From Conquest to Centralization: Domestic Conflict and the Transition to Direct Rule*

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Abstract

Why do governments centralize control over regions? We present a theory of the transition from indirect to direct rule, focusing on the strategic interaction between a ruler and local potentates who provide civil order in exchange of a share of tax revenue. When the threat of rebellion from below falls and elites become less crucial intermediaries, the ruler is able to centralize power, replacing local potentates with direct agents of the state and investing in a fiscal bureaucracy for future state development. We assess the theory using subnational data from 16th- and 17th-century Mexico around the time of a dramatic demographic collapse, which undermined the threat of domestic conflict. Using a difference-in-differences approach and an instrumental-variables empirical strategy based on the climate shocks associated with a virulent series of epidemics, we show that state centralization occurred faster in areas experiencing a more dramatic decline in population.

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What drives state centralization? May scholars have argued that states with direct forms of rule over their territory and centralized fiscal institutions are better able to provide the basic administrative infrastructure required to sustain economic growth (e.g., Gannaioli and Rainer 2007; Michalopoulos and Papaioannou 2013; Osafo-Kwaako and Robinson 2013; Dincecco and Katz 2014). By contrast, states that rely on indirect forms of rule over hinterland regions—in which local elites retain considerable power and autonomy in fiscal and military matters—tend to experience worse economic and political outcomes (e.g., Mamdani 1996; Lange 2004; Hariri 2012; Acemoglu et al. 2014). Though indirect rule may undermine long-term development, many states continue to rely on decentralized institutional arrangements, especially in difficult-to-govern frontier areas. It is thus important to understand when and how states are able to centralize control over their territory and build administrative capacity for future development.

In this paper, we present a theory of the process of state centralization and provide evidence on the transition from indirect to direct rule in colonial Mexico. Building on past work on indirect rule and state formation, we offer an explanation of political centralization that highlights the strategic dilemma faced by rulers as they seek to consolidate power. Centralization allows rulers to exert more control over territory and increase their share of tax revenues, but it also strips power from local elites, who may be better able to monitor and enforce order in their regions (e.g., Gerring et al. 2011; Naseemullah and Staniland 2016). The transition to direct rule is therefore a risky enterprise, exposing rulers to resistance by local potentates, who may wish to contest their loss of power, and to an increased threat of revolt by commoners, who may take advantage of temporarily reduced local political control. A shock that reduces the threat of popular rebellion and the incentives of elites to resist state centralization can therefore provide an opening for the establishment of direct rule. Our theory thus highlights the role that the threat of internal conflict—both conflict between the ruler and local elites and the threat of popular rebellion from below—can play in deterring attempts to centralize power, and relates to ongoing debates on whether internal conflict impedes or encourages state centralization (e.g., Besley and Persson 2011; Dincecco and Wang 2018; Garfias 2018).

We provide support for the theory using subnational panel data on the transition to direct rule in 16th- and 17th-century Mexico. After the Conquest, the Spanish Crown relied on an institution of indirect rule, the *encomienda*, to quickly establish control over newly conquered territory (e.g.,

García Martínez 2011). Elites were given the right to extract taxes and labor from the local population in exchange for providing for local defense and converting the populace to Christianity. As political control was consolidated, royal officials gradually moved to centralize colonial administration, replacing private *encomiendas* with *corregimientos*, publicly held offices through which direct agents of the state collected taxes for the Crown. The establishment of a Crown-controlled bureaucracy in charge of tax collection laid the foundation for the later development of state capacity. However, the transition was uneven, and some parts of the colony remained under this form of indirect rule until the end of the colonial period.

Crucially, the centralization of fiscal authority in Mexico occurred alongside a cataclysmic demographic collapse. Within a century of the Conquest, Mexico's indigenous population had fallen by at least 50%, mostly due to disease. The severity of the collapse varied considerably across space and shaped the Crown's ability and willingness to centralize power in different regions. In disease-affected areas, ruling elites' opportunities to extract local tax revenue and labor evaporated, reducing both their incentives and ability to contest the loss of political authority to the center. Moreover, the population collapse directly reduced the strategic benefits of indirect rule for the Crown by undermining the threat of rebellion among surviving commoners and the benefits of relying on local elites for local defense. While the spread of disease also reduced the immediate revenue gains for consolidating authority, it provided a window for the Crown to centralize power. The Crown was thus more willing and able to wrest political control from elites in areas of high population loss.

