The Monitoring of Clientelistic Networks: Evidence from Communal Lands in Mexico [*]

Horacio Alejandro Larreguy Arbesu[†]

October 2012
(PRELIMINARY AND INCOMPLETE)

Abstract

This paper studies how a political party uses electoral data to monitor the performance of its clientelistic networks. We focus on clientelistic networks that, for historical reasons, developed and operate in communal lands in Mexico and are largely controlled by the Institutional Revolutionary Party (PRI). For clientelism to work in this context, the PRI must not only (a) be able monitor the performance of its clientelistic networks but also (b) control the resources required to mobilize the networks and reward voters. Guided by a simple model, we compute two measures of the informativeness of electoral data about the performance of the PRI's clientelistic network, based on how well the available electoral data and the networks correspond together. We compare the vote share for the PRI in communal lands where the electoral data enables either high or low PRI monitoring capacity, both when the PRI does and does not have access to resources. The results show that the ability to monitor clientelistic networks contributes significantly to the enforcement of clientelistic transactions.

JEL codes: D72, D78, O17.

Keywords: broker, clientelism, clientelistic networks and monitoring.

1 Introduction

Political clientelism is the distribution of benefits targeted to individuals or groups in exchange for political support and is widespread in the developing world.[1] Both the political science and economics literature argue that clientelism undermines democracy and economic development: it weakens the ability of citizens to hold elected officials accountable and it diverts public resources to fund clientelistic exchanges.[2] However, despite the prevalence of clientelistic practices, we have a limited empirical understanding as to how political parties enforce electoral support when voters cast their votes in secret. One proposed mechanism is that of clientelistic networks. Parties may have access to local political brokers who control networks of voters that contribute to the enforcement of clientelistic transactions.[3] However, this proposed mechanism begs the question of how parties are able to provide incentives to their brokers, and consequently, ensure the electoral support of their networks.

In this paper, we study how a political party uses disaggregated electoral data to monitor the performance of its clientelistic networks and thereby enforce clientelistic exchanges. We focus on Mexico, a country in which clientelism is extensive (Diaz-Cayeros et al. 2012). In particular, we study the clientelistic networks that operate in communal lands and are largely controlled by the Institutional Revolutionary Party (PRI). Communal lands, whose distribution is illustrated in *Figure 1*, were allocated through a land redistribution policy after the 1910 Mexican revolution.[4] In each communal land there is an elected official that distributes the bulk of the government programs within his communal land. The literature and fieldwork conducted by the author show that, in the states under the PRI's control, officials operate as the PRI's political brokers, trading access to public programs for votes (MacKinlay 2011). The Federal Electoral Institute (IFE) identifies the peasants in communal lands as those with the largest risk of being subject to clientelistic practices (IFE 2012).

For clientelism to work in this context, the PRI must (a) be able monitor the performance of its clientelistic networks, and (b) control the resources required to mobilize the networks and reward voters. We use a novel identification strategy to measure the PRI's ability to monitor the performance of its clientelistic networks. We exploit plausibly exogenous differences in the overlap between communal lands and electoral sections - the smallest electoral demarcation in Mexico - that facilitate the monitoring of clientelistic networks. *Figures 2a* and *2b* show some examples of these overlaps. To measure whether PRI has control of the resources needed to mobilize its clientelistic networks and fund clientelistic exchanges, we use the PRI's control of the state government. State governments are responsible for the implementation of the bulk of public programs at the local level

---

[1] Among others, Kitschelt and Wilkinson (2007), and Schaffer (2007) document the prevalence of clientelism in the developing world.

[2] Hicken (2011) performs a comprehensive survey of the recent literature on clientelism.

[3] We later explain the theories and supporting empirical evidence that Chandra (2004), Stokes (2005), Nichter (2008), Finan and Schechter (2012), and Green and Lawson (2012) provide.

[4] Though property rights over the land are assigned to communities, individuals are allocated specific plots and are entitled to the entire product of their work.

and incumbency is necessary to manipulate government funds for clientelistic purposes (Beer 2011, Holzner 2010).[5]

The literature, fieldwork experience and several articles in the popular press reflect that the PRI uses disaggregated electoral data to enforce clientelistic transactions.[6] Holzner (2003) provides fieldwork evidence that the PRI monitors the electoral support from communal lands using disaggregated electoral data and punishes the political brokers that fail to deliver the vote of their communities. During fieldwork in the month prior to the 2012 federal election, several commissariats and peasants, who were polling station officials representing the PRI in past elections, stated that the party watched electoral section level outcomes closely to make sure that the figures matched the expected support.

To guide our empirical analysis, we develop a simple model that characterizes the relationship between the PRI's ability to monitor its clientelistic networks and the electoral support for the PRI in communal lands. In the model, the PRI and another party compete for votes offering a policy menu of public goods and transfers to voters. Additionally, when the PRI is the incumbent party, it has access to resources to mobilize its clientelistic networks and to fund clientelistic exchanges, and consequently, to obtain a larger electoral support. The model predicts that, when the PRI controls the government, communal lands where the PRI has a higher monitoring ability over the performance of its clientelistic networks should exhibit a larger electoral support for the PRI. In addition, this difference in electoral support should be absent when another party is in office at the time of the election.

Figure 3 illustrates how differences in the overlap between communal lands and electoral sections affect the PRI's ability to monitor its clientelistic networks in communal lands. We use two different measures of overlap: *fit* and *fragmentation*. The *fit* of a communal land captures the proportion of communal land voters in the electoral sections where they vote. For example, cases *a* and *b* in *Figure 3* show a *fit* of 1 and 0.5, respectively. A larger *fit* improves the PRI's monitoring ability since the electoral section-level data is more informative about the work of its clientelistic networks among the voters of the communal land. The *fragmentation* of a communal land captures how the voters of a communal land are fragmented into different electoral sections. For example, case *c* in *Figure 3* shows a larger fragmentation than case *a*. A larger *fragmentation* facilitates the PRI's monitoring ability because it provides multiple sources of information about the performance of its clientelistic networks.

The results of the empirical analysis support the predictions of the model. Communal lands with larger *fit* and *fragmentation* display a larger electoral support for the PRI. In addition, the difference in votes only appears when the PRI controls the state government. To address the concern

---

[5] According to the municipal and state public finance records, the annual expenditure of the state governments represents 80% of the joint expenditure of municipal and state governments.

[6] An illustrative example from the popular press comes from the state of Nuevo Leon, where the PRI candidate for the state governorship acknowledge that they had an army of 100 thousand individuals to monitor the election (of 2,677,343 registered voters) and that 30 thousand of those were trained to work as representatives at the polling stations. The National Action Party (PAN) contender argued that the goal of such an army was to monitor the votes they secured through clientelistic practices (Reyes and Romo 2003).

that results might be driven by omitted variables that correlate with *fit* and *fragmentation*, we show that the land area and registered voters of electoral sections and communal lands, which naturally correlate with our measures of overlap, do not predict electoral support for the PRI. Additionally, it is unlikely that electoral sections were designed with political considerations since the autonomous Federal Electoral Institute was responsible for the demarcation in 1994.[7] Further, we conduct a placebo analysis looking at incumbency at the municipal rather than the state government. The PRI's incumbency at the municipal level should not allow the PRI to mobilize its clientelistic networks in communal lands since commissariats have weak links with municipal authorities (Hevia de la Jara 2010) and municipalities have a very limited budget relative to states governments.

We then provide evidence that suggests that clientelistic networks operating in communal lands have an aggregate effect on election and policy outcomes. We use a difference in differences strategy where we compare municipalities with equal share of agricultural land, which includes communal and privates lands, but different shares of communal lands.[8] We show that, when the PRI controls the state government, municipalities with a larger share of communal lands exhibit an increased vote share for the PRI and a lower provision of public goods, measured by the number of schools and teachers per capita. Results are not driven by differential pre-trends or differences in the economic development of communal and private lands.

The results of this paper have several implications for policy, which also apply to other cases where clientelistic networks operate in narrowly defined geographical areas and electoral results are disclosed at a very disaggregated level. Naturally, there is the need to clarify and strengthen the operation rules of social programs to minimize the scope for their manipulation for electoral purposes. Out of the federal and state programs registered in the Initiative for the Strengthening of the Institutionalization of the Social Programs in Mexico (IPRO), 21% lack operation rules, 27% have no beneficiary list, 40% have a beneficiary list but it is not public, 27% have no criteria to select beneficiaries, and 32% have no evaluation mechanisms.[9] Additionally, there might be scope for a demarcation of electoral sections that minimizes the ability of parties to monitor its clientelistic networks, and consequently, that deters the enforcement of clientelistic exchanges.

Our work naturally adds to a rich literature that documents the presence and features of clientelistic practices in developing economies.[10] In particular, our work is closely related to the work on the importance of clientelistic networks to enforce electoral support in a secret ballot context. In seminal work, Stokes (2005) develops and tests different comparative statics of a model that assumes individual monitoring. Chandra (2004) advocates that clientelistic networks facilitate the monitoring of turnout, an idea later formalized and tested by Nichter (2008). Auyero (2000), Fi-

---

[7]Also, since each electoral section falls fully within a single municipality and a single electoral district, the political manipulation of electoral sections does not allow the grouping of voters to win municipalities or electoral districts, a strategy commonly known as gerrymandering.

[8]Implicitly, we are using private lands as a control group for communal lands.

[9]IPRO is a website where federal and state governments can voluntarily register the social programs they are executing. http://www.programassociales.org.mx/

[10]See Hicken (2011), Kitschelt and Wilkinson (2007), Manzetti and Wilson (2007), and Schaffer (2007) for a discussion on the work on clientelism.

nan and Schechter (2012), and Green and Lawson (2012) argue that clientelistic networks mitigate asymmetric information about voter's reciprocity, which allows parties to target benefits to individuals who are more likely to reciprocate with their vote. Our main departure from this literature is that, while the mentioned work focuses on the different ways through which clientelistic networks contribute to the enforcement of electoral support, we focus on the importance of the monitoring of a party over its political brokers to guarantee that they deliver the votes of their networks.[11] Our work is related to Keefer (2006, 2007), who argues that younger democracies exhibit an underprovision of public goods because of the inability of politicians to make credible promises to citizen leads them to prefer clientelistic polices. We provide empirical evidence that supports the suggested channel. To our knowledge, this is the first paper to provide empirical evidence that clientelism has a significant effect on aggregate electoral and policy outcomes. Finally, our work is also close to the literature that look at the overlap between political markets and the level at which different types of information are disclosed. A prominent example is Snyder and Stromberg (2010), who look at the fit between political districts and newspaper markets.

The next section describes the historical development of clientelistic networks in communal lands in Mexico. It also describes the current clientelistic practices in these lands and reports the qualitative evidence that was collected during fieldwork. To guide the empirical work, section 3 presents a model that captures the relationship between the PRI's monitoring ability over its clientelistic networks and the electoral support for the PRI in communal lands. Section 4 presents the empirical strategy and data. The empirical tests of the predictions of the model are in Section 5. In Section 6, we provide empirical evidence that supports that clientelistic networks in communal lands have aggregate effects on election and policy outcomes. Section 7 concludes.

2   Background

In this section, we highlight the main features of the historical development of clientelistic networks in communal lands. We place particular emphasis on how the PRI captured the office created to administer each communal land. We then explain how current clientelistic practices work in communal lands. We stress the importance of the PRI's control of state government to mobilize its clientelistic networks and the inability of other parties to take over the PRI's networks in states lost by the PRI. We conclude by presenting supporting qualitative data we collected during fieldwork in twelve municipalities across four states. We complement this data with qualitative evidence from the Mexican press to give a broader view of these issues across the whole of Mexico.

---

[11]Brusco et al. (2004) suggests briefly the importance of the interaction of clientelistic networks and the disclosure of election results at very disaggregated levels for clientelism.

2.1 Historical Background

After the 1910 Mexican revolution, where the redistribution of land was the central demand of the rural insurgents, there was significant land redistribution (Knight 1986). Article 27 of the 1917 Constitution established the distribution of land in the form of either agrarian communities or *ejidos*, to which we refer jointly as communal lands.[12] Additionally, the 1917 Constitution established the office of the commissariat to administer each communal land. Commissariats are democratically elected officials that mediate between the peasants of their communal lands and the government. Among their many responsibilities, they are in charge of the access and distribution of the government programs for their communities.

During its seven decades in power, the PRI established clientelistic networks in communal lands by controlling the commissariats through the state agrarian leagues of the National Peasant Confederation (CNC). The poor peasants living in communal lands, with no individual property rights, faced difficulties entering private credit markets and relied on the government for access to agricultural inputs. This dependence, together with their internal legal organization, made communal lands the perfect ground for the development of clientelistic networks (Sabloff 1981). Commissariats became the PRI's political brokers, trading access to public programs for votes (Baños 1988, MacKinlay 2011). In turn, commissariats enjoy the rents associated with their powerful position. Their discretionary control in the distribution of public programs to the interior of their communities facilitates the extraction of rents (Sabloff 1981).

2.2 Recent changes

Mexico underwent a profound democratic transition in the last two decades that paradoxically led to a strengthening of the clientelistic practices in rural Mexico (Schedler 2004). A series of political reforms, started with a constitutional reform approved in 1989 and led by the creation of the Federal Electoral Institute in 1990, eliminated vote fraud. The PRI's response to the loss of its traditional methods to control election results was to change its electoral strategy by shifting from vote fraud to clientelism and vote buying.

In the last two decades the functioning of the PRI's clientelistic networks in communal lands has heavily relied on the funds from the PRI's state governments. Municipal governments are very weak and state governments are responsible for the execution of the bulk of public programs at the local level. The PRI's state governors took advantage of the fiscal decentralization that took place in the 1990's to make use of the federal funds for clientelistic exchanges and the strengthening of their clientelistic networks in rural areas (Cornelius 2002). The role of the PRI's state governments

---

[12] Agrarian communities represented the restitution of lands that were expropriated from communities of peasants during the rule of Porfirio Díaz between 1976 and 1910. During this period, there was an extensive illegal expropriation of lands from communities of small landholders by landlords that led to a dramatic land concentration. *Ejidos* consisted of land that was granted to communities of petitioners that never had land. The logic behind the communal property rights over the land was to avoid the illegal expropriation and land concentration that took place during the rule of Porfirio Díaz.

in the endurance of the party at the local level became even more important after the PRI lost the federal government to the National Action Party (PAN) in the 2000 presidential election (Langston 2003).

In this framework, the CNC has strongly depended on the support of the PRI's state governments. An illustrative example comes from the state of Tlaxcala, where the PRI lost the state government in 1991, and returned in 2011. When the PRI recovered the state governorship, the president of the CNC in this state acknowledged that the peasant organization had lost presence in the state as a result of the political rivalry with the past two state governments. However, he asserted that he trusted that the organization would be able to recover its strength with the return of the PRI to the state government (Osorno 2011).

Despite the PRI's loss of several states and the consequent weakening of the influence of the CNC in these states, other political parties have not been able to contest the power of the CNC and overtake PRI's political networks in communal lands. The main reason is that the PAN and the Party of the Democratic Revolution (PRD) were not able to create a structure of control of commissariats in communal lands like the PRI did with the CNC during its long tenure in power.[13] The PAN created the Rural Action Program (PAR) in 2004 to coordinate the PAN's rural supporters (Cortés 2004, Soto 2004). However, the PAN's project was a total failure (Galicia 2012). In 1988, dissidents of the PRI and the CNC founded the Cardenist Peasant Central (CCC) to support the main contender against the PRI's candidate for presidency and challenge the PRI and the CNC's hegemony in the rural sector. Despite the fact that affiliates of the CCC belong to several leftist parties, including the PRI, the CCC has been mostly associated with the various forms of the PRD. However, the weight of the CCC in the communal land sector is minimal relative to the CNC one. The most conservative estimates indicate that the CCC's affiliates account for less than 3% of the CNC ones.

The CNC has no equal. It has 88 federal legislators in the Chamber of Deputies, which represent 18% of the total, and a comparable political strength in the states. Thus, in coordination with state government, the CNC plays a very important role in the allocation of resources at the local level (Galicia 2012). Nowadays, the manipulation of social programs for electoral purposes in Mexico is severe (Martinez 2010). Alianza Cívica, the main NGO that monitors electoral practices in Mexico, estimates that during the 2009 election 27% of citizens were subject to vote buying and the conditioning of social programs for their votes (Zermeño 2012). There are no separate estimates for the individuals living in communal lands but, according to the figures of the CNC, its affiliates contribute with more than 35% of the PRI's votes. After the PRI's loss in the 2000 presidential election, the federal legislators of the CNC claimed that they were the only PR's sector that fulfilled its vote quota, 6 million votes (Ramos 2000).[14]

---

[13]The PAN and the PRD are mostly urban parties with weaker presence in rural areas.

[14]It is also worth a brief mention of Mexico's communal land certification program, which started in 1992 with the reform of Article 27 of the Constitution. The so called PROCEDE (*Programa de Certificación de Derechos Ejidales y Titulación de Solares*) consists of two main stages. The first stage constitutes a certification process in which each communal land has its boundaries delineated, and its land is divided into land for common use and land for

2.3   Evidence from fieldwork and the popular press

During the fieldwork we conducted in the month prior to the 2012 presidential election we observed a strong presence of the PRI's clientelistic practices in communal lands in the states that have always been under the control of the PRI. On the contrary, we did not observe such practices in communal lands in states that the PRI lost to other parties. We conducted fieldwork in twelve municipalities of four states of Mexico, which present a range of political configurations that are particularly relevant for our analysis: Mexico, Morelos, Puebla and Tlaxcala.[15] The state of Mexico is the PRI's largest stronghold in Mexico; it has always controlled the state government and the majority of the municipal governments. Similarly, the PRI just lost the state of Puebla to the PAN in 2010. In contrast, in Morelos, the PRI lost the state government in 2000 to the PAN, which had control until 2012, when it lost to the PRD. Likewise, in Tlaxcala, the PRI just returned to state government in 2011 after two terms of non-PRI governors. During fieldwork we noted a strong prevalence of the PRI's clientelistic practices in communal lands in the state of Mexico and important residuals of these in the state of Puebla. However, these practices appeared to be fairly absent in the states of Morelos and Tlaxcala.

