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Authoritarian Survival and Poverty Traps: Land Reform in Mexico

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This paper examines why governments in underdeveloped countries systematically pursue policies that prevent long-term economic growth. Focusing on the design and implementation of Mexico's massive land redistribution program, we argue that governments do so to improve their chances of political survival. Mexico's incumbent PRI regime gave peasants communal property under a restrictive and inefficient property rights regime. This form of land reform created dependence upon the regime for survival. We find empirical support for this hypothesis using data from a panel of Mexican states from 1917-1992. Land distribution was higher during election years and where the threat of rural unrest was greater. We also show that economic growth and modernization eroded PRI support over the long term, and, further, that PRI support eroded more slowly in states receiving greater levels of land. Inefficient land redistribution therefore served the PRI's electoral interests, generating a loyal political clientele; and it contributed to political stability. Nonetheless, this policy carried steep costs: land reform substantially depressed long-term economic growth. These findings hold across various model specifications and instrumental variables estimation.

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A general conundrum of government in underdeveloped countries is why political officials systematically pursue policies that prevent long-term economic growth. Governing coalitions in these countries create monopolies and limit economic entry to create rents for favored constituents that distort prices and prevent competitive markets (North, Wallis, and Weingast 2009); create overvalued currencies, allowing the government to allocate scarce foreign exchange to valued constituents or forcing utilities to provide electrical and water service at non-remunerative prices (Easterly 2004); inflate pay for government employees, teachers, and the military in a way that causes budget deficits and reduces future revenue (Bueno de Mesquita et al. 2003); and impose financial market regulations that prevent these markets from financing enterprise creation (Rajan and Zingales 2003).

We address this puzzle in the context of a specific, historically prominent instance: land reform in Mexico. The puzzle is twofold. First, why did land reform in Mexico fail to spur long-term economic growth? Land redistribution in many countries – such as China, Japan, South Korea, and Taiwan – has catalyzed growth by creating greater equality of holdings (Alesina and Rodrik 1994, Lipton 2009). Similarly, Indian states with more intense land reform witnessed higher growth and reduced poverty (Besley and Burgess 2000). In fact, Bardhan and Mookherjee (2010) suggest in their careful study of West Bengal that land reform is one of the few developmental policies in which the trade-off between equity and growth can be avoided. The virtuous effects of land reform in India are accounted for by the fact that land can be used as collateral for credit, and peasants can engage in productivity-enhancing labor and sharecropping contracts. In Japan, South Korea, and Taiwan, reforms were characterized by land-to-the-tiller programs that created independent small farmers largely out of former renters. These programs stand in contrast to most land reforms, which fail to implement private property rights reforms

(de Janvry et al. 2013), despite their important role in development in agrarian societies (Lipton 2009).

The second part of the puzzle is why Mexico's land reform had such peculiar properties. Mexico's land reform withheld property titles and created inefficient communal property rights subject to myriad restrictions, including the prohibition of renting, selling, and using land as collateral for loans (de Janvry et al. 2013). Land reform ultimately trapped peasants into dependence on the state, rather than becoming a major factor underpinning long-term economic development.

Most of the literature emphasizes that Mexico's land redistribution implied a tension between economic growth (capitalist accumulation) and redistribution (social justice) in the countryside; the literature typically attributes the shortcomings of land reform to the failure to make equity and redistribution the overriding policy concern (see e.g. Bartra 1993, Ibarra Mendivil 1989, Warman 1972). More recent accounts by economists and policymakers stress the perversity of collective ownership within the *ejido*, or communal farm (e.g. Muñoz-Piña et al. 2003). The literature in political science, history, and sociology suggests that land reform was either employed as an instrument of peasant control or regime "legitimation" (Esteva 1980, Warman 1972).

We build on these works, focusing on why the governing Institutional Revolutionary Party (PRI) structured property rights in an inefficient manner. Mexico specialists have long argued that the PRI used its control of land to sustain its patronage networks (e.g. Simpson 1937, Silva Herzog 1959, Eckstein 1968, Sanderson 1986). Given that the PRI used many other policies to shore up election prospects rather than accomplish their ostensible rationales (see eg. Diaz-Cayeros, Estévez, and Magaloni 2013, Fox 1994, Beer 2003, Hiskey and Canache 2005,

Hiskey and Bowler 2005), scholars agree that land tenure arrangements in Mexico were inefficient.

This paper provides a more comprehensive examination of the interplay of land reform, development outcomes, and the perpetuation of the PRI in office. Building upon previous scholarship, we leverage new data to help bring more specificity and nuance to the Mexican case while connecting it more broadly to the study of autocratic regime survival. To understand the structure and consequences of Mexico's land reform program, we model underdevelopment as a function of political survival (e.g. Acemoglu and Robinson 2006, Ames 1987). Electoral imperatives and the mobilization of peasants as voters in local and national elections were foundational to the PRI's rule.[1] We argue, contrary to the substantial literature that emphasized the threats and dangers of commercial agriculture, that the lack of markets in the agrarian sector – in particular the absence of credit and land markets – was an essential element of political control used by the PRI to make peasants dependent on the regime by denying them access to independent sources of income.[2] Notwithstanding a programmatic vision grounded in social justice emerging from the Revolution, the PRI designed land distribution policies to generate political dependence rather than to empower peasants and enhance their ability to escape poverty via increased agricultural productivity.

To be sure, land distribution aided beneficiaries in the short term and provided an opportunity to remain in the agricultural sector rather than migrating to cities due to land scarcity. These reasons pushed peasants to petition for land from the regime for over 70 years. Yet land reform also carried substantial long-term costs for beneficiaries and for Mexico more

[1] An extensive literature shows that peasants were a crucial base of support for the PRI. See e.g. Ames (1970) and Kurtz (2004).
[2] Indeed, when land reform ended in 1992 and the PRI began to grant complete property rights, many peasants defected to the challenger pro-market PAN (de Janvry et al. 2013).

broadly. Land recipients came to rely on a flow of federal financial resources and subsidies to survive (i.e. credit, insurance, seeds, and fertilizers). Receiving these subsidies required that the new landholders support those in power, locking peasants into supporting the regime. Furthermore, land reform depressed overall economic growth in the long term, either by encouraging subsequent generations to stay in the less dynamic rural sector or because it more directly harmed growth by directing resources away from industrialization and creating a property rights system that discouraged long-term incentives to invest and produce.

We provide systematic empirical evidence for our claims, measuring the magnitude of the effects of land reform on both political support and economic performance and probing the robustness of the results to both model specification and potential endogeneity. First, we estimate the electoral benefits of land redistribution. Our data analysis allows us to estimate two critical values: (i) the number of votes that land reform afforded the PRI; and (ii) the relative pay-off of this policy vis-à-vis promoting economic growth. In the short run, both growth and land distribution had similar effects on PRI support. But land reform had crucial advantages over growth: economic growth and modernization eroded support for the PRI over the long term, whereas land reform generated a loyal political clientele. Second, our empirical results reveal the extent to which sustained economic growth reduced PRI support as voters defected from the party when state incomes increased. Third, we show that the economic consequences of the land reform strategy had conflicting effects over time. Using a standard growth regression framework applied to Mexican states, we show that land distribution increased economic growth in the short term. The long-term effects of cumulative reform, by contrast, were negative, substantially lowering growth and producing economic stagnation. Finally, we analyze the temporal patterns in land distribution. Our results show that the PRI distributed land as a function of two political

variables: the electoral cycle and the likelihood of rural unrest. This pattern is hard to reconcile with alternative accounts that do not countenance a political objective.

The paper is organized as follows. The next section discusses land reform policies in Mexico, fleshing out our theoretical argument. The following section provides empirical tests of our claims that land reform bolstered the PRI but hindered long-term economic growth. The last section concludes with comments from a comparative perspective.

THE ECONOMIC AND POLITICAL LOGICS OF LAND REFORM

In many countries, land reform has furthered both equity and efficiency goals. Land reform often benefits relatively poor peasants (Lipton 2009), and the cross-sectional evidence suggests that a more equitable distribution of land is growth enhancing (Alesina and Rodrik 1994). Why should land reform or redistribution contribute to economic growth? Alesina and Rodrik (1994) suggest that a relatively egalitarian distribution of land is critical for the mobilization of savings and investment that makes economic growth possible. Land reform improves economic growth to the extent that millions of farmers can own their own land, rent someone else's land, access credit, save and invest, and purchase insurance, all improving incentives and performance. It can raise the demand for labor, thereby driving up wages, and create farm enterprise opportunities (Lipton 2009). Land reform can also promote greater productivity to the extent that it improves the net asset position of tenants, even if they do not own land (Besley and Burgess 2000). Land distribution enhances efficiency when it creates better incentives between landlords and peasants; for example, when it improves the contractual relationships in agricultural input and output markets.

Many countries around the world have pursued land reform, and many of these are

regarded as highly successful (Lipton 2009). Although the definition of "success" in land reform varies widely, one benchmark is that reform allows peasants to escape from poverty. This does not imply that peasants must remain on the land; migration to better paid jobs in the service or industrial sectors in cities may also improve their well-being. If peasants escape poverty, overall agricultural productivity should increase due to greater investment and a more intensive use of labor. This improvement, in turn, increases overall economic performance.

