Elite Competition and State Capacity Development: Theory and Evidence from Post-Revolutionary Mexico*

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Abstract

International wars and inter-state rivalry have been at the center of our understanding of the origin and expansion of state capacity. In this paper, I describe an alternative path to the development of state capacity rooted in domestic political conflict. I posit that, under conditions of intra-elite conflict, political rulers seize upon the temporary weakness of their rivals, expropriate their assets, and consolidate authority. Because this political consolidation increases rulers' chances of surviving an economic elite's challenge, it enhances their incentives to develop state capacity. These ideas are formalized and tested using the case of post-revolutionary Mexico, where commodity price shocks induced by the Great Depression affected regions differentially, depending on their agricultural suitability. Using this exogenous source of variation in the local economic elite's power, I find that negative shocks lead to increased asset expropriation and substantially higher investments in state capacity. I also show that this variation in the initial development of state capacity has persisted until the present. Regions hit hardest by the Great Depression have a larger present-day state presence and can collect more revenue locally.

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I. Introduction

Weak states have been linked to pervasive violence and poor development outcomes, while capable ones—those with the ability to implement basic policies, such as taxation—can spur economic development (e.g., Migdal 1988; Evans 1995; Fearon and Laitin 2003; Dincecco and Katz 2012; Acemoglu, Garcia-Jimeno and Robinson 2014). High capacity states have, nonetheless, been historically rare, and ineffective administrations are still prevalent in much of the world. Existing scholarship on the development of state capacity focuses on the role of international conflict; however, such theories cannot fully account for the development of state capacity in the absence of intense international conflict (as has historically been true in Africa and Latin America), nor can they explain the differences in state capacity at the subnational level. This paper offers an alternative explantation for state capacity development grounded in domestic conflict, and provides supportive evidence from Mexico.

Building on recent theoretical work on social conflict (e.g., Besley and Persson 2009, 2011), I focus on two factions, an elite that owns the productive assets in the economy, and the political ruler of a low-capacity state. When in conflict, the economic elite can use their resources to deter the ruler from expropriating their assets. Moreover, the economic elite can deter the ruler from investing in future state capacity, which eventually could be used against the elite. I argue that temporary shocks that weaken the economic elite have two simultaneous effects. First, shocks may enable rulers to expropriate the elite's assets and consolidate their political authority. Second, by increasing the expected benefits of future state capacity, shocks also make rulers more likely to invest in expanding capacity. I formalize this argument in a simple two-period model of investment, conflict, and redistribution.

The comparative statics of the model—in particular the introduction of a price shock that temporarily weakens the economic elite—guide the empirical analysis. I study post-revolutionary Mexico, where regional warlords and revolutionary *caciques* (local political bosses) had recently risen to political power at the local level, but sill faced a powerful economic (landed) elite. I use a research design that exploits the differential impact of the Great Depression across *municipios* to identify the effect of temporary landowner weakness on expropriation and subsequent investment in state capacity. The identification strategy exploits the exogenous changes to agricultural commodity prices brought about by the Great Depression and uses differential crop suitability as a measure of exposure to the shock. The effects of these shocks are also assessed over the long term.

To operationalize state capacity, I adopt the notion of infrastructural power: the ability of states to penetrate their territories and logistically implement decisions (Mann 1986). While the applications of this concept have been diverse, I concentrate on the resources available to the local state to implement policy: in particular, I use the presence of government officials in the regions as a measure of capacity. This allows me to examine local variation in state capacity over time using disaggregated historical census data. When assessing the persistent effects of the commodity price shock, I also use present-day local tax revenue as a complementary outcome.

The results provide support for the theory. Places where Great Depression commodity price shocks led to larger declines in the production potential of the landed elite (i.e., exposed or treated places), experienced more intense expropriation and redistribution of land. Moreover, a stronger negative shock also induced a substantially larger increase in the number of bureaucrats. The interpretation of these findings as supportive of the theory is further bolstered by the absence of a relationship between shocks and the number of bureaucrats in places without a landed elite. Falsification tests that use *future* price changes also reveal no effect on either land redistribution or bureaucratic expansion.

These early effects on local capacity are long lasting. Negative shocks following the Great Depression lead to higher long-term state capacity outcomes: present-day number of bureaucrats and local tax revenue. One way to understand these findings is to consider the role that local political leaders played in the consolidation of the hegemonic party regime in Mexico. Stronger political bosses, with no landed elite to challenge their local authority, would have been in a better position to negotiate with the national regime, securing the benefits of increased local capacity and enhancing their access to higher office. Suggestive evidence on the geographical origins of national-level politicians in the intervening decades supports this interpretation.

This paper contributes to our understanding of state capacity by, first, identifying one set of conditions that enable its development and, second, by presenting supportive empirical evidence. Past scholarship has proposed explanations of the development of state capacity that emphasize the role of external war (e.g., Tilly 1992; Dincecco 2011; Scheve and Stasavage 2012). In Charles Tilly's formulation of the bellicitst theory of the state, for instance, the constant threat or occurrence of interstate war in early modern Europe provided the incentives to develop state institutions capable of extracting resources from their societies, at the same time as social constraints on rulers were loosened by the imminent threat of foreign invasion. The European trajectory, however, has not been observed in other regions, including Africa and Latin America, where total inter-state wars have been rare (e.g., Herbst 2000; Centeno 2003).[1]

In contrast to these accounts, which rely on the looming threat of international war as the main driving force behind the development of capacity, the theory I propose in this paper is driven by domestic conflict.[2] It builds on the idea put forward by Besley and Persson (2009, 2011) and North, Wallis and Weingast (2009) that underinvestments in capacity are the result of intra-elite conflict. For North, Wallis and Weingast, ineffective administrations are a characteristic of "natural states": poltical equilibria in which elites restrain from violence as long as expected rents in the current political arrangement are greater than the expected value of fighting. These peaceful arrangements, however, are volatile, and small exogenous changes can lead to the outbreak of violence. States remain weak even when stability is temporarily attained, because building state capacity risks the breakdown of the political equilibrium by shifting the expected balance of power in favor of the incumbent.

While this framework is useful for understanding the underlying logic of low-capacity states, it does not provide a satisfactory account of how change comes about. This paper attempts to fill that gap by examining how states can escape low-capacity traps even in the absence of inter-state war. I argue that, under the right conditions, a large economic shock that empowers one elite faction at the expense of another can generate the incentives for capacity-enhancing investments. Furthermore, by employing a quasi-experimental design, I can improve upon past evidence of state capacity development, which relies on detailed case studies or cross-national correlations.

[1]The absense of total war in these regions, however, does not negate the role of external conflict as a relevant determinant of state capacity. Thies (2004, 2005), for example, finds cross-national correlations in Latin America, Africa, and the Middle East that link not war, but rivalry—long term antagonisms between countries—with higher levels of tax revenue.

[2]Mares and Queralt (2015) also focus on domestic factors, and explore the role of sectoral elites and early democratic institutions in the introduction of income taxation in nineteenth-century Europe. Arias (2013) similarly highlights the role of domestic elites, but focuses on the conditions that enable their cooperation in the face of external threats. Fergusson, Larreguy and Riaño (2015) focus on the role of political competition between clientelist and programmatic parties. Other theories emphasize endowments and geography (Mayshar, Moav and Neeman 2013; Sánchez de la Sierra 2015), critical junctures (Kurtz 2013), and historical legacies, such as colonial centralization (Migdal 1988), or the existence of strong pre-colonial indigenous elites (Slater and Soifer 2010). In contrast to this paper's focus on coercive capacity, fiscal contract theories of the state highlight the role of compliance, an important dimension of capacity when purely coercive extraction is unfeasible or comes at a very high cost (e.g., Bates and Lien 1985; Levi 1988).

The findings presented here also inform existing theories of redistribution; specifically those that seek to explain the determinants of land reform. Past work has attributed instances of land reform to ongoing processes of democratization, with newly empowered masses demanding redistribution (e.g., Lapp 2004).[3] Explanations centered on Mexico—an autocracy throughout the period of land redistribution—have highlighted the effects of post civil-war pacification (e.g., Sanderson 1984; Dell 2012), historic grievances (e.g., Saffon 2014) and changing opportunities for emigration (e.g., Sellars 2014). I complement these accounts' focus on the interaction between peasants and elites by highlighting the role of conflicts among the elite in explaining land redistribution.[4]

The plan for the rest of this paper is as follows. In the next section I lay out a simple model of the interaction between a ruler and an economic elite in conflict and characterize the resulting investment in capacity. I describe the comparative statics when an exogenous economic shock temporarily weakens the economic elite. To evaluate these results empirically, I propose a research strategy in post-revolutionary Mexico using the differential effects of the Great Depression on crop prices, and discuss the available data sources and measurements. I then present the results, where I find support for two main predictions from the model. After discussing alternative interpretations of the results, I present evidence of the persistence of early investments in capacity, provide one possible channel of persistence, and conclude.

II. A model of elite conflict and state capacity

In this section, I characterize a conflictive relationship between a local ruler and a non-ruling economic elite that draws upon the formalization in Besley and Persson (2011). First, I argue that the ruler of a state with a limited ability to tax will not undertake the necessary investments to increase its capacity when facing a powerful economic elite that is likely to seize power in the future (and use the enhanced capacity to their advantage). This happens because, fearing a future strong state, the economic elite reacts to investments in capacity by increasing their resistance, which in turn reduces the likelihood that the ruler survives to reap the benefits of higher capacity. The ruler could attempt to deplete the economic elite's source of power by expropriating its assets, but a strong elite can successfully fight back, wrestle power away from the ruler, and reverse the expropriation.

[3] Contrary to this explanation, however, cross-national evidence in Latin America suggests that democracies have been outpaced by autocratic regimes in the redistribution of land (Albertus 2011).

[4] Closer to this paper's emphasis on intra-elite conflict, Albertus and Menaldo (2012) argue that land reform under autocracies can be implemented by new autocrats as a sign of loyalty to their own coalition (or launching organization) by expropriating the old elite.

An escape from this low-capacity trap can be attained by a large negative price shock that temporarily weakens the economic elite relative to the ruler and clears the way for investments in state capacity. This negative price shock asymmetrically favors the ruler, who can then mobilize supporters that benefit from the redistribution of assets expropriated from the elite, such as landless peasants. Though redistribution may otherwise lead to costly resistance by the elite, low enough prices render them unable to deter the ruler's predation. By facilitating the political consolidation of the ruler and lengthening his time horizon, this negative shock enables investments in the expansion of capacity that, absence the shock, were prohibitively costly. I formalize these ideas next in a two-period model of investment, conflict, and redistribution.

Actors and timing of the game. Consider two agents interacting for two periods $s = 1, 2$, a ruler, R_1, and a non-ruling economic elite, E. In each period, the ruler and the economic elite generate income as a function of exogenous prices, p_s. The ruler gets $\omega(p_s) = \omega_s$, and the economic elite $p_s L$, where L is a fixed asset (e.g., land). The ruler can tax a fraction t of the income generated in the economy, up to the maximum fiscal capacity of the state, $\tau \in [0, 1]$ (such that $t \in [0, \tau]$), and either appropriate everything for himself or transfer part ot it to the elite. This constrain on taxation captures the limited capacity of a government to perform one of its most essential tasks: raising resources. It can reflect, for instance, the absence of information about taxpayers, or of the necessary officials to collect taxes.

For simplicity, in the first period this maximum capacity, τ, is set to zero, but can be increased for the second period through a costly investment $k > 0$.[5] The ruler's decision to invest in capacity, denoted by $i \in \{0, 1\}$, determines whether the ability to tax in the second period is high ($\tau^{i=1} = \tau^H$), or low ($\tau^{i=0} = \tau^L$). Starting from a very low capacity, these investments could take the form of basic staffing of a bureaucracy that gathers information and enforces policy (here, tax collection).

In addition to investing in capacity, the ruler can also decide whether to expropriate part of the economic elite's asset, L, and redistribute it in exchange for political support (e.g., expropriated land redistributed to peasants). The ruler's expropriation decision is denoted by $j \in \{0, 1\}$. Expropriation reduces the economic elite's asset to $L - L^j$ in the second period, and, with the support of beneficiaries of redistribution (e.g., landless peasants), increases the ruler's political power, q, from a baseline $q^{j=0} = q^L$ to $q^{j=1} = q^H$, with $q^H > q^L > 0$. For

[5] Allowing for a positive τ in the first period, or a common time discount factor does not modify the results of the model.

simplicity, the level of expropriation is assumed to be exogenous and fixed up to the total amount of the original asset, $L^{j=1} \in (0, L)$ (so that with no expropriation $L^{j=0} = 0$). It is also assumed that expropriation can be attempted even with low capacity and at no direct cost to the ruler.[6] The economic elite, subject to the taxation and expropriation decisions of the ruler in the first period, can choose to invest a fraction $r \in [0, 1]$ of their exogenous income to increase their resistance (for example, by hiring private gunmen), and enhance their ability to seize power from the ruler.

The probability that the ruler in period 1 is deposed and replaced by the economic elite in period 2 depends on the political power that both agents are able and willing to marshal. Specifically, the probability that the ruler is toppled is given by a standard ratio contest function of the form $\gamma = \frac{rp_1L}{rp_1L+q^j}$ (Skaperdas 1996). The ruler can decrease the probability of losing power by mobilizing support through expropriation (increasing q^j), while the economic elite can increase their own chances by spending part of their first period income in resisting the ruler (by increasing r). If successful in overthrowing the ruler, the economic elite can roll back any intended asset expropriation, as well as take control of the state's taxing capacity and redistributive ability.