In the state of Mexico, we found evidence that supports a strong presence of PRI's clientelistic practices. We observed a close relation between commissariats and the PRI's government: in all municipalities we visited, at least one commissariat or relative works in the government. Also, commissariats stated the PRI's supporters in communal lands receive considerably more public assistance from the PRI's government. They also added that, for that to happen, it is crucial that commissariats are aligned with the party.[16] In addition, we observed a conditioning of government support. When asked about the distribution of the resources that come to the *ejido*, a commissariat mentioned, "most people support the PRI, those that do not vote for the PRI are excluded; they clearly know they cannot get anything from me." In this vein, several peasants claimed that government aid only makes it to the party supporters.

In the state of Puebla, we noticed that the PRI's clientelistic networks in communal lands are still present but they are weakening. The state of Puebla provides an interesting case study given the recent transition from the PRI to the PAN at the state government level. As in the state of Mexico, we observed that most commissariats, which were elected under a PRI's governor, continue to support the PRI openly. Not surprisingly, the PRI's commissariats report a significant decrease

---

individual plots. Additionally, the plots designated for private use are demarcated and renting is permitted. In a second stage, if a super-majority of the communal land members agree, peasants have the option of registering their plots into the private domain and then their land enters the private market. While most communal land has gone through the first stage, less than 3% has entered the private domain. Consequently, the PROCEDE has had a modest impact on the socio-economic situation of communal lands.

[15]On average we interviewed three commissariats or former commissariats (in case of short tenure of the current one) and two peasants in each municipality.

[16]A PRI commissariat stated, "the PRI government listens to everybody equally but, logically, it does not give the same support to everybody; it supports its people more." Another PRI commissariat affirmed, "it is easier for a commissariat to get support from people from his own party since, if they are not from his party, they put a series of obstacles in his way."

in government aid with the recent party transition. Commissariats also mention a radical change in the conditioning of the state government assistance for electoral support. When asked about this matter, a commissariat explained, "when the PRI was in government, the conditioning was a serious problem. If we voted for the PRI, there was aid, if we did not, we were marginalized. With the change in government, everything is more flexible; people can vote for the party they want and the aid will still come." However, commissariats report that the change at the state government level also brought a weakening of their role. Maybe with the goal of debilitating the PRI's clientelistic networks in communal lands, the PAN state government changed to operation rules of public programs to bypass the commissariats during the distribution of assistance.

The evidence from newspapers reflects that our observations from the states of Mexico and Puebla are not unique to those states. Given the limited geographical coverage of our fieldwork, we complement it with qualitative data from the popular press. Qualitative evidence from newspapers suggest that, while the individuals from communal lands that support the PRI benefit the most when it comes to receiving aid, help is conditioned on political support. An instructive example comes from the state of Tabasco. After a flood, the PRI's state government delivered aid to its supporters in communal lands under the threat that they would not longer get any help if they did not attend rallies and vote for the PRI's candidate in the upcoming election. Further, the community from the *ejido* Las Coloradas in the municipality of Cárdenas, also affected by floods, did not receive any aid since it had historically voted for the PRD (Reforma 2000). Additionally, a peasant from the *ejido* Rafael Martínez de Escobar in the municipality of Huimanguillo complained that the government promised him relief but that the commissariat informed him that "by the instruction of the state government, assistance is only given to PRI's supporters" (Marí 2001).

Further, in the states of Mexico and Puebla, we observed that parties intervene in the political life of the communal lands to gain their political control. The PRI's control of the commissariats is a political asset since it is a necessary condition for the PRI to be able to mobilize its clients in the communal lands. Thus, candidates for commissariat often run representing a party, and vote buying and fraud characterize elections for commissariats. The most outrageous case we observed was in the largest *ejido* in the state of Puebla. In the last election for commissariat, the former commissariat and the PRI's municipal president were charged with fraud to facilitate a win by the PRI's candidate.[17] This situation is not unique to the states of our fieldwork. Many other cases show up in newspapers.[18]

In the states of Morelos and Tlaxcala, we found limited evidence on clientelistic practices in communal lands. Commissariats stress that, while in the times before the PRI lost the state

---

[17] Witnesses argue that the commissariat, illegally assisted by the municipal president, issued a number of permits to represent absent peasants that exceeded the number agreed upon by the candidates before the election. Also, in the course of the election they allowed peasants that did not belong to the *ejido* to vote. Dead people also appeared in the list of voters of the election.

[18] An illustrative example comes from the state of Durango. The former commissariat of the *ejido* El Quemado in the municipality of Gómez Palacio was accused of vote buying and other irregularities in the elections to pick his successor. He, also a state legislator of the PRI, was alleged to have paid 3,000 pesos ($230) for each vote and to allow peasants that were not part of the *ejido* to vote (Acosta 2009).

government there was a conditioning of the assistance for electoral support, that is no longer the case. Additionally, they mention that the rules of the programs of the state government are clear and these are not distributed to favor individuals associated to a given political party. It is worth noticing the relevance of these facts for the state of Tlaxcala, where the PRI returned to power two years ago. They suggest that, despite the return of the PRI to the state government, clientelistic exchanges are not as strong as before the PRI lost the state government.

Finally, the evidence we observed during fieldwork corroborates the mentioned role of the CNC. On the one hand, commissariats and peasants in the state of Mexico report current support from the CNC. Evidence from newspapers also reveals that, in the states under the control of the PRI, the CNC conditions government assistance for electoral support to the PRI.[19] On the other hand, commissariats and peasants of the states of Morelos, Puebla and Tlaxcala agree that the CNC disappeared together with the PRI when the PRI lost the state elections.[20] However, commissariats in the state of Tlaxcala, where the PRI recovered the state government recently, indicated that there were several signs that the CNC was coming back to action.[21] Additionally, we observed evidence that the PRI's clientelistic networks are latent and the return of the PRI to the state government, with the consequent strengthening of CNC, could reanimate the PRI's clientelistic practices in communal lands. A commissariat pointed out, "I do not support the PRI but, if the CNC returns, we will have to support the PRI so that we get government help."

3   Model

Our goal in this section is to develop a simple model to organize the empirical work. First, we illustrate a model that characterizes the relationship between the PRI's ability to monitor the performance of its clientelistic networks and the electoral support for the PRI in communal lands. We consider both the case when the PRI controls the state government and thereby has resources to mobilize its clientelistic networks, and the case when it does not. The main prediction of the model is that, when the PRI controls the state government, there should be a larger support for the PRI in communal lands where the PRI's ability to monitor the activity of its clientelistic networks is higher. However, there should be no difference otherwise. Second, we take two patterns of overlap

---

[19] Peasants from communal lands the states of Michoacán and Nayarit acknowledge that the PRI and the CNC use them for electoral purposes but claim that it is the only way they can get some support when they are in power (Reforma 2005). Additionally, on the eve of the gubernatorial elections in the state of Oaxaca, it was reported that the PRI distributed 50 tons of fertilizers to the peasants of the *ejido* 20 de Noviembre that were affiliated with the CNC (García et al. 2004).

[20] The only exception are the commissariats and peasants that belong to sugar cane producing municipalities where the CNC plays a very important role in the bargaining of the price that peasants receive for their production.

A commissariat in the state of Puebla mentioned, "the CNC was here when the PRI was in the government. With the change in government, it is no longer present." A commissariat from the state of Morelos pointed out, "the CNC fell with the PRI government because the assistance is ultimately from programs that belong to the state and federal governments."

[21] A commissariat indicated, "the CNC has disappeared for a long time but it is now coming back with the return of the PRI to the state government". Another commissariat said, "the CNC reopened its offices in the state."

between communal lands and electoral sections that we measure in the data, and show how they facilitate the PRI's monitoring of the performance of its clientelistic networks.

3.1 Setup

The model is a small variation of the standard probabilistic voting model, which we extend by adding a standard principal-agent problem that incorporates the monitoring of the performance of clientelistic networks.

Consider a set $\mathcal{C}$ of N communal lands in state s, each inhabited by a population of peasants normalized to one. There are two political parties, the PRI and another party denoted as the OTHER that compete for the control of the state government. When in office, a party p uses the budget assigned to communal land c, $b_{c,s}$, to invest in a public good, $g_{c,s}^p$, to make a transfer, $\tau_{c,s}^p$, to individuals, and potentially to fund a political broker, $w_{c,s}^p$, $\left(g_{c,s}^p + \tau_{c,s}^p + w_{c,s}^p \le b_{c,s}\right)$.[22]

A political broker that works for party p can exert an effort, $a_{c,s}^p$, to persuade voters to vote for party p. The effort is costly and a unit of effort $a_{c,s}^p$ has a convex cost $\frac{\psi}{2} \cdot \left(a_{c,s}^p\right)^2$. The effort $a_{c,s}^p$ can potentially encompass the energy to investigate the voters with the largest reciprocity as well as the funds that the broker targets to these voters (Finan and Schechter 2012, and Green and Lawson 2012). It could also represent the use of resources to identify and mobilize unlikely-to-vote supporters of party p (Chandra 2004, Nichter 2008).

Parties choose the level of public goods, transfers and funds for political brokers in each communal land to maximize their vote share and peasants vote sincerely. From the perspective of parties, the utility of peasants in communal land c over the public good, the transfer, and political broker's effort is

$$u_{i,c,s}^p \left(g_{c,s}^p, \tau_{c,s}^p, a_{c,s}^p\right) = -\exp\left(-\gamma \left(u_c \left(g_{c,s}^p\right) + \tau_{c,s}^p + a_{c,s}^p + \left(\eta_{c,s} - \varphi_{i,c,s}\right) I_s^{PRI}\right)\right), \tag{1}$$

where $u\left(g\right)$ is increasing in g and strictly concave, I_s^{PRI} is an indicator for the PRI coming to the state office, $\varphi_{i,c,s}$ is an idiosyncratic ideology shock towards the PRI distributed uniformly on $\left[-\frac{1}{2\varphi}, \frac{1}{2\varphi}\right]$, and $\eta_{c,s}$ is a normally distributed error that reflects the uncertainty about $u_c\left(\right)$, $\eta_{c,s} \sim N\left(0, \sigma_{\eta_{c,s}}^2\right)$. We interpret $\sigma_{\eta_{c,s}}^2$ as the degree of aggregate uncertainty about the potential voting behavior of peasants in communal land c. Note that for simplicity we assume that the effort of the political broker $a_{c,s}^p$ enters additively in the average voter's utility over party p's policies. This assumption basically reflects that the effort of the political broker exerts, $a_{c,s}^p$, is able to influence voters' utility for party p.

As in a standard probabilistic voting model,

$$\pi_{c,s}^{PRI} = \frac{1}{2} + \varphi \cdot \left(u_c \left(g_{c,s}^{PRI}\right) - u_c \left(g_{c,s}^O\right) + \tau_{c,s}^{PRI} - \tau_{c,s}^O + a_{c,s}^{PRI} - a_{c,s}^O\right) + \eta_{c,s} \tag{2}$$

---

[22] For simplicity, $b_{c,s}$ is taken as given to avoid extra assumptions to pin down the distribution of resources across communal lands.

where $\eta_{c,s}$ represents the vote share for the PRI that comes from the unknown part of peasants' preferences.[23]

In our setup, only the PRI has access to clientelistic networks. This assumption mimics not only the evidence from the literature and fieldwork but also the fact that the peasant organizations of other political parties are minimal relative to the PRI's CNC. Additionally, we assume that, only when the PRI controls the state government, it is able to use public funds to mobilize its clientelistic networks.[24] From now on, since $a^O_{c,s}$ is always zero, we drop the superscript of $a^{PRI}_{c,s}$ and $w^{PRI}_{c,s}$, and we denote them as $a_{c,s}$ and $w_{c,s}$, respectively.

When in control of the state government, the PRI offers a political broker operating in communal land c a linear contract $w_{c,s} = c_{c,s} + v_{c,s} \cdot s_{c,s}$, with $c_{c,s}, v_{c,s} \geq 0$, where $s_{c,s} = a_{c,s} + \eta_{c,s}$ represents a noisy signal of $a_{c,s}$ with variance $\sigma^2_{\eta_{c,s}}$.[25] We can see $\sigma^2_{\eta_{c,s}}$ as the inverse of the PRI's ability to monitor the performance of clientelistic networks operating in communal land c. For simplicity we assume that the political broker has the following utility over a contract $(c_{c,s}, v_{c,s}, s_{c,s})$ of

$$E\left[u_{b,c,s}\left(c_{c,s}, v_{c,s}, s_{c,s}\right)\right] = E\left[-\exp\left(-\gamma\left(c_{c,s} + v_{c,s} \cdot s_{c,s} - \frac{\psi}{2} \cdot a^2_{c,s}\right)\right)\right].[26] \tag{3}$$

Additionally, we assume that the political broker has an outside option of $\underline{w}$, and hence, a contract $(c_{c,s}, v_{c,s}, s_{c,s})$ has to be such that $E\left[u_{b,c,s}\left(c_{c,s}, v_{c,s}, s_{c,s}\right)\right] \geq \underline{w}$.

3.2 Timing

The timing of the model is as follows:

1. nature draws the incumbent party,

2. each party p announces $\left\{g^p_{c,s}, \tau^p_{c,s}\right\}_{c \in C}$,

3. (the PRI proposes contracts $\left\{(c_{c,s}, v_{c,s}, s_{c,s})\right\}_{c \in C}$ to its political brokers),

4. shocks $\left\{\varphi_{i,c,s}\right\}_{i \in c, c \in C}$ and $\left\{\eta_{c,s}\right\}_{c \in C}$ are realized,

5. (brokers exert effort $\left\{a_{c,s}\right\}_{c \in C}$),

---

[23]Note that the assumption $\eta_c \sim \mathcal{N}\left(0, \sigma^2_{\eta_{c,s}}\right)$ creates the problem that support of $\pi^{PRI}_{c,s}$ can be outside $[0,1]$. However, we can assume that $\sigma^2_{\eta_{c,s}}$ is small enough for such an event to be sufficiently unlikely.

[24]We could think of this game as the stage game of a dynamic game where current funds destined to mobilize clientelistic networks and to fund clientelistic transactions were determined in the past election. Hence, when voters vote for the PRI, they are aware that a share of the future budget will be used for clientelistic purposes in future elections.

[25]$s_{c,s} = \pi^{PRI}_{c,s} - \frac{1}{2} - \varphi \cdot \left(u_c\left(g^{PRI}_{c,s}\right) - u_c\left(g^{OTHER}_{c,s}\right) + \tau^{PRI}_{c,s} - \tau^{OTHER}_s\right)$.

The restriction of linear contracts is common in the literature, justified by the work by Holmstrom and Milgrom (1987) who show that this is the optimal contract under certain assumptions. However, in general, a linear contract is not the optimal one. A Mirrlees scheme, which constitutes a non-linear contract where political brokers are infinitely punished under certain extreme tail events, would implement the first best. Under such a contract, there should be no correlation between the variance of the signal and electoral support for the PRI. However, a Mirrlees scheme is not feasible in our set up given the natural restriction that $c_{c,s}, v_{c,s} \geq 0$.

6. voters vote sincerely,

7. party p wins,

8. winner implements $\left\{g_{c,s}^p, \tau_{c,s}^p\right\}_{c \in C}$, and

9. (the PRI pays its political brokers),

where the steps in brackets are the ones that are contingent on PRI's control over the state government.

3.3 Characterization

We start characterizing the cases of no clientelism. When the PRI is not in the state office, it simply chooses $\left\{g_{c,s}^{PRI}, \tau_{c,s}^{PRI}\right\}_{c \in C}$ to maximize its expected vote share, $\frac{1}{N}\sum_{c \in C} \pi_{c,s}^{PRI}$. In this case, from the first order conditions of the maximization problem, it follows that $g_{c,s}^{PRI} = u_c'^{-1}(1)$ and $\tau_{c,s}^{PRI} = b_{c,s} - u_c'^{-1}(1)$ for all $c \in C$. Analogous to the case where the PRI is not in office, regardless whether it is in office or not, the other party chooses $g_{c,s}^O = u_c'^{-1}(1)$ and $\tau_{c,s}^O = b_{c,s} - u_c'^{-1}(1)$ for all $c \in C$.

When the PRI controls the state government at the time of the election, it solves the following problem to maximize its expected electoral support,

$$\max_{\{g_{c,s}, \tau_{c,s}, c_{c,s}, v_{c,s}\}_{c \in C}} \sum_{c \in C} \left[\varphi \cdot (u_c(g_{c,s}) + \tau_{c,s} + a_{c,s}) \right] \tag{4}$$

s.t.

$$g_{c,s} + \tau_{c,s} + c_{c,s} + v_{c,s} \cdot a_{c,s} \leq b_{c,s}, \ \forall \ c \in C, \tag{EBC}$$

$$g_{c,s}, \tau_{c,s}, c_{c,s}, v_{c,s} \geq 0, \ \forall \ c \in C$$

$$a_{c,s} \in \arg\max_a \left\{ -\exp\left(-\gamma \left(c_{c,s} + v_{c,s} \cdot a - \frac{\gamma}{2} v_{c,s}^2 \cdot \sigma_{\eta_{c,s}}^2 - \frac{\psi}{2} \cdot a^2 \right) \right) \right\}, \ \forall \ c \in C, \tag{ICC}$$

$$c_{c,s} + v_{c,s} \cdot a_{c,s} - \frac{\gamma}{2} v_{c,s}^2 \cdot \sigma_{\eta_{c,s}}^2 - \frac{\psi}{2} \cdot a_{c,s}^2 \geq \underline{w}, \ \forall \ c \in C. \tag{LLC}$$

where (EBC), (ICC), and (LLC) are respectively the expected budget constraint, the incentive compatibility constraint, and the limited liability constraint for all communal lands. (ICC) follows directly by using (3) and applying the moment generating function of a normal variable.