By this standard, Mexico's land reform has been at best only partly successful. From an economic standpoint, land distribution proved quite inefficient. Scholars broadly agree that Mexican agriculture experienced a steady decline at least since the 1960s (Lamartine Yates 1981, Sanderson 1986, Zepeda 2000). As we show below, while land reform in Mexico resulted in a modest short-term boost in economic growth, it ultimately undercut long-term growth in the regions where it was most vigorously pursued. These features stand in striking contrast to the design and virtuous effects of land reform in other countries, such as Taiwan, Korea, Japan, and the earlier land distribution policies of the United States (e.g. the 1862 Homestead Act).

To explain the shortcomings in Mexico's land reform, our argument stresses the perverse incentives faced by an autocratic regime seeking to sustain itself. The mobilization of peasants as voters in local and national elections was a cornerstone of the PRI's rule. Given this electoral imperative, the distribution of land along with the suppression credit and land markets was an effective tool of political control used by the PRI to make these peasants dependent on the regime by denying them access to independent sources of income. Land distribution was also used as a strategy to undercut the threat of rural instability and maintain a dispersed rural population reliant on the regime. When social unrest and rebellion in the countryside were higher, as during the 1920s-1930s and the 1960s-1970s, the PRI increased land distribution to

reestablish rural order and fix peasant communities to the land. Thus, land reform in Mexico must be understood as another example of the PRI's use of its control of the state for a diversion of social surplus for partisan ends, rather than for ideological preferences of social justice. Political officials chose policies that enhanced the regime's political survival rather than the country's long-term economic interests.[3]

An appropriate model of the political economy of Mexico's development must explain two phenomena: the form of restrictions imposed by post-revolutionary regimes on land distributed by the state; and why Mexico's land reform had only a muted, fleeting positive effect on economic growth. Land reform in Mexico was characterized by the following features:

(i) Land was granted to groups, not to individuals;

(ii) Land distribution was a permanent process: it continued for decades (Prosterman and Riedinger 1987);

(iii) Land could not be legally sold, rented, or used for collateral (de Janvry, Gordillo and Sadoulet 1997);

(iv) The president was directly in charge of the distribution of land, as petitioned by peasants through the state governors and the National Agrarian Commission (Walsh Sanderson 1984);

(v) As land reform continued, a parallel private property regime for land rights was developed, which was invulnerable to expropriation by the state for the purposes of land redistribution;

(vi) The agrarian ministry settled land disputes with the input of peasant and farmer organizations, but in last appeal, by the president himself.

These features of Mexico's land reform operated in concert with a cumbersome land petition process to keep peasants supportive of the regime. Petitioning land from the government was not a trivial enterprise: it usually involved hiring a lawyer who would keep track of the long and complex process, send commissions to Mexico City to talk with the federal bureaucracies

[3] Our account is therefore in the spirit of North, Wallis, and Weingast's (2009) "natural state."

involved in the land granting process, and create an appropriate organizational form to manage the common pool resources obtained through the *ejido*. Zepeda (2000, 83) shows that settling controversies related to land title required 99 steps of legal procedure involving a multiplicity of authorities. Failing to support the PRI risked further delays and denial of petitions. Van der Haar (2001) shows that in the Tojolabal region the average time for a land petition to be executed was 12.4 years. Furthermore, Walsh Sanderson (1984) shows that on average across the country the lag between the provisional grant given by the governor and the definitive grant given by the president was another three years; and that the presidential grant would only be executed (i.e. land actually granted) four years later. Landlords used the complex agrarian bureaucracy and other strategies that relied upon the power of local authorities to buy time, even when land had been granted.

Many accounts have highlighted these characteristics of land reform in Mexico. However, most authors describe them as a natural consequence of historical processes: land reform happened as an imperative arising from the peasant demands for social justice. Few accounts explain why land reform had these specific characteristics. Marxist scholars studying the Mexican rural economy have focused more on issues of peasant dependence on the state, although they have linked land reform to the capitalist mode of production or agrarian protest rather than the electoral imperatives of PRI hegemony (see Bartra 1993; Ibarra Mendivil 1989).

Our theory of land reform draws on an approach to the political economy of development whereby the party in power can obtain electoral support either by promoting economic growth or by creating a "punishment regime" in which it uses its fiscal resources to induce political support by rewarding supporters and punishing opponents (e.g. Ames 1987). Voters must decide how to vote knowing that defectors may be punished by the withdrawal of government transfers.

This approach yields several insights. First, the poorer voters are, the more effective is the punishment regime in deterring voter defection. A fixed subsidy is more likely to sway a poor voter than a richer one. Second, the growth-promoting strategy has a serious disadvantage because it is self-defeating over time. Growth garners political support in the short run because it makes voters better off in that period. Yet the richer voters become, the more able they are to defect from the system. The policy perversity arises because the PRI based its long-term support on a critical mass of poorer voters whose dependency on the state was crucial to maintaining support. Whereas the PRI therefore had short-term incentives to deliver economic growth, consistent growth ultimately undercut their grip on power by enabling wealthier voters to defect from supporting the regime while still maintaining their livelihood.

Compared to successful land reform and distribution in many other countries, the design inefficiencies embedded in Mexico's reform were so significant that peasants typically required on-going subsidies to maintain productivity. These subsidies provided the PRI with a credible threat over local agricultural communities: failing to support the PRI in elections risked losing the subsidies needed to survive. If peasants and other opposition groups could have coordinated, they could have attempted to voting out the PRI or pressure for more autonomous peasant unions and distribution networks that would fix these shortcomings. But this type of coordination is very difficult, particularly in rural areas where populations are dispersed and relatively immobile. Indeed, as latent pressure from below became manifest in frequent rural rebellions in the 1960s and 1970s that threatened a more coherent challenge to political stability, the PRI responded with increased land distribution to reestablish rural order and keep peasant communities involved in production. One peasant community, acting on its own, cannot affect the system but only whether it receives its subsidies. This scenario forces each peasant community to tow the party

line.

The Mexican land distribution arrangement created a complex system that granted land to peasants in exchange for their political loyalty. Land was granted to a village as a whole, with individuals named as beneficiaries. Peasants acquired the right to use and work the land either individually or collectively, but were not granted full property rights. Peasants were not permitted to leave their plots idle for more than two consecutive years, and were not allowed to rent individualized plots.[4] If peasants migrated to the cities or to the U.S., they risked losing their land, which provided incentives to remain in the countryside where the PRI had greater leverage over them. This prevented markets from arising that would allow land to be transferred to the highest valued users. Furthermore, before the end of land reform in 1992, neither the village nor individual peasants could sell the land or use it as collateral to access commercial loans. Peasants consequently depended upon the state's credits for their livelihood. The agrarian federal bureaucracies, controlled by the PRI, could threaten the denial of credits if peasants failed to support the party.

Collective ownership meant that investment and improvements to land could occur only with the direct aid of the state, primarily through official petitions, rather than pursued by peasants as private enterprises. Furthermore, the value of the investments and improvements could not be appropriated by individual farmers, creating problems of moral hazard. In combination, these two effects encouraged the undercapitalization of land even in those *ejidos* with access to credit. Peasants came to rely on state subsidies and credits for seeds, insurance, fertilizer, and other inputs.

Land reform legislation evolved over time to seize on these characteristics and increase

[4] Evidence suggests that peasants were able to evade some of these restrictions. For example, many who migrated rented their lands.

the political utility of land reform as the early stages of reform gave way to continuous, decades-long reform under the PRI. Table 1 details key developments in the evolution of land reform legislation. It highlights how land policy gradually became centralized, how mechanisms of legal protection became increasingly weak, and how tension mounted between economic growth and keeping land reform policy alive. As PRI governments realized the deleterious long-term economic effects of their land reform policy on the agricultural productivity that was key to providing cheap food to potentially volatile urban workers, they sought to create a parallel system of land property rights that would be immune from the threat of land redistribution while keeping the *ejido* system intact.

Although some evidence exists that the collectivized *ejido* system was initially not inferior to private cultivation (Eckstein 1968), it eventually led to poor incentives for production, particularly as more low quality land was distributed. Lamartine Yates (1981,134) calculated that by 1970 crop output per hectare was around 40% higher in small private farms than in the *ejido* sector.

EMPIRICAL EVIDENCE: LAND DISTRIBUTION, ELECTORAL IMPERATIVES AND ECONOMIC GROWTH

This section provides empirical evidence regarding the political manipulation of land distribution policy and its consequences. First, we study the relationship between land distribution and the erosion of PRI support at the state level. Second, we study the short and long run consequences of land reform for economic growth. Finally, we investigate the timing of land reform.

Electoral Decline and Permanent Land Distribution

We have argued that land distribution helped generate long-term support among the peasantry for the PRI. To test whether land distribution helped the electoral fortunes of the party, we examine the determinants of PRI support in each Mexican state from 1940-1994. Mexican specialists have noted, at least since the work of Brandenburg (1955), that PRI support varies across states in significant ways. We test directly whether land distribution reduced the erosion of PRI support over time and show that land distribution improved electoral support for the PRI, controlling for wealth, economic growth, and urbanization.[5]

Several of the models in the analysis include state fixed effects, which implicitly control for unobserved state-specific and time-invariant heterogeneity (e.g. geography, proportion of arable land available for distribution, or political culture) that may jointly influence a state's support for the PRI as well as the degree of land reform. If a variable remains relatively constant over time, its omission will not bias our estimates in these models. Most of the estimations also include a time trend to capture the secular decline in support for the PRI over time. The time trend is specified as the log of the count of presidential administrations given that PRI support eroded slowly at first and then more quickly with time. Including this trend ensures that the estimated impact of land distribution on PRI support does not simply proxy for a secular shift that is due to other factors such as opinions about the party's legitimacy or national-level electoral irregularities or vote rigging.