Both agents, ruler and economic elite, have linear utilities in consumption. For the ruler, the period 1 payoff is $u_1 = c_1 = \omega_1 - \mathbb{1}(i = 1)k$, where k is the exogenous cost of investing in capacity. In period 2, his payoff is $u_2 = (1 - t_2)\omega_2 + T_2^{R_1}$, where t_2 is the level of taxation and $T_2^{R_1}$ is a transfer to the first-period ruler from the collected revenue. For the economic elite, the period 1 payoff is $u_1 = c_1 = (1 - r)p_1L$, where r is the fraction of period 1 income that the elite invest in resisting. In period 2, $u_2 = (1 - t_2)p_2(L - L^j) + T_2^E$, where L^j is the expropriated land, if any, and T_2^E is a transfer to the economic elite from the collected revenue.

To sum up, in period 1, the ruler makes two simultaneous choices: whether to expropriate a portion L^j of the economic elite's asset, L (decision j), and whether to pay the cost k of the investment in future fiscal capacity (decision i). Upon observing this, the economic elite chooses, in period 1, the level of investment in political power, r. In period 2, whoever takes over political power sets the level of taxation, t_2, and chooses transfers $T_2^{R_1}$ and T_2^E.

The timing of the game is:

[6] The main results of the model hold for reasonable parameter values when there is a fixed cost to expropriation, or when the expropriated assets cannot be taxed in the second period.

1. The parameters k, q^j, L, L^j, p_1, and p_2 are given; period 1 incomes p_1L and ω_1 are realized.

2. Period 1 ruler, R_1, chooses whether to expropriate (j), and whether to invest in period 2 capacity (i).

3. The economic elite, E, chooses the proportion of first-period income used to topple the ruler, r.

4. With probability $\gamma(\cdot)$, the ruler in period 1 is replaced in power by the economic elite, and with $\big(1-\gamma(\cdot)\big)$ he remains in power; a successful replacement allows the economic elite to roll back expropriation.

5. The second-period incomes $p_2(L-L^j)$, and ω_2 are realized, and the second-period ruler, $R_2 \in \{R_1, E\}$, chooses policies $\{t_2, T_2^{R_2}, T_2^E\}$. Payoffs are realized.

Solution. I use subgame perfection as a solution concept. Given period 1 decisions of the ruler and the economic elite, whoever retains power in period 2 ($R_2 \in \{R_1, E\}$) will tax to maximum capacity (i.e., $t_2 = \tau_2^i$), and redistribute all revenues to itself ($\tau_2^i(p_2L+\omega_2) = T_2^{R_2}$). Additionally, if the economic elite successfully seizes power, any expropriation chosen by the ruler in period 1 will be rolled back.

Given these second-period outcomes, what is the choice of resistance, r, that the economic elite selects? The problem for the elite in the first period is

$$\begin{aligned} max_{\{r\}}u^E &= u_1^E + E(u_2^E) \\ &= \underbrace{(1-r)p_1L}_{u_1^E} + \underbrace{\gamma(\cdot)\big(p_2L+\omega_2\tau_2\big) + [1-\gamma(\cdot)]p_2(L-L^j)(1-\tau_2)}_{E(u_2^E)}. \end{aligned}$$

The problem faced by the economic elite is how much consumption to forego during the first period in exchange for an increased probability of seizing power in period 2. That is, taking a larger slice of their income—which they could otherwise consume—to raise their chances of capturing the state in the future (recall that the elite's probability of seizing power increases with their resistance: $\gamma(\cdot) = \frac{rp_1L}{rp_1L+q^j}$.)

For notational convenience, define $\mathcal{M} \equiv \frac{1}{p_1L}\left[\sqrt{q^j(\omega_2+p_2L)\tau_2^i + p_2L^j(1-\tau_2^i)} - q^j\right]$ as the first order condition of the elite's utility with respect to their resistance, r. This expression emerges from the functional form of the contest function, $\gamma(\cdot)$, and summarizes the elite's gain of increasing their resistance relative to the strength of the ruler. Since $r \in [0,1]$, the level of political resistance, r, that maximizes the elite's expected payoff in period 1 is:

$$r^* = \begin{cases} 0 & if \;\; \mathcal{M} \leq 0 \\ \frac{1}{p_1 L}\left[\sqrt{q^j(\omega_2 + p_2 L)\tau_2^i + p_2 L^j(1-\tau_2^i)} - q^j\right] & if \;\; 0 < \mathcal{M} < 1 \\ 1 & if \;\; \mathcal{M} \geq 1 \end{cases} \quad \text{(a)}$$

To characterize the equilibrium outcomes of interest, I assume two things. First, that the ruler is not extremely strong (such that $\mathcal{M} > 0$). This condition holds when his political power, q^j, is not too big relative to future total after-tax income. Second, the technical assumption $q^j \geq \frac{p_2 L^j}{p_2 + \omega_2}$.

The low-capacity trap. To describe the equilibrium outcomes in the absence of an economic shock, I further assume that the elite's first period income is large enough (such that $\mathcal{M} < 1$). This happens for large enough first period prices, p_1.

Under these assumptions, the economic elite's best response—as captured in (a)—is to increase its resistance in order to offset changes in the balance of power induced by the ruler. These come about when the ruler decides to expropriate, and thus increase his own political resources through peasant support. Similarly, the elite resists more intensely when the expected future extractive capacity is higher—that is, when the ruler decides to invest in capacity.

Given the economic elite's best response, as well as the anticipated period 2 redistributive decisions of whoever takes power ($R_2 \in \{R_1, E\}$), the ruler decides how to act. The ruler's problem is:

$$max_{\{j\in\{0,1\}, i\in\{0,1\}\}} \underbrace{\omega_1 - \mathbb{1}(i=1)k}_{u_1^{R_1}} + \underbrace{\gamma(\cdot)\omega_2(1-\tau_2^i) + [1-\gamma(\cdot)][p_2 L\tau_2^i + \omega_2]}_{E(u_2^{R_1})}.$$

The ruler has two decisions to make: whether to expropriate, and whether to invest in future capacity. Consider the expropriation choice first ($j \in \{0,1\}$). For notational ease, denote $\gamma_{j=1}(\cdot) \equiv \frac{r^*_{j=1} p_1 L}{r^*_{j=1} p_1 L + q^j}$ as the probability that the ruler is toppled given that he decides to expropriate (i.e., $j = 1$), and given the economic elite's best response to expropriation (i.e., $r^*_{j=1}$, evaluated in equation (a)). The ruler will decide to expropriate L^j from the economic elite if doing so increases his expected payoff. Define the difference in the ruler's payoff between expropriating and not expropriating as

$$\Gamma(j) \equiv \gamma_{j=1}(\cdot)\omega_2(1-\tau_2^i) + [1-\gamma_{j=1}(\cdot)][p_2 L\tau_2^i + \omega_2] - \gamma_{j=0}(\cdot)\omega_2(1-\tau_2^i) + [1-\gamma_{j=0}(\cdot)][p_2 L\tau_2^i + \omega_2].$$

When the *expropriation condition* $\Gamma(j) \geq 0$ holds, the ruler will expropriate. For this condition to be met, it is sufficient that $\gamma_{j=1}(\cdot) \leq \gamma_{j=0}(\cdot)$; that is, that expropriation enhances the ruler's chances of survival. Note, however, that this is not always the case. On the one hand, expropriation increases the rulers chance of survival by increasing his political power; on the other hand, the economic elite will strategically respond to the threat of expropriation by increasing their own political power, r, potentially offsetting any advantage for the ruler.

What about the decision to invest in future state capacity ($i \in \{0,1\}$)? The ruler will choose to forego present consumption and pay the cost of the capacity investment, k, in exchange for a higher future capacity if it improves his expected payoff. This comparison is again easier to see by defining $\gamma_{i=1}(\cdot) \equiv \frac{r^*_{i=1}p_1 L}{r^*_{i=1}p_1 L + q^j}$ as the probability that the ruler is toppled given that he decides to invest in future capacity (i.e., $i = 1$), and given the economic elite's best response to that choice ($r^*_{i=1}$, evaluated in equation (a)). Now define the difference between the local ruler's payoff from investing in capacity and his payoff without investing as

$$\Delta(i) \equiv \left\{\gamma_{i=1}(\cdot)\omega_2(1-\tau_2^H) + [1-\gamma_{i=1}(\cdot)][p_2 L\tau_2^H + \omega_2] - \left[\gamma_{i=0}(\cdot)\omega_2(1-\tau_2^L) + [1-\gamma_{i=0}(\cdot)][p_2 L\tau_2^L + \omega_2]\right]\right\}.$$

The ruler will invest in future state capacity if $\Delta(i) \geq k$. This is the *capacity building* condition. It simply states that when the expected benefit of investing outweighs the investment cost, capacity will be increased. The condition again depends on the economic elite's reaction to a capacity investment decision, through its effect on the probability of survival of the ruler. That is, when the ruler decides to invest in capacity, the economic elite will respond by increasing their resistance, which in turn reduces the likelihood that the ruler survives to reap the benefits of future capacity (i.e., $\gamma_{i=1}(\cdot) > \gamma_{i=0}(\cdot)$). Hence, the ruler needs to weigh the increased risk of being deposed against the potential benefits of higher future taxation capacity.

What happens to the likelihood that the ruler expropriates and invests in capacity when period 1 prices, p_1, decrease? Under the assumptions above, marginal changes in p_1 do not have any effect on either decision. This is the case because the economic elite's best response resistance, r^*, adjusts with period 1 prices to offset any changes in the balance of political power that determines the probability of the ruler's survival. For notational convenience, define $\underline{k} \equiv \Delta(i)$ as the threshold investment cost that leaves the ruler indifferent about whether to invest, such that for costs higher than $\underline{k}$, no investment occurs. Then:

Proposition 1. *When the ruler is not overpowering and the elite has enough resources* $(0 < \mathcal{M} < 1)$*:*
1. The ruler's decision to expropriate L^j *from the economic elite's asset,* L*, is unaffected by marginal changes in first-period prices,* p_1*.*
2. The ruler's threshold investment cost, $\underline{k}$*, is unaffected by marginal changes in first-period prices,* p_1*.*

(Proof in appendix)

Together, these results characterize a low-capacity trap. A sufficiently strong economic elite, through their efforts to seize political power, can deter both expropriation attempts and investments in capacity by the ruler. Furthermore, marginal changes in the elite's resources are not enough to escape a low-capacity trap. Using this basic model, I will now show that only a sufficiently large *negative* shock to period 1 prices, p_1, can provide a way out of this trap. The ruler, facing a weakened economic elite, can enhance his chances of survival by expropriating, and can invest in capacity in the absence of effective deterrence by the economic elite.

Negative price shock. In a low-capacity trap, marginal changes in period 1 prices, p_1, do not affect the equilibrium outcomes. However, for a large enough drop in period 1 prices, the best the economic elite can do is to set $r^* = 1$; that is, to use all of their available resources to increase their resistance. This happens because, from the perspective of the economic elite, the value of period 1 consumption decreases (since the prices that determine their income are lower) with respect to future potential payoffs, at the same time as the balance of political power tips in favor of the ruler. They consequently pull all their first-period resources into capturing the state, which in the future would allow them to both enjoy the entirety of their production (by rolling back any expropriation decision), and to tax the resources of the ousted leader for themselves.

To explore the ruler's behavior in the presence of very low prices, define $\underline{p_1}$ as the highest period 1 price such that $r^* = 1$. A "low enough price," then, is one in which $p_1 \leq \underline{p_1}$.[7] In this case, the probability that the ruler is replaced in the second period remains unchanged, regardless of the economic elite's reaction $\left(\text{it becomes } \gamma_{r^*=1}(\cdot) = \frac{p_1 L}{p_1 L + q^j}.\right)$ The ruler knows that by expropriating, his power increases (because $q^H \geq q^L$), along with his chances of survival. Hence, expropriation becomes unambiguously preferable.

The same occurs with the elite's reaction to investments in future state capacity. Since the elite are already making their best effort to capture power ($r^* = 1$), the ruler's survival probability is the same regardless of his decision to invest in capacity (i.e., $\gamma_{i=1}(\cdot) = \gamma_{i=0}(\cdot) = \gamma_{r^*=1}(\cdot)$). Given the elite's inability to further react against the ruler, the *capacity building* condition ($k \leq \Delta(i, p_1 \leq \underline{p_1})$) that drives the decision to invest reduces to:

$$k \leq \left\{ (\tau_2^H - \tau_2^L) \left[p_2 L - \gamma_{r^*=1}(\cdot)[p_2 L + \omega_2) \right] \right\}.$$

For a given threshold cost of investing in capacity $\underline{k}$, the *capacity building* condition is more likely to be satisfied with low enough prices. This is the case because the elite—as attractive as capturing a more capable state in the future might be—are not capable of reacting by increasing their political power r, since they are already doing as much as possible. Thus:

Proposition 2. *When $p_1 \leq \underline{p_1}$, the economic elite invests as much as possible to replace the ruler ($r^* = 1$). The ruler, in turn, always chooses to expropriate ($j = 1$), and will decide to invest in state capacity for comparatively higher investment costs, k. Furthermore, a marginal decline in first-period prices increase the investment cost threshold, $\underline{k}$, at which investment in capacity is chosen by the ruler.*

(Proof in appendix)

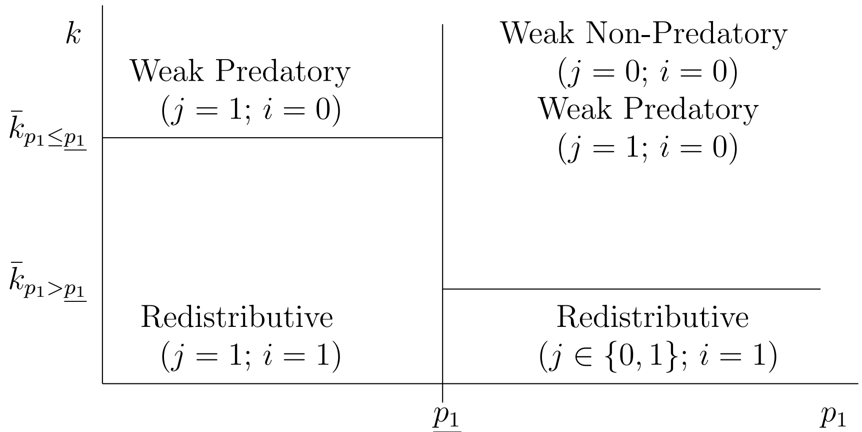
This final result summarizes the effects of a sufficiently large negative price shock. The ruler's decisions are intuitive. With the ability of the economic elite to challenge him temporarily diminished, calling on the external support of the beneficiaries of redistribution is now unambiguously preferable, and thus expropriation is always chosen. Furthermore, the reaction of the economic elite to any investment in future capacity by the ruler is now neutralized. This makes investments in capacity preferable, when previously they were prohibitively costly because of the elite's reaction they triggered.