We empirically demonstrate the link between the demographic collapse and the adoption of direct rule using two related empirical strategies. We first employ a difference-in-differences approach, exploiting within-district variation in population and the form of rule over time. To further address concerns about reverse causality and measurement error, we also adopt an instrumental-variables approach based on the features of a series of climate-related epidemics in the late 16th and early 17th centuries. These epidemics, caused by a rodent-transmitted pathogen known as cocoliztli, emerged during rebound periods of rainfall following severe droughts (Acuña Soto et al. 2002). Extending the empirical strategy of Sellars and Alix-Garcia (2018), we construct instruments for the decline in population using proxies for these climate conditions derived from tree-ring chronologies (Cook and Krusic 2004). We find that the transition from indirect (*encomienda*) to direct (*corregimiento*)

rule occurred more rapidly in areas that experienced a more precipitous decline in population. These results are robust under numerous empirical specifications. As we discuss below, the particular spatial and temporal pattern of transition to direct rule cannot be explained by competing theories that focus solely on revenue considerations or the feasibility of projecting power to the periphery. We further show that the effect of the collapse on the transition to direct rule was magnified in areas where the threat of rebellion had been high prior to the collapse and where elites had more profitable outside earnings opportunities, providing additional support for the theory.

This paper contributes to classic debates in political science about the role of conflict in state formation. Past scholarship on the development of state capacity has emphasized the role of interstate war in the centralization of fiscal authority. In Western Europe, for example, the increasing costs of interstate conflict generated incentives to centralize tax collection to wage wars successfully (e.g., Tilly 1990; Besley and Persson 2011; Hoffman 2012; Gannaioli and Voth 2015; Ko, Koyama and Sng 2018). Though much work has found evidence in support of this bellicist theory of state development (e.g., Herbst 2000; Centeno 2003; Queralt n.d.), its applicability is questionable in contexts such as much of Africa or Latin America, which did not see the same level of dense population, resource competition, and external conflict as did Western Europe (e.g., Osafo-Kwaako and Robinson 2013). By contrast, we provide a rationale for state centralization that focuses on the role of domestic conflict, both conflict between elites and the state and the threat of popular rebellion from below. The relationship between internal conflict and the development of state capacity is central to work on modern as well as historical state formation (e.g., Leonard and Straus 2003; Slater 2010; Blattman and Miguel 2010). The literature, however, is divided on whether internal conflict impedes or encourages state centralization (e.g., Besley and Persson 2011; Dincecco and Wang 2018; Garfias 2018). In this paper, we highlight the role of elites as strategic intermediaries between the ruler and the masses, and illustrate how a sudden reduction in the threat of internal conflict—both conflict between the ruler and elites and the threat of unrest from below—can facilitate state centralization.[1]

[1]Beyond interstate war, other work has focused on the feasibility of projecting direct rule into the hinterland (e.g., Cederman and Girardin 2010; Mayshar, Moav and Neeman 2017); or on the role of institutional bargains between the ruler and local elites (e.g., Hoffman and Rosenthal 1997; Dincecco 2009; Gailmard 2017; Garfias 2019) and conflict among competing elite groups (e.g., Mares and Queralt 2015; Garfias 2018; Beramendi, Dincecco and Rogers 2019) in shaping fiscal capacity.

Our focus on the threat of elite and popular revolt also sets this paper apart from the classic literature on population dynamics and state formation, and particularly work linking the Black Plague with the rise of the European nation-state (e.g., Epstein 2000; Levine 2006; Voigtlander and Voth 2013*a*;*b*). In these accounts, the institutional impacts of population scarcity operate largely through increasing the income and bargaining power of surviving labor. This in turn undermines feudal arrangements, which triggers more intense interstate warfare and ultimately leads to increased incentives to build tax capacity. Population collapse serves a different role in our theory. Consistent with historical evidence on our context and a growing literature on population density and civil unrest (e.g., Katz 1988; Homer-Dixon 1999; Acemoglu, Fergusson and Johnson 2017), we argue that a severe decline in population can lower the threat of rebellion from below. Like other shocks to the threat of internal conflict, this weakens the bargaining power of elite intermediaries by obviating the ruler's need to outsource local political control. A decline in population also lowers potential rents, reducing the willingness and ability of local elites to resist centralization. By linking a decline in population with a reduction in local unrest and elite bargaining power, this work calls attention to new mechanisms through which population scarcity—rather than abundance, as is sometimes argued (e.g., Herbst 2000; Boone 2003; Fenske 2013)—may facilitate state centralization and the development of state capacity.

1. Domestic Conflict and the Transition to Direct Rule

The centralization of political and fiscal authority is a key feature of state development. The establishment of a class of public officials employed directly by a ruler lays the foundation for implementing policies that would be not be feasible under indirect forms of rule, such as new forms of taxation, which require an established administrative bureaucracy to function. The additional revenue and information generated by centralization can increase both the size and reach of the state going forward. By contrast, reliance on indirect rule is often thought to lead to persistent state weakness with adverse effects on development (e.g., Mamdani 1996; Lange 2009; Acemoglu et al. 2014). Though centralization may be beneficial, both contemporary and historical governance arrangements have differed widely in the extent to which decision-making is concentrated in the hands of a central ruler or government.