To address potential issues of heteroskedasticity and any arbitrary patterns of correlation within countries, such as serial correlation and correlation due to state-specific components, we

[5] Kurtz (2004) provides one of the few econometric analyses of PRI support and agrarian politics, although his focus is on the period after 1991, once land reform ends. Using municipal-level data, he shows that peasants tended to support the PRI, confirming the individual level findings of the public opinion literature.

cluster standard errors by state. Lastly, because we are examining the determinants of PRI electoral support as a function of factors such as land distribution and economic growth, we lag the independent variables by one period so that they capture processes occurring temporally prior to an election and thus capture voter responses.

The dependent variable is measured as the state-level PRI vote share by presidential election. Data on PRI vote share are taken from Castellanos Hernández (1997). The mean PRI vote share by presidential election during the period was 0.824, or 82.4%. Table 2 contains a full set of summary statistics for this and other variables used in the analyses. [6]

As with numerous authors (e.g. Kurtz 2004, Magaloni 2006), we use PRI vote share data to analyze voter support for the party. Nonetheless these data should be treated with caution. As Klesner and Lawson (2001, 24) summarize, it is well known that "the PRI long engaged in any manner of fraud to increase its vote shares at the expense of the opposition." PRI vote share may therefore capture not only genuine voter support, including support generated clientelistically through policies such as land reform, but also the local capacity of the PRI to rig elections. Of course, to the extent that these are effectively random noise or uncorrelated with land reform, they should simply bias downward the estimated coefficients and make a relationship harder to find. The models address more serious concerns with rigging not only by including state fixed effects and a time trend, but also by testing robustness to state-specific time trends. For fabrication to be problematic in the fixed effects models with state-specific time trends, it would have to be quite particular: state-level and time-varying in a way that deviates from within-state trends in PRI support and is systematically positively correlated with observed land distribution. We are unaware of any literature suggesting this specific pattern of tampering.

[6] The supplementary appendix includes a codebook of variable coding and sources.

The key independent variable in the analysis is land distribution. Land distribution is measured in two different ways, with data constructed from the Mexican land registry kept by the Padrón e Historial de Núcleos Agrarios of the Registro Agrario Nacional. The first measure, Land Distribution (% Area), captures the percentage of total surface area in a state distributed to peasants under a given administration. This variable reflects the change in each administration of land that is either owned by the federal government or some private landholder and that is turned into *ejido* land. The average of this variable was 2.83% of land transferred. Because this measure is normalized by state land area, and the demand for remaining unreformed land may have potentially shifted by administration in a way that made further transfers more or less important, we also include a second measure of land reform that captures the log of total land area transferred in hectares (after adding one to enable using the log for areas that experienced no reform). The mean of the unlogged version of this variable was 199,769 hectares. Consistent with the theory detailed above, we expect both of the land reform measures to have a positive effect on PRI support.

The analysis also includes a set of control variables hypothesized to affect PRI support over time. The first measures the level of development in each state for a given administration, defined as the log per capita GDP in constant 1993 pesos. State-level GDP data are taken from Germán-Soto (2005), and population data are from the national statistics agency (INEGI). Following Ames (1970) and Magaloni (2006), we expect modernization as measured by the level of development to have a negative effect on PRI support. Increased income works at liberating voters from the system: richer voters can better afford to make "ideological investments" in democratization and defect from the PRI despite the risk of financial punishment (Magaloni 2006).

The analysis includes a variable for economic growth, measured as the growth rate of state GDP across administrations. Mexican political observers have long claimed that one reason why the party persisted during the so-called Mexican miracle was due to its delivery of economic growth. Our theoretical framework highlights that economic growth has conflicting effects on autocratic survival: in the short-term, growth helped the PRI by making voters better off in that period, but in the long-run it hurt the party because richer voters more easily defected from the system. We expect economic growth to have a positive effect on PRI electoral support. In contrast, we expect a higher level of development to hurt the PRI. Data on state-level economic growth were calculated from the state GDP data from Germán-Soto (2005).

Our models also include a measure of urbanization, with data taken from INEGI census data. Brandenburg (1955) prominently noted that PRI support is greater in the countryside than in cities. Percent Urban is measured as percentage of the population living in urban areas. We adjust the scale of this variable for the tables by dividing by 100; it can therefore be interpreted as the proportion of urban residents in a state. We expect this variable to have a negative effect: more urban states should support the PRI at lower rates.

Finally, we tried controlling for financial transfers in the form of federal public investment.[7] Although he failed to reach conclusive results, Ames (1970) tested the hypothesis that higher levels of federal public investment should increase PRI support. We thus expect this variable to have a positive effect. Federal Public Investment is measured as a percentage of state GDP and is taken from Arroyo (1995). Data are only available beginning in 1958.

Table 3 reports the estimates of PRI support beginning in the 1940s. Model 1 indicates

[7] We also tested a control for education, which could reduce PRI support and, when omitted, potentially bias downward the log per capita GDP variable in favor of our hypothesis. This variable was almost always statistically insignificant and never affected our conclusions.

that, as expected, high levels of GDP per capita erode PRI support. By contrast, economic growth as reflected by Δlog(GDP) brings greater support to the party. Controlling for the effects of economic modernization on political support, the distribution of land as measured by Land Distribution (% Area) increases PRI support in the states. Finally, as anticipated, higher rates of urbanization are linked to lower rates of PRI support.

Model 2 includes the measure of federal public investment. Though positive, it is far from statistically significant. Because including this variable also substantially reduces the overall number of observations in the model by truncating the sample to post-1958, it is excluded from remaining models.[8]

Models 3-4 introduce a time trend. The estimated effect of land distribution on PRI support is again strongly positive, whether measured as Land Distribution (% Area) or log(Land Distribution). GDP per capita maintains its sign but loses statistical significance in these models. It regains significance, however, with the inclusion of state fixed effects in Models 5-6.

The PRI's distribution of land has a positive and statistically significant effect on PRI support in a state in Model 5. The size of the effect is meaningful: if 10% of the land in any given state is distributed, PRI votes increase by roughly 3.8 percentage points. Using the variable log(Land Distribution), a two standard deviation in land distribution above its mean results in a predicted 3.6% increase in PRI support using the Model 6 coefficient. However, this variable does not reach conventional levels of statistical significance in Model 6 (p=0.19).

The negative effect of higher GDP per capita on PRI support is relatively strong in Models 5-6. An increase in GDP per capita of 50% leads to an approximately 9.6% drop in PRI support. By contrast, economic growth as reflected by Δlog(GDP) brings greater party support.

[8] Results are nonetheless similar if it is included.

The average state-level economic growth across six-year administrations (32.8%) leads to roughly 11% higher PRI support. At that growth rate, the net effect of modernization on PRI support becomes negative after three presidential administrations, or a total of 18 years, and subsequently continues to decline. The declining positive effects of growth on PRI support are compounded by the fact that growth tends to slow at higher levels of development (Barro and Sala-i-Martin 1995), eroding the capacity for growth to gain party support. As expected therefore, the results indicate that growth has conflicting effects on PRI support.

Urbanization has a negative effect on changes in PRI support across the Table 3 models, leading to a decrease in PRI support. A 10% increase in the percentage of the population that is urban in a state leads to an estimated 5.9% decline in PRI support in Models 5-6.

We can gain greater insight into the relative size of the estimated Table 3 effects through a simulation of the predicted effects of modernization variables vis-à-vis land reform. Figure 1 shows the Model 5 estimated effects of three specific independent variables on the change in PRI support: the level of development, economic growth, and land distribution (% Area). The predicted values are calculated keeping all other variables at their means. While the variables graphed in Figure 1 have different scales, they are graphed together here as if they were in an analogous scale. Each variable is graphed from its minimum to its maximum values.[9]

Figure 1 provides two insights, one about the political implications of land policy, the other about the political implications of growth. First, consider land. The land distribution variable ranges from 0% of land area in a given state distributed by a specific administration to 58% of the land area being distributed (corresponding to Baja California during the Diaz Ordaz term). The positive slope of the line for land distribution suggests that distributing *ejido* land

[9] The scale for economic growth excludes one outlier for high growth; the Table 3 results are nonetheless robust to its exclusion.

generated greater support for the PRI.

Second, consider state economic growth. The dotted line is also upward sloping, indicating that growth enhanced the PRI's political prospects. Although accumulating economic growth ultimately led to a decrease of PRI support as states got richer, as indicated above, growth itself had a positive effect on PRI support. At the lowest end of observed growth rates, the first percentile growth rate in a Mexican state over the course of a presidential administration during this period was -32% (a yearly average of -5.3%). Ceteris paribus, a growth rate of this magnitude results in a predicted 57% electoral support. But a yearly growth rate of 14.7% (a total of 88% during an administration) in an otherwise similar state, which corresponds to the 99th percentile in this data, produces an estimated slightly over 97% support level for the PRI.

As Table 3 and Figure 1 indicate, growth and land distribution had positive electoral effects for the PRI. But land reform had crucial political advantages over growth: land distribution was more fully in the scope of government action, and in contrast to growth, which was destabilizing over time, land was used to maintain a political clientele loyal.