For exposition we assume the non-negativity constrain constraint over $\tau_{c,s}$ is not binding and there is an interior solution.[27] Replacing (EBC) and (ICC) into (4), we rewrite the problem as

$$\max_{\{\tau_{c,s}, v_{c,s}\}_{c \in C}} \sum_{c \in C} \left[\varphi \cdot \left(u_c \left(b_{c,s} - \tau_{c,s} - \underline{w} - \frac{1}{2}\frac{1}{\psi}\left(1 + \gamma\psi\sigma_\eta^2\right) v_{c,s}^2 \right) + \tau_{c,s} + \frac{v_{c,s}}{\psi} \right) \right] \tag{5}$$

---

[27]We analyze the case where the non-negativity constrain over $\tau_{c,s}$ is binding in the *Model Appendix*.

Using the first order conditions of this problem, we can compute the expected increase in the electoral support for the PRI in communal land c that the PRI achieves through its clientelistic networks, which we denote as $\Delta\pi_{c,s}^{PRI}$.[28] The difference between $\pi_{c,s}^{PRI}$, when the PRI controls the state government, and $\pi_{c,s}^{PRI}$, when it does not, is

$$\Delta\pi_{c,s}^{PRI} = \frac{1}{2}\frac{1}{\psi\left(1 + \gamma \cdot \psi \cdot \sigma_{\eta_{c,s}}^2\right)}.$$

Note that the increase in the electoral support for the PRI, $\Delta\pi_{c,s}^{PRI}$, is decreasing in the noise of the signal. Recall that $\sigma_{\eta_{c,s}}^2$ represents the inverse of the PRI's ability to monitor its clientelistic networks operating in communal land c. As a consequence, the model predicts that the increase in the vote share for the PRI, $\Delta\pi_{c,s}^{PRI}$, should be increasing in the PRI's monitoring ability.

3.4 Bringing the model to the data

The model predicts that communal lands where the PRI's ability to monitor the performance of clientelistic networks is larger should exhibit a larger electoral support for the PRI when it controls the state government. To bring this prediction to the data we need variation in this monitoring ability. Next, we analyze two patterns of overlap between communal lands and electoral section that we identify in the data and show how they facilitate the PRI's monitoring of the performance of clientelistic networks by reducing the noise of the observed signal.

In Mexico there are approximately thirty-two thousand communal lands and sixty-five thousand electoral sections. The overlap between communal lands and electoral sections is far from perfect. The location of the communal land and the criteria used to demarcate the electoral sections, which we address extensively later, created a plausibly exogenous variation in the overlap between the two. *Figure 1* shows the location of the communal lands in Mexico, and *Figure 2a* and *Figure 2b* zoom in on 4 states to illustrate the broad variation in overlap. In both figures municipality boundaries are in continuous black lines, electoral sections are demarcated in dashed blue lines and communal lands are in green.

3.5 The effect of "*fit*"

The first pattern of overlap we analyze is the *fit* between a communal land and the electoral sections where its peasants vote. The *fit* of a communal land captures the average proportion of voters of each electoral section that belong to the communal land. Next we show that a communal land with a large *fit* facilitates the monitoring of the performance of clientelistic networks. The intuition is simple. Consider a political broker that controls a clientelistic network that operates in a communal land. The PRI monitors the performance of the broker following the results of the electoral sections

---

[28]From the first order conditions of the above problem it follows that $g_{c,s} = u_c'^{-1}(1)$, and $v_{c,s} = \frac{1}{1+\gamma\cdot\psi\cdot\sigma_\eta^2}$ for all $c \in C$. The second order conditions are guaranteed by the concavity of $u\left(\right)$.

where the peasants from the communal land vote. Both the broker and the PRI have better information on the potential voting behavior of the peasants in the communal land relative to the one of outsiders.[29] Hence, monitoring the broker will be harder when the communal land peasants vote together with outsiders.

To illustrate the concept of *fit* and this intuition, consider the cases *a* and *b* in *Figure 3*. In both cases, all the voters in the communal land cast their vote in a single electoral section, which we denote respectively as electoral sections 1 and 2. However, while in case *a* all voters from electoral section 1 live in the communal land, in case *b* only half of the voters from electoral section 2 do so. A political broker that operates in a communal land and the PRI have better information about the potential voting behavior of the voters in the communal land than the one of those outside. Hence, relative to case *b*, in case *a*, the election results of electoral section are a better signal of the performance of the political broker. Consequently, the PRI should be better able to monitor the political broker's performance in case *a* relative to case *b*. Although this example assumes that all the voters in the communal land cast their vote in the same electoral section, the intuition extends to the cases where they vote in different electoral sections. The PRI should be better able to monitor the performance of a political broker in case *c* relative to case *d* of *Figure 3*.

To formalize the intuition and this example, consider a communal land c that overlaps with an electoral section e in state s. The electoral section e has a share $\alpha_{e,c,s}$ of voters that belong to the communal land c and a share $1 - \alpha_{e,c,s}$ that do not. As defined above, $\alpha_{e,c,s}$ coincides with the definition of the *fit* of the communal land c. The electoral support for the PRI of the voters from the electoral section e is

$$\pi_{e,s}^{PRI} = \alpha_{e,c,s} \cdot \pi_{c,s}^{PRI} + \left(1 - \alpha_{e,c,s}\right) \cdot \pi_{nc,s}^{PRI},$$

where, from (2), $\pi_{c,s}^{PRI} = \frac{1}{2} + \varphi \cdot \left(u_c\left(g_{c,s}^{PRI}\right) - u_c\left(g_{c,s}^{O}\right) + \tau_{c,s}^{PRI} - \tau_{c,s}^{O} + a_{c,s}^{PRI}\right) + \varepsilon_{c,s}$ and $\pi_{nc,s}^{PRI} = \frac{1}{2} + \varepsilon_{nc,s}$ represent the electoral support for the PRI of the voters that belong to the communal land and of those outside, respectively.[30] Recall that $\varepsilon_{c,s}$ and $\varepsilon_{nc,s}$ are normally distributed errors - $\varepsilon_{c,s} \sim N\left(0, \sigma_{\varepsilon_{c,s}}^2\right)$ and $\varepsilon_{nc,s} \sim N\left(0, \sigma_{\varepsilon_{nc,s}}^2\right)$ - that reflect the uncertainty about $\pi_{c,s}^{PRI}$ and $\pi_{nc,s}^{PRI}$, respectively. We assume that $\sigma_{\varepsilon_{c,s}}^2 < \sigma_{\varepsilon_{nc,s}}^2$ to replicate that political brokers and the PRI have better information about the potential voting behavior of peasants in communal lands relative to the one of outsiders.

To construct the signal, $s_{c,s}$, on which the PRI conditions transfers to the political broker that works in communal land c, the PRI uses electoral data and its prior knowledge about the potential voting behavior of peasants in communal land c as follows,

$$s_{c,s} = \frac{\pi_{e,s}^{PRI} - \frac{1}{2} - \alpha_{e,c,s} \cdot \varphi \cdot \left(u_c\left(g_{c,s}^{PRI}\right) - u_c\left(g_{c,s}^{O}\right) + \tau_{c,s}^{PRI} - \tau_{c,s}^{O}\right)}{\alpha_{e,c,s}}.$$

---

[29] This difference in information follows thanks to the presence of the network and the constant interaction with the communal land voters to which the party targets transfers to reward their votes.

[30] $\pi_{nc,s}^{PRI} = \frac{1}{2} + \varphi \cdot \left(u_c\left(g_{nc,s}^{PRI}\right) - u_c\left(g_{nc,s}^{O}\right) + \tau_{nc,s}^{PRI} - \tau_{nc,s}^{O}\right) + \varepsilon_{nc,s}$ is the analogous expression to (2) for non-communal lands but, since we assume that no clientelistic networks operate in non-communal lands, $g_{nc,s}^{PRI} = g_{nc,s}^{O}$ and $\tau_{nc,s}^{PRI} = \tau_{nc,s}^{O}$, and hence, $\pi_{nc,s}^{PRI} = \frac{1}{2} + \varepsilon_{nc,s}$

Hence, the signal of $a_{c,s}$ is $s_{c,s} = a_{c,s} + \eta_{c,s}$, where $\eta_{c,s} = \varepsilon_{c,s} + \left(\frac{1-\alpha_{e,c,s}}{\alpha_{e,c,s}}\right) \cdot \varepsilon_{nc,s}$. The variance of the signal is $\sigma^2_{\eta_{c,s}} = \sigma^2_{\varepsilon_{c,s}} + \left(\frac{1-\alpha_{e,c,s}}{\alpha_{e,c,s}}\right)^2 \sigma^2_{\varepsilon_{nc,s}}$.

Since the uncertainty about the potential voting behavior of voters from non-communal lands, $\sigma^2_{\varepsilon_{nc,s}}$, is strictly larger than the uncertainty of voters in communal lands, $\sigma^2_{\varepsilon_{c,s}}$, the variance of the signal, $\sigma^2_{\eta_{c,s}}$, is decreasing in the *fit* of the communal land c, $\alpha_{e,c,s}$. Recall that the noise of the signal reflects the PRI's ability to monitoring the clientelistic networks operating in communal land c. As a consequence, from the above analysis, it follows that, when the PRI is in office at the time of the election, communal lands with a larger *fit* should exhibit a larger electoral support for the PRI thanks to the PRI's better monitoring ability.

We finally provide the formal definition of the measure of the communal land *fit* that we use in our empirical analysis. Consider the set of electoral sections e that overlaps with communal land c in state s, $E_{c,s}$. Denote $area_{c,s}$ the area of a communal land c in state s and $\{area_{e,s}\}_{e \in E_{c,s}}$ the set of the areas of the electoral sections that belong to $E_{c,s}$. Consider the proportion of an electoral section e that overlaps with a communal land c, $\frac{area_{c,s} \cap area_{e,s}}{area_{e,s}}$. We denote the *fit* as the average for all electoral sections e that overlap with a communal land c,

$$fit_{c,s} = \frac{1}{|E_{c,s}|} \sum_{e \in E_{c,s}} \frac{area_{c,s} \cap area_{e,s}}{area_{e,s}}. \tag{6}$$

3.6   The effect of "*fragmentation*"

The second pattern of overlap we analyze is the *fragmentation* of a communal land into the electoral sections where the individuals living in the communal land vote. The *fragmentation* of a communal land captures how the voters of a communal land are split into different electoral sections. Next we show that a communal land with a large *fragmentation* eases the monitoring of the performance of clientelistic networks. To see the intuition of this result, consider again a political broker that operates in a communal land and a political party that monitors the broker's effort looking at the results of the electoral sections where the communal land peasants vote. The party receives a signal about the broker's performance from each electoral section. The noise of various signals is smaller relative to the noise of a single signal. Hence, a party is better able to infer the political broker's effort when the peasants from the communal land where the broker operates vote in several electoral sections.

To illustrate the concept of *fragmentation* and this intuition let us return to *Figure 3* but now focus on cases a and c. While in case a all voters from communal land cast their vote in a single electoral section, which we denote as electoral section 1, in case c they do it in two, half in electoral section 3 and the other half in electoral section 4. A political party that monitors a political broker that operates in a communal land receives a signal about his performance from each electoral section where the peasants from the communal land vote in. Hence, relative to case a, in case c, the party receives an extra signal about the broker's effort. Consequently, a party should be better able to

monitor the broker and thereby sustain clientelistic transactions in case c relative to case a. Finally, by an analogous argument, holds for case d relative to case b of *Figure 3*.

To formalize the intuition and this example, consider a communal land c in state s where voters cast their votes in a set of electoral election $E_{c,s}$. A share $\rho_{c,e,s}$ of individuals vote in each electoral section e $\left(\sum_{e \in E_{c,s}} \rho_{c,e,s} = 1 \right)$.[31] The electoral support for the PRI of the voters from the communal land c is then

$$\pi_{c,s}^{PRI} = \sum_{e \in E_{c,s}} \rho_{c,e,s} \cdot \pi_{c,e,s}^{PRI},$$

where $\pi_{c,e,s}^{PRI} = \frac{1}{2} + \varphi \cdot \left(u_c \left(g_{c,s}^{PRI} \right) - u_c \left(g_{c,s}^{O} \right) + \tau_{c,s}^{PRI} - \tau_{c,s}^{O} + a_{c,s}^{PRI} \right) + \varepsilon_{c,e,s}$ represents the electoral support for the PRI of the voters that vote in electoral section e. Recall that $\varepsilon_{c,e,s}$ is a normally distributed error that reflect the uncertainty about $\pi_{c,e,s}^{PRI}$, $\varepsilon_{c,e,s} \sim N \left(0, \sigma_{\varepsilon_{c,s}}^2 \right)$.

The PRI uses electoral data and its prior knowledge about the potential voting behavior of communal land peasants to construct the following signal of the effort of the broker, $a_{c,s}$,

$$s_{c,s} = \sum_{e \in E_{c,s}} \rho_{c,e,s} \cdot \left[\pi_{c,e,s}^{PRI} - \frac{1}{2} - \varphi \cdot \left(u_c \left(g_{c,s}^{PRI} \right) - u_c \left(g_{c,s}^{O} \right) + \tau_{c,s}^{PRI} - \tau_{c,s}^{O} \right) \right].$$

Hence, the signal of $a_{c,s}$ is $s_{c,s} = a_{c,s} + \eta_{c,s}$, where $\eta_{c,s} = \sum_{e \in E_{c,s}} \rho_{c,e,s} \cdot \varepsilon_{c,e,s}$. The variance of the signal is $\sigma_{\eta_{c,s}}^2 = \left(1 - \varrho_{c,s} \right) \cdot \sigma_{\varepsilon_{c,s}}^2$, where $\varrho_{c,s} = 1 - \sum_{e \in E_{c,s}} \left(\rho_{c,e,s} \right)^2$ is the *fragmentation* of communal land c.

The PRI's ability to monitor its clientelistic networks in communal land c is increasing in the *fragmentation* of the communal land c. Consequently, from the above analysis, it follows that, when the PRI controls the state government at the time of the election, communal lands with a larger *fragmentation* should exhibit a larger electoral support for the PRI.

We finally provide the formal definition of the measure of *fragmentation* that we use in our empirical analysis. Consider the set of electoral sections e that overlaps with communal land c in state s, $E_{c,s}$. Denote $area_{c,s}$ the area of a communal land c in state s and $\{area_{e,s}\}_{e \in E_{c,s}}$ the set of the areas of the electoral sections that belong to $E_{c,s}$. Consider the square of the proportion of a communal land c that overlaps with an electoral section e, $\left(\frac{area_{c,s} \cap area_{e,m,s}}{area_{c,m,s}} \right)^2$. We denote *fragmentation* as one minus the sum for all electoral sections e that overlap with a communal land c,

$$frag_{c,s} = 1 - \sum_{e \in E_{c,m,s}} \left(\frac{area_{c,s} \cap area_{e,s}}{area_{c,s}} \right)^2. \tag{7}$$

---

[31] For the sake of exposition, we consider the case where all voters in $E_{c,s}$ belong to the communal land. In other words, we formalize the simplest case where the *fit* of the communal land is one.

4 Empirical Strategy and Data

4.1 Empirical Strategy

In this section we develop the empirical strategy used to test the two main predictions of the model. Our empirical approach then tests whether communal lands with a larger *fit* and *fragmentation* exhibit larger electoral support for the PRI when the state government is under the control of the PRI.

The variation in *fit* and *fragmentation* comes from of the initial location of the communal lands and the subsequent drawing of the electoral sections. In 1994, the Federal Electoral Institute (IFE) designed the sections for electoral purposes so that each included a minimum of 50 and a maximum of 1500 voters. Additionally, each electoral section was conceived to fall fully within a single municipality and to avoid the partition voters from the same locality (population nucleus).

The demarcation had no political considerations, which is essential for the validity of the identification strategy. When the IFE demarcated the electoral section in 1994, it represented an autonomous institution administered by a body of councilors, who are citizens with no links to any party or state branch. To get a sense of the institutional strength of the IFE, note that the 1994 federal elections were the first conducted by the IFE and it was the first time in Mexican history that elections were free from vote fraud (Schedler 2004). Additionally, the electoral sections were demarcated inside already set municipalities and electoral districts. Hence, the political manipulation of electoral sections could have not allowed for the grouping of voters to win municipalities or electoral districts, a strategy commonly known as gerrymandering. In addition, we later show that the land area and registered voters of electoral sections and communal lands, which naturally affect *fit* and *fragmentation*, do not predict electoral support for the PRI.

The variation in the PRI's control of the state government comes mostly from states switching from the PRI to another party. The PRI not only held Mexico's presidency for 71 years, but for a long period it also controlled the politics of all states, many of which are still under the control of the PRI . In our period of analysis (1991 - 2010), out of 31 sates, 17 states experienced a change in party in the state government.[32] Additionally, out of these states, the PRI recently regained the state government in four.