Under forms of indirect rule, central authorities delegate considerable political and fiscal authority

to local power-holders, who provide political control over their regions while holding fealty to the central ruler. Local potentates may retain considerable independent coercive power, and they are often granted the right to extract local resources or tax revenues in exchange for maintaining order. This is the classic model of the relationship between lords and the monarch under feudalism. Similar institutional arrangements can be found in the territorial organization of empires and in the administration of political holdings acquired through conquest. Under direct rule, by contrast, administrative and military power is concentrated in a central state administration. Salaried agents of the state are deployed to hinterland regions to govern. Unlike intermediaries under indirect rule, these agents typically do not hold independent coercive power, and they can be removed through regularized bureaucratic procedures (e.g., Doyle 1986; Mamdani 1996; Lange 2009; Gerring et al. 2011). Studies of direct and indirect rule often focus on colonial institutions (e.g., comparisons between British and French colonization in Africa), but indirect forms of rule have been common historically and persist today under a variety of forms and labels (e.g., Gerring et al. 2011; Naseemullah and Staniland 2016). Central governments in many parts of the world, such as Afghanistan, Somalia, Burma/Myanmar, northwest Pakistan, and areas of India, continue to rely on local elites to extend power over areas that might otherwise be difficult to govern.

Despite the potential benefits of centralization, establishing direct fiscal and political control over territory is not always feasible or optimal for the central ruler. Indirect rule arrangements are often implemented in areas where a ruler's political control might otherwise be tenuous, such as in territory that has been recently conquered or that is far from the seat of power. Indirect rule may also be attractive in areas where state centralization would be possible. Local elites may be better positioned to establish political order given their physical proximity to the domain, their access to information about those living there, and their ability to put down incipient rebellions using local sources of force. Given these comparative advantages, the ruler may be willing to strike a deal with elites in the hinterland to delegate the responsibility for controlling and administering this territory. By delegating fiscal authority to these local potentates, the ruler may be able to extend control over territory without having to invest in creating an extensive administrative bureaucracy, as would be needed to govern directly. This lowers the cost of extending and maintaining power.

However, reliance on indirect rule is also costly for a central ruler. Indirect rule usually entails a

loss of revenue to local intermediaries as compensation for administering their regions. In addition, local potentates also gain considerable bargaining power over the ruler because of the central role that they play in maintaining order. Because these elites maintain independent coercive power, it is costly and difficult for the ruler to wrest control if he should later decide to centralize authority. Local elites may organize and violently challenge a central ruler, especially when their interests are threatened by efforts to centralize power. Even if the elites are not powerful enough to pose a direct military threat, they can often extract concessions from the ruler through the veiled or explicit threat of facilitating popular unrest in their districts (e.g., Lange 2004; Hetcher and Kabiri 2008; Siroky, Dzutsev and Hechter 2013). This threat may be especially salient where potentates control the repressive apparatus needed to put down rebellion.

In determining whether to establish direct rule, a central ruler thus faces a dilemma. Direct rule holds the promise of higher future revenue and improved political control, but it also heightens the risk of domestic conflict and requires a costly initial investment to set up an administrative apparatus.[2] As long as the risk of rebellion remains high and local potentates have an incentive to contain unrest, the ruler may be unable or unwilling to centralize authority.

A shock that lowers the risk of popular rebellion and elite resistance can thus provide an opening for political centralization. If the risk of rebellion declines, the ruler no longer needs to rely on local elites to provide order. This undermines the benefits of indirect rule for the central government, reducing local elites' bargaining power and making centralization more attractive. If the willingness and ability of elites to resist centralization declines as well, this can heighten the pressure for centralization. For example, if elite rents from maintaining indirect rule evaporate, they have little ability or incentive to resist the ruler's efforts to centralize power.

We argue that a sudden, large loss of population, such as occurred during the waves of epidemics in early colonial Mexico, represents one example of a centralizing shock. A population collapse can facilitate the transition to direct rule through the two mechanisms described above. First, a sharp decline in population reduces the threat of popular rebellion. This can occur for at least two reasons. A large literature has linked high population density with conflict through resource competition,

[2]The ruler's objective of maximizing revenue while carefully considering the risk of rebellion has a parallel in the *revenue* and *power* hypotheses in Gerring et al. (2011).

among other channels (e.g., Homer-Dixon 1999; Goldstone 2002; Acemoglu, Fergusson and Johnson 2017). In addition, a severe demographic collapse can rupture informal institutions that facilitate collective action. This mechanism is highlighted by the Mexico-specific literature on indigenous mobilization (or lack thereof) in the early colonial period as the region was dealing with cycles of massive population loss (e.g., Taylor 1979; Katz 1988). The reduction in the threat of revolt lowers the risk to the ruler of centralizing political authority, undermining the bargaining power of local elites who have a comparative advantage in maintaining order.