Figure 1 shows that the level of development lowers support for the PRI, as indicated by the downward sloping dashed line. Only very poor states are predicted to maintain their support for the PRI due to this variable. The estimates provide a clear picture of the way in which modernization eroded hegemony. Until the mid-1960s, the low per capita GDP of many states predicts that poor regions confer substantial support to the PRI during presidential elections. However, over time, accumulating economic growth led to a decrease of PRI support as states got richer. Combining the two effects we estimate that, by the mid-1980s, the poorest states such as Oaxaca and Chiapas were among the few predicted to maintain high levels of support for the

PRI across elections.[10]

Robustness to Lags and State-Specific Time Trends

The theoretical argument indicates that peasant capture, once it occurs, is persistent. Model 7 tests this hypothesis more explicitly. Model 7 also more directly models persistence and feedback in PRI vote share. It does so by using an autoregressive distributive lag (ADL) model. The dependent variable is now the change in PRI vote share across administrations, and the ADL model adds a lag of the dependent variable and a lag of Land Distribution to the regression. This strategy enables us to calculate the total, long-run effect of a permanent change in Land Distribution. The long-run multiplier (LRM) coefficient is 0.268 ($p<.05$), supporting the notion of long-term peasant capture. Meanwhile, the lag in PRI support is statistically insignificant.

Model 8 attempts a different approach at modeling short- and longer-run effects. Since GDP per capita in levels may capture more than just the sum of changes in economic growth, Model 8 drops GDP per capita. It then adds additional lags of Land Distribution and $\Delta\log(GDP)$, as well as interactions between these variables and their lags. Land Distribution and its lag are both positive and statistically significant whereas Land Distribution interacted with its lag is statistically insignificant. This again suggests that peasant capture is persistent across periods, and additional land redistribution on top of previous land redistribution has no deleterious effect on PRI support. While $\Delta\log(GDP)$ and its lag are similarly both positive, $\Delta\log(GDP)$ interacted with its lag is now *negative* and statistically significant. This finding supports the notion that while economic growth contributed to PRI support, sustained positive growth that yielded higher levels of development ultimately undercut the PRI.

Model 9 drops the national-level non-linear time trends in favor of state-specific time

[10] These findings are consistent with the seminal work of Brandenburg (1955) and Ames (1970).

trends. States differ considerably, and there may be systematic trends in PRI support that differ across states in a way that is correlated with land reform but due to omitted or unobserved policy instruments or other factors such as the capacity to rig elections. Including state-specific time trends alleviates these concerns and others for which national-level trends only imperfectly capture state-level drifts. The Model 9 results remain strong, and confirm the findings from previous models.

Robustness to Endogeneity

While Table 3 suggests that increases in land distribution yield higher PRI support, there may be reverse causality running from PRI support to land distribution that biases the estimated coefficients. For example, states with a history of high support for the PRI may be more likely to receive land via the land reform program as a reward for political loyalty. Without doubt, states that "underprovided" support to the PRI – like Guanajuato and Jalisco – received less land. We therefore turn to an instrumental variables (IV) approach designed to capture exogenous variation in land distribution.

We instrument land distribution with the number of land beneficiaries (in thousands) in a state's surrounding region as well as the number of hectares (in millions) of arid land in the state. Beneficiaries in the surrounding region, who have on average had their land applications in for at least seven years prior to receiving grants (see Walsh Sanderson 1984 and discussion on the delays in land grant timing above), should affect PRI support in a state by increasing the likelihood of seeing land distribution due to regional pressure or demonstration effects stremming from peasants requesting more land.[11] The second instrument, Arid Land Area,

[11] The independent decisions of former neighboring governors to support or block specific land requests from reaching the federal level should not directly influence their neighboring state's PRI support, however.

should also be linked to higher land distribution. Because arid land is lower quality due to exogenous climatic and geographic factors, a greater portion of arid land in a state led to larger land grants in those zones.[12] Similarly, the PRI was more willing to distribute tracts of arid land that were otherwise of little value once more productive lands had been distributed (Walsh Sanderson 1984).

Do these instruments satisfy the exclusion restriction, or might they proxy for or be correlated with some factor that exerts a direct effect on PRI support? Perhaps more land reform beneficiaries in a state's neighborhood, for instance, may affect PRI support by influencing voters' perception of the PRI's commitment to redistribution. To address this particular threat to inference, we controlled for the average regional change in PRI support in the previous period to pick up the potential spillover in voter perception associated with neighboring land reform. All of the results hold.[13] Beyond this, as we discuss below, we conducted statistical tests of the overidentifying restrictions and consistently fail to reject the hypothesis that the instruments are valid.

Table 4 presents the second-stage IV results. Models 1-2 use region rather than state fixed effects given that arid land area is fixed by state. While the full first-stage regressions are omitted for reasons of space, the coefficients on the instruments in the first stage are reported in Columns 1-2. The results conform to theoretical expectations: Beneficiaries in the Region is positive and highly statistically significant, and Arid Land Area is also positive (and statistically significant in Model 2). The results from the first stage also suggest that these variables are good instruments from a statistical perspective. The F-statistic is 11.50 in the first stage of Model 1

[12] See, e.g., Cameron and Trivedi (2005) on the validity and properties of using a time-invariant instrument such as this in IV regressions.
[13] All results testing possible violations of the exclusion restriction in Tables 4 and 5 are available upon request but not included here due to space restrictions.

and 21.22 in Model 2 – above the threshold separating weak from strong instruments.[14] Importantly, heteroskedasticity and autocorrelation consistent Hansen J tests of the over-identifying restrictions fail to reject the hypothesis that these instrumental variables are exogenous. A Hansen J test returns a chi-square of 0.214 with a p-value of 0.64 in Model 1 and a chi-square of 1.401 with a p-value of 0.24 in Model 2.

The second-stage results in Models 1-2 demonstrate that the findings for land distribution from previous columns hold: Land Distribution (% Area) and log(Land Distribution) are positive and strongly significant.

Models 3-4 present a second set of IV regressions. These models reintroduce state-level fixed effects. Arid Land Area therefore drops from the first stage. Beneficiaries in the Region remains strong in the first stage. Furthermore, the coefficients on Land Distribution (% Area) and log(Land Distribution) are positive, strongly significant, and similar in magnitude to the Model 1-2 coefficients. If 10% of the land in a state is distributed, PRI votes increase by roughly 13.3 percentage points. The variables for modernization and urbanization are statistically significant and in the same direction as in previous models with state fixed effects.

Models 5-6 replace the national-level time trend in Models 3-4 with state-specific time trends similar to Model 9 of Table 3. Again the main results for land distribution hold. The modernization variable is short of statistical significance (p=.11 in Model 5 and .19 in Model 6) but in the expected direction.

The substantive significance of the IV coefficients for Land Distribution (% Area) and log(Land Distribution) in Table 4 increases notably vis-à-vis both the Table 3 models and the modernization variables. Because the Hansen J tests indicate that the instruments are valid, the

[14] Staiger and Stock (1997) argue that F-tests from the first-stage should be greater than 10.

measures of land distribution are most likely endogenous, and the direction of bias is apparently against our hypothesis. Accounting for potential sources of endogeneity implicitly in the IV framework yields a more accurate estimate of the true impact of land distribution on PRI support.

The Table 3-4 results emphasize the conundrum for the party: because development undermined its support, how could it remain in power? The best option for the PRI, according to these results, is that a state grows while remaining underdeveloped. But such combination is impossible, because in the long run states growing faster become richer, and thus would abandon the party. To the extent that the regime could use its power and policies such as land reform to garner political support separately from growth, it could delay the negative political consequences of modernization.

The Consequences Of Land Reform: A Short-Term Increase in Economic Growth Followed by a Long-Term Decline

Mexico arrived to the developmental scene of the post-WWII years as a promising example of a progressive government that had achieved land reform where other countries throughout Latin America had failed. Compared to other countries in the world, Mexico had a moderate level of land concentration in 1960: similar to that of the United States and Britain and substantially lower than most other Latin American countries such as Argentina, Brazil, Colombia, Guatemala, and Peru.

Yet why did Mexican land reform fail to translate into superior Mexican growth vis-à-vis even its Latin American peers, let alone those countries where land reform was implemented heavily such as China (following the agrarian reforms of the late 1970s), India, Japan, South Korea, and Taiwan. This section demonstrates that while land reform in Mexico led to short-term gains in economic growth, over time its effects on growth became negative.

We employ standard empirical growth models to understand the effect of land reform on development. Several models include state fixed effects to control for unobserved time-invariant factors such as geography, culture, state land area, or the initial stock of land available for reform that could otherwise affect both economic growth and land reform. The estimations also all include linear, quadratic, and cubic time trends to ensure that the estimated effect of land distribution on growth does not simply proxy for a time trend. Land reform declined from 1940 into the 1950s followed by an increase through the late 1960s and early 1970s and finally a decline throughout the 1980s until the end of land reform. If these trends are correlated with economic growth, failing to include time trends may result in attributing a causal role to the impact of land reform on growth that instead reflects secular shifts due to other factors.