The main outcome of our empirical analysis is the vote share for the PRI in municipal elections. Since municipal and state government elections are commonly staggered, the electoral support for the PRI in interim municipal elections represents a signal to the PRI about the well-functioning of its clientelistic networks. Hence, if the PRI is able to mobilize its clientelistic networks to increase its electoral support when it controls the state government, this should be reflected in its electoral support in municipal elections. In addition, municipal elections also have the advantage that they take place every three years, which provides a larger sample size and allows analyzing pretrends. Further, the available state election data provides little variation to empirically test the implications

---

[32]13 out the other 14 states have always had a state governor of the PRI.

of the model.[33]

Our analysis is at the electoral section level and our estimation equation follows directly from the model. The vote share for the PRI in electoral section e in municipality m in state s in year t can be decomposed as follows

$$\pi_{e,m,s,t} = \alpha_{e,m,s} \cdot \pi_{c,e,m,s,t} + (1 - \alpha_{e,m,s}) \cdot \pi_{nc,e,m,s,t},$$

where $\alpha_{e,m,s}$ is the share of voters from communal lands in the electoral section, and $\pi_{c,e,m,s,t}$ and $\pi_{nc,e,m,s,t}$ are the vote shares for the PRI of the communal land voters and the non-communal land voters, respectively. In turn,

$$\pi_{c,e,m,s,t} = \sum_i \rho_{c_i,e,m,s} \cdot \pi_{c_i,m,s,t}$$

where $\rho_{c_i,e,m,s}$ is the share of voters from communal lands in the electoral section that come from communal land c_i and $\pi_{c_i,m,s,t}$ is the vote share for the PRI of the voters that come from communal land c_i. From the model in *Section 3*,

$$
\begin{aligned}
\pi_{c_i,m,s,t} = {} & \beta_0 + \beta_{1,c} \cdot PRI_{s,t} + \beta_2 \cdot fit_{c_i,m,s} + \beta_3 \cdot PRI_{s,t} \cdot fit_{c_i,m,s} \\
& + \beta_4 \cdot frag_{c_i,m,s} + \beta_5 \cdot PRI_{s,t} \cdot frag_{c_i,m,s} + \eta_{c_i,m,s} + \varepsilon_{c_i,m,s,t}
\end{aligned}
$$

with $\beta_2 = \beta_4 = 0$ and β_3, $\beta_5 > 0$. Additionally, we assume that

$$\pi_{nc,e,m,s,t} = \beta_0 + \beta_{1,nc} \cdot PRI_{s,t} + \eta_{nc} + \varepsilon_{nc,e,m,s,t}.$$

Putting all together,

$$
\begin{aligned}
\pi_{e,m,s,t} = {} & \beta_0 + \beta_1 \cdot PRI_{s,t} + \beta_2 \cdot fit_{e,m,s} + \beta_3 \cdot fit_{e,m,s} \cdot PRI_{s,t} \\
& + \beta_4 \cdot frag_{e,m,s} + \beta_5 \cdot frag_{e,m,s} \cdot PRI_{s,t} + \eta_{e,m,s} + \varepsilon_{e,m,s,t}
\end{aligned}
$$

where we denote $fit_{e,m,s} = \alpha_{e,m,s} \cdot \sum_i \rho_{c_i,e,m,s} \cdot fit_{c_i,m,s}$ as the electoral section *fit* and $frag_{e,m,s} = \alpha_{e,m,s} \cdot \sum_i \rho_{c_i,e,m,s} \cdot frag_{c_i,m,s}$ as the electoral section *fragmentation*.[34]

Our extended baseline specification is as follows:

$$
\begin{aligned}
\pi_{e,m,s,t} = {} & \beta_0 + \beta_1 \cdot PRI_{s,t} + \beta_2 \cdot fit_{e,m,s} + \beta_3 \cdot fit_{e,m,s} \cdot PRI_{s,t} \\
& + \beta_4 \cdot frag_{e,m,s} + \beta_5 \cdot PRI_{s,t} \cdot frag_{e,m,s} \\
& + \Gamma' X_{e,m,s,t} + \Delta' G_{e,m,s} + \eta_{m,s} + \phi_y + \varepsilon_{e,m,s,t}
\end{aligned}
\tag{8}
$$

---

[33]State government elections take place every six years and the data at the section and municipal level is not available for many states for the first half of the period of analysis. This lack of data constitutes a serious problem since identification comes from states that switch from the PRI to another party. Many states have missing state government election data under the PRI, which removes them from the sample of identifying observations.

[34]To construct $fit_{e,m,s}$ and $frag_{e,m,s}$ we approximate $\alpha_{e,m,s}$ and $\rho_{c_i,e,m,s}$ using area shares. Additionally, $\beta_1 = \alpha_{e,m,s} \cdot \sum_i \rho_{c_i,e,m,s} \cdot \beta_{1,c} + (1 - \alpha_{e,m,s}) \cdot \beta_{1,nc}$, $\eta_{e,m,s} = \alpha_{e,m,s} \cdot \sum_i \rho_{c_i,e,m,s} \cdot \eta_{c_i,m,s} + (1 - \alpha_{e,m,s}) \cdot \eta_{nc}$, and $\varepsilon_{e,m,s,t} = \alpha_{e,m,s} \cdot \sum_i \rho_{c_i,e,m,s} \cdot \varepsilon_{c_i,m,s,t} + (1 - \alpha_{e,m,s}) \cdot (\varepsilon_{nc,e,m,s,t})$.

where $\pi_{e,m,s,t}$ is the vote share for the PRI in electoral section e in municipality m in state s in year t, $PRI_{s,t}$ is a dummy variable that indicates whether the PRI controls the state government at the time of the election, $fit_{e,m,s}$ is the electoral section *fit*, $frag_{e,m,s}$ is the electoral section *fragmentation*, $X_{c,m,s,t}$ is a vector of communal land controls interacted with $PRI_{s,t}$ and $G_{c,m,s}$ is a vector of spatial controls for the location of communal lands within each state. $\eta_{m,s}$ are municipality fixed effects, which control for municipality characteristics that are invariant over time. A more robust specification includes electoral section fixed effects $\eta_{e,m,s}$, which absorb $fit_{e,m,s}$, $frag_{e,m,s}$, and $G_{c,m,s}$. With the introduction electoral section fixed effects, the identification comes from communal lands that experienced a change in the party that controls the state government. ϕ_t are either year dummies that control for national level trends or state-year dummies that control for state-level trends, $\phi_{s,t}$. Standard errors are clustered at the state level in all regressions.

The model from *Section 3* predicts that, for a given *fragmentation*, communal lands with larger *fit* should exhibit a larger support for the PRI because they facilitate the monitoring of the performance of the clientelistic networks operating on them. In addition, this increased electoral support for the PRI should only manifest when the PRI controls the state government, which provides funds to mobilize the networks. Thus, the model predicts that $\beta_2 = 0$ and $\beta_3 > 0$. Through a similar reasoning, our model also predicts that, for a given *fit*, communal lands with more *fragmentation* should result in a larger support for the PRI when it is in the state office. Hence, the model also predicts that $\beta_4 = 0$ and $\beta_5 > 0$.

$X_{c,m,s,t}$ includes the area and registered voters of the electoral sections as well as the weighted average area and imputed registered voters of the overlapping communal lands, and the interaction of these variables with $PRI_{s,t}$.[35] $X_{c,m,s,t}$ then addresses the concern that *fit* and *fragmentation* may pick differences in the extension or population of electoral sections and communal lands, which might be associated with other correlates of electoral support for the PRI. $G_{c,m,s}$ includes a series of flexible polynomials of latitude and longitude of the centroid of each communal land interacted with state dummies. Consequently, $G_{c,m,s}$ addresses the concerns that the spatial distribution of *fit* and *fragmentation* is correlated with the electoral support for the PRI.

4.2 Data

We use election data at the electoral section and the municipal level for all municipal elections from 1991 to 2010 for which data is available as our main outcome variable.[36] We restrict attention to this time period because the electoral figures before do not necessarily represent the votes cast by the electorate. Prior to 1990, electoral figures were directly manipulated by the PRI after voters cast their votes through practices such as ballot stuffing. As mentioned above, a series of political reforms, started with a constitutional reform approved in 1989 and led by the creation of the Federal

---

[35]The way we imputed the registered voters of the overlapping communal lands is in (12) in the variable construction appendix.

[36]The data at the municipality level is available for all elections. See the Data Appendix for the detail of the data available at the section level.

Electoral Institute in 1990, eliminated vote fraud (Schedler 2004). The election data at the section level comes from the state electoral institutes, which are the responsible for conducting municipal and state governor elections. The election data at the municipal level comes from several sources: the Alain de Remes' 1980-1990 electoral data base, the BANAMEX-CIDAC's 1985-2010 electoral data base, and different state electoral institutes.

To compute the measures of *fit* and *fragmentation* used in our empirical analysis, we use geospatial data on the location of the communal lands and the electoral sections in Mexico. The electoral section data is from the Federal Electoral Institute (IFE).[37] The communal land data comes from the Agrarian National Registry (RAN), which collected the data during the rollout of Mexico's land certification program - the PROCEDE. The RAN facilitated the spatial location of all communal lands that completed the certification stage of the program or were in the process of certification by the end of 2006. The sample includes more than 95% of the communal lands in Mexico.

Electoral data at the state level for all state gubernatorial elections from 1985 to 2010 provides the main regressors of the empirical analysis: the vote share that the PRI obtained in the last state election, and whether the PRI is the incumbent party at the state level. The source of this data is the BANAMEX-CIDAC's 1985-2010 electoral data base.

Finally, the data on other regressors of interest and policy outcomes come from the 2007 Agricultural Census, several Population Censuses (1990 to 2010), and the State and Municipal Data Base System (1994-2010). The source of all these data sets is the Mexican National Institute of Statistics and Geography (INEGI).

5   Validity of the Identification Assumptions and Results

5.1   Validity of the Identification Assumptions

Table 1 presents three panels with partial correlations between *fit* and *fragmentation*, the land area and registered voters of electoral sections and the weighted average land area and imputed registered voters of the overlapping communal lands, and the vote share for the PRI in municipal elections. The goal of this exercise is to illustrate that variables that are related to *fit* and *fragmentation* are not correlated with the electoral support for the PRI. Due to the nature of the process of demarcation of electoral sections, *fit* and *fragmentation* are associated with the land area and registered voters of electoral sections and communal lands. A significant correlation between these variables and the electoral support for the PRI would cast doubt about the plausible exogeneity of *fit* and *fragmentation*, even after we control for these in our empirical analysis.

Throughout all panels of *Table 1* we keep the regressors fixed and consider different outcome variables. From column (1) to (4), the regressors are the land area and registered voters of the elec-

---

[37]In 1994 the Federal Electoral Institute demarcated the current electoral sections. Since then there have only been minor changes - less than 1% have been affected - to reflect, in the majority of the cases, the creation of new municipalities and, in isolated cases, the urban development of areas close to cities.

toral sections, and the weighted average land area and imputed registered voters of the overlapping communal lands, respectively. We start analyzing panels A and B where the outcome variables are *fit* and *fragmentation*, respectively. Column (1) shows that there is a significant positive relationship between both *fit* and *fragmentation* and the area of electoral sections. Columns (2) to (4) exhibit that there is a significant negative relationship between both *fit* and *fragmentation* and the registered voters of electoral sections and the weighted average land area and imputed registered voters of the overlapping communal lands.

To address the concern that *fit* and *fragmentation* might be picking a systematic variation in unobservable variables that are correlated with the regressors in panels A and B, in panel C we consider the vote share for the PRI in municipal elections as an outcome. In addition, we also include the interaction between the regressors and whether the PRI controls the state government. As explained above, the identification of the monitoring of clientelistic networks comes from the interaction of *fit* and *fragmentation* with whether the PRI is in the state office. Hence, to address the mentioned concern, panel C shows whether the interaction of the correlates of both *fit* and *fragmentation* and the PRI's incumbency in the state government predicts the electoral support for the PRI. Encouragingly, none of these interactions is statistically significant. While in Panel C we only report the mentioned interaction, the omitted coefficients on the levels of the regressors are significant.

5.2   Preview of Results

Figure 4 shows four plots that illustrate the relationship between the vote share for the PRI with both *fit* and *fragmentation* in the communal lands under PRI governors and non-PRI governors. In all figures the PRI's vote share in municipal elections is on the y axis. On the x axis is *fit* in the top two figures and *fragmentation* in the two bottom figures. In addition, the two left figures indicate the associations when the PRI controls the state government and the two right ones when it does not.

As predicted by the model, the two left figures in *Figure 4* show that communal lands with a larger *fit* and *fragmentation* exhibit a larger electoral support for the PRI when it controls the state government. Additionally, the two right figures suggest that *fit* and *fragmentation* present no clear association with the electoral support for the PRI when another party controls the state government, which is also encouraging concerning the plausible exogeneity of *fit* and *fragmentation*.

Figures 5a and *5b* illustrates the evolution of the vote share for the PRI over time for the states that experience a change in state government control from the PRI to another party. The PRI's vote share in municipal elections is on the y axis and the number of elections since the change from the PRI in the state government is on the x axis. The baseline year when the change took place is normalized to zero. Thus, elections during the PRI's state governments take negative values and elections during state governments of other parties take positive values. In addition, the data is divided into communal lands above and below the *fit* median in *Figure 5a* and above and below

the *fragmentation* median in *Figure 5b*.

As predicted by the model, *Figures 5a* and *5b* indicate that communal lands with a larger *fit* and *fragmentation* exhibit a larger electoral support for the PRI only when it controls the state government. Additionally, it is worth noticing that there are no differential trends in electoral support for the PRI in communal lands with different *fit* and *fragmentation*. Hence, despite the empricial identification of the paper is based on the plausible exogeneity of *fit* and *fragmentation*, we could see our estimation equation as a difference in differences were we see changes in the party that controls the state government as plausibly exogenous due to the mention no differential trends.

5.3 Results

Table 2 reports the results of our empirical specification that tests whether communal lands with a larger *fit* and *fragmentation* exhibit a larger PRI's vote share when the PRI controls the state government. Recall that the unit of analysis is the electoral section and the outcome variable is the PRI's vote share in municipal elections. Column (1) presents the baseline specification in equation (8), column (2) includes spatial controls for the location of communal lands within each state, column (3) introduces electoral section fixed effects, and column (4) adds state-year fixed effects.

As predicted by the model in *Section 3*, results indicate that *fit* and *fragmentation* have a significant positive effect on the PRI's vote share when the PRI controls the state government. The identification of these effect -in particular for the case of *fragmentation*- comes mostly from within electoral section variation since specifications in columns (3) and (4), which include electoral section fixed effects, present larger point estimates than specifications in columns (1) and (2).[38] As also predicted by the model, columns (1) and (2) indicate that the effect of *fit* and *fragmentation* is indistinguishable from zero when another party controls the state government.

The most robust results in column (4) suggest that, when the PRI is the incumbent party at the state government, a one standard deviation increase in *fit* corresponds to a 1.52 pp increase in the vote share for the PRI. Additionally, when the PRI is in control of the state government, a one standard deviation increase in *fragmentation* corresponds to a 1.08 pp increase in the vote share for the PRI. To interpret the importance of the coefficients, note that a one standard deviation increase in *fit* and *fragmentation* involves a 2.60 pp increase on the vote share for the PRI. Such an increase accounts for 65% of the 4 pp of incumbency advantage that the PRI enjoys when it controls the state government. In addition, in 19% of municipal elections the winning margin is less than 2.60 pp.

The predictions of the model are then supported by the data. For a given *fragmentation* of a communal land, a larger *fit* leads to a larger PRI vote share. For a given *fit* of a communal land, a larger *fragmentation* turns into an increased vote share for the PRI. Additionally, the effects only show when the PRI controls the state government, and consequently the funds necessary to support

---

[38]The point estimates on the interaction between *fragmentation* and PRI's governor are not statistically significant in columns (1) and (2). However, they are not statistically different from the coefficients in columns (3) and (4).

clientelistic transactions.

5.4 Placebo

We conduct a placebo exercise to further address any concerns that results might be driven by a omitted unobservable variables that correlate with PRI's electoral support. In our placebo exercise, instead of considering the incumbency of the PRI in the state office, we use its incumbency in the municipal office. It is fundamental to the identification strategy of the PRI's monitoring of its clientelistic networks operating in communal lands that the PRI is able to mobilize its networks only when it controls the state government. Commissariats have weak links with municipal authorities (Hevia de la Jara 2010) and municipal governments are very weak since state governments are responsible for the execution of the bulk of public programs at the local level. Hence, the PRI's incumbency at the municipal level should not allow the PRI to mobilize its clientelistic networks in communal lands. However, if *fit* and *fragmentation* capture the variation in omitted unobservable variables, which are correlated with the PRI's electoral support, our placebo estimates should also be significantly positive.

Table 3 replicates columns (1) to (4) in *Table 2* but instead of looking at the effect of *fit* and *fragmentation* on the PRI's vote share when the PRI controls the state government, it looks at their effects when the PRI controls the municipal government. Results support the validity of our identification strategy. They indicate that a larger *fit* or *fragmentation* does not contribute to the electoral support for the PRI when the PRI controls the municipal government at the time of the election. Additionally, the effect of *fit* and *fragmentation* are also indistinguishable from zero when another party controls the municipal government.

