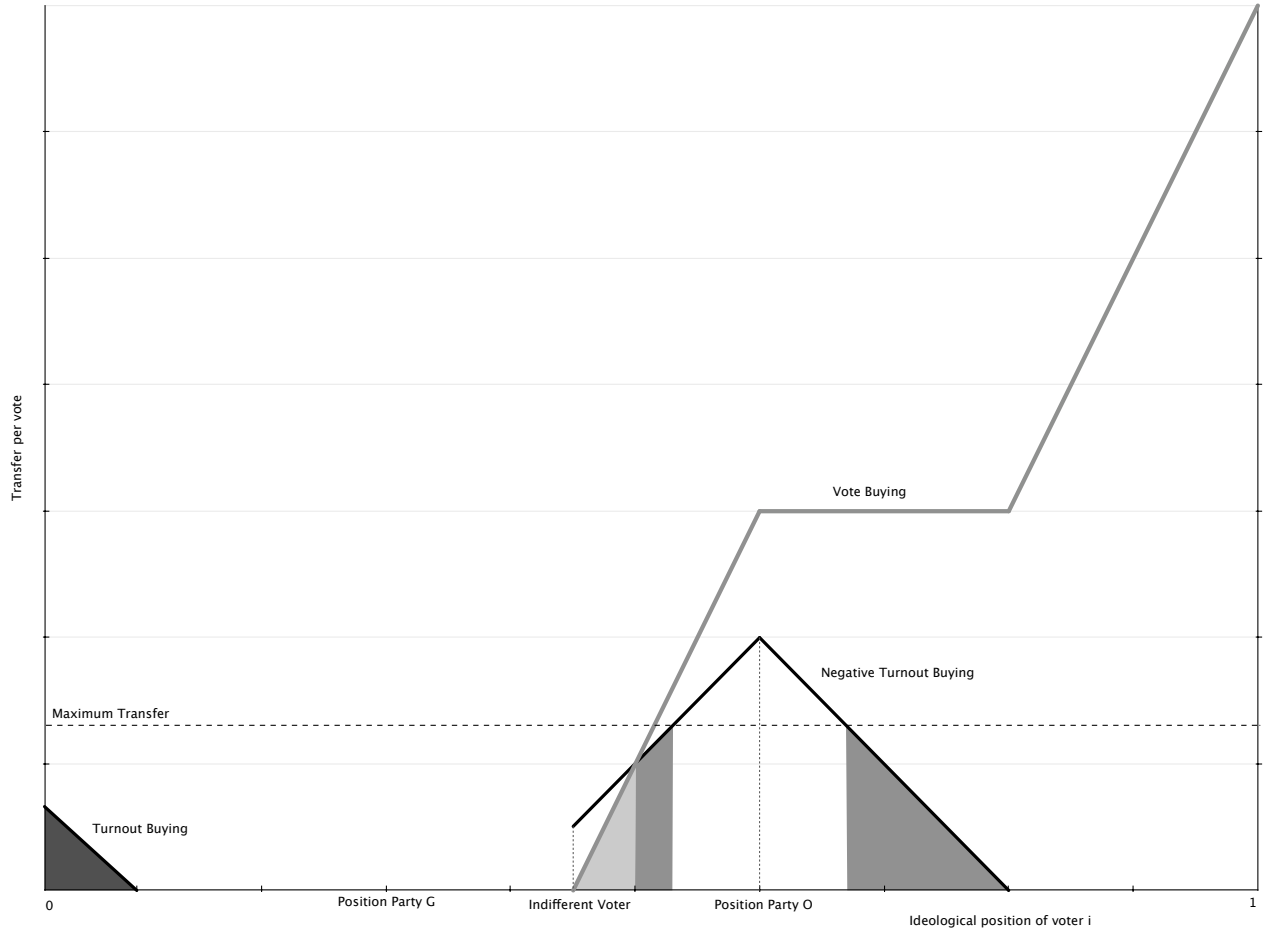


Table 1: Necessary asset transfers as a function of x_i

Voter type	Clientelistic strategy	Transfer per vote
$x_i \leq x^G - b$	Turnout buying:	$\frac{(x^G - x_i) - b}{1 + \alpha}$
$x^G - b < x_i \leq \frac{x^G + x^O}{2}$	No arrangement	0
$\frac{x^G + x^O}{2} < x_i \leq x^O$	Negative turnout buying: Vote buying:	$b - (x^O - x_i)$ $\frac{2x_i - (x^G + x^O)}{2\alpha}$
$x^O < x_i \leq x^O + b$	Negative turnout buying: Vote buying:	$b - (x_i - x^O)$ $\frac{x^O - x^G}{2\alpha}$
$x_i > x^O + b$	No arrangement: Vote buying:	0 $\frac{(x_i - x^G) - b}{\alpha}$