We use as our dependent variable the economic growth of the Mexican states from 1940-1992. The mean level of growth during the period was 5.51%. Following standard models, we employ two independent variables to account for initial levels of development and human capital (Barro and Sala-i-Martin 1995). The first is log per capita income, with GDP data again from Germán-Soto (2005) and population data from INEGI. The second variable captures the percentage of the population over age ten that is illiterate, with data from INEGI. As the growth literature details extensively (e.g. Barro and Sala-i-Martin 1995, Ch. 11-12), poor states tend to grow faster than richer ones. Hence, convergence hypothesizes a negative relationship between per capita income and long-term growth. On the other hand, human capital should speed up convergence, with higher literacy rates linked to greater economic growth. Illiteracy Rate should therefore have a negative sign.

We include two main variables for land reform. One captures recent distribution and the other is cumulative, since the aggregate long-term impact of land reform on growth may differ

from its short-term effects. The first measure, Land Distribution, captures the log of total land area transferred in hectares in the previous five years.[15] This variable uses a five-year window of reform given that the true impact of land reform on short-term growth elapses over several years as new *ejidos* are organized and begin production. This variable also smoothes the uneven nature of land distribution in any given year, capturing more coherent policies of distribution in a given state over a period of time.[16] The second land reform variable, Cumulative Land Distribution, measures the log of total land area transferred in hectares from 1917 up until the beginning of the five-year window recorded by the Land Distribution variable. Cumulative Land Distribution therefore taps the longer-term impact of a history of land distribution on economic growth. The average of the unlogged version of this variable is 1.8 million hectares. Consistent with the theory detailed above, we expect land to have a positive effect in the short term, followed by a negative long-term impact.

We also include variables for the percentage of urban inhabitants in a state as well as for net migration. We include Percent Urban given that the effect of land reform on growth in may simply capture the pace of rural-urban transformation, which when more rapid may contribute to growth through, inter alia, an increase in the manufacturing labor supply. We include a variable for net yearly migration in thousands given that state migration inflows and outflows may be linked to new land distribution and simultaneously have implications for economic growth. Data for Net Migration are calculated from census figures and taken primarily from INEGI.

Table 5 reports a series of OLS estimates of economic growth at the state level. Model 2

[15] We focus on this measure here and in subsequent analyses over measures normalized by state area given that the latter may distort the perceived degree of reform (e.g. by recording a lower portion of land reformed in a large, sparsely populated state compared to a smaller, similarly populated state that receives the same amount of land distribution). We instead directly control for factors that may impact the importance of land distribution and use state fixed effects.
[16] See the supplementary appendix for graphs of yearly land distribution by state.

adds Net Migration to the Model 1 baseline, and Model 3 adds state fixed effects. The central variables of interest, Land Distribution and Cumulative Land Distribution, have conflicting effects on growth. Land distribution in the previous five-year period has a positive impact on growth in Models 1-3. The yearly effect is rather small: ceteris paribus, a one standard deviation increase in land distributed yields a 0.084% increase in yearly growth in Model 3 specification. The cumulative effect of land distribution, however, is negative and statistically significant in Models 1-3. A one standard deviation increase in prior land distributed yields a 0.122% *decrease* in yearly growth in Model 3.

The variables for per capita income and illiteracy in Models 1-3 suggest conditional convergence and a positive effect of human capital formation, consistent with previous findings. The coefficient on per capita income in Model 3 implies that the growth of a rich state with double the income per capita of a poor state should have a lower economic growth rate than the poorer state by roughly 9%. At that rate, half the gap between the rich and poor state would be closed in just over 7 years. The speed of convergence during this period is fast, consistent with the literature on growth in Mexico (e.g. Esquivel 1999).

Robustness to Lags and State-Specific Time Trends

Model 4 substitutes the Cumulative Land Distribution measure with lags of previous 10-year windows of land redistribution. Because the cumulative measure increases over time by construction, if growth rates trend down as incomes rise, the negative result in Models 1-3 may be spurious. To test this, Model 4 includes 5-year and 15-year lags of land distribution in addition to the five-year window of recent land distribution in Models 1-3.[17] Land Distribution in the previous five-year period has a positive impact on growth. Land Distribution in the prior ten

[17] Additional lags point to a similar trend, though the observations begin to decline substantially.

years has a negative but insignificant effect on growth, and Land Distribution ten more years previous (i.e., 15-25 years prior to the present) has a negative and statistically significant effect. Confirming previous models, Model 4 therefore indicates that land distribution has a positive short-term influence on growth that slowly turns negative in the long term. This model also suggests that the negative finding for Cumulative Land Distribution in previous models is not driven by a spurious correlation.

Model 5 returns to the Model 3 specification but drops the national-level non-linear time trends, instead including state-specific time trends as in Model 9 of Table 3. The results strengthen. Systematic trends in economic growth driven by unobserved policies or factors that differ across states and may be correlated with recent or cumulative land reform are not driving the findings.

Robustness to Endogeneity

Of course, the size and direction of the estimated effects of land distribution on growth may suffer endogeneity bias related to the possibility that economic growth may in part cause land distribution. For instance, high rates of economic growth in a state may spur demands from below for distribution of wealth and property. Or perhaps states with low rates of growth may be targeted with land reform as demands for land fester and the threat of rural unrest increases. We therefore turn to a series of instrumental variables estimations in Models 6-7 that build from Model 3.[18]

We conduct the IV estimations with instruments for both Land Distribution (5 yr) and Cumulative Land Distribution. As in Table 4, we use the number of land beneficiaries in a state's surrounding region and arid land area as instruments for the 5-year lagged sum of Land

[18] IV estimations building from the Model 4 and Model 5 specifications also yield similar results.

Distribution. We also use two instruments for Cumulative Land Distribution. The first is the cumulative number of beneficiaries (in millions since 1917) in the surrounding region, since this should increase cumulative land distribution in that state due to local pressure and demonstration effects. The second instrument is Percent Mountainous Land. In contrast to rain-fed zones, pasture and rangeland, and even sloped hillsides that were distributed, the most rugged, rural mountain zones (e.g. the northern Sierra Madre Oriente) were more difficult to distribute in large tracts (Walsh Sanderson 1984). As a result, states with more mountainous land should have had less cumulative land distribution.

There are several potential threats to the exclusion restriction that could be raised. First, more neighboring land reform beneficiaries may directly suppress growth in a state if growth rates are spatially correlated (perhaps due to other policy instruments or shared markets). Controlling for a spatial lag of growth, however, did not alter the results. The percentage of mountainous land may also directly influence growth through health and infrastructure provision, or alternatively through impacting agricultural productivity. Again, controlling for these factors did not change the results. Furthermore, statistical tests of the overidentifying restrictions always fail to reject the hypothesis that the instruments are valid.

Models 6-7 of Table 5 present a set of second-stage IV estimations.[19] Model 6 uses region rather than state fixed effects since arid land area and percent mountainous land are fixed by state. While the first-stage regressions are omitted for space considerations, we follow conventional practice and include the full set of four instruments in both first-stage regressions in Model 6 and both instruments in the first-stage regressions in Model 7. The first-stage results are

[19] A separate set of IV estimations of the effect of land redistribution on average state-level economic growth over the period 1950-1993 using as instruments the number of land petitions from the period 1916-1935 and the percentage of land unsuitable for agriculture yielded similar results (available upon request).

as expected: Beneficiaries in the Region is positive and highly statistically significant in the first stage where Land Distribution (5 yr) is the dependent variable (Models 6-7), as is Arid Land Area (Model 6). Cumulative Beneficiaries in the Region is also positive and highly statistically significant in the first stage where Cumulative Land Distribution is the dependent variable (Models 6-7), and Percent Mountainous Land is negative and statistically significant (Model 6). The first stage results also indicate that these variables are good instruments. The first-stage F-statistics consistently indicate strong instruments. Furthermore, a Hansen J test of the over-identifying restrictions yields a chi-square of 2.952 with a p-value of 0.23 in Model 6, thereby failing to reject the hypothesis that the instrumental variables are exogenous.

The second-stage results in Models 6-7 suggest that the true effect of land distribution on economic growth is higher after addressing possible endogeneity. The yearly effect of a one standard deviation increase in the 5-year sum of Land Distribution is now a 0.99% increase in growth using the Model 7 coefficient, slightly over a ten-fold increase over the OLS estimate in Model 3 with state fixed effects. If this impact is compounded over a five-year period, growth increases by slightly over 5%. The cumulative effect of land distribution, however, remains negative and increases in magnitude over Models 1-3. A one standard deviation increase in prior land distributed yields a 1.02% *decrease* in yearly growth.

The impact of these differing effects becomes substantial as land distribution cumulates, increasing the cumulative measure relative to the 5-year sum. If all states experienced the average yearly values in the dataset for the 5-year window of Land Distribution and for Cumulative Land Distribution, the average estimated growth rate using the Model 5 coefficients would have been 3.88% per year. If land distribution had been 30% less than it was, however, the average estimated yearly growth rate would have been 6.61%.

The growth regressions in Table 5 support the hypothesis that land distribution was designed to help the PRI survive politically. Land reform delivered a short-term boost to growth and met a longstanding peasant demand. Yet in the long term, the inefficiencies embedded in the new property rights regime considerably lowered state-level growth and ultimately trapped peasant land recipients and subsequent generations into dependence on the state.[20]

The Timing of Land Distribution: The Electoral Cycle

Perhaps the most notable trait of land reform in Mexico is the long period over which it was undertaken. It became a permanent fixture of the regime's policies (Prosterman and Riedinger, 1987), from the last years of the Mexican Revolution until 1992. The early land reform process focused heavily on redistribution; land seized from large landowners was granted to peasants who were living on or near the land. By the 1950s, land reform shifted in part to incorporate federal lands along with more redistributive reforms. Into the late 1960s and 1970s, land reform again became more redistributive: land was taken away from medium-size farmers to be constituted into *ejidos*.