6   Aggregate Political and Policy Effects of Clientelism

The goal of this section is twofold. First, we want to show that the presence of clientelistic networks in communal lands has an aggregate effect on election outcomes. To identify this effect we look at municipality level outcomes and exploit a difference in differences strategy where we use private lands as a control group for communal lands. In doing this, we use the fact that there is a larger presence of clientelistic networks operating in communal lands than in private ones. Consequently, communal lands should exhibit a larger electoral support for the PRI relative to private lands when the PRI controls the state government. However, note that the effect we estimate might not solely reflect the PRI's monitoring over its clientelistic networks in communal lands.[39]

Our second goal in this section is to see whether the presence of clientelistic networks in communal lands has an aggregate effect on policy outcomes. In the *Model Appendix* we show that communal lands where clientelistic networks operate more extensively experience a lower invest-

---

[39]Unfortunately, we cannot look at its interaction with aggregate fit and fragmentation since we do not have enough variation at the municipal level.

ment in public goods when the PRI controls the state government at the time of the election. The intuition is that funding a political broker has a larger electoral return in communal lands and, consequently, they crowd out the provision of public goods. Again, we could think of private lands as places where clientelistic networks operate less extensively. Consequently, communal lands should exhibit a lower public good provision relative to private lands when the PRI controls the state government. To estimate the effect of clientelism on policy outcomes, we look at schooling outcomes and use an analogous identification strategy to the one we use for the case of the election outcomes.

Schooling outcomes are appropriate for our goal for two reasons. First, since the 1992 National Agreement for the Modernization of Basic Education (*Acuerdo Nacional para la Modernización de la Educación Básica* - ANMEB), states have been responsible for the administration of basic education at the local level in Mexico (Helper et al. 2006, Santibañez et al. 2005).[40] Second, they represent an appropriate measure of public goods since exclusion is very hard. *Figure 6* shows three municipalities in the state of Zacatecas where municipality boundaries are in continuous black lines, electoral sections are demarcated in dashed blue lines, communal lands are in green, and the location of a primary schools in yellow squares. *Figure 6* illustrates that, due to the short distances, it is very hard to exclude students from a communal land to attend a nearby school or to exclude students living close to a communal land to attend to a school there.

6.1 Empirical strategy

Our baseline specification to test the aggregate effect of the presence of clientelistic networks in communal lands on election and policy outcomes is the following:

$$
\begin{aligned}
y_{m,s,y} = {} & \beta_0 + \beta_1 \cdot PRI_{s,y} + \beta_2 \cdot PRI_{s,y} \cdot cl_{m,s} + \beta_3 \cdot PRI_{s,y} \cdot al_{m,s} + \\
& \beta_4 \cdot v_{s,y} + \beta_5 \cdot cl_{m,s} \cdot v_{s,y} + \beta_6 \cdot al_{m,s} \cdot v_{s,y} + \eta_m + \phi_{s,y} + \varepsilon_{m,s,y}
\end{aligned}
\tag{9}
$$

where $y_{m,s,y}$ is an outcome of interest in municipality m in state s in year y, $PRI_{s,y}$ is a dummy variable that indicates whether the PRI controls the state government at the time of the election, $cl_{m,s}$ is the share of communal land area over the total area of a given municipality, $al_{m,s}$ is the share of total agricultural land over the total area of a given municipality, and $v_{s,y}$ is the vote share that the PRI obtained in the last state government election by the year y. η_m are municipality fixed effects, which control for municipality characteristics that are invariant over time, including the levels of $cl_{m,s}$ and $al_{m,s}$. With municipality fixed effects, the identification comes from within variation in

---

[40]The majority of the financial resources still comes from the Federal Subsecretary of Basic Education (*Subsecretaría de Educación Básica* - SEP). However, states do raise their own funds to invest in new teachers or schools.

With respect to other potenial outcomes for public goods, conversely, the public health system is mostly administered by the federal government. Between the Mexican Social Security Institute (*Instituto Mexicano del Seguro Social* - IMSS) and the Institute for Social Security and Services for State Workers (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* - ISSSTE), the federal government provides health care coverage to most individuals. The IMSS and the ISSSTE are federal government organizations that provide health care to workers in the private sector and federal employees, respectively.

municipalities that experienced a change in the party that controls the state government. $\phi_{s,y}$ are either year dummies or state-year dummies.[41] They control for national level trends and state level trends, respectively. Standard errors are clustered at the state level in all regressions.

The coefficient β_2 captures the effect of the PRI's incumbency at the state level on municipalities with a larger share of communal lands. As explained above, on the one hand, if the PRI's clientelistic networks in communal lands have an aggregate effect of election outcomes, we expect $\beta_2 > 0$ when focusing on the PRI's electoral support as an outcome variable. On the other hand, if the networks have a negative effect of policy outcomes, we expect $\beta_2 < 0$ when looking at schooling supply as an outcome variable.

There is the worry that, in the case of the electoral outcomes, β_2 might be capturing reverse causality. In other words, there is the concern that differential trends in the electoral support for the PRI in communal lands drive party changes in the state government. This concern is mitigated in the most robust specification that includes control for state-level trends, which are the actual driving forces of party changes at the state government level. Hence, this specification accounts for any differential trend in the electoral support for the PRI in communal lands that is correlated with state-level trends. In addition, in all specifications we control for the interaction between the state vote share that the PRI obtained in the last state gubernatorial election and the municipal shares of communal and agricultural land, $cl_{m,s} \cdot v_{s,y}$, and $al_{m,s} \cdot v_{s,y}$ respectively. In addition, to address this concern further we conduct a placebo analysis, which we explain later.

6.2   Preview of Results

To get a preview of the results and rule out pretrends in the electoral support for the PRI, *Figure 7* illustrates the vote share for the PRI over time for the states that experience a change in state government control from the PRI to another party.[42] The PRI's vote share in municipal elections is on the y axis and the number of elections since the change from the PRI in the state government is on the x axis. The baseline year when the change took place is normalized to zero. Thus, elections during the PRI's state governments take negative values and elections during state governments of other parties take positive values. In addition, the data is divided into municipalities above and below the communal land median.

Figure 7 indicates no presence of differential pretends between municipalities above and below the communal land median under PRI's state governments. Additionally, *Figure 7* shows that municipalities above the communal land median exhibit a larger voter share for the PRI when the PRI controls the state government. However, such a difference vanishes the moment the PRI loses the state government.

---

[41]When $\phi_{s,y}$ are state-year dummies, $PRI_{s,y}$ and $v_{s,y}$ are absorbed.

[42]Recall from above that the bulk of the variation comes from these switches.

6.3 Results on Election Outcomes

Table 4 reports the results of our empirical specification that tests whether municipalities with a larger share of communal lands exhibit larger PRI's vote shares when the PRI controls the state government. Recall that the unit of analysis is the communal land and the outcome is the PRI's vote share in municipal elections. Columns (1) and (3) present the baseline specification as characterized in equation (9), and columns (2) and (4) add state-year dummies. Columns (3) and (4) add several controls that capture the level of economic development of the municipalities.

The baseline results in column (1) suggest that, when the PRI is the incumbent party at the state government, a one standard deviation increase in the share of communal lands corresponds to a 2.89 pp increase in the vote share for the PRI in municipal elections. This effect represents a 5.34% increase with respect to the mean. Results in column (2) indicate that the baseline result is robust to the introduction of state year fixed effects, which suggests that state level trends in support for the PRI are not driving the results.

To deal with the concern that communal lands are not only capturing the presence of clientelistic networks but also potential differences in economic development that correlate with electoral support for the PRI, columns (3) and (4) include a series of controls that account for these potential differences. These consist of the share of households with access to electricity, piped water and connection to drainage, which are the measures of economic development that are consistently captured in all censuses in Mexico. Results from columns (3) and (4) indicate that our findings are robust with the same magnitude and statistical significance as in columns (1) and (2).

We should note a caveat on the estimates we present in columns (3) and (4), explaining why they are not the baseline specification. The model suggests that clientelism might result in a lower provision of public goods. Consequently, when including controls that capture economic development, we are controlling for outcome variables, which delivers unidentified estimates (Angrist and Pischke 2009). Thus, we provide estimates in columns (3) and (4) for the sake of robustness but do not consider them as the most preferred specification.

Table 5 replicates the estimates from *Table 4* using an indicator of whether the PRI wins in a municipal election as an outcome instead. Estimates in *Table 5* provide the same implications as in *Table 4*. Overall, the findings in *Tables 4* and *5* support that municipalities with a larger share of communal lands exhibit larger electoral support for the PRI when the PRI controls the state government.

6.4 Placebo

To address directly the mentioned reverse causality concern, we again conduct a placebo exercise considering the incumbency of the PRI in the municipal office instead of its incumbency in the state office. If differential trends in the electoral support for the PRI in communal lands drive the results on electoral outcomes, they should drive the effect of the incumbency of the PRI in both the state and municipal office.

Table 6 replicates the estimates from *Table 4* considering the incumbency of the PRI in the municipal office instead of its incumbency in the state office. Results indicate that municipalities with a larger share of communal lands do not present a differential electoral support for the PRI when the PRI is in office at the municipal level. Additionally, municipalities with a larger share of agricultural lands, which, recall, include both communal and private lands, exhibit a lower vote share for the PRI when the PRI controls the municipal government. However,

The negative estimates of the incumbency of the PRI in the municipal office in municipalities with a larger share of agricultural lands simply reflect the downward trend we observe in *Figure 7*. During the period we study there is a significant decrease in the support for the PRI. The reason this decrease is larger for municipalities with a larger share of agricultural lands is that urban areas were the first ones to turn against the PRI in the late 1980s and early 1990s.

6.5   Results on Policy Outcomes

Table 7 reports the results of our empirical specification that tests whether municipalities with a larger share of communal lands exhibit a worse schooling supply when the PRI controls the state government. Odd columns present the baseline specification, as characterized in equation (9), and even columns add state-year dummies. In the first two columns, the outcome is the number of primary and secondary school per 1,000 inhabitants. The outcome in columns (3) and (4) is the number of primary and secondary teachers per 1,000 inhabitants. In the last two columns, the outcome is the number of students that attend primary and secondary school per 1,000 inhabitants.[43] With respect to this last outcome, the number of students is not necessarily indicative of the quality of the education supply. However, a lower number of students enrolled per capita confirms the effect of a worse schooling supply measured by the two other outcome variables.

Overall, the estimates in *Table 7* suggest that municipalities that have a larger share of communal lands have a significantly worse educational supply when the PRI is the party in the state government. Results in column (1) indicate that, when the PRI is the incumbent party, a one standard deviation increase in the share of communal lands corresponds to a 3.93 percentage drop in the number of primary and secondary schools relative to the sample mean. The third column shows that one standard deviation more in the share of communal lands is associated with a 3.09 percentage decrease in the number of primary and secondary schools relative to the sample mean, if the PRI is in power. Estimates in column (5) imply that, when the PRI controls the state government, a one standard deviation increase in the share of communal lands denotes a 3.24 percentage drop in the number of students enrolled in primary and secondary schools relative to the sample mean. All the mentioned estimates from *Table 7* are robust to introducing state-year dummies.

To address the worry that communal lands are not only capturing the presence of clientelistic networks but also differences in economic development, we replicate the specification of *Table 7* in

---

[43]The results do not change when primary and secondary education are consider separately. Omitted results are available upon request.

Table 8 adding controls that capture the level of economic development of the municipalities. Note that in the case of public good provision, this represents a more relevant concern since it could simply be that the PRI is less likely to provide public goods in poor areas regardless of the presence of clientelistic networks. *Table 8* shows that results are robust with the same magnitude and statistical significance as in *Table 7*. Again, as in the case of the electoral outcomes, we also emphasize that controls that reflect municipal economic development might be outcomes and, consequently, deliver unidentified estimates. Thus, we provide these estimates in *Table 8* for the sake of robustness but do not consider them as the most preferred specification.

Overall, the findings in *Tables 7* and *8* support that municipalities with a larger share of communal lands exhibit a reduced provision of public goods - measured by schooling supply - when the PRI controls the state government.

6.6 Placebo

As in the case of electoral outcomes, we conduct a placebo exercise considering the incumbency of the PRI in the municipal office instead of its incumbency in the state office. If differential trends in the schooling outcomes in communal lands drive the results on policy outcomes, they should drive the effect of the incumbency of the PRI in both the state and municipal office.

Table 9 replicates the estimates from even columns in *Table 7* and *8* considering the incumbency of the PRI in the municipal office instead of its incumbency in the state office. Results indicate that municipalities with a larger share of communal lands do not present differences in schooling outcomes when the PRI is in office at the municipal level.

7 Conclusion

In this paper, we make two contributions to our understanding of the way through which clientelistic transactions prevail in the context of a secret ballot, and the effect of clientelism on electoral and policy outcomes. Our main contribution is to provide empirical evidence that the PRI's access to clientelistic networks and the availability of electoral results at a very disaggregated level contribute to enforce clientelistic transactions. Exploiting plausibly exogenous differences in the overlap between communal lands and electoral sections that facilitate the PRI's supervision of its clientelistic networks, we show that places where the overlap eases the PRI's monitoring of the performance of its networks exhibit a larger electoral support for the PRI when the PRI controls the state government, and consequently, the funds necessary to mobilize its networks and fund clientelistic exchanges.

Second, we show that when the PRI controls the state government municipalities with a larger share of communal lands exhibit an increased vote share for the PRI and a lower provision of public goods, measured by schooling supply. We use a difference in differences strategy where we compare municipalities with equal share of agricultural land, which includes communal and private

lands, but different shares of communal lands.[44] Results are not driven by differential pretrends or difference in the economic development of communal and private lands. Our second contribution provides ground to the literature that suggests that clientelism might hurt democracy since voters lose the ability to hold politicians accountable to deliver the public goods they desire (Keefer 2007, Kitschelt and Wilkinson 2007, Lyne 2007).

The results of this paper have several implications for policy, which also apply to other cases where clientelistic networks operate in narrowly defined geographical areas and electoral results are disclosed at a very disaggregated level. Naturally, there is the need to clarify and strengthen the operation rules of social programs to minimize the scope for their manipulation for electoral purposes. Additionally, there might be scope for a demarcation of electoral sections that minimizes the ability of parties to monitor its clientelistic networks, and consequently, that deters the enforcement of clientelistic exchanges. Further, in case such a demarcation was not possible, the results from this paper are useful for policies that attempt to crack down on clientelistic practices since it identifies the location where these exchanges are more likely to prevail.

Finally, it is worth pointing out some findings from fieldwork that, because of the lack of statistical power due to a small sample of observations, we could not test in the empirical analysis but represent very good news for democracy. During fieldwork we observed that, when the PRI returns to a previously lost state, the clientelistic networks in communal lands no longer have the strength they had before.[45] This finding might explain the strategy carried by the PAN and the PRD in recent state government elections where both parties formed a coalition to overturn the PRI from the state government. The strategy proved to be successful since, out of the 18 states that experienced a change in party in the state government, in 5 cases (Chiapas 2000, Nayarit 1999, Oaxaca 2010, Puebla 2010, Sinaloa 2010) it was thanks to the coalition between the PAN and the PRD.[46] The popular press indicates that the PAN and the PRD are considering another coalition for the upcoming state elections in the state of Veracruz, the second most populated state after Mexico state.

---

[44]Implicitly, we are using private lands as a control group for communal lands.

[45]Political turn over seems to be very important to weaken clientelistic practices since clientelistic networks in communal lands appear to require an important set up cost and to constitute high-maintenance structures. The PRI was able to afford the considerable set up cost during its seven decades in power but the PAN and the PRD have not had control of any state government long enough to develop its networks. Additionally, the PRI's networks seem to debilitate quickly once the PRI loses the control of the state government, and consequently, it is unable to continue to support its networks.

[46]3 of those states (Chiapas, Oaxaca and Puebla) are in the top 10 most populated states of Mexico.

References

[1] Angrist, Joshua D. and Jorn-Steffen Pischke. 2009. "Mostly Harmless Econometrics: an Empiricist's Companion." Princeton : Princeton University Press.

[2] Auyero, Javier. 2000. "Poor people's politics: Peronist survival networks and the legacy of Evita." Durham, NC: Duke University Press.

[3] Baños Ramírez, Othón. 1988. "Los nuevos campesinos de México: el caso de Yucatán." Estudios Sociológicos, 6(17): 309-335.

[4] Beer, Caroline C. 2007. "Invigorating Federalism: the Emergence of Governors and State Legislatures as Powerbrokers and Policy Innovators." In Camp, Roderic Ai. The Oxford Handbook of Mexican Politics. Oxford: The Oxford University Press.

[5] Brusco,Valeria, Marcelo Nazareno, and Susan C. Stokes. 2004. "Vote Buying in Argentina." Latin American Research Review, 39(2): 66-88.

[6] Calvo, Ernesto, and M. Victoria Murillo. 2010. "Selecting Clients: Partisan Networks and the Electoral Benefits of Targeted Distribution." Columbia University Working Paper.

[7] Chandra, Kanchan. 2004. "Why Ethnic Parties Succeed: Patronage and Ethnic Head Counts in India," New York: Cambridge University Press.

[8] Cornelius, Wayne A. 2002. "La eficacia de la compra y coacción del voto en las elecciones mexicanas de 2000." Perfiles Latinoamericanos, 20: 11-31.

[9] Diaz-Cayeros, Alberto, Federico Estevez, and Beatriz Magaloni. 2012. "Strategies of Vote Buying: Social Transfers, Democracy, and Poverty Reduction in Mexico." Book Manuscript.

[10] Finan, Frederico, and Laura Schechter. 2012. "Vote-Buying and Reciprocity." Econometrica, 80(2): 863-881.

[11] Gans-Morse, Jordan, Sebastian Mazzuca, and Simeon Nichter. 2011. "Varieties of Clientelism: Machine Politics During Elections." Working Paper Harvard University.

[12] Grammont, Horacio H. C. y Horacio Mackinlay, 2009. "Campesino and indigenous social organizations facing democratic transition in Mexico, 1938-2006." Latin American Perspectives, 36(4): 21-40.

[13] Greene, Kenneth F., and Chappell Lawson. 2012. "Self-Enforcing Clientelism." MIT Working Paper.