To illustrate the different possible outcomes in the characterized equilibrium, let $\bar{k}_{p_1 \leq \underline{p_1}}$ be

[7] This is equivalent to dropping the third assumption, and considering the case in which $\mathcal{M} \geq 1$.

the maximum cost of investing in future state capacity that satisfies the *capacity building* condition when prices are low enough ($p_1 \leq \underline{p_1}$); and $\bar{k}_{p_1 > \underline{p_1}}$ when they are at normal levels ($p_1 > \underline{p_1}$). Figure 1 maps the possible expropriation ($j \in \{0, 1\}$) and capacity investment ($i \in \{0, 1\}$) decisions predicted by the model, for different values of investment cost, k, and period 1 prices, p_1, while fixing the value of the rest of the parameters.

Figure 1: Equilibria of Expropriation and Capacity Investment Decisions



Three types of states emerge from figure 1, depending on the expropriation and capacity investment outcomes. To the right of $\underline{p_1}$, the ruler will choose whether to expropriate based on the political support he can get through redistribution (see appendix). The decision to invest in state capacity, on the other hand, will change at some threshold investment cost $\bar{k}_{p_1 > \underline{p_1}}$, creating two regions. For costs lower than $\bar{k}_{p_1 > \underline{p_1}}$, the ruler chooses to invest, whereas for those above that threshold he does not. I call *weak non-predatory* states the set of equilibrium outcomes where neither expropriation nor investments in capacity are selected by the ruler, because of effective deterrence by the elite. In these cases the strategic cost of investing in capacity is high, and redistribution does not provide the ruler with effective political support. When, on the other hand, redistribution of the elite's assets can generate considerable support for the ruler, while the investment cost is still prohibitive, a *weak predatory* state that expropriates but does not develop capacity emerges.

The region left of $\underline{p_1}$ only becomes possible with a price shock that generates low enough prices. Here, expropriation always happens (as characterized in Proposition 2), ruling out a *weak non-predatory* state outcome. A threshold investment cost $\bar{k}_{p_1 \leq \underline{p_1}}$ that cuts through the ruler's decision to invest in future state capacity also separates two types of states. Investment costs above this threshold result in a *weak predatory* state, while costs below it lead to a *redistributive* one. As illustrated in the figure, however, the threshold cost is larger in this region, so that investments in capacity occur even at higher costs, as compared to cases where the period 1 price is at a normal level (i.e., $p_1 > \underline{p_1}$). With low enough prices, *redistributive* states are more likely to emerge than *weak* states for a given cost of capacity-enhancing investments.

Summing up, when facing low enough prices that temporarily weaken a non-ruling economic elite, a ruler will have an incentive to expropriate and consolidate his power. Furthermore, investments in future capacity and, with them, the foundations of a capable state, can take place at higher investment costs. Thus, under the scope conditions of the model (elite factions in conflict, and asset redistribution as a way rulers have to rally potential supporters), two key hypotheses that emerge from this simple formalization are:

1. When the non-ruling economic elite faces low enough prices, rulers will expropriate.

2. Rulers are also more likely to invest in expanding state capacity.

III. Background

Ideally, these hypotheses could be evaluated by randomly assigning prices to a sample of ruler–elite pairs in conflict. As an approximation to this ideal design, I use a large economic shock—the Great Depression—as an exogenous change in agricultural commodity prices in Mexico, and take local political rulers and the local economic (landed) elite as the relevant actors. Mexico in the aftermath of the revolution—which lasted from 1910 to roughly 1919—is an attractive case study; it satisfies the scope conditions of the theory and, because of the political situation, offers a sizeable number of subnational units, which allows for meaningful quantitative analysis.

Local *hacendados*—the owners of large estates—had developed credible rent-sharing arrangements with the political elite during the pre-revolutionary period (e.g., Haber, Maurer and Razo 2003). However, after the revolution, the Mexican state collapsed. The incipient national institutions of the old regime disappeared during the turmoil of the civil war, and the power vacuum was filled at the local level by a confederation of regional warlords, as well as other *caciques* (political bosses), with local power bases (e.g., Brading 1980; Knight 2005).

The old pre-revolutionary bosses, members of large landowning families, were completely discredited politically after the revolution and stopped holding public office. They nonetheless "wielded unseen but surely felt power, [and] had the means of coercion or could easily purchase them" (Wasserman 1993, p. 128).[8] In some places, the old landed elite staged a comeback after several years of political retreat, while in others they lost influence definitively.

Local politics during the period proceeded largely independent of national politics, as municipal factions wrestled control of the available economic resources: land and taxes. During the period, *municipios* relied on their own resources to run the local government, with little support from state and federal resources. They retained the prerogative of taxing land, services, and the production and sale of some commodities. The local bureaucracy staffed tax collection offices, public safety forces (e.g., municipal guards), and sometimes provided basic public services, such as water provision, public sanitation, and the administration of local public markets, slaughterhouses and burial grounds.

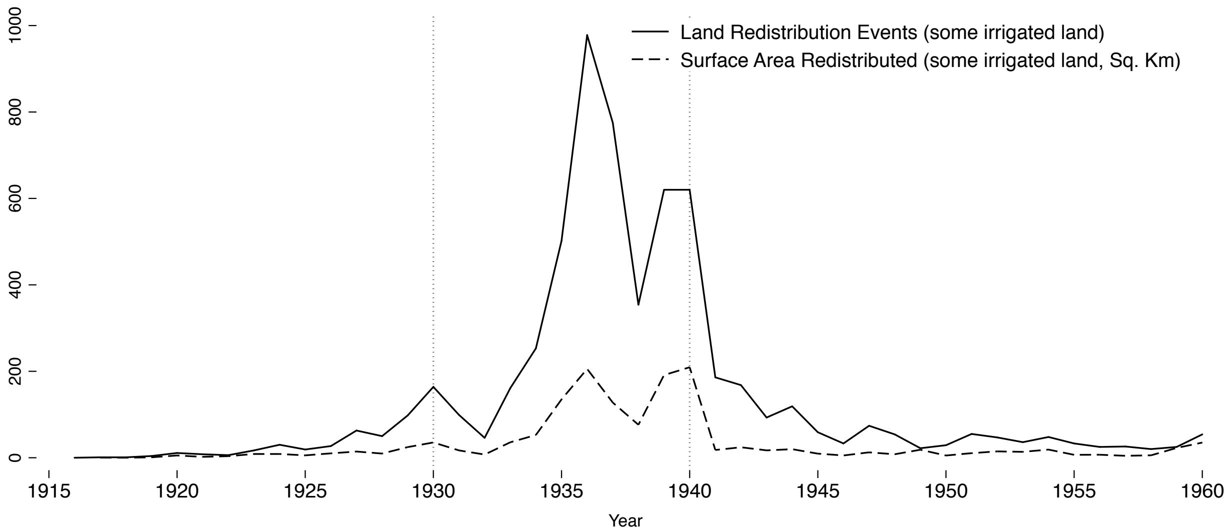
The conflict over local power—and its associated rents—often turned violent, as the prerevolutionary elites struggled to preserve their position, and the new bosses sought to establish themselves locally. The outcome of these conflicts hinged on the resources that these groups were able to mobilize in their favor; while the old elite could turn to their estates to support their bid for power, the rising notables could rally land-hungry peasants.[9]

Despite their retreat from local political life after the outbreak of the revolution, *hacendados* were largely able to secure their properties during the years of civil war (1910-19), even in the face of limited land redistribution implemented by the various armed factions as part of their recruiting strategies. In the 1920s, with agrarian legislation already in place, land reform was used as a political instrument to demobilize peasants in conflictive regions, but it was largely limited to claims of past dispossession and by villages outside *haciendas* (e.g., Sanderson 1984; Gaona 1991; Dell 2012; Saffon 2014).

[8]Centralization only resumed once the national-level power struggles settled with the establishment of a national party in 1929. However, it was no until after World War II, when an economic boom enhanced federal financial resources, that the central state would claim authority in most municipalities. While the federal government often intervened in regional disputes, these were calculated affairs, with the objective of preempting open conflict that could escalate to national proportions and threaten the regime (Wasserman 1993).

[9]The potential commitment problem between agrarian bosses and peasants was addressed through an institutional innovation specific to the Mexican land reform. To keep peasants from withdrawing their support from the new bosses after receiving land, they were granted were limited usufruct rights, and faced the threat of compensation payments well into the 1950s (García-Treviño 1953; Magaloni, Weingast and Díaz-Cayeros 2008). Peasants, now organized in agrarian communities (which were formed as a condition for receiving land), could credibly threaten to mobilize against a local ruler who backed down from redistribution.

Figure 2: Land Redistribution in Mexico (1916-1960)



Source: Sanderson (1984). Irrigated land. Dates correspond to the official date of redistribution; usually lag actual redistribution date by a couple of years.

Thus, by the 1930s, local landowners still retained the main source of wealth in rural *municipios*. The period of mass land redistribution only came, as figure 2 shows, after the Great Depression, and particularly after 1934. While the revival of the land reform program was supported at the national level by president Lázaro Cárdenas (1936-1940), its implementation had a very local dynamic, and could only happen with support from local authorities.[10] Local political leaders could (and did) encourage land petitions and streamline their approval. At the same time, they were also able also stop the process at various stages, if it was in their interest. Whether the struggle between *hacendados* and the new local political leaders determined the expansion of local state capacity, perhaps mediated by land reform, remains an open question in the literature.

In the Mexican post-revolutionary context, the formal model developed above suggests that, in the areas that were badly hit by a negative price shock and landowners' resources were diminished, the new political bosses should have been more likely to expropriate land (Hypothesis 1), and to invest to increase state capacity (Hypothesis 2). Furthermore, these effects should arise specifically where competing elites—the landowners—were present.

[10]The process started with a group of peasants requesting land to a local agrarian commission, whose membership was determined by local political appointment. This was followed by a recommendation of the commission to the state governor based on technical and political criteria. Governors had the ability to formally veto the petition. If approved, it was sent to the national agrarian commission, which could approve and send it to the president to sign (Craig 1983).

Illustrative cases. A number of case studies exemplify this pattern of landlord domination that persisted through the revolution, followed by agrarian unrest that culminated in land reform, and the final consolidation of the new local political leadership—often military *caudillos* or local *caciques*—that instigated expropriation (e.g., Singer 1988; Harper 2009). The available data also suggests that, in these cases, political consolidation was also accompanied by an expansion in local state capacity.

The local *cacique* Ernesto Prado, from Michoacán's *Cañada de los Once Pueblos*, badly hit by the Great Depression, provides a good example:

> [T]he second half of the nineteenth century saw an intense process of privatization of communal lands in the *Cañada*. During the *Porfiriato* [the pre-revolutionary period], the municipality's political oligarchy was made up of just three families. Later, during the Mexican Revolution, many inhabitants began to demand land. During Francisco Múgica's term as governor (1920-22), Prado began a formidable agrarian campaign in which he visited several towns, [...] while at the same time winning control of the municipal presidency of Chilchota by means of his relatives and friends. During Cárdenas' presidency [in the late 1930s], Prado succeeded in redistributing land in Tanaquillo, his hometown: 'the rural defence [forces] were led by him, as were the communal authorities and those in charge of the municipal administration, [all of whom] were installed and unseated at Prados' whim'. Later governors [...] tried to remove Prado, but despite their best efforts, his influence lasted for several more years (Calderón 2005, p. 134).

San Felipe del Progreso, in the state of Mexico, also suffered a negative price shock in the aftermath of the Great Depression. In her ethnographic study of the *municipio*, Margolies (1975) describes a similar process to the one in the *Cañada*. A handful of *hacienda* owners prospered in the late nineteenth century by expanding both their export-oriented production and, given the proximity to mines, domestic-oriented grain production. They dominated local political life—at least one of them directly served as municipal president during the pre-revolutionary period—and had a considerable degree of authority not only within their estates but in the surrounding towns. "In short, [the *hacendado*] sought a comfortably mutualistic relationship with townsfolk and a toadyish receptivity which permitted him to do whatever he wanted in any contingency. [He could] satisfy both insignificant whims [...] and regulatory demands" (Margolies 1975, p. 32).