Figure 2 shows land distributed by definitive presidential decrees in Mexico from 1917-1992. The most intense episodes of land grants occurred in the 1930s and early 1940s and in the late 1960s and early 1970s.[21] The Lázaro Cárdenas administration distributed around 9.6% of the total land area in the country; the Díaz Ordaz administration distributed 12.6%; and Echeverría distributed around 5.5%. By 1990 more than half of the national territory had been distributed. Since land is scarce and its supply fixed, as land distribution continued it became increasingly

[20] Several classic studies such as Warman (1972) suggest that this was indeed primarily dependency rather than genuine regime support, at least over the longer term.
[21] This is also true at the state level for most Mexican states; see the supplementary appendix.

common to distribute lower quality land or for the same plot of land to be distributed more than once, with two or more communities claiming presidential resolutions entitling them to the land (see Walsh Sanderson 1984, Sanderson 1986).

From 1917-1992 the Mexican government distributed an average of 1.3 million hectares of land each year. Many scholars have attributed this trend to bureaucratic inertia (e.g. Grindle 1986) or to presidential ideological commitments to land distribution (Wilkie 1978). A substantial amount of scholarship has focused on understanding why land reform was reactivated in the 1960s and 1970s, with an underlying assumption that distributing land was the natural thing for the "revolutionary state," or at least for populist leaders to do.

Scholars have well documented that the Cárdenas administration used land reform as a crucial mechanism to reconstruct his reformist political coalition (see, e.g., Cornelius 1975). However, the literature on land reform in Mexico is less clear as to why the Díaz Ordaz administration carried out such massive land reform. The ideological commitment to land distribution is not a good explanation, since by virtually every account Díaz Ordaz was a heavy handed "law and order" conservative politician. His successor, Luis Echeverría, who by all accounts was a leftist and populist leader, did not distribute land more intensely than other presidents.

Our theoretical discussion suggests why Díaz Ordaz accelerated land reform. To survive, the PRI had to both staunch the erosion of their support *and* avert the risk of instability. The 1960s were a time of electoral and social challenges. By the late 1960s the PRI was facing increasing opposition to its hegemony, including the loss of one gubernatorial election (Nayarit), and most likely fraudulent victories in several state elections (Chihuahua, San Luis Potosí and Sonora) and municipal races (Bezdek 1973, Lujambio 2001). Erosion of the PRI's electoral

support was accompanied by social unrest, culminating with the violent repression of the student movement in 1968, which revealed the more authoritarian side of the regime. The hegemonic party rarely resorted to violence if it could achieve political support through other means. The social unrest, guerilla activity, and frequent rebellions in the countryside in the 1960s and early 1970s therefore made land distribution attractive as a strategy to undercut instability while avoiding the use of force.

To gain insight into the timing and targeting of land reform, we perform a series of tobit and OLS estimations of land reform from 1930-1992 using the state-year as the unit of observation. The tobit models include region fixed effects and the OLS models include state fixed effects to control for unobserved heterogeneity and time-invariant factors linked to land distribution such as soil quality, climate, land area, terrain, and land arability.[22] The estimations also include linear, quadratic, and cubic time trends given that land distribution was high in the 1930s, declined from 1940 into the 1950s, increased through the late 1960s and early 1970s and finally declined throughout the 1980s until the end of land reform. The time trends capture secular trends in land distribution that may be due to factors such as ideological commitments to land reform, presidential priorities, or the nature of the political challenges that faced the regime. We cluster standards errors by state to address potential issues of heteroskedasticity and autocorrelation due to factors such as bureaucratic inertia in land distribution.

The dependent variable is the log of total land area transferred in hectares. To measure the impact of electoral challenges we include a dummy variable, Election, for election years. We subsequently separate this variable into two dummy variables: Presidential Election and Midterm Election, since the effects of these elections may differ. Both presidential and midterm elections

[22] A series of unconditional fixed effects tobit models that used indicator variables for the panels yielded largely similar results, but are not included given bias concerns in these models.

occurred every six years during the period, and were offset by three years. To examine the influence of rural unrest we include a proxy for latent pressure from below by rural workers, measured as the log of the net value of agricultural, animal and forest production in constant 1970 pesos divided by the number of rural inhabitants. Agricultural production data are constructed from various years of the agrarian census, and population figures are from INEGI. This measure is an approximation of land pressure, and should be lower when the amount of land and the value of agriculture are high relative to the size of the rural population. We invert this measure to ease interpretation so that higher values correspond to greater latent land pressure. This measure has the advantage that it captures the likelihood of rural unrest rather than outright rebellion, the latter of which was typically met with repression whereas the former could be addressed by the PRI via higher land distribution to forestall revolt.

The analyses also include several controls. We employ a variable that simply measures the log net value of agricultural, animal and forest production in constant 1970 pesos. Agricultural value may affect land distribution because an underperforming agricultural sector may spur reform, or because high levels of production may enable redistribution of future surplus via reform. We also include a variable for rural population density to control for demographic pressure driving the pace of reform.[23]

The analysis, reported in Table 6, suggests that land reform responded primarily to the electoral calendar and latent pressure from below by rural inhabitants.[24] These variables are positive and statistically significant across Models 1-7, indicating that they are robust to model specification, introducing time trends, and including region or state fixed effects. The

[23] We also tested a control for economic growth, which had no measurable impact.
[24] A time-series analysis at the national level yielded similar findings. National-level land distribution was higher during presidential election years and periods of violence in the form of rebellion, mass demonstrations, and significant guerrilla activity (results available upon request).

coefficients on elections in the tobit models indicate that about 26% more land, or nearly half a million additional hectares, was distributed in electoral years than in non-electoral years.

The existence of a strong "political cycle" in land redistribution is hard to reconcile with alternative explanations that do not imply some sort of clientelism or political objective. The link between presidential elections and land distribution has often been attributed to the president seeking to accomplish his goals in land distribution before the end of his term. However, if a president sought to grant land extensively, there is no reason to wait until the last year, and there were few mechanisms that would hold a president accountable for not fulfilling land distribution promises made at the term's outset. Indeed, as Models 5 and 7 indicate, the spike in land distribution around elections also occurred during midterm elections. The electoral imperative of generating voter support in elections provides a more plausible explanation. No PRI president wanted to be the one who led to a weak election for his successor or presided over substantial midterm election losses, so no PRI president wanted to halt land reform.

The Table 6 models also indicate that land reform responded to latent pressure from below by rural inhabitants and was used as a tool to avert the risk of instability. When the value of agricultural production was lower relative to the number of rural inhabitants, land distribution increased. This is particularly notable during the two main spikes of land reform seen in Figure 2. The Cristero war spread in the late 1920s as rebels launched operations from rural bases, and rural militias (*agraristas*) were recruited to resist them in areas where federal troops were absent until their 1936 pacification. The conflict also caused disruptions in production in rural areas as rebels raided towns and ranches for food and supplies. Cárdenas incorporated the impoverished rural sector from these areas into his political coalition and increased land distribution to them. Another set of challenges to the PRI arose in the 1960s and early 1970s. A major drought

plagued the countryside in the 1950s and endured in several northern states until the mid-1960s. Production suffered in these regions while the rural population continued to grow, leading to increased land pressure. At the same time, frequent rural rebellions broke out in the 1960s and 1970s in areas where large landowners remained powerful and rural demands for land or inputs had gone unmet. Diaz Ordaz (1964-1970) and Echeverría (1970-1976) responded to these threats with the distribution of considerable pasture and other land (primarily in the north) that had been occupied by peasants or threatened with occupation (Walsh Sanderson 1984).

CONCLUSIONS

This paper addresses the question of why developing countries pursue policies that hinder economic growth in the long term. We argue that they do so to maintain their political coalition and prevent instability and violence (e.g. Acemoglu and Robinson 2006, Ames 1987, Haber et al. 2003, North Wallis, and Weingast 2009). As Bates (1981) prominently detailed with agricultural policies in many post-colonial African states, government officials may adopt economically inefficient policies for the ends of creating voter dependence on the state and thereby generating political capital.

We address this larger question in the context of land reform in Mexico, asking why land reform failed to make a significant contribution to economic growth in the long term and why it had specific design features such as communal property rights and prohibitions against selling or using the land as collateral. Building on a large literature on land reform, we argue that Mexico's land reform was designed to create dependence. Peasants were given land with highly inefficient property rights, requiring on-going subsidies from the government to survive. This dependence gave the regime a credible threat to withdraw the subsidies if the new landholders failed to

support the PRI.

Our empirical results demonstrate that land reform in Mexico was highly successful as an instrument for the electoral mobilization. Land reform had effects of a similar magnitude to the electoral reward the PRI obtained from good economic performance. But the particular institutional features of Mexican land reform made land easier and more attractive to deliver than growth. While both land reform and economic growth generated significant electoral pay-offs, growth had the serious disadvantage of being self-destructive over time: as voters became richer, they were more likely to defect from the PRI.