A second mechanism through which a population collapse may influence the transition to direct rule is by temporarily reducing available rents for local elites. In our setting, as is often true under indirect rule, elites were compensated for the expense of providing authority with a share of local tax revenues. Tribute burdens in colonial Mexico were calculated as a standard capitation tax on households, making the link between population and revenue explicit (Cook and Borah 1971; Zavala 1973). A reduction in local revenue decreases the benefits of indirect rule for the elite, especially if they have profitable outside earnings opportunities in commerce, farming, or mining. Even if elites would prefer to maintain indirect rule, a sharp reduction in revenue can undermine their ability to raise a local militia and resist the ruler's attempts to centralize authority. Though a sharp decline in population could also reduce the ruler's immediate revenue gain from centralizing power, a demographic shock provides an opening to consolidate authority while local potentates are relatively weak and the threat of generalized rebellion is low. It thus enables the ruler to seize direct control of territory where it would be otherwise too costly to do so.

We present a formalization of this argument in the Appendix Section A.1. From our theory, we derive a series of testable hypotheses on the relationship between the demographic collapse and the transition to direct rule. First, a central authority should more likely to establish direct rule in the wake of a precipitous population collapse (Hypothesis 1). If the benefits of indirect rule are based on containing the threat of rebellion from below, as we argue, a demographic shock that targets areas where the potential for contentious action is high should have a disproportionate effect on the transition to direct rule. We therefore expect that the effect of a decline in population on the transition to direct rule should be amplified where the latent threat of rebellion was higher (Hypothesis 2). Our theory also suggests that the effect of the population collapse on the transition

to direct rule (Hypothesis 3) and the overall level of direct rule (Hypothesis 4) should be higher where elites have better outside options for wealth extraction. This is because the presence of other extraction opportunities lowers the relative benefits of indirect rule for the elite, and elites with other options should be less likely to contest the centralization of power as revenues decline.

We empirically evaluate these hypotheses in the remainder of the paper. In the next section, we provide background on our empirical context, 16th- and 17th-century Mexico.

2. Historical Setting

Though primarily thought of as an institution of labor exploitation, the Spanish *encomienda* was designed in part to facilitate the rapid extension of political authority through indirect rule (García Martínez 2011).[3] Following the fall of the Triple Alliance (Aztec Empire), the Spanish Crown was faced with the challenge of administering an expansive new territory far from the metropole. Royal authorities used the promise of indigenous tribute—a traditional capitation tax levied on heads of household—and labor to outsource the conquest of new territory to freelance conquistadors, who became the first *encomenderos* (holders of *encomiendas*). In exchange for the right to extract from the local population, the *encomenderos* provided for local defense, tax collection, and Christian conversion. As with British indirect rule in Africa and South Asia, the Spanish *encomienda* functioned by superimposing institutions of indirect rule over the pre-existing political organization and tribute system in the territory (Gibson 1964; Hassig 1985; García Martínez 2011). In the early years of the colony, the *encomienda* provided a relatively low-cost way to incorporate both conquistadors and indigenous elites into the colonial state, providing a "rickety superstructure of government" in places where the reach of the Crown might not have extended otherwise (Knight 2002, p. 29; see also Zavala 1973, p. 47–9; García Martínez 2011, p. 1938).

As suggested by our theory, reliance on indirect rule did not come without costs. The emerging power and autonomy of the *encomendero* class came to be seen as a threat to the Crown's authority within a few years of the Conquest, but early efforts to centralize authority stalled in the face of extensive elite resistance (Gibson 1964; Yeager 1995; Knight 2002). What eventually subverted *encomendero* power was the catastrophic collapse of Mexico's indigenous population. Though precise

[3]The institutions associated with indirect rule vary widely. The Mexican case arguably corresponds most closely with what Naseemullah and Staniland (2016) term "hybrid rule" in their institutional typology.

figures vary, it is estimated that the indigenous population of Central Mexico declined by up to 90% during the first century of colonial rule, primarily due to disease (Cook and Borah 1971; Hassig 1985; Knight 2002). The sharp decline of the population had two important consequences for the transition to direct rule. First, it greatly depressed the threat of indigenous rebellion. In the wake of epidemics, indigenous social institutions facilitating collective action collapsed, population pressures on land decreased, and survivors were left "demoralized and disorganized" (Katz 1988, p. 80). Controlling local rebellion had been a central responsibility of *encomenderos* and a justification for the continuation of indirect rule (Gibson 1964; Zavala 1973; Knight 2002). As the population declined, so too did the political benefits of indirect rule for the Crown, no longer beholden to local elites to provide political order. The evaporation of tribute income due to the decline in population reduced both the willingness and ability of "politically subdued" *encomenderos* to resist the Crown's efforts to centralize political authority as elites increasingly sought other opportunities in agriculture and mining (Zavala 1973; Hassig 1985; Knight 2002, p. 57).