Table 2: Summary statistics for dependent variables by electoral cycle

	Obs.	Mean	St. Dev.		Obs.	Mean	St. Dev.
PRI Win				Turnout			
ALL	10624	0.68	0.47	ALL	10620	0.6	0.21
Cycle 1	1753	0.91	0.29	Cycle 1	1753	0.46	0.18
Cycle 2	1753	0.79	0.41	Cycle 2	1740	0.54	0.18
Cycle 3	1753	0.70	0.46	Cycle 3	1752	0.59	0.26
Cycle 4	1753	0.62	0.48	Cycle 4	1752	0.62	0.15
Cycle 5	1753	0.53	0.50	Cycle 5	1752	0.65	0.16
Cycle 6	1753	0.53	0.50	Cycle 6	1752	0.7	0.21
Cycle 7	106	0.57	0.50	Cycle 7	106	0.84	0.15
PRI Share				Opp. Share			
ALL	10617	0.30	0.14	ALL	10379	0.22	0.12
Cycle 1	1752	0.33	0.18	Cycle 1	1568	0.12	0.09
Cycle 2	1753	0.31	0.13	Cycle 2	1720	0.19	0.11
Cycle 3	1752	0.3	0.13	Cycle 3	1735	0.23	0.12
Cycle 4	1751	0.29	0.13	Cycle 4	1747	0.24	0.09
Cycle 5	1751	0.28	0.11	Cycle 5	1752	0.26	0.11
Cycle 6	1752	0.28	0.14	Cycle 6	1751	0.27	0.12
Cycle 7	106	0.39	0.12	Cycle 7	106	0.38	0.11
PRI Only				Opp. Wins			
ALL	10624	0.59	0.49	ALL	10624	0.49	0.94
Cycle 1	1753	0.90	0.30	Cycle 1	1753	0.04	0.23
Cycle 2	1753	0.83	0.38	Cycle 2	1753	0.12	0.41
Cycle 3	1753	0.69	0.46	Cycle 3	1753	0.25	0.61
Cycle 4	1753	0.52	0.50	Cycle 4	1753	0.49	0.86
Cycle 5	1753	0.39	0.49	Cycle 5	1753	0.83	1.1
Cycle 6	1753	0.25	0.43	Cycle 6	1753	1.2	1.32
Cycle 7	106	0.29	0.46	Cycle 7	106	0.83	1.16

Table 3: Summary statistics for independent variables by electoral cycle

	Obs.	Mean	St. Dev.		Obs.	Mean	St. Dev.
Procede				New Voters			
ALL	10624	0.49	0.41	ALL	10624	0.11	0.02
Cycle 1	1753	0.00	0.00	Cycle 1	1753	0.12	0.01
Cycle 2	1753	0.11	0.20	Cycle 2	1753	0.12	0.01
Cycle 3	1753	0.45	0.32	Cycle 3	1753	0.11	0.01
Cycle 4	1753	0.67	0.30	Cycle 4	1753	0.1	0.01
Cycle 5	1753	0.79	0.26	Cycle 5	1753	0.1	0.01
Cycle 6	1753	0.91	0.18	Cycle 6	1753	0.1	0.01
Cycle 7	106	0.94	0.16	Cycle 7	106	0.1	0.01
Total Voters				Prop. Female			
ALL	10624	26764	73966	ALL	10624	0.5	0.03
Cycle 1	1753	21436	57600	Cycle 1	1753	0.5	0.05
Cycle 2	1753	24041	64814	Cycle 2	1753	0.5	0.05
Cycle 3	1753	26048	70676	Cycle 3	1753	0.5	0.05
Cycle 4	1753	28039	76874	Cycle 4	1753	0.51	0.02
Cycle 5	1753	30011	82782	Cycle 5	1753	0.51	0.02
Cycle 6	1753	31937	87375	Cycle 6	1753	0.5	0.02
Cycle 7	106	11414	53644	Cycle 7	106	0.5	0.01
Revenue				Instrument			
ALL	10624	17.7	16.17	ALL	10624	0.63	0.42
Cycle 1	1753	9.2	11.62	Cycle 1	1753	0	0
Cycle 2	1753	10.46	10.47	Cycle 2	1753	0.35	0.34
Cycle 3	1753	11.66	9.65	Cycle 3	1753	0.67	0.3
Cycle 4	1753	18.87	13.16	Cycle 4	1753	0.84	0.24
Cycle 5	1753	24.62	16.97	Cycle 5	1753	0.91	0.2
Cycle 6	1753	30.66	19.85	Cycle 6	1753	0.98	0.14
Cycle 7	106	30.06	9.23	Cycle 7	106	0.98	0.13