Our empirical investigation reveals two other effects of land reform policy. First, while land reform benefitted its recipients in the short term, it was nonetheless economically costly in the long term. This could have worked through several channels. Land reform may have indirectly harmed growth by providing an opportunity for subsequent generations to work in the less dynamic rural sector, thus tying rural individuals to the land and slowing the rural-urban transformation. More directly, it may have shunted valuable resources away from state-led industrialization efforts that ultimately led manufacturing wages to outpace agriculture. The new property rights system ushered in may also have directly hurt long-term growth by dampening long-term incentives to invest within *ejidos* and also in the private sector as the reform sector steadily grew, eroding property rights security in the private sector and generating conflict at the frontiers between *ejidos* and private land. Further research may shed light on which of these mechanisms operated most strongly.

Second, land distribution had important political impacts. Land distribution was systematically higher during election years and where pressure from below by the rural sector was higher. This pattern of land distribution served the PRI's electoral interests and contributed

to stability in office. Sustaining the hegemonic coalition of numerous factions and organizations required mass support (Magaloni 2006), which could be most effectively mobilized around regular elections.

In broad terms, the results suggest that governments in many developing countries face a tradeoff between policies that enhance long-term economic growth and the government's political security. Governments can, in the short-term, bind voters to support them by creating political dependence in which voters exchange political support for valued resources. This may come at the expense of economic efficiency, and for some governments like the PRI, that tradeoff is well worth it.

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Table 1: Major Developments in Mexico's Land Reform

Year	Legal Provision	Consequences
1915	The original decree that initiated land reform provided for the provisional possession of the land by villages, with a final approval resting on the president.	Mexican land distribution was spurred by the demands of the peasants led by Emiliano Zapata during the Revolution
1917	Article 27 in the Constitution established the domain over all land, water and natural resources by the nation; the state also acquired the obligation to distribute land to peasants that petitioned for it.	Article 27 provided the basis of subsequent agrarian reform, although numerous laws, decrees, and circulates shaped the actual functioning of administration of land reform in Mexico (Zepeda 2000)
1920	Law of *Ejidos* required approval of the state governors prior to transmission of a land request to a National Agrarian Commission.	Originally, the maximum size of private property was to be mandated by state governments in accordance with local conditions. This did not mean that all estates larger than these numbers were expropriated but that landless peasants in them could threaten to seek a land grant, out of the estates, from the federal government. State and municipal authorities often played a key role in protecting landlords from expropriation.
1915 to 1926	Landowners could appeal to the Supreme Court in order to receive an injunction against the expropriation of their land.	The Supreme Court in this initial phase ruled in favor of landowners.
1922	Estates with more than 150 hectares of irrigated land, 250 hectares of rain-fed land, or up to 400 hectares of land of lesser quality were to be expropriated for redistribution.	Given strong peasant opposition to process delays, state governors were given one month after receipt of the request to rule in favor of a petition. After that month, it passed automatically to the National Agrarian Commission.
1926 to 1939	The recourse of judicial appeal was no longer available.	The president was allowed to distribute land unchecked by the veto power of the judiciary.
1934	One representative of the federal government, another of the state, and one representative of peasants formed Mixed Agrarian Commissions, in charge of evaluating the petitions, with the ultimate authority to support or grant the petition resting on the president. The law was modified to allow expropriation of smaller properties (one third the size if they were near a village).	The central state increasingly acquired more power to decide on land distribution, overriding the states. The purpose of these changes was to centralize land distribution. The legislation was "designed to break the political preeminence of governors over local agrarian commissions" (Walsh Sanderson, 1984, p. 55).
1958	The Department of Agrarian Affairs and Colonization, which later became the Ministry of Agrarian Reform, was created. This ministry was a highly centralized agency with considerable power over state officials.	The Mixed Agrarian Commissions of the states were also highly dependent upon the federal government because 2 of the 3 members were named by federal agrarian authorities and the president. Hence, provisional land grants by a state's authorities had to be approved by the president, although peasants had the right to directly petition the national government if a governor refused to grant a petition.
1940	The federal government feared that land reform would end up hindering investment in agriculture, so by 1940 landowners were provided so called "*certificados de inafectabilidad*," which would allow them to seek a Court injunction against expropriation. The *certificado* reserved a certain amount of land (150 hectares of irrigated land, or some "equivalent" land of lower quality), which could not be subject to expropriation.	The private sector engaged in agricultural production was protected from land reform, de facto creating two types of property rights regimes in the countryside. However, the legislation excluded other veto players, in particular Courts, from the land distribution process, granting the president considerable discretion to expropriate and distribute.
1942	The size subject to expropriation was reduced to 100 hectares of irrigated land, yet farms producing commercial crops were allowed up to 150 hectares. In 1937, large cattle and stock ranches with over 500 head of cattle and 300 head of smaller livestock were exempted from expropriation for a period of up to 25 years.	Politicians subsequently manipulated the maximum size of private property that could not be subject to expropriation so as to meet two competing needs: increase the available land for redistribution, and create incentives for farmers of export crops to invest. These exports were central for financing Import Substitution Industrialization.
1971	In 1971, the quantity of ranch land exempt from expropriation was reduced to the amount of land needed to support 500 head of stock, without a clear specification of type. Land rental was allowed among ejido members.	While the federal government was committed to land reform, it made efforts to ensure that some of the most productive land in the countryside would be protected from redistribution. The government also attempts to make contracting more flexible.
1991 to 1992	Land reform is declared ended.	Article 27 is amended. Restrictions on land markets are loosened and a land titling process (PROCEDE) begins.

Table 2: Summary Statistics

State-Presidential Administration (Sexenio) Variables					
Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
PRI Vote Share	0.82	0.15	0.23	1	288
ΔPRI Vote Share	-0.05	0.13	-0.52	0.32	288
log(GDP per cap)	8.85	0.66	7.06	10.95	288
Δlog(GDP)	0.33	0.22	-0.48	1.59	256
Percent Urban	0.53	0.2	0.14	1	288
Federal Public Investment	3.12	4.78	0.34	37.27	192
Land Distribution (% Area)	0.03	0.05	0	0.58	288
log(Land Distribution)	10.61	2.76	0	15.21	288
Beneficiaries in Region (Ths.)	27.47	18.65	4.12	85.55	288
Arid Land Area (Mls. Has.)	1.73	3.62	0	14.08	288
State-Year Variables					
Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Economic Growth Rate	5.51	9.1	-103.61	90.63	1664
Illiteracy Rate	32.77	19.11	3.6	82	2016
log(GDP per cap)	8.82	0.68	6.7	11.33	1696
Percent Urban	0.49	0.21	0.1	1	2016
Net Migration	-4.1	56.38	-536.23	854.26	2016
Land Distribution	7.95	3.83	0	14.54	2016
Land Distribution (5 yr)	10.72	2.67	0	15.3	2016
Cumulative Land Distribution	13.44	1.46	6.94	16.1	2000
Beneficiaries in Region (Ths.)	7.52	10.59	0	71.08	2016
Cumulative Benef. in Region (Mls.)	0.44	0.2	0.01	0.83	2016
Arid Land Area (Mls. Has.)	1.73	3.61	0	14.08	2016
Percent Mountainous Land	0.45	0.24	0	0.88	2016
Land Pressure	-7.71	0.66	-9.59	-6.23	2016
log(Agricultural Production)	20.46	1.03	16.81	22.55	2016
Rural Population Density	17.45	18.83	0.16	114.72	2016
Election	0.33	0.47	0	1	2016
Presidential Election	0.16	0.37	0	1	2016
Midterm Election	0.16	0.37	0	1	2016

Table 3: Effect of Land Reform on PRI Support, 1940-1994

Model Specification:	OLS				OLS-FE		ADL-FE	OLS-FE	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
log(GDP per cap)	-0.067**	-0.109***	-0.040	-0.040	-0.191***	-0.193***	-0.123***		-0.299***
	(0.025)	(0.031)	(0.031)	(0.033)	(0.056)	(0.059)	(0.037)		(0.104)
Δlog(GDP)	0.262***	0.299***	0.253***	0.268***	0.339***	0.344***	0.160***	0.399***	0.471***
	(0.044)	(0.055)	(0.046)	(0.047)	(0.067)	(0.068)	(0.045)	(0.099)	(0.074)
Percent Urban	-0.246***	-0.232**	-0.259***	-0.224**	-0.587***	-0.591***	-0.249	-0.736***	0.786
	(0.077)	(0.092)	(0.074)	(0.083)	(0.193)	(0.193)	(0.175)	(0.173)	(0.713)
Land Distribution (Pc area)	0.454**	0.487**	0.441**		0.384***		0.128	0.440***	0.340**
	(0.183)	(0.210)	(0.178)		(0.099)		(0.079)	(0.105)	(0.140)
Federal Public Investment		0.001							
		(0.002)							
log(Land Distribution)				0.008**		0.007			
				(0.004)		(0.005)			
Lag Land Distribution (Pc area)							0.154**	0.562**	
							(0.076)	(0.225)	
Land Distribution (Pc area), LRM							0.268**		
							(0.099)		
Lag ΔPRI Support							-0.054		
							(0.040)		
Lag Δlog(GDP)								0.318***	
								(0.105)	
Δlog(GDP)*Lag Δlog(GDP)								-0.413*	
								(0.236)	
Land Dist.*Lag Land Dist. (Pc area)								-1.522	
								(1.428)	
State Fixed Effects	NO	NO	NO	NO	YES	YES	YES	YES	YES
Non-linear Time Trend	NO	NO	YES	YES	YES	YES	YES	YES	NO
State Specific Time Trend	NO	NO	NO	NO	NO	NO	NO	NO	YES
Observations	224	160	224	224	224	224	224	192	224
R-Squared	0.395	0.496	0.408	0.405	0.457	0.445	0.386	0.723	0.508

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ (two-tailed)

Dependent variable is PRI vote share by presidential period in Models 1-6 and 8-9, and change in PRI vote share in Model 7.