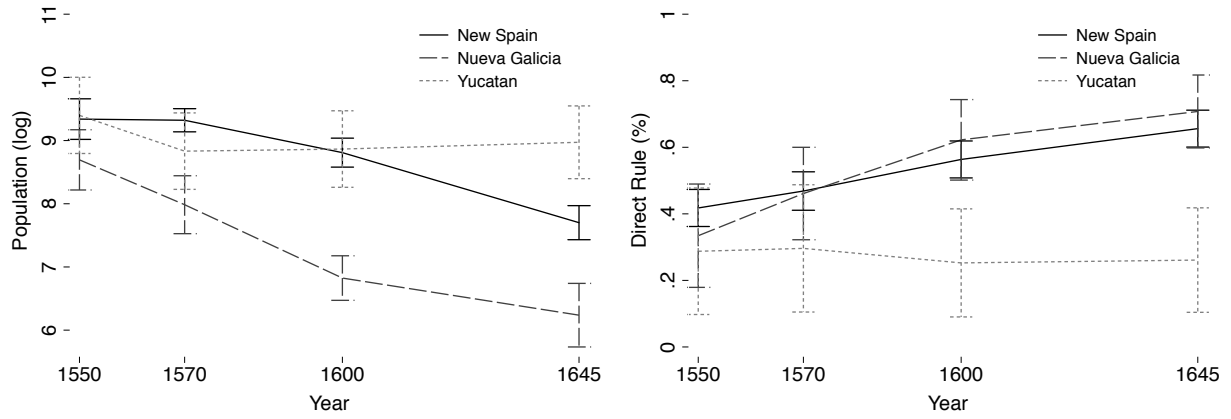
By 1600, the Crown had implemented numerous provisions eroding formal *encomendero* power, and the encomienda had faded from importance in much of Mexico (Gibson 1964; Hassig 1985; Knight 2002). Private *encomiendas* were gradually replaced by *corregimientos*, public offices through which royal officials directly collected taxes for the Crown.[4] Unlike *encomenderos*, the holders of the new offices, *corregidores*, were paid directly by the royal government and answered to higher-level royal officials (Gibson 1964; Knight 2002; García Martínez 2011).[5] *Corregidores* became "useful agents of centralization," helping the government to consolidate power within the royal bureaucracy (Knight 2002, p. 54). By centralizing tribute collection through the *corregimiento*, the Crown "penetrated and dissolved the private fiefs of the early *encomenderos*" and strengthened the political control of the Crown (Knight 2002, p. 57; see also Gibson 1964; Zavala 1973).

The transition to direct rule, however, was not universal. While the Crown quickly moved to centralize control over holdings in parts of the colony, in other areas it actively perpetuated indirect

[4] This process typically occurred at the time of death of *encomenderos*, when their holdings would revert to Crown control. Inheritance rules for *encomiendas* varied. The Crown tried to limit successions to one lifetime, but eventually extended inheritance limits to up to four successions (and longer in some cases), with important differences across space and time. See Zavala (1973) and Gerhard (1993*c*).

[5] *Corregimientos* remained salaried offices throughout our period of analysis. However, the Crown began to auction them off to elites in the second half of the 17th century (Pietschmann 1972; Guardado 2018).

Figure 1: Regional Trends in Population and Direct Rule



(a) Population (log) (b) Direct rule

The graphs plot the mean logged population (**left**) and direct rule (**right**) over time and across districts in each region, with 95% confidence intervals. Data sources and construction are discussed in Section 3. These data use a ten-year bandwidth around population cutoffs.

rule, immediately reassigning *encomiendas* to local elites upon their reversion to Crown control. In Figure 1, we plot the proportion of holdings that had transitioned to direct rule over time alongside average logged population for three governorships: New Spain (central Mexico/Mexico City), Nueva Galicia (north-central Mexico), and Yucatan (the southeast and Yucatan peninsula). Scholars emphasizing the near-complete elimination of the *encomienda* by the end of the 16th century have typically focused on central Mexico, which was heavily affected by the population collapse (e.g., Gibson 1964; Hassig 1985). By contrast, in the Yucatan, where indigenous populations remained relatively dense,[6] the *encomienda* thrived well into the 18th century (García Bernal 1979; Gerhard 1993*c*; Knight 2002).