Table 4: Regressions of instrument on baseline variables

	level	cycle2	cycle3	cycle4	cycle5	cycle6
	(1)	(2)	(3)	(4)	(5)	(6)
PRI Win 90-92	.019* (.012)	.017 (.030)	.035** (.015)	-.013 (.021)	-.021 (.013)	-.021 (.021)
PRI Only 90-92	.003 (.010)	.003 (.040)	-.012 (.035)	.016 (.024)	.006 (.008)	-.017 (.021)
Turnout 90-92	.119 (.108)	.095 (.362)	.114 (.264)	.110 (.271)	-.099 (.097)	-.200 (.126)
PRI 90-92	-.147 (.108)	-.306 (.353)	.044 (.251)	-.019 (.253)	.059 (.098)	.204 (.132)
OPP 90-92	-.240** (.114)	-.419 (.401)	-.016 (.274)	-.003 (.298)	.146 (.137)	.252* (.152)
Elections in 90	-.129*** (.009)	-.543*** (.072)	.443*** (.029)	.032 (.035)	.053** (.021)	-.005 (.028)
Elections in 91	-.027*** (.007)	-.140* (.079)	.125*** (.032)	.032 (.043)	-.006 (.018)	-.017 (.027)
Population 90	-5.78e-08* (3.49e-08)	-2.14e-08 (9.53e-08)	-1.56e-07 (1.26e-07)	7.68e-08 (1.03e-07)	3.69e-08 (4.18e-08)	6.95e-08* (4.11e-08)
Ruggedness	-.0004*** (.0000789)	-.0001 (.0005)	-.0007* (.0004)	.0004 (.0004)	-.0000547 (.0002)	.0004*** (.0001)
Distance City	-.0002** (.0000821)	-.0007** (.0003)	.0005* (.0003)	.0002 (.0002)	-.0001 (.0001)	.0001 (.0002)
Indigenous 90	-.061*** (.017)	-.264* (.146)	.019 (.091)	.181** (.083)	.114*** (.042)	-.060 (.038)
Illiterate 90	-.171*** (.051)	-.252 (.255)	.024 (.165)	.076 (.121)	-.099 (.070)	.206 (.130)
Return 90	-.255 (.879)	.594 (5.181)	.052 (2.682)	-1.197 (2.924)	-.100 (1.162)	.004 (1.493)
Econ Active 90	-.008 (.083)	-.152 (.316)	.012 (.204)	.306* (.176)	-.157 (.131)	.061 (.293)
Unemployed 90	.398** (.160)	1.209*** (.462)	-.728** (.314)	-.008 (.368)	-.095 (.125)	-.331*** (.127)
Mean Wage 90	.013 (.014)	.041 (.071)	-.006 (.046)	-.037 (.031)	.021 (.017)	-.030 (.034)
Wage StD 90	-.011 (.018)	-.046 (.088)	.044 (.044)	.017 (.040)	-.022 (.034)	.016 (.044)
Agriculture 90	.013 (.023)	.094 (.100)	-.056 (.075)	-.070* (.039)	.041 (.027)	.002 (.027)
Area Ejidos 91	-1.75e-07 (3.70e-07)	9.16e-07 (1.05e-06)	-1.61e-06** (6.70e-07)	3.81e-07 (5.66e-07)	-4.39e-09 (2.91e-07)	6.30e-08 (5.03e-07)
Ejidatarios 91	4.28e-06 (3.77e-06)	7.86e-06 (9.98e-06)	3.95e-06 (7.72e-06)	-5.22e-06 (5.83e-06)	-7.93e-06*** (3.04e-06)	2.07e-06 (4.53e-06)
Ejidos 91	-.0003 (.0003)	-.002*** (.0008)	.002*** (.0006)	.0002 (.0004)	.0002 (.0002)	-.0001 (.0005)
Obs.	9274	1533	1533	1533	1533	1533
F statistic	21.317	185.131	87.713	14.427	15.611	49