OLS = Ordinary least squares; ADL = Autoregressive distributed lag; FE = fixed effects. Standard errors clustered by state in parentheses.

Independent variables are lagged by one period except "Lag" variables, which are lagged by two periods.

Table 4: IV Estimates of Effect of Land Reform on PRI Support, 1940-1992

Model Specification:	IV (Second Stage)		IV-FE (Second Stage)			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
log(GDP per cap)	-0.053	-0.007	-0.149***	-0.116*	-0.181*	-0.156
	(0.035)	(0.061)	(0.047)	(0.061)	(0.100)	(0.100)
Δlog(GDP)	0.200***	0.200**	0.266***	0.220***	0.334***	0.335***
	(0.062)	(0.084)	(0.061)	(0.074)	(0.077)	(0.086)
Percent Urban	-0.229**	-0.089	-0.712***	-0.873***	-0.045	0.506
	(0.104)	(0.125)	(0.210)	(0.296)	(0.680)	(0.801)
Land Distribution (Pc area)	1.834***		1.334***		1.533***	
	(0.371)		(0.426)		(0.401)	
log(Land Distribution)		0.044**		0.041***		0.047***
		(0.018)		(0.014)		(0.012)
First Stage Instrument	0.0014***	0.0423***	0.0014***	0.0465***	0.0014***	0.0469***
(Beneficiaries in Region)	(0.0003)	(0.0065)	(0.0002)	(0.0079)	(0.0002)	(0.0073)
First Stage Instrument	0.0007	0.0961**				
(Arid Land Area)	(0.0009)	(0.0358)				
Region Fixed Effects	YES	YES	NO	NO	NO	NO
State Fixed Effects	NO	NO	YES	YES	YES	YES
Non-linear Time Trend	YES	YES	YES	YES	NO	NO
State Specific Time Trend	NO	NO	NO	NO	YES	YES
Observations	224	224	224	224	224	224

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ (two-tailed)

Dependent variable is PRI vote share by presidential period. Standard errors clustered by state in parentheses in Models 1-2. Robust standard errors with a Newey-West correction for serial correlation in Models 3-6. Full Stage 1 results not reported due to space limitations but are available upon request. Independent variables are lagged by one period.

Table 5: Effect of Land Reform on Economic Growth, 1940-1992

Model Specification:	OLS			OLS-FE		IV-FE (Second Stage)	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
log(GDP per cap)	-3.511**	-3.539**	-9.257***	-10.166**	-11.874***	-5.765***	-9.860***
	(1.500)	(1.505)	(2.920)	(4.147)	(4.094)	(0.956)	(1.296)
Illiteracy Rate	-0.070	-0.071	-0.238*	-0.198	-0.925***	-0.222***	-0.083
	(0.051)	(0.051)	(0.119)	(0.120)	(0.206)	(0.072)	(0.191)
Percent Urban	2.868	2.385	1.219	-2.208	-31.433	5.220**	7.870
	(2.394)	(2.407)	(9.804)	(11.817)	(20.386)	(2.605)	(10.193)
Net Migration		0.005*	-0.001	-0.004	-0.009*	0.006	-0.002
		(0.003)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)
Land Distribution (5 yr)	0.254*	0.267*	0.324*	0.306*	0.609***	2.602**	3.847**
	(0.149)	(0.147)	(0.178)	(0.162)	(0.168)	(1.237)	(1.609)
Cumulative Land Distribution	-0.654**	-0.697**	-1.381*		-1.689**	-3.552*	-11.483**
	(0.294)	(0.292)	(0.754)		(0.811)	(1.964)	(5.703)
5-yr Lag Land Distribution (10 yr)				-0.184			
				(0.220)			
15-yr Lag Land Distribution (10 yr)				-0.483*			
				(0.275)			
State Fixed Effects	NO	NO	YES	YES	YES	YES	YES
Non-linear Time Trends	YES	YES	YES	YES	NO	YES	YES
State Specific Time Trend	NO	NO	NO	NO	YES	NO	NO
Observations	1663	1663	1663	1376	1663	1663	1663

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ (two-tailed)

Dependent variable is economic growth rate, in percent. Full Stage 1 results for Models 6-7 not reported due to space limitations but are available upon request. Standard errors clustered by state in Models 1-5. IV-2SLS FE regressions in Models 6-7 robust to IV-GMM approach. Model 6 includes region fixed effects. Instruments for 5-year lagged sum of Land Distribution are the number of beneficiaries (in thousands) in the surrounding region (Models 6 and 7) and arid land area (Model 6). Instruments for Cumulative Land Distribution are the cumulative number of beneficiaries (in millions since 1917) in the surrounding region (Models 6 and 7) and percent mountainous land (Model 6).

Table 6: Timing of Land Reform, 1930-1992

Model Specification:	Tobit					OLS-FE	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
log(Agricultural Production)	1.714***	1.425***	1.714***	2.104***	2.103***	3.830***	3.824***
	(0.296)	(0.241)	(0.296)	(0.288)	(0.288)	(0.791)	(0.792)
Rural Population Density	-0.134***	-0.124***	-0.134***	-0.118***	-0.118***	-0.107***	-0.107***
	(0.025)	(0.023)	(0.025)	(0.018)	(0.018)	(0.030)	(0.031)
Land Pressure	2.463***		2.463***	1.620***	1.622***	3.606***	3.606***
	(0.426)		(0.426)	(0.491)	(0.490)	(0.878)	(0.879)
Election		0.258**	0.256**	0.258**		0.234**	
		(0.113)	(0.113)	(0.112)		(0.090)	
Presidential Election					0.323**		0.284**
					(0.128)		(0.105)
Midterm Election					0.395**		0.363**
					(0.169)		(0.136)
Region Fixed Effects	YES	YES	YES	YES	YES	NO	NO
State Fixed Effects	NO	NO	NO	NO	NO	YES	YES
Non-linear Time Trends	NO	NO	NO	YES	YES	YES	YES
Observations	2016	2016	2016	2016	2016	2016	2016

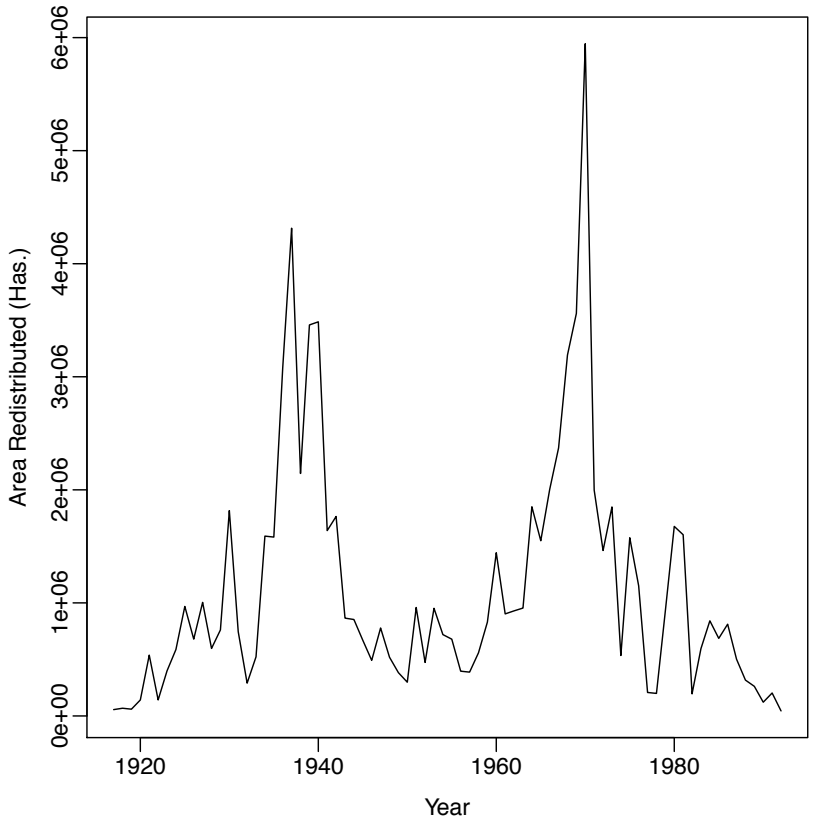
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ (two-tailed)

Dependent variable is log of land area transferred, in hectares. Standard errors clustered by state in parentheses. Constants estimated but not reported. Tenure count polynomials estimated to control for temporal duration but not reported.

Figure 1: Effect of Land Distribution, Growth, and Modernization on PRI Support

Note: PRI support is measured by presidential term. Land distribution is measured as the percent of land area in a state reformed during a given presidential term. Development is a log measure, as in the Table 3 models.

Figure 2: Land Redistribution in Mexico, 1917-1992



Note: Data taken from Registro Agrario Nacional (2011).