[14] Helper, Susan, David I. Levine and Christopher Woodruff. 2006. "How Does Economic Liberalization affect Investment in Education? Evidence from Mexico." University of California San Diego Working Paper.

[15] Hevia de la Jara,Felipe. 2010. "Uso político de programas sociales y nuevos intermediarios institucionales: el Programa Progresa/Oportunidades en el sur de Veracruz," Desacatos, 34: 119-132.

[16] Hicken, Allen. 2011. "Clientelism." Annual Review of Political Science, 14: 289–310.

[17] Holmstrom, Bengt and Paul Milgrom. 1987. "Aggregation and Linearity in the Provision of Intertemporal Incentives," Econometrica, 55(2): 303-328.

[18] Holzner, Claudio A. 2010. "Poverty of Democracy: The Institutional Roots of Political Participation in Mexico." Pittsburgh, PA: University of Pittsburgh Press.

[19] Holzner, Claudio A. 2003. "End of Clientelism: Changing Political Practices Among the Poor in Mexico." University of Utah Working Paper.

[20] Instituto Federal Electoral. 2012. Manual del Observador Electoral. Distrito Federal, Mexico.

[21] Keefer, Philip. 2006. "Programmatic parties: Where do they come from and do they matter?" Annual Meeting American Political Science Association.

[22] Keefer, Philip. 2007. "Clientelism, Credibility, and the Policy Choices of Young Democracies." American Journal of Political Science, 51(4): 804-821.

[23] Kitschelt, Herbert, and Steven I. Wilkinson, eds. 2007. "Patrons, Clients, and Policies: Patterns of Democratic Accountability and Political Competition." Cambridge, UK: Cambridge University Press.

[24] Knight, Alan. 1986. "The Mexican revolution." New York, NY: Cambridge University Press.

[25] Lawson, Chappell. 2000. "Mexico's Unfinished Transition: Democratization and Authoritarian Enclaves in Mexico." Mexican Studies, 16(2): 267-287.

[26] Langston, Joy. 2003. "Rising From the Ashes? Reorganizing the PRI's State Party Organizations after Electoral Defeat." Comparative Political Studies 36(3): 263-318.

[27] Lutz, Bruno. 2006 "Formas de dominación en las organizaciones rurales de México." In Ed. Grammont, Hubert C. "La construcción de la democracia en el campo latinoamericano." Buenos Aires: Consejo Latinoamericano de Ciencias Sociales.

[28] Lyne Mona M. 2007. "Rethinking economics and institutions: the voter's dilemma and democratic accountability." In Kitschelt and Wilkinson 2007, 206–26.

[29] Magaloni, Beatriz, Alberto Diaz-Cayeros and Federico Estévez. 2007. "Clientelism and portfolio diversification: a model of electoral investment with applications to Mexico." In Kitschelt and Wilkinson 2007, 182-205.

[30] Manzetti, Luigi and Carole J. Wilson. 2007. "Why Do Corrupt Governments Maintain Public Support?" Comparative Political Studies, 40(8): 949-970.

[31] Mackinlay Grohmann, Horacio. 2011. "Las relaciones sociales corporativas en el sector rural: 1940 - 2000." Artículos y Ensayos de Sociología Rural, 6(12): 13-51.

[32] Middlebrook Kevin. 1995. "The Paradox of Revolution: Labor, the State, and Authoritarianism in Mexico." Baltimore, MD: Johns Hopkins University Press.

[33] Romero, Jorge Javier. 2007. "Clientelismo, patronazgo y justicia electoral en México. Una lectura institucionalista." Universidad Autónoma Metropolitana Working Paper.

[34] Sabloff, Paula L. W. 1981. "Caciquismo in Post-Revolutionary Mexican Ejido-Grant Communities." Albuquerque, New Mexico: Latin American Institute, University of New Mexico.

[35] Santibañez, Lucrecia, Georges Vernez and Paula Razquin. 2005. "Education in Mexico: Challenges and Opportunities." Santa Monica, CA: RAND Corporation.

[36] Schaffer, Frederic C., ed. 2007. "Elections for Sale: The Causes and Consequences of Vote Buying." Boulder, CO: Lynne Rienner Publishers.

[37] Schedler, Andreas. 2004. "El voto es nuestro. Cómo los ciudadanos mexicanos perciben el clientelismo electoral." Instituto de Investigaciones Sociales, Revista Mexicana de Sociología, 66(1): 57-97.

[38] Snyder, James Jr. and David Strömberg. 2010. "Press Coverage and Political Accountability." Journal of Political Economy, 118(2): 355-408.

[39] Stokes, Susan. 2005. "Perverse Accountability: A Formal Model of Machine Politics with Evidence from Argentina." American Political Science Review, 99(3): 315-325.

[40] United Nations Development Program. 2004 " Democracy in Latin America: Toward a Citizens' Democracy." New York, NY.

References

[1] Costa, César. "Acusan Polo Pasillas de ensuciar elecciones ejidales." Noticias de El Sol de La Laguna, Durango, Mexico, May 26th 2009.

[2] Cortés, Nayeli. "Crea PAN estructura abocada al campo." El Universal, México, June 14th 2004.

[3] Del Collado, Fernando. "Inducción del voto rural: Donde aún vive el dinosaurio." Reforma, Mexico, July 16th 2000.

[4] Galicia, Víctor. 2012. Personal Interview, July 2012.

[5] García, Lev, Ernesto Núñez and Iván Rendón. "Crecen anomalías." Reforma, Mexico, August 1st 2004.

[6] Marí, Carlos. "Acusan que en Tabasco el PRI condiciona votos." Reforma, Tabasco, Mexico, July 25th 2001.

[7] Martínez, Martha. "Programas sociales: arma electoral." Reforma, Mexico, June 20th 2010.

[8] Osorno Xochipa, Juana. "La CNC debilitada; anteriores gobiernos cooptaron líderes de la agrupación." e-tlaxcala.mx, Tlaxcala, Mexico, August 1st 2011.

[9] Pensamiento, Daniel."Amenaza tricolor retirar progresa." Reforma, Mexico, May 31st 2000.

[10] Ramos, Claudia. "Confederación Nacional Campesina: Reformarse o morir." Reforma, Mexico, September 3rd 2000.

[11] Reforma. "Compras y coacciones de sufragios." Reforma, Tabasco, Mexico, June 14th 2000.

[12] Reforma. "Asumen Ejidatarios Uso en Elecciones." Reforma, Mexico, January 7th 2005.

[13] Reyes, Rosalía and Carmen Romo. "Afirma PRI tener 100 mil vigilantes." Reforma, Nuevo León, Mexico, June 23rd 2003.

[14] Soto, Luis. "Agenda Confidencial." El Financiero, México, June 15th 2004.

[15] Zermeño, Jésica. "Compra de Voto." Reforma, Mexico, April 1st 2012.

A Model Appendix

In this section we consider the extension of the model to the case where the non-negativity constrain constraint over $\tau_{c,s}^{PRI}$ is binding. In this case, the PRI solves the following maximization problem to maximize its expected electoral support when it is the incumbent at the state government,

$$\max_{\{v_{c,s}\}_{c \in \mathcal{C}}} \sum_{c \in C} \left[\varphi \cdot \left(u_c \left(b_{c,s} - \underline{w} - \frac{1}{2}\frac{1}{\psi} \left(1 + \gamma\psi\sigma_\eta^2\right) v_{c,s}^2 \right) + \frac{v_{c,s}}{\psi} \right) \right]$$

which is (5) setting $\tau_{c,s}$ to zero.

From the first order condition and the budget constraint,

$$g_{c,s} = b_{c,s} - \underline{w} - \frac{1}{2}\frac{1}{\psi}\left(1 + \gamma\psi\sigma_\eta^2\right) v_{c,s}^2 \ \forall \ c \in C \tag{10}$$

$$u_c'\left(b_{c,s} - \underline{w} - \frac{1}{2}\frac{1}{\psi}\left(1 + \gamma\psi\sigma_\eta^2\right) v_{c,s}^2 \right)\left(1 + \gamma\psi\sigma_\eta^2\right) v_{c,s} = 1 \ \ \forall \ c \in C, \tag{11}$$

where (11) defines $v_{c,s}$ implicitly.

Note that, while in the unconstrained case, clientelism does not alter the investment in public goods, in this case it does. Differentiating (10) and (11), it follows that

$$\frac{dg_{c,s}}{d\sigma_{\eta_{c,s}}^2} = -\gamma\tau_1 \frac{dv_{c,s}}{d\sigma_{\eta_{c,s}}^2} > 0$$

$$\frac{dv_{c,s}}{d\sigma_{\eta_{c,s}}^2} = -\frac{-u_c''\left(g_{c,s}\right)\left(1 + \gamma\psi\sigma_\eta^2\right)\gamma\psi v_{c,s}^3 + 2u_c'\left(g_{c,s}\right)\gamma\psi^2 v_{c,s}}{-2u_c''\left(g_{c,s}\right)\left(\left(1 + \gamma\psi\sigma_\eta^2\right) v_{c,s}\right)^2 + 2u_c'\left(g_{c,s}\right)\psi\left(1 + \gamma\psi\sigma_\eta^2\right)} < 0$$

Thus, in the constrained case the investment public good $g_{c,s}$ is decreasing in the PRI's monitoring ability over the performance of its clientelistic networks.

It is worth emphasizing the reason why in the unconstrained case clientelism does not alter the investment in public goods. This follows directly from the assumption that the utility function is

linear in the transfer, which is an assumption that provides analytical tractability to the model. However, in the absence of this assumption, the conditioning of transfers for electoral support would alter the investment on public goods.

Finally, for the constrained case, the difference between $\pi_{c,s}^{PRI}$, when the PRI controls the state government, and $\pi_{c,s}^{PRI}$, when it does not, is decreasing in the noise of the signal, $\sigma_{\eta_{c,s}}^2$:

$$\frac{\partial \Delta \pi_{c,s}^{PRI}}{\partial \sigma_{\eta_{c,s}}^2} = -\frac{1}{2} u_c' \left(g_{c,s} \right) \varphi \gamma v_{c,s}^2 < 0.$$

B   Variable Construction Appendix

We imputed the number of registered voters in communal land c as

$$voters_{c,m,s} = \sum_{e \in E_{c,m,s}} \frac{area_{c,m,s} \cap area_{e,m,s}}{area_{c,m,s}} * voters_{e,m,s}, \tag{12}$$

where $E_{c,m,s}$ is the set of electoral sections that overlap with communal land c, $area_{c,m,s}$ is the area of communal land c, and $area_{e,m,s}$ is the area of the electoral section e. We used the software ArcGIS 10 to compute $area_{c,m,s}$, $area_{e,m,s}$ and $area_{c,m,s} \cap area_{e,m,s}$.[47]

---

[47]We computed $area_{c,m,s} \cap area_{e,m,s}$ using the Intersect command of the Analysis Toolbox.

C   Figures

Figure 1

Note: State boundaries are in black and communal lands in green.

Figure 2a
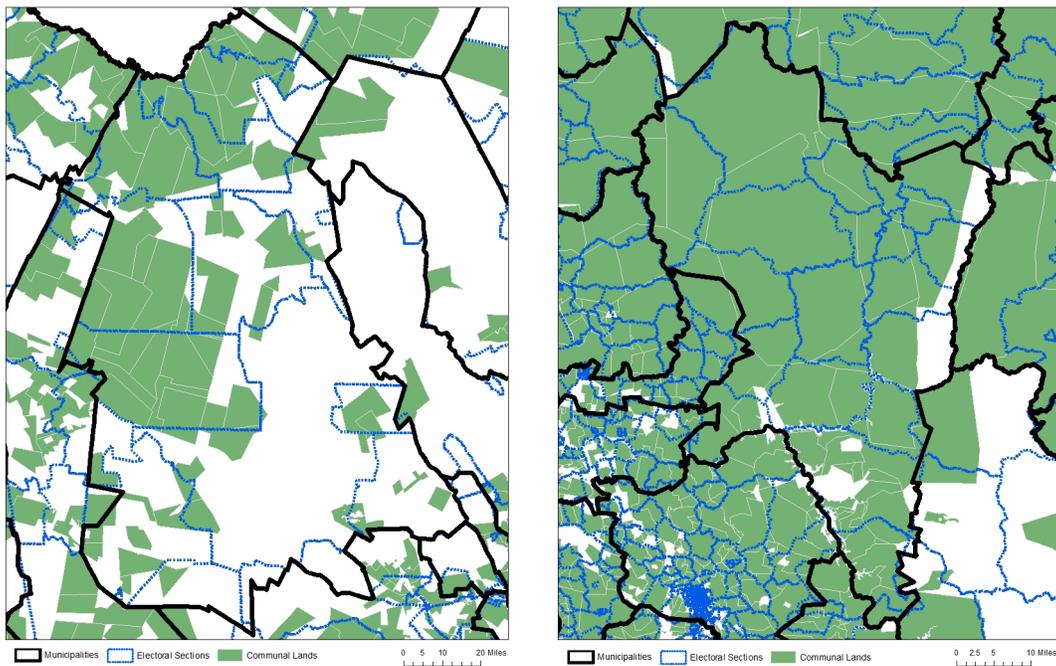
Ocampo in Coahuila de Zaragoza State   Del Nayar in Nayarit State

Note: Municipal boundaries are in black, electoral sections in blue and communal lands in green.

Figure 2b
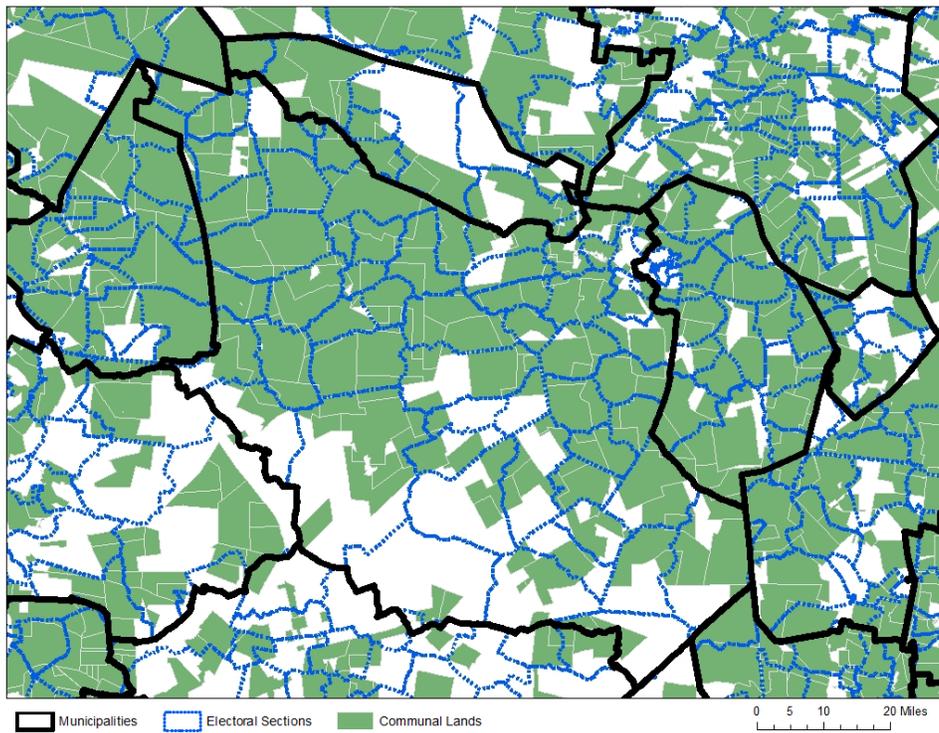
Concepcion del Oro Mazapil, and Melchor Ocampo in Zacatecas State
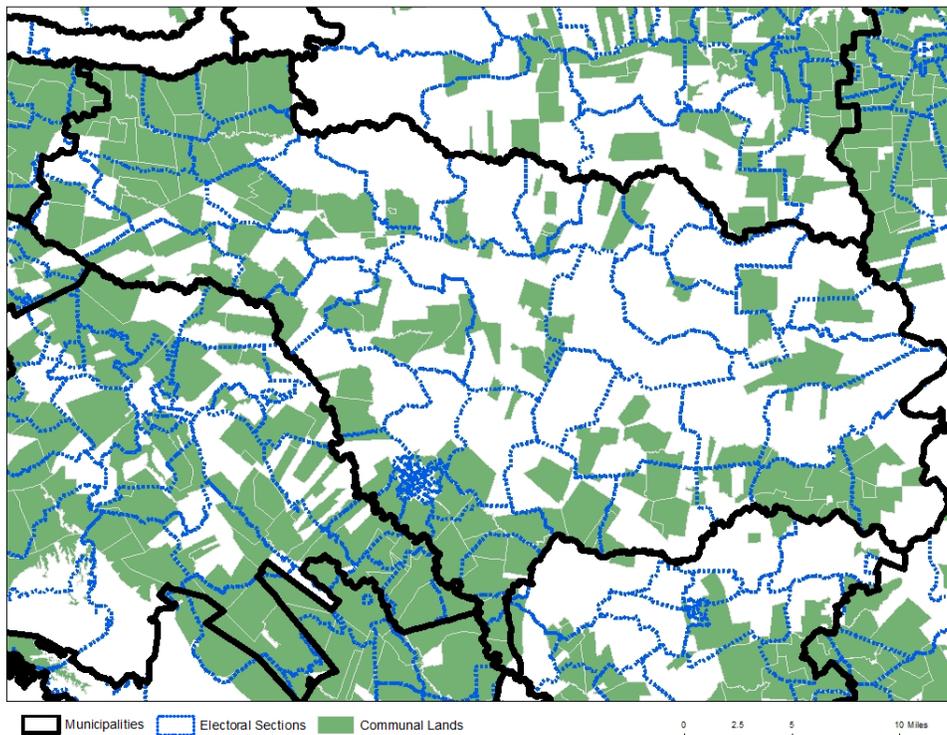
Tierra Blanca in Veracruz de Ignacio de la Llave

Note: Municipal boundaries are in black, electoral sections in dotted blue and communal lands in green.