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

Table 5: First stage results without additional lagged dependent variables

	FD Procede (1)	FD Procede*PRI Only (2)	FD Procede (3)	FD Procede*PRI Only (4)
Instrument	-.395*** (.018)	-.243*** (.013)	-.391*** (.020)	-.235*** (.015)
Instr*PRI Only	-.056*** (.014)	.686*** (.012)	-.058*** (.015)	.670*** (.013)
PRI Only	.051*** (.011)	.077*** (.008)	.052*** (.012)	.081*** (.009)
New Voters	-1.764*** (.346)	-1.254*** (.340)	-2.131*** (.466)	-1.995*** (.474)
Prop. Female	-.117*** (.045)	-.064* (.036)	-.012 (.060)	-.045 (.051)
Total Voters	-3.31e-07 (2.02e-07)	-1.59e-07 (1.99e-07)	-2.14e-08 (5.81e-07)	3.03e-07 (5.35e-07)
Revenue	-.0004* (.0002)	-.0003* (.0002)	-.0005* (.0003)	-.0004* (.0002)
Obs.	10611	10611	10611	10611
F statistic	298.498	384.633	1569.976	405.879

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

Table 6: Results for estimation in levels

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PRIwin	PRIwinIV	Turnout	TurnoutIV	OPPmax	OPPmaxIV	PRI	PRIV
Procede	.034 (.023)	.092*** (.033)	-.022** (.010)	-.001 (.016)	-.027*** (.006)	-.043*** (.009)	.004 (.007)	.033*** (.011)
Procede*PRI Only	-.072*** (.024)	-.067** (.030)	.040*** (.010)	.046*** (.012)	.069*** (.006)	.079*** (.007)	-.012* (.007)	-.013 (.008)
PRI Only	.206*** (.017)	.202*** (.020)	-.029*** (.008)	-.033*** (.009)	-.045*** (.005)	-.052*** (.005)	.034*** (.005)	.033*** (.006)
Revenue	.0008** (.0003)	.0007** (.0003)	.003*** (.0001)	.003*** (.0002)	.001*** (.0000866)	.001*** (.0000857)	.002*** (.0001)	.002*** (.0001)
New Voters	-1.411*** (.348)	-1.284*** (.352)	-.936*** (.179)	-.907*** (.183)	-.053 (.106)	-.128 (.105)	-1.651*** (.121)	-1.587*** (.123)
Prop. Female	-.659*** (.124)	-.684*** (.125)	.023 (.057)	.017 (.057)	.014 (.034)	.015 (.034)	-.113*** (.038)	-.116*** (.038)
Total Voters	-3.84e-07*** (5.76e-08)	-3.79e-07*** (5.77e-08)	-4.81e-07*** (3.29e-08)	-4.76e-07*** (3.29e-08)	-1.24e-07*** (1.94e-08)	-1.24e-07*** (1.87e-08)	-3.00e-07*** (2.26e-08)	-2.97e-07*** (2.26e-08)
Revenue	.0008** (.0003)	.0007** (.0003)	.003*** (.0001)	.003*** (.0002)	.001*** (.0000866)	.001*** (.0000857)	.002*** (.0001)	.002*** (.0001)
PRI Win Lag			-.005 (.005)	-.004 (.005)	.009*** (.003)	.009*** (.003)	-.005 (.004)	-.005 (.004)
Obs.	10624	10624	10612	10612	10371	10371	10609	10609

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

Table 7: Results for binary dependent variable PRI win.