Hacendados were able to successfully resist the revolutionary turmoil (1910-19) through self-financed armed defense groups, and the newer local revolutionary political leadership saw them as a threat. By the 1930s these local authorities reacted with a "deliberately calculated" indifference to illegal land invasions on the *haciendas*, and "repeatedly denounced the landlords as 'provocators' and 'subverters' whose only aim was to create problems for the government" (p. 43). Macario Durán, a local agrarian leader from the 1930s that rose to the municipal presidency in the early 1940s, "exercised absolute power from 1940 to 1957" (Torres-Mazuera 2012, p. 51), which allowed him to profit from lands formally held in common property and monopolize local trade.

Consistent with these accounts, in both cases the available data suggests that price shocks hit the regions negatively, and that both expropriation of assets from the landed elite and one measure of local state capacity, the number of bureaucrats, increased substantially. The *Cañada* roughly corresponds to the *municipio* of Chilchota, which saw its commodity potential—the gross income that could be potentially generated given the local agro-climatic conditions and commodity prices—fall by 30% from 1930 to 1940. Over the same period, land was redistributed for the first time, and the number of bureaucrats rose from 4 to 35. In San Felipe, commodity potential fell by 20%. Land redistribution, though already underway by 1930, increased by a factor of 8 in the next decade, while the number of bureacrats tripled from 15 to 45. Relative to the national trends in the number of bureaucrats, which on average increased by a factor of 1.5 during the period (or 10 bureaucrats per *municipio*, in absolute terms), these were large increases.

Naolinco, in the central region of the state of Veracruz, provides an example of failed expropriation and continued conflict. In the aftermath of the revolution, a radical *agrarista* movement, led by governor Adalberto Tejada, took momentum regionally. Armed peasants organized into rural defense forces and successfully took over local governments across the state (Fowler-Salamini 1978). While a sizeable number of provisional land redistributive grants were approved, in places like Naolinco *hacendados* were able to continuously avoid their implementation through violence, by employing (costly) hired guns to intimidate peasants and their leadership. The most prominent armed group that sold protection was the *Mano Negra*, led by the *hacendado* Manuel Parra, which took over local administrations in the region and reportedly killed thousands of peasants in the region during the period (Santoyo 1995). After Parra's death in 1943 agrarian unrest continued. His *hacienda* was eventually expropriated and redistributed in the 1950s under the leadership of Guillermo

Cedeño, who nonetheless had to flee the *municipio* himself after several attempts on his life.

Contrary to the previous cases, in Naolinco commodity potential only fell by 10% (close to the mildest possible decline across the country), which could partly explain the landowners' ability to resist far reaching land reform and challenge the agrarian leadership. In the 1930s, there was only one definitive redistributive grant with expropriated quality land, which amounted to less than 1% of the *municipio*'s surface area. While the number of bureaucrats increased—following a nation-wide upward trend—it did so at a slower rate than the other cases, from 23 to 30 public officials (a 30% increase).

IV. Research design

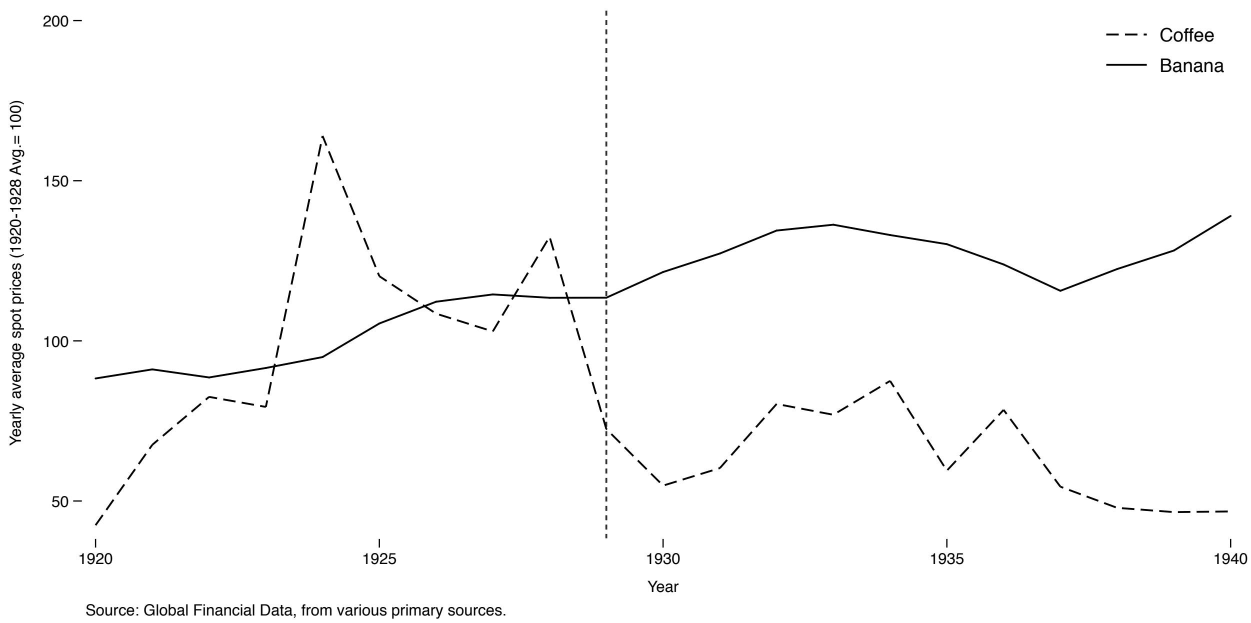
These cases highlight a consistent pattern, but opportunities for a definitive consolidation of the local political leaders that emerged from the revolution and, the hypothesized expansion of state capacity, likely varied from region to region in unobserved ways, making a systematic evaluation of the proposed theory challenging. To overcome these difficulties I rely on one source of exogenous variation to the landed elite's available resources, and thus to their ability to resist and challenge the rising local political leaders. Price shocks induced by the Great Depression affected crop values differentially and were largely unexpected (e.g., Hamilton 1992). Thus, they can provide credibly exogenous variation in the economic resources of the landed elite between regions suitable to produce different crops.

As the model suggests, a large negative shock to the economic power of elites can increase investments in state capacity—potentially with long-term consequences. In Mexico, these price shocks came during a period of political reorganization following the turmoil of the Revolution. If local leaders successfully consolidated power after a large shock that depleted the landed elite's resources, and their political machines were in turn integrated into the national political system under the PRI regime, these initial increases in local capacity could have persisted.

Figure 3 illustrates this component of the identification strategy. After 1929, some internationally traded agricultural commodities, such as coffee, display a sharp decline in their prices, while others remain relatively stable (rice) or even slightly increase (bananas).[11]

[11] Table 6 in the appendix presents the average prices before and after the Great Depression, by commodity. FIgure 5, also in the appendix, plots the yearly trend in commodity potential before and after the Great Depression, for the most and least affected *municipios*.

Figure 3: Price Differential Before and After the Great Depression



Given the availability of historical data, two estimation strategies are implemented: a difference-in-differences approach that analyzes outcomes in two periods (1930 and 1940) and compares differential *changes* in state capacity and land redistribution, and a cross-sectional estimation that compares its *levels* after the shock was realized.

Difference-in-differences design. The main results are obtained through a difference-in-differences approach (similar to Topalova 2010), that compares changes in outcome y_{it} in differentially shocked places:

$$lny_{it} = \alpha + \beta_1 ln\bar{V}_{it} + \lambda_t \times X_{i,1930} + \lambda_t + \gamma_i + \varepsilon_{it} \tag{1}$$

where $\bar{V}_{it}$ is a measure of commodity potential in time t for *municipio* i; $X_{i,1930}$ is a vector of time invariant pre-shock controls that are interacted with the time fixed effect λ_t; γ_i are *municipio* fixed effects; and ε_{it} is an error term. The outcome y_{it} is a municipal-level measure of *local* state capacity or land reform. Commodity potential, the main variable of interest, is defined as:

$$\bar{V}_{it} = \sum_{g=1}^{G} \frac{\bar{P}_{gt} \times Suitability_{ig}}{Avg.\ Suitability_g}$$

where $\bar{P}_{gt}$ is the average price of crop g in time $t \in \{1920s, 1930s\}$; $Suitability_{ig}$ is a *municipio*-specific crop suitability measure (in metric tonnes) determined by agro-climatic conditions; and $Avg.\ Suitability_g = \frac{1}{N}\sum_{i=1}^{N} Suitability_{ig}$ is a national average. Thus, $\bar{V}_{it}$ aggregates the value of the potential production of a *municipio* at a given point in time relative to the rest of the country.[12] Parameter β_1 in the equation can capture the price shocks' effect through the channel that the model suggests: the temporary weakening of the landed elite leads to the expropriation of land, along with an increase in the incentives to invest in local capacity.

With exogenous controls, the key identification assumption is $E(\varepsilon_{it}|\lambda_t, \gamma_i, ln\bar{V}_{it}) = 0$. That is, a *municipio* should have to maintain the same difference to an unexposed control *municipio* had it not been shocked by the Great Depression.

Cross-sectional design. For a cross-section one decade after the shock, the following equation is estimated:[13]

$$y_{i,1940} = \alpha + \beta_0 ln\bar{V}_i^{1920s} + \beta_1 S_i^{1920s-30s} + \delta X_i + \varepsilon_i \tag{2}$$

where $y_{i,1940}$ is a *municipio*-level outcome of local state capacity or land redistribution for 1940. $\bar{V}_i^{1920s}$ is the initial commodity potential (using the 1920-1929 price average), prior to the price shocks; $S_i^{1920s-30s}$ is the percentage shock to the commodity potential attributable to the Great Depression; X_i is a vector of covariates; and ε_i is an error term.

The percentage shock to commodity potential is given by:

$$S_i^{1920s-30s} = \frac{\bar{V}_i^{1930s} - \bar{V}_i^{1920s}}{\bar{V}_i^{1920s}} \times 100$$

Here, the identification assumption is $E(\epsilon_i|\bar{V}_i^{1920s}, S_i^{1920s-30s}) = 0$, which is a relatively stringent condition. It requires, for instance, that unobservables related to state capacity/land reform are not correlated with the initial crop suitability in each *municipio*, nor with its

[12] An alternative empirical strategy in which the production mix is used to determine the extent to which *municipio* is hit by the price shocks requires information about the actual crops grown, along with the area used for their production. This approach was not pursued for two reasons. First, *municipio*-level data is only available for a handful of states (from the 1930 agricultural census); second, and more importantly, directly using the production mix could induce endogeneity in equation (1) to the extent that it is related to unobserved characteristics in the *municipio* that potentially affect the trajectory of state capacity and land reform, such as local labor repressive institutions.

[13] The estimation strategy is similar to Bhavnani and Jha (2013).

change induced by international price fluctuations. However, to the extent that one can regard these variables as exogenous—they are constructed from geographic features, along with internationally determined prices—the estimate for β_1 should be similar to the difference-in-differences approach.

For long-term outcomes, a similar version to equation (2) is estimated:

$$y_{i,2000} = \alpha + \beta_1 ln\bar{V}_i^{1920s} + \beta_2 S_i^{1920s-30s} + \delta X_i + \varepsilon_i \tag{3}$$

where $y_{i,2000}$ is a present-day outcome.

V. Measures and data

To characterize capacity, I draw from the notion of infrastructural power—"the capacity to actually penetrate society and to implement logistically political decisions" (Mann 1986, 170). I operationalize this concept by assessing the available resources of the state to implement policy, focusing on a key component: the presence of government officials in *municipios* (Soifer 2008). Almost any governmental action requires implementing agents. Bureaucrats gather information and enforce decisions, and keeping them on the payroll requires resources. For this reason, the realized number of bureaucrats at any given time (absent outside funds) reflects the realization of costly investments in expanding the capacity of the local government.

Adopting this resource-based approach to capacity, however, requires distinguishing between the ability of state actors to implement political decisions—such as extracting information and resources or maintaining order—and their incentives to do so. In the context of post-revolutionary Mexico, where constant government presence was concentrated in a few places and non-existent in most of the territory, this challenge can be partially addressed. The decision to set up a minimum number of bureaucrats is a precondition to implementing subsequent policies; it is necessary for the operation of local government.

Archival research suggests that bureaucrats during the period indeed filled essential roles in local governments, and were unlikely appointed solely for patronage purposes.[14] Local expenditure budgets from the period indicate that policing and tax collecting positions were,

[14]Conducted in the *Archivo General de la Nación* throughout December, 2014. The information comes from expenditure budgets in 72 *municipios* in Baja California, Campeche, Chihuahua, Puebla, Querétaro, and Zacatecas. This non-random sample was selected based on availability, but nonetheless spans through the period of study (1925-38), and across various regions of the country.

respectively, the most common functions; together they account for almost half of all bureaucrats in the inspected *municipios*. The positions that follow are basic administration (mostly city hall members), the local judiciary, and *municipio* representatives in smaller towns. Other functions, incuding local prison keeping, sanitation, market and cemetery administration, employ a negligible number of people. Together, these secondary functions account on average for less than 10% of public employees.[15]

The total number of bureaucrats is available by *municipio* from the 1930 and 1940 population censuses, as reported by the respondent's main occupation, and was entered from historical census reports for this project.[16] For 1940, but not 1930, these data are disaggregated in a way that allows to distinguish between federal, state and municipal bureaucrats.