Our theory provides an explanation for these regional patterns. As the center of Spanish power in the Americas, Mexico City was under solid Crown control, reducing the potential political benefits of indirect rule for the Crown. Local elites' economic dependence on the *encomienda* was also somewhat diminished in this region given other attractive economic opportunities. As tribute revenues declined following population loss, and as opportunities in agriculture and mining increased, elites in central Mexico transitioned to other forms of economic extraction, dampening their incentives to contest the centralization of power (Gibson 1964; Lockhart 1969; Keith 1971; Florescano 1976; Hassig 1985; Knight 2002). The population collapse thus provided an opening for the centralization of authority.

[6]The temporal pattern of demographic collapse in the Yucatan was different from the rest of the colony. Population actually increased in this region between 1600 and 1645 (García Bernal 1979).

This pattern of rapid transition to direct rule was replicated in other parts of the colony, such as Nueva Galicia, where the potential for rural revolt diminished quickly following the Conquest and where displaced elites had considerable opportunities for enrichment in agriculture and mining (Gerhard 1993*b*; Knight 2002).

In the Yucatan, social resistance from the region's large and relatively homogeneous indigenous population (nearly all spoke intelligible dialects of Yucatec Maya) complicated Spanish efforts to establish political dominance (Huerta and Palacios 1976; Gerhard 1993*c*). In addition, because the region contained few precious metals, had poor land quality, and was distant from trade routes, elites had few alternative earnings opportunities. Granting rights to indigenous tribute and labor through the *encomienda* thus remained the primary mechanism for attracting Spanish settlement to the Yucatan and maintaining control over the region (Gerhard 1993*c*; Knight 2002, p. 28–9).

The transition to direct rule thus differed considerably across Mexico. In some areas, the precipitous decline in population undermined the threat of rebellion and the economic value of local tribute collection, reducing the attractiveness of and reliance on indirect rule institutions for both the Crown and local elites. In other areas, the survival of the local population kept the threat of rebellion comparatively high and made the transition direct rule less feasible and attractive. In the remainder of the paper, we systematically evaluate whether the differing severity of Mexico's demographic collapse can explain these spatial differences in Mexican institutional development.

3. Data

We empirically evaluate the relationship between Mexico's population collapse and the adoption of direct rule using subnational panel data from colonial Mexico and two empirical strategies: a difference-in-differences approach and an instrumental-variables approach. These approaches allow us to leverage plausibly exogenous variation in the magnitude of the population collapse to examine its causal effect on the transition to direct rule. We digitize data on the population collapse, the dissolution of the *encomienda* and adoption of the *corregimiento*, and a series of covariates for north-central, central, and southern Mexico. We focus our attention to regions that were solidly under Spanish control throughout the time period and thus where the implementation of direct rule would have been feasible.

Our primary source is Gerhard's three-volume guide to colonial Mexico (1993*a*; 1993*b*; 1993*c*), which contain data for all periods at the level of Mexico's political divisions as of 1786.[7] Data on population and many of our covariates are not generally available below this level of aggregation. We also believe that this is the appropriate level of analysis at which we can assess our theory, which hinges on the changing threat of rebellion from below in regions that experience population decline.[8]

3.1 Colonial Indigenous Population

Gerhard draws on numerous sources to construct estimates of district population at scattered intervals during the colonial era, relying most heavily on the *relaciones geográficas*, a series of questionnaires distributed by the Crown to local officials beginning in the middle of the sixteenth century. A goal of these questionnaires was to assess the size of the local population to improve tribute collection and colonial administration (Gerhard 1993*a*; Knight 2002). The Crown implemented several policies to discourage misrepresentation on the questionnaire, including a review process through which both Spanish and Indian observers could challenge the results in an official hearing (Cook and Borah 1960; 1971; Gerhard 1993*a*; Knight 2002). Gerhard also draws on parish registers, census lists, and other sources to construct more complete population estimates when possible. The reliability of Gerhard's population data is discussed in depth in Gerhard (1993*a*) and Sellars and Alix-Garcia (2018).[9]

While data are sparse for much of the colonial period, we are able to construct comprehensive estimates of district population at four time points between the middle of the sixteenth and middle of the seventeenth centuries: 1550, 1570, 1600, and 1645.[10] Because the exact year in which population was reported varies considerably across the sample, we use a five-year bandwidth on either side of each year point to measure district population.[11] Many districts are missing population data in one

[7] We present descriptive statistics in Appendix Section B.1.

[8] As individual *encomienda* tended to be relatively small (sometimes only a fraction of a town), any uprising large enough to worry the Crown would likely cut across several individual *encomiendas*. See Appendix Section D for a more detailed discussion.