	FD (1)	FD (2)	FD FE (3)	FD IV (4)	FD IV (5)	FD FE IV (6)
Procede	.170*** (.042)	.117*** (.038)	.184*** (.047)	.357*** (.083)	.260*** (.077)	.360*** (.095)
Procede*PRI Only	-.318*** (.037)	-.260*** (.034)	-.327*** (.043)	-.399*** (.054)	-.317*** (.049)	-.378*** (.064)
PRI Only	-.511*** (.030)	-.098*** (.032)	-.564*** (.034)	-.468*** (.037)	-.065* (.039)	-.539*** (.043)
New Voters	2.232*** (.856)	2.096* (1.110)	1.981* (1.172)	2.433*** (.870)	2.325** (1.132)	2.196* (1.183)
Prop. Female	-.270 (.236)	-.175 (.233)	-.387 (.329)	-.270 (.257)	-.178 (.233)	-.409 (.330)
Total Voters	-5.67e-07 (6.67e-07)	-3.32e-07 (7.65e-07)	-3.52e-06 (2.20e-06)	-5.53e-07 (6.63e-07)	-3.27e-07 (7.63e-07)	-3.47e-06 (2.20e-06)
Revenue	.0000126 (.0005)	.0002 (.0005)	-.0003 (.0006)	.000074 (.0005)	.0003 (.0005)	-.0002 (.0005)
PRI Win Lag		-.479*** (.014)			-.479*** (.014)	
Obs.	10603	8863	10603	10603	8863	10603
F statistic	89.305	175.136	89.373	87.206	170.837	86.212
Cragg-Donald				243.445	240.603	197.936

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

Table 8: Results for dependent variable Turnout

	(1)	(2)	(3)	(4)	(5)	(6)
Procede	-.011 (.011)	-.002 (.011)	-.009 (.013)	.047* (.029)	.075*** (.029)	.075*** (.027)
Procede*PRI Only	.024** (.010)	.036*** (.009)	.024* (.013)	.037** (.016)	.027* (.016)	.032* (.019)
PRI Only	-.012 (.008)	-.029*** (.008)	-.012 (.010)	-.018 (.012)	-.026** (.011)	-.018 (.014)
New Voters	.293 (.442)	-.361 (.527)	.662 (.522)	.448 (.462)	-.201 (.549)	.909* (.544)
Prop. Female	.420*** (.032)	.389*** (.039)	.541*** (.057)	.417*** (.033)	.386*** (.040)	.527*** (.054)
Total Voters	-5.93e-07*** (1.89e-07)	-6.99e-07*** (2.10e-07)	5.00e-07 (6.61e-07)	-5.68e-07*** (1.91e-07)	-6.81e-07*** (2.15e-07)	5.10e-07 (6.68e-07)
Revenue	.0003 (.0002)	.0003 (.0003)	-.0000358 (.0003)	.0003 (.0003)	.0003 (.0003)	.0000221 (.0003)
PRI Win Lag	.002 (.004)	-.0005 (.003)	.003 (.004)	.003 (.004)	-.0001 (.003)	.004 (.004)
Turnout Lag		-.389*** (.100)			-.392*** (.099)	
Obs.	8859	8816	8858	8859	8816	8858
F statistic	42.429	45.66	36.667	40.669	41.842	36.768
Cragg-Donald				239.238	234.037	184.891

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

Table 9: Results for dependent variable vote share out of total electorate for the locally strongest opposition party

	FD (1)	FD (2)	FDFE (3)	FDIV (4)	FDIV (5)	FDFEIV (6)
Procede	-.007 (.007)	-.012* (.007)	-.004 (.008)	-.027* (.015)	-.027* (.015)	-.019 (.017)
Procede*PRI Only	.047*** (.007)	.062*** (.007)	.039*** (.008)	.068*** (.010)	.085*** (.009)	.053*** (.012)
PRI Only	.010 (.007)	-.010 (.007)	.017** (.008)	-.002 (.008)	-.024*** (.008)	.009 (.010)
New Voters	.207 (.253)	.015 (.267)	-.021 (.337)	.196 (.263)	.013 (.277)	-.014 (.350)
Prop. Female	.088** (.037)	.108*** (.041)	.199*** (.056)	.088** (.037)	.108*** (.041)	.201*** (.057)
Total Voters	-2.78e-07** (1.11e-07)	-4.90e-07*** (1.22e-07)	5.98e-07 (4.21e-07)	-2.70e-07** (1.10e-07)	-4.80e-07*** (1.22e-07)	5.87e-07 (4.20e-07)
Revenue	.0001 (.0001)	.0003** (.0001)	-.0002 (.0001)	.0001 (.0001)	.0003** (.0001)	-.0002 (.0002)
PRI Win Lag	.037*** (.003)	.006 (.004)	.039*** (.004)	.037*** (.003)	.006 (.004)	.039*** (.004)
Opp. Share Lag		-.416*** (.056)			-.418*** (.056)	
Obs.	8630	8198	8628	8630	8198	8628
F statistic	55.82	61.284	56.021	56.394	61.912	56.513
Cragg-Donald		241.371		241.371	223.611	187.307