As a measure of the second main dependent variable, asset expropriation, I rely on land redistribution microdata at the agricultural unit (*ejido*) level from Sanderson (1984), which includes the outcome of petitions at the national level (including denied grants), date of redistribution and basic characteristics of the landholding. I focus on redistributions that include at least some land with access to water, the most valuable landholding type, and the productive core of large agricultural estates. Expropriation of marginal land would not have substantially affected *hacendados*' resources, and with them their ability to resist local political leaders.[17]

For long-term outcomes, a similar measure of capacity—number of bureaucrats—is available from the 2000 population census. A second measure, local taxes as a proportion of local GDP, is also used.[18] This measure partially reflects the realized extractive capacity of local governments, given past investments in capacity.

Crop suitability is available as total production capacity (ton/ha) for low input level rain-

[15]Education was not provided by *municipios* during the period, which is reflected in the inspected budgets: only four municipalities planned on hiring people for these purposes (two of them were cities).

[16]The self-reported measure from the population census in 1930 yields a similar number of bureaucrats (147,301) to the reported number in an independent source, the *Censo de funcionarios y empleados públicos*, generated within the government (159,253). The differences might be partially attributable to the timing of each measurement—May and November, respectively. Unfortunately, the data in this alternative source is not disaggregated enough for the type of analysis conducted here.

[17]Irrigated land is present in 45% of all redistributive actions over the period of study. Other types of landholding are rainfed land, pastures, desert and mountainous. Aggregating all type of redistributed land yields similar, albeit weaker, results.

[18]Local taxes include local *impuestos*, *derechos*, *productos*, *aprovechamientos*, and *contribuciones de mejoras*. They are averaged over the 1989-2013 period, and normalized by *municipio* GDP estimates from 2005, generated by the UNDP.

fed crops (1960-1990), from FAO's Global Agro-Ecological Zones. These data are spatially merged with *municipios* to obtain a local-level suitability measure.[19] Present-day *municipio* maps were individually modified for this project to follow 1940 borders when possible, using georeferenced period maps from the 1940 population census. Price data for a number of internationally traded crops come from the Global Financial Data repository.[20]

The theory presented above suggests that negative economic shocks affect state capacity through the weakening of a non-ruling economic elite. As a measure of the presence of this non-ruling economic elite—in this case, the older landowning elite—I use the existence of large estates in a municipio. I identify the *municipios* with a landed elite by using the classification of settlements in the 1930 population census and restrict the analysis to places with at least one ranch, *hacienda*, or *finca* (estate).[21] Unsurprisingly, large estates are present in the large majority of the *municipios* in 1930. Of course, powerful landowners in post-revolutionary Mexico were not restricted to traditional *hacendados*, and during the revolutionary period some post-revolutionary local leaders became *hacienda* owners themselves;[22] however, given available sources, *hacienda* presence meaningfully captures the presence of a traditional elite whose wealth was based primarily on the exploitation of agricultural commodities.

Additional covariates used in the analysis include total population, the proportion of people working in agriculture, the proportion of people living in cities, and dispersion of settlements (number of localities per hectare), from the 1930 and 1940 population censuses.

[19] The spatial merge results in the average suitability within each *municipio*'s polygon weighted by the area of overlap with each of the suitability grid-cells. These are available at a 5 arc-minute grid-cell resolution.

[20] Data is available for bananas, barley, cacao, coffee, cotton, maize, rice, sugar, and wheat. Prices are yearly average spot prices from a variety of primary sources, compiled by the Global Financial Data.

[21] The classification is based on the "political category" of the settlement, and thus changes depending on the region; the same type of agricultural unit could be referred to as *rancho* or *hacienda* (or *finca* in southern states). Comparing Southworth's 1910 Official Directory of Estates with that year's census classification confirms this observation; for a given *municipio*, the number of estates roughly correspond to the sum of ranches and *haciendas* reported in the census, while the *haciendas* alone fall short.

[22] While these actors would also be affected by negative economic shocks, the argument only requires an asymmetry of resources. In cases where the new local political leadership acquired land and competed with the older landed elite, a negative shock would have generated an asymmetry in resource availability as long as the new elite's military and organizational structure—originated during the revolutionary years—was not affected by the economic shock.

VI. Results

What was the effect of the large negative economic shock brought about by the Great Depression on local state capacity in Mexico? The argument developed in this paper suggests that places experiencing a large negative shock should have undergone a greater increase in land reform and state capacity on average than places with a milder one.

Figure 4: Nadaraya-Watson Regression.
Changes in Bureaucrats/Land Reform on Changes in Commodity Potential (1930-40)

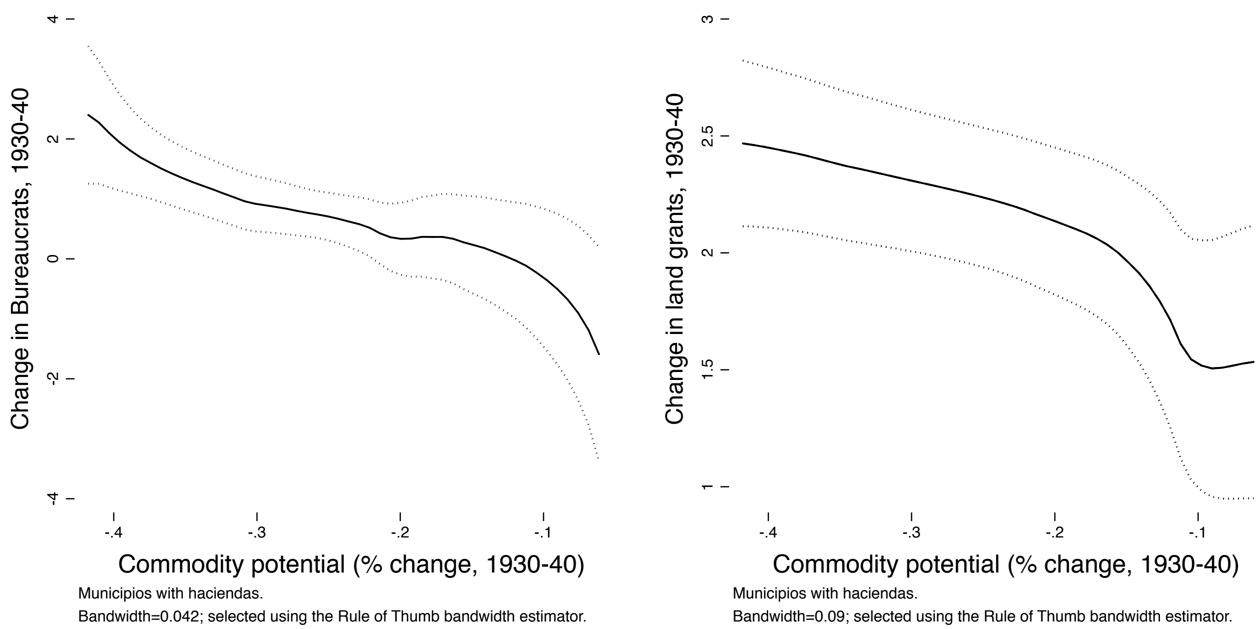


Figure 4 provides some initial supporting evidence. It presents the bivariate relationship at the *municipio* level between changes in the commodity potential in the 1920s-1930s period and changes in the number of bureaucrats (left panel), or the intensity of quality land redistribution (right panel). Even as the number of bureaucrats increases overall between 1930 and 1940, there is a strong linear relationship between the intensity of the commodity price shock and bureaucratic growth. Places that suffer the strongest negative shocks to their commodity potential experience the highest increases in capacity, as measured by the number of bureaucrats. For land redistribution the same pattern is observed; amidst a general rise in redistributive grants, its increase is largest where commodity potential drops the most. These descriptive patterns foreshadow what I find when estimating equations (1) and (2).

Table 1: Commodity Shocks and Bureaucrats

	(1) Bureaucrats per 1000 people (Haciendas)	(2) Bureaucrats per 1000 people (Haciendas)	(3) Bureaucrats per 1000 people (No haciendas)	(4) Bureaucrats per 1000 people (Haciendas)
Commodity potential (log)	-8.10*	-9.60**	2.04	
	(4.31)	(4.09)	(3.19)	
Placebo commodity potential (log)				-0.36
				(0.54)
Population in 1930 (log) × 1940		0.14	1.00**	-0.28
		(0.44)	(0.45)	(0.51)
Municipal surface area, Ha. (log) × 1940		0.095	0.14	0.51
		(0.29)	(0.42)	(0.37)
Localities per Ha. in 1930 × 1940		486.2	441.9	428.1
		(350.3)	(459.0)	(347.0)
Population in agriculture in 1930 (%) × 1940		-0.017	-0.012	-0.027
		(0.027)	(0.022)	(0.026)
Population in cities in 1930 (%) × 1940		-4.26	3.65	-3.47
		(3.42)	(2.90)	(3.37)
Commodity potential (log) in 1930 × 1940		0.0089	0.0046	0.049
		(0.17)	(0.21)	(0.17)
Year FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Within-*Municipio* Mean of DV	4.28	4.28	2.55	4.28
Within-*Municipio* SD of DV	2.33	2.33	1.77	2.33
R sq.	0.73	0.74	0.75	0.73
Observations	2904	2904	1434	2904
Number of municipios	1506	1506	734	1506

OLS estimations. See equation (1) for the econometric specification. The unit-of-analysis is the *municipio*-year. Standard errors (clustered at the *municipio* level) in parentheses.

Difference-in-differences design. Table 1 shows the difference-in-differences estimates, equation (1), for the number of bureaucrats per 1000 people.[23] The estimated effect of the commodity potential on state capacity is, as expected, negative, large, and precisely estimated. Interpreted causally, it suggests a substantial effect: a one standard deviation *decrease* in the within-*municipio* potential induces almost one within-*municipio* standard

[23]Alternative measures to those analyzed in tables 1 and 2, the logged number of bureaucrats, and proportion of *municipio* land redistributed, are presented in table 8 in the appendix, and yield similar results.

deviation *increase* in the number of bureaucrats per 1000 people. For a *municipio* at the 25th percentile of population and state capacity in 1930 (roughly 2,500 people and 2 bureaucrats), the suggested effect of a negative shock of one within-*municipio* standard deviation is more than a two-fold increase in the number of public officials, to 6. In a larger *municipio* with average population and state capacity in 1930 (7,700 people with 29 bureaucrats) the effect of a similarly large shock is an increase of 18 agents of the local government.

These estimated magnitudes are large but plausible, and comparable to the observed changes in the cases presented above, Chilchota and San Felipe del Progreso. Furthermore, local expenditure budgets from the state of Chihuahua (available for at least two points in time for a handful of *municipios*), support the interpretation that changes in the number of bureaucrats prioritize order-keeping or extractive activities. For instance, in Balleza, where the number of local bureaucrats more than doubled from 5 in 1925 to 11 in 1935-38, personnel in the local treasury increased from one to three tax collectors, in policing from one to two policemen, and the geographical range of local government was expanded from having no municipality representative in smaller towns to having three. In Ascención, where the number of bureaucrats actually declined from 8 to 7 from 1925 to 1937, a city hall administration post was re-purposed into a policing position.

Also consistent with the argument, the effect of negative shocks on commodity potential is only found in places with a landed elite in 1930; places without it have a coefficient that is orders of magnitude smaller and is not statistically significant (column 3). A placebo test, reported in column 4, replaces commodity potential with its value one decade into the future. Any strong association between this placebo and state capacity could indicate the presence of an underlying differential trend driving the main results. It is reassuring to find that this is not the case; the coefficient on the placebo commodity potential is small and not statistically significant.

The mechanism that connects price shocks to investments in state capacity according to the model is the permanent elimination of the threat posed by the non-ruling economic elite through the expropriation of their productive asset. In the Mexican context, however, this did not primarily entail a simple transfer of the asset—here, land—to the new ruling elite (although this often happened).[24] Expropriating land and redistributing it with limited property rights to peasants allowed incumbent leaders to rely on a non-economic source of

[24]On occasion, revolutionary generals simply took possession of *haciendas* for their own profit (e.g., Wasserman 1993).

power in their struggle with the landed elite, and to build a network of political clients with an entrenched interest in the survival of their patron (García-Treviño 1953).

Table 2: Commodity Shocks and Land Redistribution

	(1) Land reform, grants (Haciendas)	(2) Land reform, grants (Haciendas)	(3) Land reform, grants (No haciendas)	(4) Land reform, grants (Haciendas)
Commodity potential (log)	-3.44**	-5.27***	3.93***	
	(1.69)	(1.82)	(1.30)	
Placebo commodity potential (log)				0.13
				(0.33)
Population in 1930 (log) × 1940		2.21***	0.43**	2.03***
		(0.38)	(0.21)	(0.36)
Municipal surface area, Ha. (log) × 1940		-0.0090	0.43***	0.14
		(0.15)	(0.14)	(0.16)
Localities per Ha. in 1930 × 1940		45.8	22.3	-0.15
		(200.1)	(122.8)	(186.7)
Population in agriculture in 1930 (%) × 1940		0.021	0.0018	0.017
		(0.014)	(0.0046)	(0.013)
Population in cities in 1930 (%) × 1940		1.41	0.29	1.79
		(1.42)	(1.17)	(1.43)
Commodity potential (log) in 1930 × 1940		-0.039	0.18**	-0.018
		(0.12)	(0.083)	(0.12)
Land reform by 1930 (grants) × 1940		0.25	-0.80**	0.28
		(0.38)	(0.33)	(0.38)
Year FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Within-*Municipio* Mean of DV	1.37	1.37	0.35	1.37
Within-*Municipio* SD of DV	1.64	1.64	0.44	1.64
R sq.	0.58	0.65	0.61	0.65
Observations	3012	3012	1468	3012
Number of municipios	1506	1506	734	1506

OLS estimations. See equation (1) for the econometric specification. The unit-of-analysis is the *municipio*-year. Standard errors (clustered at the *municipio* level) in parentheses.