[9] Livi-Bacci (2006) discusses shortcomings with using tribute-based data to estimate total population given exemptions in the tribute system, especially in the period prior to the one under study (p. 199–200). Sellars and Alix-Garcia (2018) find a strong correlation between the change in population for this period implied by the Gerhard data and by direct population measures for a subset of towns in Cook and Borah (1979), which is our main concern given the fixed-effects empirical strategy. As we discuss below, our second empirical strategy is also designed to account for measurement error in the explanatory variable.

[10] These correspond with the years of relatively complete *relaciones* (Gerhard 1993*a*, p. 28–33).

[11] Our results are robust to extending the bandwidth to 10 years, which increases our sample size considerably (Appendix

or more of the years. For the main analysis, we use the subsample of observations with at least two years of population data, but results are robust to using all available observations or the subset where the panel is balanced (Appendix Sections C.2 and C.5). Where district populations are measured in tributary units (i.e., the number of individuals paying tribute to the Crown), we convert to population using a multiplier of 2.8 as suggested by Cook and Borah (1960; 1971). In Appendix Section C.3, we replicate our analysis using tributary units in the subsample of district-years where data was recorded in terms of tribute-payers.

3.2 *Encomienda* and Direct Rule

To construct our measure of direct rule, we draw on Gerhard's lists of *encomiendas* in each district over time. These lists were compiled from the *relaciones* and other archival sources. Using historical sources, Gerhard records when an *encomienda* had been brought under Crown control or was reassigned to another *encomendero*. Though the record of individual *encomienda* holdings is sometimes sparse, we use this source to calculate a district-level[12] measure of the expansion of direct rule over time. To do this, we aggregate the list of *encomiendas* in Gerhard by district and calculate the proportion of private *encomiendas* that had been taken by the Crown, and thus fell under the authority of a *corregimiento*, by each of the population cutoffs identified above. We exclude districts where there were no *encomiendas*, which were generally places with a limited pre-Columbian population.[13] We record the status of a given *encomienda* as missing if Gerhard is unable to identify its status as of a given time point, though this is rare in our data.

3.3 Additional Variables

We include geographic and political control variables to account for other factors that might have influenced both the decline in population and the adoption of direct rule. We first include a series of geographic controls: the district land area, the minimum distance from the district to Mexico City, the average district elevation, and an indicator for whether a given district contains land in a malarial zone (i.e., under 1000 meters of elevation). The distances were calculated using GIS software with

Section C.4).

[12] As noted above, this is the level at which our population measure is recorded and at which we believe it is appropriate to assess our theory.

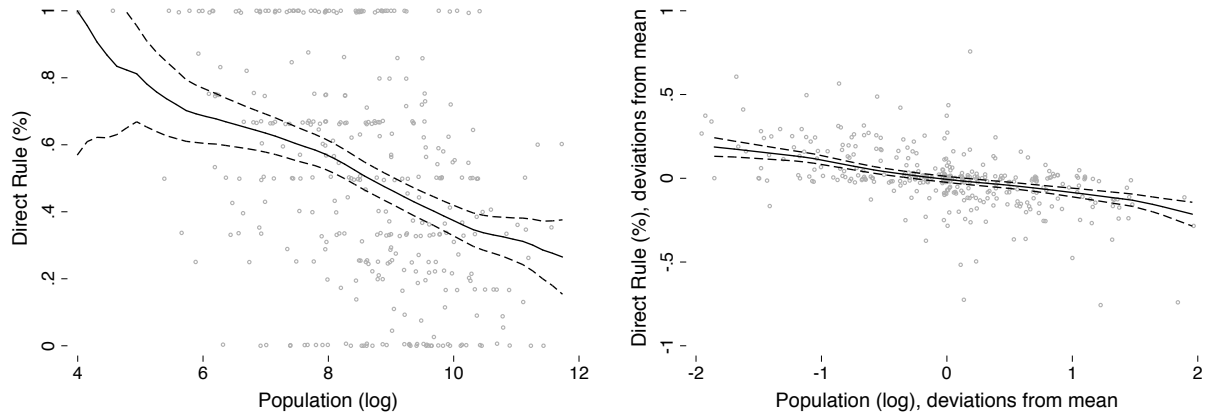
[13] A small number of areas were exempted from the *encomienda* for political reasons, notably Tlaxcala for its cooperation with Cortés during the Conquest. These areas are also excluded from this analysis.

data from Mexico's National Institute of Statistics and Geography (INEGI). The elevation measures were extracted from a 90-meter resolution digital elevation model provided by INEGI. Climate data for our instrumental-variables empirical strategy, described in detail below, are calculated based on data from Cook and Krusic (2004). The social indicators we use in some specifications (year of European contact, organized resistance to the Spanish Conquest, languages spoken at Conquest,and number of settlements in 1786) were digitized from the Gerhard volumes. Finally, our measures of mine locations in the sixteenth century were digitized from data in UNAM (2007).