Figure 3

Case a

Case b

Case c

Case d

Note:

⬤ Communal Land (1000 voters)

Electoral Section 1 (1000 voters)

Electoral Section 2 (2000 voters)

Electoral Section 3 (500 voters)

Electoral Section 4 (500 voters)

Electoral Section 5 (1000 voters)

Electoral Section 6 (1000 voters)

38
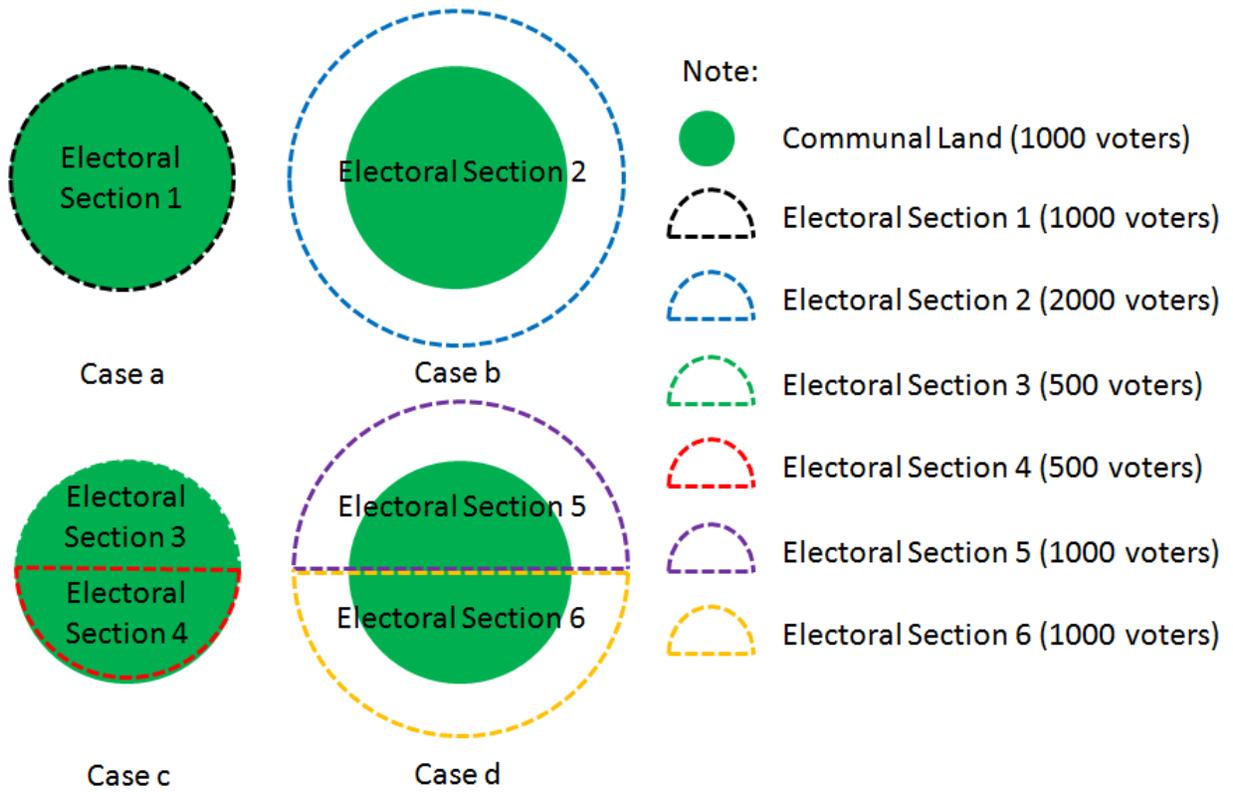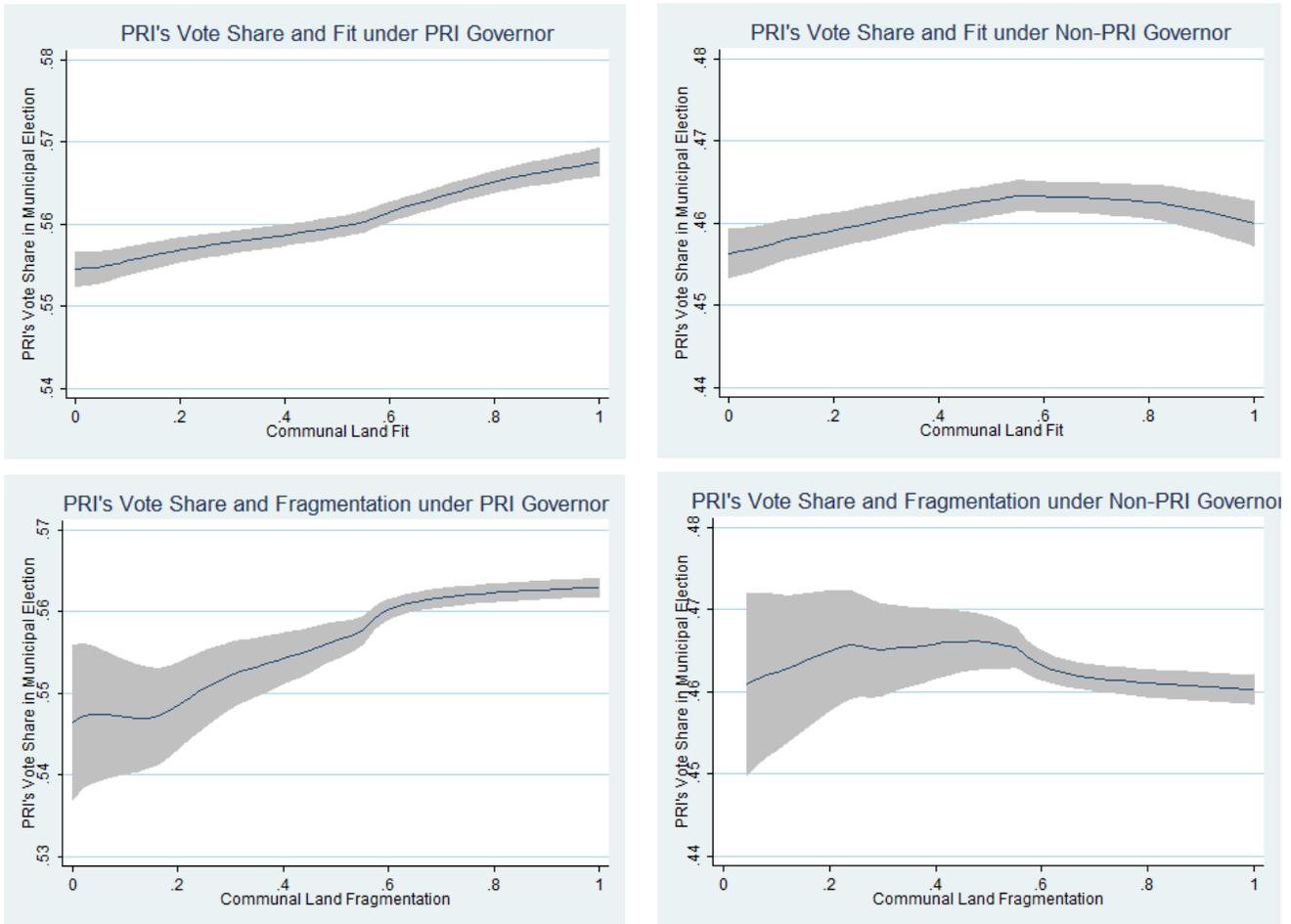
Figure 4

Note: The relationship of the PRI's vote share with the communal land fit is in the top figures, and with the communal land fragmentation in the bottom figures. The two left figures indicate these associations when the PRI controls the state government and the two right ones when it does not.

Figure 5
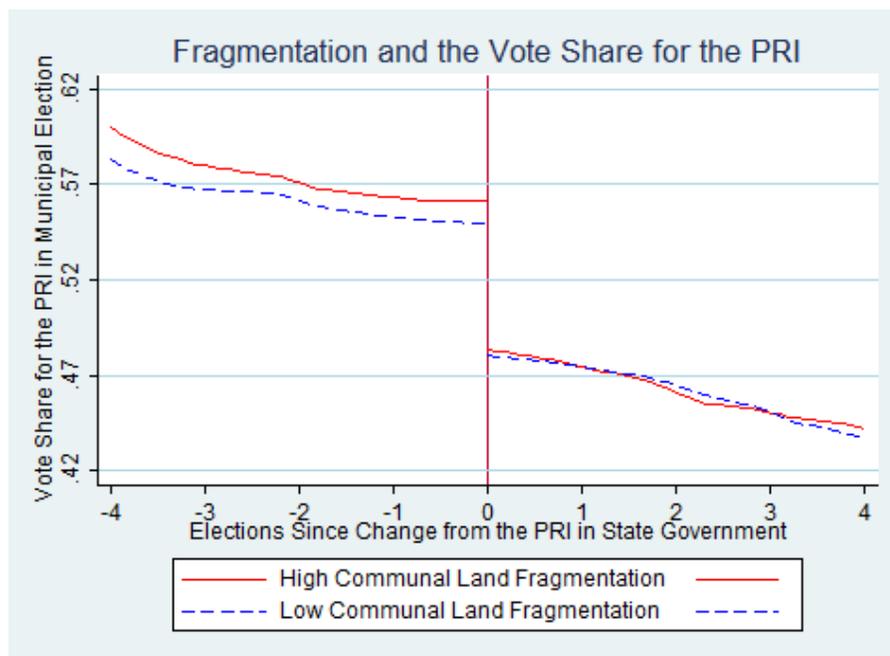
Note: The red line indicates the change from a state governor of the PRI to a state governor that belongs to another party.

By construction, only municipalities that experienced a change in party at the state government level are included in the plot.

Figure 6
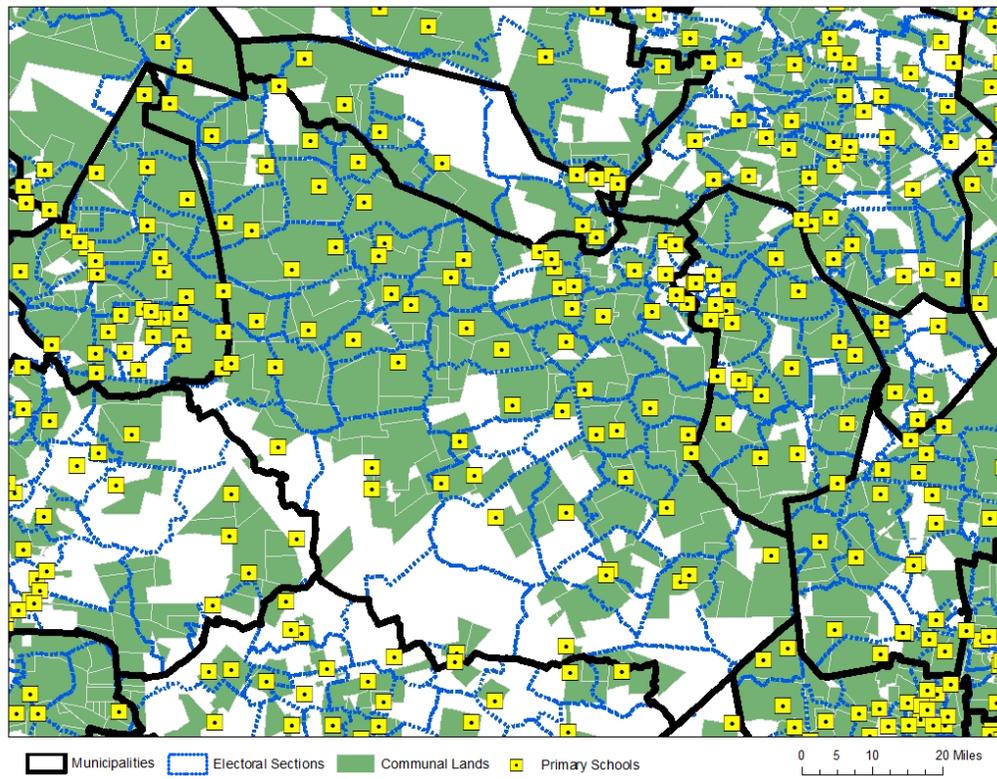
Note: Municipal boundaries are in black, electoral sections in dotted blue, communal lands in green and primary schools in yellow.

Figure 7

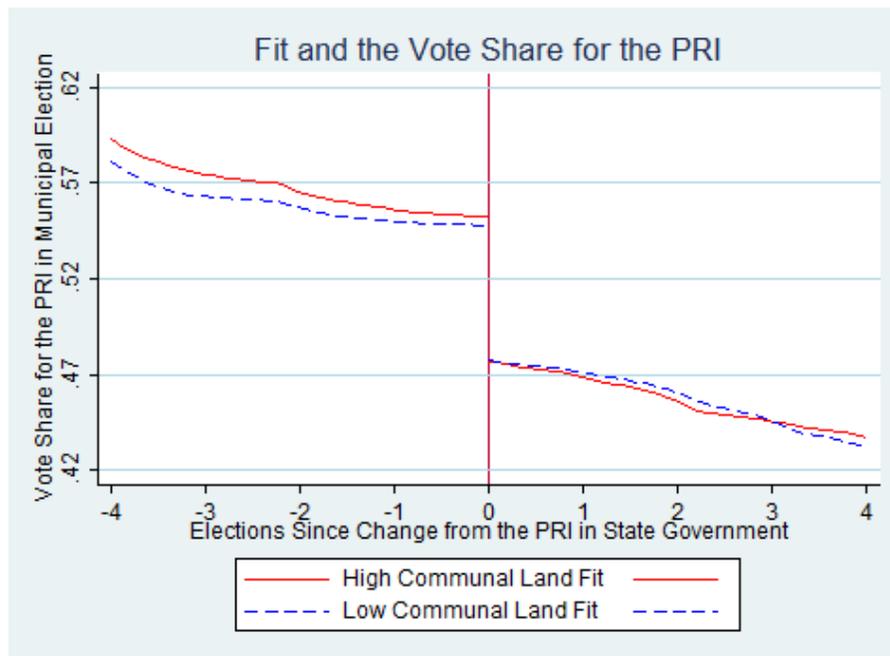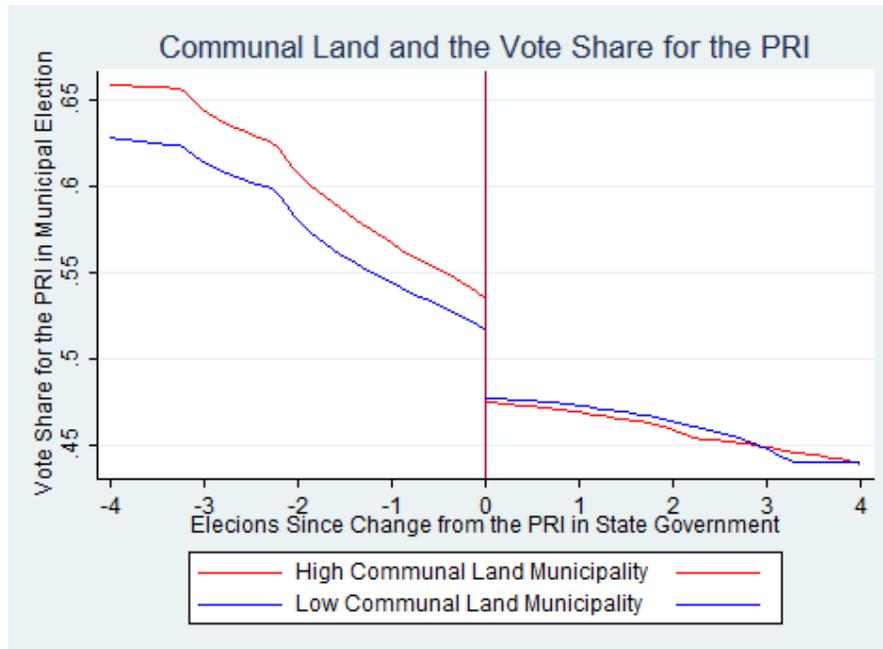Note: The red line indicates the change from a state governor of the PRI to a state governor that belongs to another party.

By construction, only municipalities that experienced a change in party at the state government level are included in the plot.