Changes in the *municipio*-specific commodity potential have the predicted effect on the trajectory of redistributive land grants, as table 2 indicates. The effect is also large, negative, and statistically significant. A causal interpretation of the coefficient indicates that a one standard deviation *decrease* in within-*municipio* commodity potential leads to one additional land redistribution grant—an *increase* of almost 80% of a within-*municipio* standard deviation in the number of redistribution land grants. Again, the effect of shocks is not found in the placebo specification (when replacing commodity potential with its value ten years into the future, in column 4).

In places without estates, shocks do have an effect, but in the opposite direction: badly hit places redistribute less land. The theory presented here cannot account for this finding—it applies only to cases with a landed elite—but the absence of a similar effect to that estimated in places with estates helps increase the confidence in the interpretation of the results as supportive of the theory. In any case, the positive effect of shocks on land redistribution in the absence of a landed elite is not entirely surprising. A decline in the value of production would make the petitioning process, a costly affair for landless peasants without a powerful local sponsor, less attractive. This would lead to a lower likelihood of land redistribution in places without a landed elite, as the estimates in fact indicate. This finding, then, highlights the complementarity between the elite-driven account of land reform in Mexico presented in this paper and demand-driven explanations, in which the dissatisfied and dispossessed peasants are at the center of land redistributive outcomes (e.g., Saffon 2014; Sellars 2014).

For the case of land grants, I can further assess the main identifying assumption of the difference-in-differences design—that exposed *municipios* would maintain the same difference to unexposed *municipios* had they not been shocked by the Great Depression. This is because, unlike data on public officials, redistributive land grants are available for prior years.[25] I find no evidence that prior changes in land grants (between 1920 and 1930) predict changes in commodity potential, suggesting the plausibility of the identifying assumption (table 10 in the appendix). Furthermore, when dividing *municipios* between those most and least negatively shocked (figure 6 in the appendix), land grants prior to the Great Depression follow a visibly parallel trend.

Cross-sectional design. So far, the analysis has focused on all types of bureaucrats.[26] Does this pattern also hold when focusing only on local bureaucracy? Estimating the difference-

[25] Aggregate data on public officials is also available from prior population censuses, but not at the *municipio* level.

[26] During this period, local bureaucrats—state and municipal—were less numerous than federal employees, but concentrated in the least populated areas. This leads to higher levels of local bureaucrats per capita across *municipios*. Furthermore, the federal bureaucracy nominally includes members of the armed forces, which were often controlled by local strongmen, rather than by the central line of command in Mexico City. Taken together, this suggests that the patterns of the bureaucracy can be informative about *local* state capacity specifically.

in-differences equation (1) for local bureaucrats requires disaggregated data for 1930, which is not available. For this reason, the cross-sectional empirical approach described in section IV is implemented using only 1940 data. Table 3 presents the results; they suggest that the same pattern holds for local bureaucrats.

Table 3: Commodity Shocks and Local Bureaucrats (1940)

	(1) Local bureaucrats per 1000 people	(2) Local bureaucrats per 1000 people	(3) Bureaucrats per 1000 people	(4) Bureaucrats per 1000 people	(5) Land redistribution (grants)	(6) Land redistribution (grants)
Commodity potential 1920s (log)	-0.013	-0.013	0.049	-0.016	0.12	-0.043
	(0.016)	(0.015)	(0.12)	(0.093)	(0.084)	(0.083)
% shock to commodity potential	-2.08***	-1.03***	-14.0***	-9.77***	-4.76***	-7.17***
	(0.35)	(0.30)	(3.61)	(2.78)	(1.53)	(1.73)
Population, 1930 (log)		-0.045		-0.29		2.20***
		(0.036)		(0.28)		(0.27)
Bureaucrats per 1000 people, 1930		0.017***		0.36***		
		(0.0049)		(0.044)		
Municipal surface area, Ha. (log)		0.13***		0.65***		0.0033
		(0.025)		(0.20)		(0.11)
Localities per Ha., 1930		86.9**		973.2**		51.4
		(37.2)		(402.0)		(141.9)
Pop. in agriculture 1930 (%)		-0.0065***		-0.039***		0.021**
		(0.0019)		(0.014)		(0.0098)
Pop. in cities 1930 (%)		1.36***		7.72***		1.44
		(0.18)		(1.49)		(1.00)
Land reform by 1930 (grants)					2.86***	2.25***
					(0.31)	(0.27)
Mean of DV	0.68	0.69	4.76	4.78	2.63	2.73
SD of DV	0.86	0.85	8.02	8.04	6.00	6.13
R sq.	0.031	0.24	0.016	0.26	0.18	0.31
Number of municipios	1514	1452	1514	1452	1596	1506

OLS estimations. See equation (2) for the econometric specification. The unit-of-analysis is the *municipio*. Municipios with *haciendas*. Robust standard errors in parentheses.

The first two columns present the estimation of the cross-sectional specification—equation (2)—using local (municipal) bureaucrats. Using the model with controls, the magnitude is similar to using all bureaucrats (columns 4 and 5), but smaller than when using the difference-in-differences approach. The mean percentage shock to the commodity potential from the 1920s to the 1930s is associated with an *increase* of 13% of the cross-sectional standard deviation in the number of local bureaucrats per 1000 people. The models for land reform (models 5 and 6) display the same pattern, with a negative and statistically significant effect of smaller magnitude than with the difference-in-differences estimation.

Summing up, both empirical strategies—a difference-in-differences approach that compares places differentially affected by the Great Depression price shocks and a cross-sectional design in 1940—suggest that negative price shocks generate substantial increases in the expropriation of the productive assets of a non-ruling economic elite (through land reform), and in state capacity investments (through the number of bureaucrats).

VII. Discussion

The last section presented supportive evidence of the theory's predictions, and provided two ways of increasing confidence in the interpretation of the results. First, by assessing the relationship between commodity shocks and state capacity/land redistribution in the absence of a landed elite; and second, through a falsification test, using future commodity shocks. Both strategies provide results supportive of my interpretation. The placebo tests are estimated to be close to zero and insignificant in all cases, as is the effect of commodity shocks on state capacity in places without a landed elite.

Yet, a competing interpretation that could be compatible with the results presented thus far is one in which the federal government directly attempted to create a broader political coalition that included the peasantry (e.g., Knight 1992). According to this narrative, the coalition-building promoted by the federal government was underway during this period and was successful enough to provide stability to the national PRI regime for decades to come. One implication stemming from this top-down account is that federal land redistribution efforts should have been focused in places with the highest likelihood of success: those where landowners were most weakened and thus least able to resist the reform.

When petitioning for land had reached its final stage, at the national level, the president had the ability to definitively reject petitions. If the president strategically exploited weakened landed elite to bring peasants into his coalition without incurring high political costs, the land grant presidential approval rates—conditional on arriving petitions—should have been higher in the worst-hit regions. Using the difference-in-differences design from equation (1), however, I find no relationship between shocks and presidential petition approvals; a land petition was as likely to be approved by the president in badly hit regions as it was in unaffected ones (table 11 in the appendix). That is, I find no evidence linking federal government actions to the differential commodity shocks after the Great Depression, as this top-down alternative explanation would have it. These results also rule out a second alternative interpretation, in which the federal government reacted to the Great Depression by redistributing land to prevent peasant rebellion (since the worst-hit areas would have arguably been particularly prone to peasant unrest.)

Given these results, then, what is the long-run significance of this early increase in local state capacity for the Mexican case? The evidence suggests that the patterns described above—higher state increases in capacity in places negatively hit by the commodity shock—endure over the long term.

Table 4 provides suggestive evidence of this persistence. Using the cross-sectional empirical strategy by estimating equation (2), I find that both available present-day outcomes—the number of bureaucrats per 1000 people and local tax collection as a proportion of local GDP—are correlated with the Great Depression price shocks in the expected way. In addition to estimating models similar to those used for the shorter-term effects, columns 2 and 4 include, for reference, present-day controls (if the estimation were to be interpreted causally, however, their inclusion could induce post-treatment bias). The magnitude of the effects relative to variation in state capacity outcomes is comparable to the shorter term effects presented in the last section (in tables 1 and 3), suggesting that the induced differences might have set differentially shocked regions on distinct trajectories. Early investments in capacity were important enough to differentiate the affected from the unaffected *municipios* for decades, amidst a process of national convergence in local state capacity.[27]

One explanation for the observed persistence in capacity can be traced to the process of political development of the PRI regime. In places where the path to political consolidation was cleared by the large negative shock brought about by the Great Depression, local political leaders would have been better able to bargain with the emerging national regime to their advantage. These local bosses were attractive to the regime because of the control they exerted in their regions. In exchange for their support to the national ruling coalition,

[27]Convergence is evidenced by the dispersion in bureaucratic presence, the comparable measure of state capacity over time. The coefficient of variation for the number of bureaucrats per 1000 people (i.e., standard deviation divided by the mean) goes from 2.41 in 1930 to 1.8 in 1940 and 0.76 in 2000. The same trend is observed with the total number of bureaucrats.

Table 4: Commodity Shocks and Long Term Local State Capacity

	(1) Bureaucrats per 1000 people (2000)	(2) Bureaucrats per 1000 people (2000)	(3) Local taxes (% of mun. GDP) Avg. 1989-2013	(4) Local taxes (% of mun. GDP) Avg. 1989-2013
Commodity potential 1920s (log)	-0.028	-0.047	0.020***	0.024***
	(0.12)	(0.11)	(0.0069)	(0.0069)
% shock to commodity potential	-14.4***	-12.2***	-0.94***	-0.78***
	(2.36)	(2.38)	(0.15)	(0.15)
Population, 1930 (log)	-1.28***	-2.52***	-0.017	0.086***
	(0.30)	(0.34)	(0.016)	(0.020)
Bureaucrats per 1000 people, 1930	0.33***	0.28***	0.00056	0.0035**
	(0.033)	(0.032)	(0.0014)	(0.0016)
Municipal surface area, Ha. (log)	0.12	0.37**	0.013	0.019
	(0.20)	(0.18)	(0.012)	(0.012)
Localities per Ha., 1930	624.0**	507.2*	55.9***	76.7***
	(295.0)	(296.9)	(20.8)	(24.0)
Pop. in agriculture 1930 (%)	-0.059***	-0.048**	-0.00071	-0.000074
	(0.019)	(0.020)	(0.0011)	(0.0010)
Pop. in cities 1930 (%)	3.60***	3.15***	-0.044	-0.00070
	(1.05)	(1.05)	(0.056)	(0.059)
Municipal GDP 2005 (log)		2.14***		-0.031
		(0.41)		(0.021)
Federal transfers (log) Avg. 1989-2013		-1.63***		-0.082***
		(0.45)		(0.026)
Mean of DV	9.71	9.65	0.42	0.42
SD of DV	6.69	6.63	0.43	0.43
R sq.	0.22	0.26	0.034	0.077
Number of municipios	1446	1440	1452	1446

OLS estimations. See equation (2) for the econometric specification. The unit-of-analysis is the *municipio*. Municipios with *haciendas*. Robust standard errors in parentheses.

consolidated bosses could have secured local extraction over the long term—using locally developed capacity—but also increased their ability to place themselves (or their allies) in high profile national positions.

Table 5: Commodity Shocks and Future National-Level Politicians

	(1) Federal government cabinet members (1940-1970)	(2) Federal government cabinet members (1940-1970)	(3) National-level legislators (1940-1970)	(4) National-level legislators (1940-1970)
Commodity potential 1920s (log)	-0.033	-0.041	-0.073	-0.068
	(0.038)	(0.038)	(0.17)	(0.16)
% shock to commodity potential	-2.17***	-2.34**	-6.43**	-4.20
	(0.82)	(1.13)	(2.71)	(3.46)
Population, 1930 (log)	1.08***	0.77***	4.26***	2.94***
	(0.19)	(0.15)	(0.65)	(0.58)
Bureaucrats per 1000 people, 1930		0.13***		0.31***
		(0.044)		(0.065)
Municipal surface area, Ha. (log)		-0.32***		-0.85*
		(0.11)		(0.44)
Localities per Ha., 1930		-142.9		-646.8*
		(95.5)		(387.5)
Pop. in agriculture 1930 (%)		-0.0072		-0.025*
		(0.0050)		(0.014)
Pop. in cities 1930 (%)		3.42***		16.0***
		(0.99)		(3.21)
Mean of DV	0.57	0.60	2.52	2.68
SD of DV	3.35	3.46	9.85	10.2
R sq.	0.099	0.26	0.18	0.36
Number of municipios	1557	1452	1557	1452

OLS estimations. See equation (2) for the econometric specification. The unit-of-analysis is the *municipio*, and the dependent variable measures the total years served by politicians born in each *municipio*. Municipios with *haciendas*. Robust standard errors in parentheses.

To assess the conjecture of consolidation and increased access to national political influence, I analyze the access to national-level political office associated with each *municipio* for the period 1940-1976.[28] I construct a geographic political access measure using Roderic Camp's

[28] This period spans from immediately after I measure state capacity outcomes following the commodity shocks to the end of president Luis Echeverría's term in 1976. Past analyses of the Mexican national political network suggest that a military-based sub-network ruled from the Revolution until Echeverría's term, replaced later by a finance-based sub-network (Gil-Mendieta and Schmidt 1996). While the miltary-

political biographies, and focus on members of Congress and appointed high-ranking officials (members of the national cabinet, the attorney general, and Justices of the Supreme Court). After assigning each politician to their place of birth, I add the number of years served in the Chamber of Deputies and the Senate (or in high-ranking appointments), aggregating to the *municipio* level.