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

Table 10: Results for dependent variable vote share out of total electorate for PRI

	(1)	(2)	(3)	(4)	(5)	(6)
Procede	-.005 (.006)	.001 (.007)	-.005 (.008)	.039** (.018)	.053*** (.018)	.051*** (.018)
Procede*PRI Only	-.011* (.006)	-.011* (.006)	-.008 (.007)	-.007 (.010)	-.017* (.010)	.0005 (.012)
PRI Only	-.009* (.005)	-.011** (.005)	-.013** (.006)	-.012* (.007)	-.009 (.007)	-.019** (.008)
New Voters	-.159 (.292)	-.539* (.317)	.444 (.335)	-.045 (.303)	-.429 (.326)	.619* (.354)
Prop. Female	.249*** (.032)	.237*** (.034)	.283*** (.045)	.247*** (.033)	.235*** (.035)	.273*** (.046)
Total Voters	1.79e-07* (9.53e-08)	3.47e-07*** (1.11e-07)	-1.59e-08 (3.04e-07)	1.97e-07** (9.73e-08)	3.61e-07*** (1.14e-07)	-1.14e-08 (3.09e-07)
Revenue	.0002 (.0001)	.0002 (.0001)	.0002 (.0002)	.0002 (.0001)	.0002 (.0001)	.0002 (.0002)
PRI Win Lag	-.027*** (.002)	-.011*** (.003)	-.028*** (.003)	-.027*** (.002)	-.010*** (.003)	-.028*** (.003)
PRI Share Lag		-.281*** (.048)			-.284*** (.048)	
Obs.	8854	8807	8853	8854	8807	8853
F statistic	49.59	62.587	47.926	49.608	62.271	46.795
Cragg-Donald				238.892	233.927	184.489

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

Table 11: Results estimation in first differences including the number of opposition victories and its interaction with PROCEDE as additional variables of interest.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PRIwin	PRIwinIV	Turnout	TurnoutIV	OPPmax	OPPmaxIV	PRI	PRIIV
Procede	.089*** (.033)	.376*** (.072)	-.002 (.014)	.061* (.033)	.007 (.009)	-.018 (.017)	-.005 (.008)	.051*** (.020)
Procede*PRI Only	-.365*** (.029)	-.602*** (.043)	.017 (.012)	.024 (.017)	.041*** (.008)	.071*** (.010)	-.017*** (.007)	-.024** (.011)
Procede*Num Opposition	.291*** (.028)	.287*** (.043)	-.011 (.007)	-.021* (.011)	-.024*** (.005)	-.028*** (.007)	-.009** (.005)	-.0009 (.007)
PRI Only	-.638*** (.024)	-.512*** (.030)	-.006 (.009)	-.011 (.012)	.025*** (.007)	.007 (.008)	-.016*** (.005)	-.011 (.007)
Num Opposition	-.803*** (.027)	-.816*** (.037)	.007 (.007)	.016 (.011)	.041*** (.004)	.046*** (.006)	-.037*** (.005)	-.030*** (.007)
New Voters	1.241 (.861)	1.341 (.882)	.285 (.444)	.439 (.464)	.251 (.253)	.249 (.265)	-.227 (.294)	-.118 (.304)
Prop. Female	-.116 (.162)	-.112 (.163)	.416*** (.032)	.410*** (.033)	.078** (.039)	.077** (.039)	.254*** (.030)	.249*** (.031)
Total Voters	1.58e-06** (7.77e-07)	1.62e-06** (7.65e-07)	-5.78e-07*** (1.86e-07)	-5.46e-07*** (1.88e-07)	-3.48e-07*** (1.18e-07)	-3.40e-07*** (1.17e-07)	2.97e-07*** (9.43e-08)	3.22e-07*** (9.71e-08)
Revenue	-.0007 (.0004)	-.0007 (.0004)	.0002 (.0002)	.0003 (.0003)	.0002 (.0001)	.0002 (.0001)	.0002 (.0001)	.0002 (.0001)
PRI Win Lag			.002 (.004)	.002 (.004)	.033*** (.003)	.034*** (.003)	-.024*** (.002)	-.024*** (.002)
Obs.	10603	10603	8859	8859	8630	8630	8854	8854
F statistic	261.749	233.052	39.384	37.672	55.607	55.526	53.963	55.312
Cragg-Donald		157.41		153.207		155.042		152.982

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