Table 1: Partial Correlations Between Fit and Fragmentation, their Determinants and the Vote Share for the PRI in Municipal Elections

Panel A: Partial Correlation Between the Determinants of Fit and Fragmentation, and Fit

Outcome: Fit

	(1)	(2)	(3)	(4)
Electoral Section Area	.0467***			
	[.0035]			
Electoral Section Voters		-.029***		
		[.0085]		
Communal Land Area			-.025***	
			[.0087]	
Communal Land Voters				-.0844***
				[.0053]
Mean Fit	0.4222	0.4222	0.4222	0.4222
Mean Regressor	2.187	7.31	2.916	7.338
Standard Deviation Regressor	1.922	0.8142	1.326	1.463
Observations	27931	27931	27931	27931
R-squared	0.1949	0.0274	0.0365	0.3353

Panel B: Partial Correlation Between the Determinants of Fit and Fragmentation, and Fragmentation

Outcome: Fragmentation

	(1)	(2)	(3)	(4)
Electoral Section Area	.0249***			
	[.0048]			
Electoral Section Voters		-.0136**		
		[.0055]		
Communal Land Area			-.0377***	
			[.009]	
Communal Land Voters				-.0651***
				[.0071]
Mean Fit	0.8058	0.8058	0.8058	0.8058
Mean Regressor	2.187	7.31	2.916	7.338
Standard Deviation Regressor	1.922	0.8142	1.326	1.463
Observations	27931	27931	27931	27931
R-squared	0.2572	0.2004	0.2537	0.4203

Panel C: Partial Correlation Between the Determinants of Communal Land Fit and Fragmentation, the Vote Share for the PRI in Municipal Elections

Outcome: The Vote Share for the PRI in Municipal Elections

	(1)	(2)	(3)	(4)
Electoral Section Area * PRI's Governor	0.005			
	[.0034]			
Electoral Section Voters * PRI's Governor		-0.0132		
		[.0081]		
Communal Land Area * PRI's Governor			0.0025	
			[.0085]	
Communal Land Voters * PRI's Governor				-0.0067
				[.0053]
Mean Vote Share for the PRI	0.5045	0.5045	0.5045	0.5045
Mean Regressor	2.201	7.327	2.934	7.351
Standard Deviation Regressor	1.943	0.8206	1.32	1.47
Observations	133943	133943	133943	133943
R-squared	0.0615	0.0556	0.056	0.0574

Note: In all specifications, the units of observation are the electoral section, and we cluster standard errors at the state level. Fit and fragmentation are the area weighted average of the communal land fit and fragmentation of the communal lands that overlap with the electoral section. The communal land fit captures the area weighted average share of voters of each section that overlaps with the communal land. The communal land fragmentation captures how fragmented a communal land is into the electoral sections it overlaps with. * p<.1, ** p<.05, *** p<.01.

Table 2: The Effect of Fit and Fragmentation on the PRI's Vote Share in Municipal Elections

	(1)	(2)	(3)	(4)
PRI's Governor	.1214***	.1259***	.1723***	
	[.0422]	[.0423]	[.0556]	
Fit	-0.0047	-0.0067		
	[.0229]	[.0243]		
PRI's Governor * Fit	.0808***	.0859***	.1249**	0.0717*
	[.0289]	[.0291]	[.0486]	[.0426]
Fragmentation	-0.0039	-0.0061		
	[.0264]	[.0262]		
PRI's Governor * Fragmentation	0.0248	0.0313	.0722**	.0559**
	[.0349]	[.0336]	[.0342]	[.0267]
Effect (pp)	2.19	2.42	4.04	2.60
Area and population controls	Yes	Yes	Yes	Yes
Municipality fixed effects	Yes	Yes		
Spatial controls		Yes		
Electoral Section fixed effects			Yes	Yes
State - Year Fixed Effects				Yes
Mean Outcome	0.5045	0.5045	0.5045	0.5045
Mean Fit	0.4235	0.4235	0.4235	0.4235
Standard Deviation Fit	0.2115	0.2115	0.2115	0.2115
Mean Fragmentation	0.8088	0.8088	0.8088	0.8088
Standard Deviation Fragmentation	0.193	0.193	0.193	0.193
Observations	133943	133943	133943	133943
R-squared	0.2808	0.2883	0.5062	0.567

Note: In all specifications, the unit of observation is the electoral section, we control for the share of the electoral section that overlaps with communal lands and its interaction with PRI's Governor, we include year fixed effects, and we cluster standard errors at the state level. Fit and fragmentation are the area weighted average of the communal land fit and fragmentation of the communal lands that overlap with the electoral section times the share of the electoral section that overlaps with communal lands. The communal land fit captures the area weighted average share of of each section that overlaps with the communal land. The communal land fragmentation captures how fragmented a communal land is into the electoral sections it overlaps with. Area and population controls include electoral area's area and registered voters, and weighted average area and registered voters of the overlapping communal lands. Geographical controls include flexible polynomials of latitude and longitude of the centroid of each electoral section interacted with state dummies. * p<.1, ** p<.05, *** p<.01.

Table 3: Placebo on the Effect of Fit and Fragmentation on the PRI's Vote Share in Municipal Elections

	(1)	(2)	(3)	(4)
PRI's Mayor	0.0142	0.0115	.0546**	.0461**
	[.0238]	[.0241]	[.0199]	[.0202]
Fit	0.0018	0.0047		
	[.0175]	[.0175]		
PRI's Mayor * Fit	0.0104	0.009	0.0149	0.0139
	[.0165]	[.0163]	[.0125]	[.013]
Fragmentation	0.0106	0.0117		
	[.0167]	[.0169]		
PRI's Mayor * Fragmentation	-0.031	-0.029	-0.0224	-0.0258
	[.0218]	[.0217]	[.0164]	[.0177]
Effect (pp)	-0.38	-0.37	-0.12	-0.20
Area and population controls	Yes	Yes	Yes	Yes
Municipality fixed effects	Yes	Yes		
Spatial controls		Yes		
Electoral fixed effects			Yes	Yes
State - Year Fixed Effects				Yes
Mean Outcome	0.5044	0.5044	0.5044	0.5044
Mean Fit	0.4236	0.4236	0.4236	0.4236
Standard Deviation Fit	0.2115	0.2115	0.2115	0.2115
Mean Fragmentation	0.8091	0.8091	0.8091	0.8091
Standard Deviation Fragmentation	0.1927	0.1927	0.1927	0.1927
Observations	133730	133730	133730	133730
R-squared	0.2824	0.2893	0.2813	0.3467

Note: In all specifications, the unit of observation is the electoral section, we control for the share of the electoral section that overlaps with communal lands and its interaction with PRI's Mayor, we include year fixed effects, and we cluster standard errors at the state level. Fit and fragmentation are the area weighted average of the communal land fit and fragmentation of the communal lands that overlap with the electoral section times the share of the electoral section that overlaps with communal lands. The communal land fit captures the area weighted average share of of each section that overlaps with the communal land. The communal land fragmentation captures how fragmented a communal land is into the electoral sections it overlaps with. Area and population controls include electoral area's area and registered voters, and weighted average area and registered voters of the overlapping communal lands. Geographical controls include flexible polynomials of latitude and longitude of the centroid of each electoral section interacted with state dummies. * p<.1, ** p<.05, *** p<.01.

Table 4: Difference in Differences Estimates of the Effect a PRI's Governor on the PRI's Vote Share in Municipal Elections

Outcome: the PRI's vote share	(1)	(2)	(3)	(4)
PRI's Governor	-0.0214		0.0369	
	[.0264]		[.1576]	
Communal Land * PRI's Governor	.1565**	.1409***	.1507**	.1405***
	[.061]	[.0376]	[.0616]	[.0459]
Agricultural Land * PRI's Governor	-0.0067	-0.0473	-0.0053	-0.0425
	[.0462]	[.0466]	[.0416]	[.0412]
Municipality and Year Fixed Effects	Yes	Yes	Yes	Yes
State - Year Fixed Effects		Yes		Yes
Controls for Economic Development			Yes	Yes
Mean of Ouctome	0.541	0.541	0.5408	0.5408
Mean of Communal Land	0.2333	0.2333	0.2332	0.2332
Standard Deviation of Communal Land	0.1847	0.1847	0.1846	0.1846
Mean of Agricultural Land	0.5249	0.5249	0.5252	0.5252
Standard Deviation of Agricultural Land	0.2837	0.2837	0.2837	0.2837
Observations	13902	13902	13855	13855
R - squared	0.5603	0.6577	0.5709	0.6641

Note: In all specifications, the units of observation are municipalities and we cluster standard errors at the state level. Controls for economic development include the share of households with access to electricity, piped water and connection to drainage. * p<.1, ** p<.05, *** p<.01.

Table 5: Difference in Differences Estimates of the Effect a PRI's Governor on Whether the PRI Wins in Municipal Elections

	(1)	(3)	(2)	(4)
PRI's Governor	-0.0811		-0.1106	
	[.1195]		[.5689]	
Communal Land * PRI's Governor	.4844*	.3658*	.4436*	.392*
	[.246]	[.2053]	[.2467]	[.2272]
Agricultural Land * PRI's Governor	-0.0025	-0.1809	-0.0058	-0.1926
	[.1214]	[.1592]	[.1237]	[.1754]
Municipality Fixed Effects	Yes	Yes	Yes	Yes
State - Year Fixed Effects		Yes		Yes
Controls for Economic Development			Yes	Yes
Mean of Ouctome	0.5759	0.5759	0.5756	0.5756
Mean of Communal Land	0.2333	0.2333	0.2332	0.2332
Standard Deviation of Communal Land	0.1847	0.1847	0.1846	0.1846
Mean of Agricultural Land	0.5249	0.5249	0.5252	0.5252
Standard Deviation of Agricultural Land	0.2837	0.2837	0.2837	0.2837
Observations	13902	13902	13855	13855
R - squared	0.3481	0.4661	0.3539	0.4692

Note: In all specifications, the units of observation are municipalities and we cluster standard errors at the state level. Controls for economic development include the share of households with access to electricity, piped water and connection to drainage. * p<.1, ** p<.05, *** p<.01.

Table 6: Difference in Differences Estimates of the Effect a PRI's Mayor on the PRI's Vote Share in Municipal Elections

	(1)	(2)	(3)	(4)
PRI's Mayor	0.006		0.0142	
	[.0215]		[.1156]	
Communal Land * PRI's Mayor	-0.0076	-0.0064	-0.0137	-0.0301
	[.0328]	[.0227]	[.0288]	[.0229]
Agricultural Land * PRI's Mayor	-.0584*	-.0462***	-.0608**	-.0733***
	[.0298]	[.0125]	[.0283]	[.0182]
Municipality and Year Fixed Effects	Yes	Yes	Yes	Yes
State - Year Fixed Effects		Yes		Yes
Controls for Economic Development			Yes	Yes
Mean of Ouctome	0.5409	0.5409	0.5407	0.5407
Mean of Communal Land	0.2333	0.2333	0.2331	0.2331
Standard Deviation of Communal Land	0.1846	0.1846	0.1846	0.1846
Mean of Agricultural Land	0.5248	0.5248	0.525	0.525
Standard Deviation of Agricultural Land	0.2837	0.2837	0.2837	0.2837
Observations	13822	13822	13779	13779
R - squared	0.5648	0.6608	0.5728	0.6674

Note: In all specifications, the units of observation are municipalities and we cluster standard errors at the state level. Controls for economic development include the share of households with access to electricity, piped water and connection to drainage. * p<.1, ** p<.05, *** p<.01.

Table 7: Difference in Differences Estimates of the Effect of a PRI's Governor on Educational Outcomes for Primary and Secondary School in Communal Land Areas

Outcomes	Schools	Schools	Teachers	Teachers	Students	Students
	(1)	(2)	(3)	(4)	(5)	(6)
PRI's Governor	0.0195		.4327**		7.904	
	[.0236]		[.1937]		[6.497]	
Communal Land * PRI's Governor	-.2649***	-.2857***	-1.362***	-.9697***	-32.78***	-25.08***
	[.0569]	[.0741]	[.3992]	[.3555]	[11.8]	[9.673]
Agricultural Land * PRI's Governor	0.0222	0.0821	-0.1248	0.2694	2.821	14.18
	[.0416]	[.0605]	[.2827]	[.3395]	[9.317]	[9.215]
Municipality and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State - Year Fixed Effects		Yes		Yes		Yes
Mean Ouctome	1.276	1.276	8.343	8.343	191.6	191.6
Mean Communal Land	0.234	0.234	0.2339	0.2339	0.2334	0.2334
Standard Deviation Communal Land	0.1894	0.1894	0.1892	0.1892	0.1891	0.1891
Mean Agricultural Land	0.5272	0.5272	0.5272	0.5272	0.5264	0.5264
Standard Deviation Agricultural Land	0.2861	0.2861	0.2857	0.2857	0.2862	0.2862
Observations	32663	32663	32781	32781	33015	33015
R - squared	0.9807	0.9828	0.9111	0.9346	0.8018	0.832

Note: In all specifications, we cluster standard errors at the municipality level. Schools, Teachers and Students are per 1,000 inhabitants. * p<.1, ** p<.05, *** p<.01.

Table 8: Differences in Differences Estimates of the Effect of PRI Governorship on Educational Outcomes in Communal Land Areas Controlling for Covariates of Economics Development

Outcomes	Schools	Schools	Teachers	Teachers	Students	Students
	(1)	(2)	(3)	(4)	(5)	(6)
PRI Governor	-0.3929		-1.743		-55.87**	
	[.4829]		[1.106]		[23.77]	
Communal Land * PRI's Governor	-.1648***	-.2195***	-1.204***	-.8139**	-30.32***	-21.29**
	[.0533]	[.0713]	[.3827]	[.3512]	[11.01]	[9.46]
Agricultural Land * PRI's Governor	-0.001	0.0483	-0.1899	0.1254	0.8899	9.231
	[.0402]	[.0572]	[.2803]	[.3431]	[9.294]	[9.294]
Municipality and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State - Year Fixed Effects		Yes		Yes		Yes
Mean Ouctome	1.276	1.276	8.343	8.343	191.6	191.6
Mean Communal Land	0.234	0.234	0.2339	0.2339	0.2334	0.2334
Standard Deviation Communal Land	0.1894	0.1894	0.1892	0.1892	0.1891	0.1891
Mean Agricultural Land	0.5272	0.5272	0.5272	0.5272	0.5265	0.5265
Standard Deviation Agricultural Land	0.2861	0.2861	0.2857	0.2857	0.2862	0.2862
Observations	32619	32619	32737	32737	32972	32972
R - squared	0.9809	0.9829	0.9114	0.9349	0.803	0.8331

Note: In all specifications, we cluster standard errors at the municipality level. Schools, Teachers and Students are per 1,000 inhabitants. Controls for economic development include the share of households with access to electricity, piped water and connection to drainage. * p<.1, ** p<.05, *** p<.01.

Table 9: Difference in Differences Estimates of the Effect a PRI?'s Mayor on Educational Outcomes

Outcomes	Schools	Schools	Teachers	Teachers	Students	Students
	(1)	(2)	(3)	(4)	(5)	(6)
Communal Land * PRI Governor	0.0013	-0.0046	-0.0941	-0.1239	-2.564	-3.928
	[.0377]	[.0371]	[.2112]	[.2086]	[5.266]	[5.258]
Agricultural Land * PRI Governor	0.0245	0.0294	0.1381	0.1206	3.251	2.962
	[.0216]	[.0252]	[.121]	[.1362]	[2.957]	[3.252]
Municipality and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State - Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls for Economic Development		Yes		Yes		Yes
Mean Ouctome	1.267	1.266	8.321	8.322	191.3	191.3
Mean Communal Land	0.2342	0.2342	0.2342	0.2341	0.2337	0.2336
Standard Deviation Communal Land	0.1843	0.1843	0.1842	0.1841	0.1841	0.1841
Mean Agricultural Land	0.5283	0.5284	0.5283	0.5284	0.5275	0.5276
Standard Deviation Land	0.2829	0.2829	0.2825	0.2826	0.2831	0.2831
Observations	30013	29964	30130	30081	30364	30315
R - squared	0.9826	0.9831	0.9334	0.9349	0.8287	0.8303

Note: In all specifications, we cluster standard errors at the municipality level. Schools, Teachers and Students are per 1,000 inhabitants. Controls for economic development include the share of households with access to electricity, piped water and connection to drainage. * p<.1, ** p<.05, *** p<.01.

Table A: Available Municipal Election Data at the Electoral Section Level

State	Available Data Starting in 1994	Unavailable Data Starting in 1994
Aguascalientes	2004 , 2007, 2010	1995,1998, 2001
Baja California	1995, 1998, 2001, 2004, 2007, 2010	None
Baja California Sur	1999, 2002, 2005, 2008	1996
Campeche	1997, 2000, 2003, 2006, 2009	1994
Chiapas	1995, 1998, 2001, 2004, 2007, 2010	None
Chihuahua	1998, 2001, 2004, 2007, 2010	1995
Coahuila	1996, 1999, 2002, 2005, 2009	None
Colima	1994, 1997, 2000, 2003, 2006, 2009	None
Federal District	not in sample	not in sample
Durango	1995, 1998, 2001, 2004, 2007, 2010	None
Guanajuato	1997, 2000. 2003, 2006, 2009	1994
Guerrero	1996, 1999. 2002, 2005, 2008	None
Hidalgo	1996, 1999, 2002, 2005, 2008	None
Jalisco	1995, 1997, 2000, 2003, 2006, 2009	None
Michoacán	1995, 1998, 2001, 2004, 2007	None
Morelos	1997, 2000, 2003, 2006, 2009	1994
Nayarit	1996, 1999, 2002, 2005, 2008	None
Nuevo León	2000, 2003, 2006, 2009	1994, 1997
Oaxaca	2004, 2007, 2010	1995, 1998, 2001
Puebla	1998, 2001, 2004, 2007	1995, 2010
Querétaro	1997, 2000, 2003, 2006, 2009	1994
Quintana Roo	1999, 2002, 2005, 2008, 2010	1996
San Luis Potosí	1997, 2000, 2003, 2006, 2009	1994
Sinaloa	2001, 2004, 2007, 2010	1995, 1998
Sonora	1994, 1997, 2000, 2003, 2006, 2009	None
State of Mexico	1996, 2000, 2003, 2006, 2009	None
Tabasco	1997, 2000, 2003, 2006, 2009	1994
Tamaulipas	1995, 1998, 2001, 2004, 2007, 2010	None
Tlaxcala	2001, 2004, 2010	1995, 1998, 2007
Veracruz	2000, 2004, 2007. 2010	1994, 1997
Yucatán	1995, 1998, 2001, 2004, 2007, 2010	None
Zacatecas	1998, 2001, 2004, 2007, 2010	1995