Table 5 presents the estimates of the cross-sectional model, equation (2), using the *municipio* aggregate number of years in national-level political offices as the dependent variable. Negative shocks following the Great Depression are associated with higher representation of a *municipio* in both appointed and elective high-ranking positions (albeit the latter is less precisely estimated). The results provide evidence for one channel of persistence of the documented shorter-term effects of temporary landed elite weakness on state capacity. They also suggest the relevance of political geography as a determinant of the patterns of political recruitment during the PRI regime, beyond the social characteristics of individual politicians (e.g., Smith 1979; Camp 1995).

VIII. Conclusion

Large economic shocks that affect elites differentially can disrupt pre-existing political equilibria in ways that may be conducive to the development of state capacity. Specifically, in contexts of intra-elite conflict, shocks may bring about political stability by disproportionately favoring the incumbent ruler, and opening a window of opportunity during which this short-lived strength can be consolidated. One such way is the expropriation of assets, like land, from the temporarily weak elite. By making it advantageous to expropriate a non-ruling economic elite and extending the time horizon of rulers, these shocks can simultaneously induce higher investments in capacity, such as staffing bureaucracies and deploying public employees, or introducing costly local tax systems.

In this paper, I a presented a simple formalization of these ideas in a two-period, two-agent model. The key comparative statics that emerge from this model were empirically evaluated with a research design that uses the Great Depression as a shock to post-revolutionary Mexico. By focusing on local political bosses that emerged from the revolution across the country, and by using region-specific agro-climatic commodity potential in combination with

based ruling coalition was not characterized by direct intervention of the military in national politics, its civilian leadership did rely on the support of the military for presidential bids. Furthermore, the military-based sub-network had a regional approach in bringing the country's economic regions under the regime's control.

commodity price shocks, I assessed the effect of the Great Depression on both expropriation (land redistribution) and on a capacity-enhancing investment, the expansion of local bureaucracy. Negative shocks were found to induce more land redistribution in places with large landowners, as well as a substantial increase in the number of bureaucrats. These effects persist over the long term, suggesting that the Great Depression played an important role in the expansion of local state capacity for the case of Mexico.

Underdevelopment is usually accompanied by ineffective governments. There is growing evidence that capable states can have a sizeable effect on economic development, but the conditions that foster state capacity are not well understood. In this paper I describe a possible path out of low-capacity traps.

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Appendix

Proof of Proposition 1.

Proof. E's optimization problem is

$$max_{\{r\}}(1-r)p_1L + \big[\gamma(\cdot)\big(p_2L+\omega_2\tau_2^i\big) + [1-\gamma(\cdot)]p_2(L-L^j)(1-\tau_2^i)\big]\big).$$

This payoff is continuous and strictly concave in $r \in (0,1)$, since the contest function $\gamma(\cdot)$ is strictly concave in r: $\frac{\partial}{\partial r}\gamma(\cdot) = \frac{Lp_1q^j}{(Lp_1r+q^j)^2} > 0$, and $\frac{\partial^2}{\partial r^2}\gamma(\cdot) = -\frac{2L^2p_1^2q^j}{(Lp_1r+q^j)^3} < 0$. Hence the solution of the optimization problem will yield a unique interior solution that corresponds to the maximum. This is given by the first order condition:

$$\frac{\partial}{\partial r}u^E(r) = 0,$$

with $u^E(r) = (1-r)p_1L + \big[\gamma(\cdot)\big(p_2L+\omega_2\tau_2^i\big) + [1-\gamma(\cdot)]p_2(L-L^j)(1-\tau_2^i)\big]$. The first order condition can be written as

$$p_1L = \left(\frac{Lp_1q^j}{(Lp_1r+q^j)^2}(p_2L+\omega_2\tau_2^i) - \frac{Lp_1q^j}{(Lp_1r+q^j)^2}[p_2(L-L^j)(1-\tau_2^i)]\right),$$

which, after some algebra simplifies to:

$$r^* = \frac{1}{p_1L}\Big[\sqrt{q^j(\omega_2+p_2L)\tau_2^i + p_2L^j(1-\tau_2^i)} - q^j\Big].$$

Note that r is bounded by assumption between $[0,1]$. Hence, it takes a value of 0 when $\sqrt{q^j(\omega_2+p_2L)\tau_2^i + p_2L^j(1-\tau_2^i)} \leq q^j$. I ignore the set of equilibria that arise from this set of parameter values.

The ruler takes the elites's best response as given. Recall that, after trivially choosing the maximum level of taxation possible and transferring all to himself, R_1's problem becomes

$$max_{\{j\in\{0,1\},i\in\{0,1\}\}}\omega_1 + p_1L\tau_1 - k^i + \big[\gamma(\cdot)\omega_2(1-\tau_2^i) + [1-\gamma(\cdot)][p_2L\tau_2^i+\omega_2]\big].$$

The *expropriation condition* $\Gamma(j) \geq 0$ guarantees that the decision to expropriate will yield a higher expected payoff for the local ruler. This follows from the fact that expropriation only affects the probability of ruler replacement, and period 2 payoffs. It can be written as:

$$\begin{aligned}0 \leq\ & \gamma_{j=1}(\cdot)\omega_2(1-\tau_2^i) + [1-\gamma_{j=1}(\cdot)][p_2L\tau_2^i+\omega_2] - \\ & \gamma_{j=0}(\cdot)\omega_2(1-\tau_2^i) + [1-\gamma_{j=0}(\cdot)][p_2L\tau_2^i+\omega_2],\end{aligned}$$

which, after some algebra, becomes:

$$0 \leq (\gamma_{j=0}(\cdot) - \gamma_{j=1}(\cdot))\,(p_2L+\omega_2).$$

Since $p_2L + \omega_2 > 0$, a sufficient condition for the *expropriation condition* is that $\gamma_{j=0}(\cdot) \geq \gamma_{j=1}(\cdot)$; i.e., that expropriating leads to a lower probability of deposal.

This condition is more likely to be met for higher values of q_H. To see this, the inequality can be expressed in terms of the parameters by substituting r^* into $\gamma(\cdot)$ for $j = 0$ and for $j = 1$ and solving for q^j:

$$\gamma_{j=0}(\cdot) \geq \gamma_{j=1}(\cdot)$$
$$\frac{r^*_{j=0}p_1L}{r^*_{j=0}p_1L + q^j} \geq \frac{r^*_{j=1}p_1L}{r^*_{j=1}p_1L + q^j},$$

which, after some algebra simplifies to

$$\frac{q^H(q^H - q^L)}{q^L} \geq \frac{p_2L^j(1 - \tau_2^i)}{(\omega_2 + p_2L)\tau_2^i}.$$

It is clear from this expression that increasing q^H makes it more likely that the inequality will hold, as does increasing period 2 income $(\omega_2 + p_2L)$.

What is the effect of marginally changing p_1? Note that when substituting r^* into $\gamma(\cdot)$, p_1 cancels out and leaves the *expropriation condition* unaffected.

With respect to the *capacity building* condition, first note that, when $0 < \mathcal{M} < 1$, E's best response to R_1's investment in capacity will increase the probability that R_1 is deposed:

$$\gamma_{i=1}(\cdot) > \gamma_{i=0}(\cdot)$$
$$\frac{r^*_{i=1}p_1L}{r^*_{i=1}p_1L + q^j} > \frac{r^*_{i=0}p_1L}{r^*_{i=0}p_1L + q^j}.$$

After substituting for r^* and some algebra, this expression simplifies to

$$(\tau_2^H - \tau_2^L)[q^j(\omega_2 + p_2L) - p_2L^j] > 0,$$

which is satisfied when $\tau_2^H \geq \tau_2^L$ and $q^j \geq \frac{p_2L^j}{\omega_2 + p_2L}$ (both true by assumption). That is, choosing to enhance capacity always leads to a lower probability that the ruler survives.

When marginally changing p_1, the *capacity building* is also unaffected, for the same reason it does not change the *expropriation condition*; i.e., when substituting r^* into $\gamma(\cdot)$, p_1 cancels out, leaving $\Delta(i)$ unchanged. $\square$

Proof of Proposition 2.

Proof. Define $\underline{p_1} \in \mathbb{R}^+$ as the value of p_1 that solves r^* when $r^* = 1$:

$$\underline{p_1} = \frac{1}{L}\Big[\sqrt{q^j(\omega_2 + p_2 L)\tau_2^i + p_2 L^j(1 - \tau_2^i)} - q^j\Big].$$

For any value of p_1 such that $p_1 \leq \underline{p_1}$, the best E can do is to use all of their available resources to resist R_1, by setting $r^* = 1$.

As a consequence of this, $\gamma_{j=0}(\cdot) = \frac{Lp_1}{Lp_1 r + q^L}$, and $\gamma_{j=1}(\cdot) = \frac{Lp_1}{Lp_1 r + q^H}$. Since, by assumption $q^H > q^L$, it follows that $\gamma_{j=0}(\cdot) > \gamma_{j=1}(\cdot)$. This leaves the local ruler better off expropriating ($j = 1$) whenever $p_1 \leq \underline{p_1}$.

The investment in capacity decision depends on satifying the *capacity building* condition ($k \leq \Delta(i)$):

$$\begin{aligned} k \leq \big\{\gamma_{i=1}(\cdot)\omega_2(1 - \tau_2^H) + &[1 - \gamma_{i=1}(\cdot)][p_2 L\tau_2^H + \omega_2] - \\ &\big[\gamma_{i=0}(\cdot)\omega_2(1 - \tau_2^L) + [1 - \gamma_{i=0}(\cdot)][p_2 L\tau_2^L + \omega_2]\big]\big\}, \end{aligned}$$

which can be simplified to

$$k \leq \big\{(\tau_2^H - \tau_2^L)p_2 L - [p_2 L + \omega_2][\gamma_{i=1}(\cdot)\tau_2^H - \gamma_{i=0}(\cdot)\tau_2^L]\big\}. \tag{A1}$$

When $p_1 \leq \underline{p_1}$, it has been shown that $r^* = 1$. E cannot further increase resistance, and thus $\gamma_{i=0}(r^* = 1) = \gamma_{i=1}(r^* = 1) = \frac{p_1 L}{p_1 L + q^H}$. Hence, when $p_1 \leq \underline{p_1}$, the right hand side of the *capacity building* condition reduces to $\Delta(i, r^* = 1)$:

$$k \leq \big\{(\tau_2^H - \tau_2^L)[p_2 L - \gamma(r^* = 1)(p_2 L + \omega_2)]\big\}. \tag{A2}$$

How does equation (A2) compare to (A1)? In other words, when will investments in capacity will happen for larger values of k? They are larger when $p_1 \leq \underline{p_1}$ if:

$$\begin{aligned} \big\{(\tau_2^H - \tau_2^L)p_2 L - [p_2 L + \omega_2][\gamma_{i=1}(\cdot)\tau_2^H - \gamma_{i=0}(\cdot)\tau_2^L]\big\} < \\ \big\{(\tau_2^H - \tau_2^L)[p_2 L - \gamma(r^* = 1)(p_2 L + \omega_2)]\big\}, \end{aligned}$$

which, after some algebra reduces to

$$\tau_2^H[\gamma_{i=1}(\cdot) - \gamma(r^* = 1)] > \tau_2^L[\gamma_{i=0}(\cdot) - \gamma(r^* = 1)].$$

This condition is always true, because $\tau_2^H > \tau_2^L$ and $\gamma_{i=1}(\cdot) > \gamma_{i=0}(\cdot)$.

Given $p_1 \leq \underline{p_1}$, how does the threshold investment cost, $\underline{k} \equiv \Delta(i, r^* = 1)$, change with first-period prices, p_1? The partial derivative of $\underline{k}$ with respect to p_1 leads to

$$-\Big[\frac{Lq^H}{(p_1 L + q^H)^2}\Big](\tau_2^H - \tau_2^L)(p_2 L + \omega_2) < 0.$$

□

Table 6: Average Spot Prices (USD per metric tonne), Before and After the Great Depression

Commodity	1920-29	1930-39	% Change
Banana	$472.66	$593.60	+25.6%
Barley	$91.11	$110.00	+20.7%
Cacao	$1,220.89	$853.86	-30.1%
Coffee	$1,708.03	$1,135.70	-33.5%
Cotton	$2,647.34	$1,541.33	-41.8%
Maize	$35.2	$25.3	-28.2%
Rice	$591.97	$537.43	-9.2%
Sugar	$613.42	$489.22	-20.3%
Wheat	$302.88	$231.50	-23.6%

Source: Global Financial Data, from various primary sources.

Table 7: Descriptive Statistics

	count	mean	sd	min	p25	p50	p75	max
Bureaucrats per 1000 people	4417	3.71	7.21	0	0.81	1.95	3.90	190.1
Number of bureaucrats (log)	4417	2.21	1.55	0	1.10	2.08	3.14	8.59
Local bureaucrats per 1000 people	2248	0.55	0.82	0	0	0.26	0.82	8.11
Number of local bureaucrats, 1940 (log)	2248	1.05	1.16	0	0	0.69	1.79	6.28
Irrigated Land Redistribution (grants)	4417	1.05	3.74	0	0	0	0	93
Irrigated Land Redistribution (% of municipio)	4417	0.0060	0.026	0	0	0	0	0.41
Hacienda in 1930	2169	0.67	0.47	0	0	1	1	1
Commodity potential (log)	4417	8.17	1.34	0.48	7.36	8.39	9.08	11.2
Placebo commodity potential (log)	4417	8.03	1.43	0.48	7.14	8.21	9.06	11.3
Population, 1930 (log)	2169	8.18	1.05	5.21	7.40	8.21	8.91	12.1
Pop. in agriculture 1930 (%)	2169	30.3	11.8	1.63	25.6	29.0	32.8	204.0
Localities per Ha., 1930	2169	0.00073	0.00083	0.0000044	0.00023	0.00049	0.00096	0.016
Municipal surface area, Ha. (log)	2169	10.1	1.51	5.46	9.07	10.0	11.1	14.8
Pop. in cities 1930 (%)	2169	0.057	0.17	0	0	0	0	1
Local taxes (% of mun. GDP) Avg. 1989-2013	2169	0.42	0.48	0	0.16	0.28	0.50	7.55
Bureaucrats per 1000 people (2000)	2140	9.21	7.03	0.22	4.98	7.63	11.2	82.4
Municipal GDP 2005 (log)	2169	19.8	1.77	14.9	18.6	19.8	20.9	25.8
Federal transfers (log) Avg. 1989-2013	2158	16.6	1.27	13.4	15.8	16.6	17.4	21.3
Federal government cabinet member-years (1940-1970)	4417	0.25	2.15	0	0	0	0	58
National-level legislator-years (1940-1970)	4417	1.15	6.24	0	0	0	0	190

Table 8: Commodity Shocks, Bureaucrats, and Land Redistribution
Alternative Measures

	(1) Bureaucrats (log) (Haciendas)	(2) Bureaucrats (log) (Haciendas)	(3) Bureaucrats (log) (No haciendas)	(4) Land reform (% of mun.) (Haciendas)	(5) Land reform (% of mun.) (Haciendas)	(6) Land reform (% of mun.) (No haciendas)
Commodity potential (log)	-0.79**	-1.03***	-0.30	0.0082	-0.034***	0.039**
	(0.32)	(0.36)	(0.61)	(0.013)	(0.010)	(0.018)
Population in 1930 (log) × 1940		0.10**	0.16**		0.0085***	0.0036
		(0.047)	(0.076)		(0.0021)	(0.0023)
Municipal surface area, Ha. (log) × 1940		0.0041	-0.031		-0.0047***	0.00021
		(0.033)	(0.058)		(0.0017)	(0.0018)
Localities per Ha. in 1930 × 1940		54.6	2.44		6.77	-1.61
		(38.4)	(86.4)		(4.79)	(2.26)
Population in agriculture in 1930 (%) × 1940		-0.0028	-0.0013		0.000072	0.000011
		(0.0031)	(0.0041)		(0.00010)	(0.000051)
Population in cities in 1930 (%) × 1940		-0.34*	0.41		-0.0044	0.0028
		(0.20)	(0.33)		(0.0075)	(0.013)
Commodity potential (log) in 1930 × 1940		-0.0027	-0.044		0.00013	0.0029***
		(0.024)	(0.041)		(0.00074)	(0.0011)
Land reform by 1930 (% of municipio) × 1940					-0.82***	-1.01***
					(0.18)	(0.022)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Within-*Municipio* Mean of DV	2.61	2.61	1.41	0.0066	0.0066	0.0047
Within-*Municipio* SD of DV	0.57	0.57	0.53	0.0081	0.0081	0.0064
R sq.	0.91	0.91	0.88	0.56	0.63	0.71
Observations	2904	2904	1434	3012	3012	1468
Number of municipios	1506	1506	734	1506	1506	734

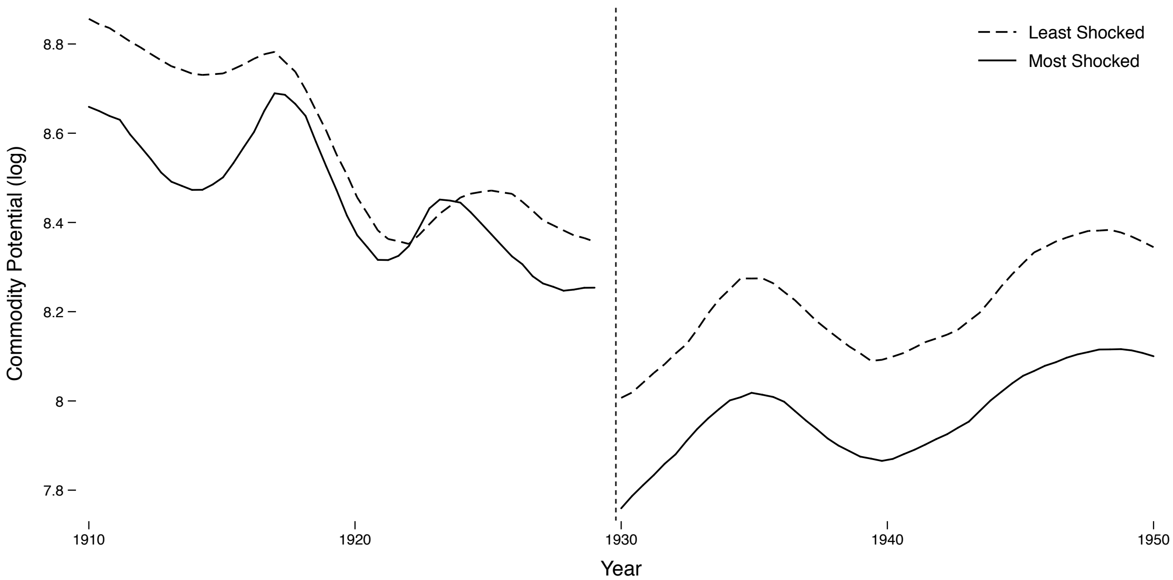
OLS estimations. See equation (1) for the econometric specification. The unit-of-analysis is the *municipio*-year. Standard errors (clustered at the *municipio* level) in parentheses.

Table 9: Commodity Shocks and Local Bureaucrats (1940)
Alternative Measures

	(1) Number of local bureaucrats (log)	(2) Number of local bureaucrats (log)	(3) Number of bureaucrats (log)	(4) Number of bureaucrats (log)	(5) Land reform (% of mun.)	(6) Land reform (% of mun.)
Commodity potential 1920s (log)	0.032	-0.022	0.068**	-0.015	0.0014***	0.00011
	(0.022)	(0.014)	(0.028)	(0.015)	(0.00046)	(0.00052)
% shock to commodity potential	-1.39***	-1.06***	-1.98***	-1.83***	0.015	-0.047***
	(0.41)	(0.30)	(0.51)	(0.32)	(0.010)	(0.0099)
Population, 1930 (log)		0.61***		0.87***		0.0084***
		(0.030)		(0.033)		(0.0015)
Bureaucrats per 1000 people, 1930		0.016***		0.036***		
		(0.0027)		(0.0047)		
Municipal surface area, Ha. (log)		0.12***		0.18***		-0.0047***
		(0.021)		(0.025)		(0.0012)
Localities per Ha., 1930		88.2**		172.2***		6.80**
		(36.3)		(51.1)		(3.38)
Pop. in agriculture 1930 (%)		-0.0033*		-0.0020		0.000070
		(0.0017)		(0.0018)		(0.000071)
Pop. in cities 1930 (%)		1.57***		1.41***		-0.0042
		(0.14)		(0.14)		(0.0053)
Land reform by 1930 (% of municipio)					0.28*	0.18
					(0.15)	(0.13)
Mean of DV	1.34	1.36	2.83	2.86	0.011	0.011
SD of DV	1.18	1.18	1.48	1.48	0.034	0.033
R sq.	0.0085	0.61	0.013	0.72	0.018	0.12
Number of municipios	1514	1452	1514	1452	1596	1506

OLS estimations. See equation (2) for the econometric specification. The unit-of-analysis is the *municipio*. *Municipios* with *haciendas*. Robust standard errors in parentheses.

Figure 5: Commodity Potential, 1910-1950



Nadaraya-Watson regressions. Bandwidths selected using the Rule of Thumb estimator. The unit-of-analysis is the *municipio*-year. Most and least shocked groups consist of *municipios* exposed to a below- and above-average percentage change in commodity potential from 1930 to 1940, respectively.

Table 10: Predictors of Commodity Shock, 1930-40

	(1) % Shock to Commodity Potential (Haciendas)	(2) % Shock to Commodity Potential (Haciendas)	(3) % Shock to Commodity Potential (No Haciendas)	(4) % Shock to Commodity Potential (No Haciendas)
Change in land grants, 1920-30	-0.00080	-0.00039	-0.0012	-0.00049
	(0.0018)	(0.0019)	(0.0038)	(0.0039)
Bureaucrats per 1000 people, 1930		-0.00021		-0.00049
		(0.00038)		(0.00047)
Commodity potential 1920s (log)		0.00041		0.000071
		(0.0015)		(0.0021)
Mean of DV	-0.29	-0.29	-0.26	-0.26
SD of DV	0.073	0.073	0.072	0.070
R sq.	0.000096	0.00058	0.000093	0.00090
Number of municipios	1596	1452	762	717

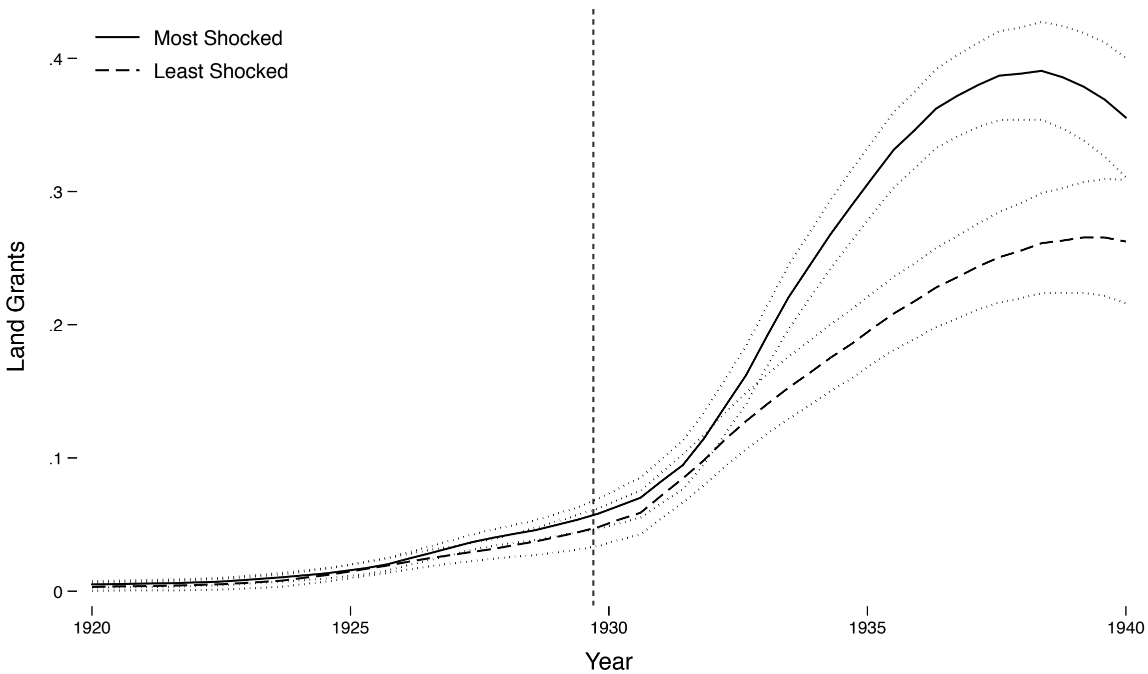
OLS estimations. The unit-of-analysis is the *municipio*. Robust standard errors in parentheses.

Table 11: Rate of Positive Land Reform Presidential Resolutions

	(1) Positive Land Grant Resolutions (%) (Haciendas)	(2) Positive Land Grant Resolutions (%) (Haciendas)	(3) Positive Land Grant Resolutions (%) (No Haciendas)
Commodity potential (log)	-0.13	0.061	0.75
	(0.16)	(0.19)	(0.53)
Population in 1930 (log) × 1940		0.029	-0.042
		(0.030)	(0.085)
Municipal surface area, Ha. (log) × 1940		0.018	0.0084
		(0.020)	(0.067)
Localities per Ha. in 1930 × 1940		-7.92	-83.8
		(34.1)	(99.7)
Population in agriculture in 1930 (%) × 1940		0.0015	0.0025
		(0.0020)	(0.0038)
Population in cities in 1930 (%) × 1940		0.040	0.13
		(0.11)	(0.23)
Commodity potential (log) in 1930 × 1940		0.0039	0.054
		(0.011)	(0.046)
Land reform by 1930 (grants) × 1940		-0.019***	-0.010
		(0.0044)	(0.014)
Year FE	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes
Within-*Municipio* Mean of DV	0.85	0.85	0.81
Within-*Municipio* SD of DV	0.15	0.15	0.17
R sq.	0.68	0.69	0.82
Observations	1652	1612	280
Number of municipios	1318	1269	359

OLS estimations. See equation (1) for the econometric specification. The unit-of-analysis is the *municipio*-year. Standard errors (clustered at the *municipio* level) in parentheses.

Figure 6: Parallel Trends in Redistributive Land Grants



Nadaraya-Watson regressions with 95% confidence intervals. Bandwidths selected using the Rule of Thumb estimator. The unit-of-analysis is the *municipio*-year. *Municipios* with *haciendas*. Most and least shocked groups consist of *municipios* exposed to a below- and above-average percentage change in commodity potential from 1930 to 1940, respectively.