4. Empirical Analysis

Our theory posits an inverse relationship between the size of the local indigenous population and the transition to direct rule. We begin by providing graphical evidence on this relationship (Figure 2). In the left panel, we pool all district-year observations and plot the proportion of *encomiendas* that had been absorbed by the Crown by a given year in a given district (i.e., the extent of the transition to direct rule) over the logged local indigenous population in that year. In line with our theory, there is steep negative relationship between these variables. In the right panel, we provide additional evidence of this inverse relationship by demeaning the data and examining within-unit changes in population and direct rule over time.

Figure 2: Indigenous Population and Direct Rule in Mexico's Colonial Districts



(a) Pooled observations (b) Deviations from the mean

The figure on the **left** plots a Nadaraya-Watson regression of direct rule on logged population, pooling all observations. The figure on the **right** plots a Nadaraya-Watson regression of direct rule on logged population, both in terms of deviations from their within-district mean. The dashed lines are 95% confidence intervals. Bandwidths are selected using the Rule-of-Thumb estimator. The unit-of-analysis is the district-year.

Evaluating the causal relationship between population dynamics and the transition to direct rule is challenging given the complex interplay between demographics and political institutions. Mexico's population collapse was related to numerous geographic and political factors, many of which are likely to have independently influenced the decision to centralize tribute collection and political rule. We empirically evaluate the relationship between Mexico's population collapse and the transition to direct rule using two related research designs.

4.1 Differences-in-Differences Estimation

We first adopt a difference-in-differences approach, examining within-district changes in population and the adoption of direct rule over time. This estimation strategy accounts for time-invariant district characteristics, such as geography or local cultural norms, that could be related to both the adoption of direct rule and the magnitude of the population collapse. We also include time-period fixed effects to flexibly account for colony-wide trends in the transition to direct rule and in population dynamics. Our baseline estimating equation is:

$$DirectRule_{it} = \beta lnPop_{it} + \Theta_t X_i + \Pi U_{it} + \lambda_t + \gamma_i + \varepsilon_{it}, \tag{1}$$

where $DirectRule_{it}$ is the proportion of *encomiendas* in district i that have been taken by the Crown and turned into *corregimientos* by year t; $lnPop_{it}$ is the log of the population of district i in year t; λ_t and γ_i represent year and district fixed effects; and ε_{it} is an error term. While the year and district fixed effects can account for common and time-invariant factors that may have influenced the adoption of direct rule, we also include a series of control variables that may have altered the time path of direct rule adoption. First, we include a vector of time-invariant controls (X_i) interacted with each year indicator to allow the trajectory, as well as the level, of direct rule adoption to vary by these observable factors. These include political and geographic variables (elevation, log of the surface area, whether the district is in a malarial zone, and log of the distance to Mexico City) that may have had evolving impacts on the adoption of direct rule over time.[14] In some specifications, we also include interactions with the year of first known European contact and the district's initial population. Finally, we include time-varying measures of climatic conditions (U_{it}) that may have influenced both population dynamics and direct rule adoption (mean, minimum, and standard

[14]Note that controlling for log surface area by year fixed effects allows for a more flexible relationship between population and area than using population density directly.

deviation of the Palmer Drought Severity Index in each time period, as discussed below). We cluster standard errors at the district level.

Our primary hypothesis posits that the transition to direct rule should be faster in areas experiencing a more precipitous decline in population (i.e., $\beta < 0$). To causally interpret $\hat{\beta}_{OLS}$, we must assume that $E(\varepsilon_{it}|lnPop_{it},\Theta_t X_i,U_{it},\lambda_t,\gamma_i) = 0$. This assumes, in particular, that the standard parallel trends assumption holds in this setting. We discuss the plausibility of this assumption below.

4.2 Differences-in-Differences Results

Table 1 presents the main difference-in-differences results. The dependent variable is the proportion of local *encomienda* holdings in a district that the Crown has brought under direct rule by a given year. In the first column, we provide estimates using all available observations, including only district and year fixed effects.[15] Columns (2) to (4) present estimates for the subset of observations where climate data are available for our instrumental-variables empirical strategy (described below). This sample excludes districts from southeastern Mexico and the Yucatan peninsula. The second column presents the baseline estimation using this subsample. In column (3), we add our full set of time-varying and time-interacted geographic and climate control variables. In column (4), we add the year of first known contact with Europeans and the initial level of (log) population interacted with year indicators.

The coefficient estimates on district population are negative and statistically significant at conventional levels across all specifications. Moreover, they are of similar magnitude in all models. Using the estimates of column (3), the results suggest that a one within-district standard deviation decrease in population increases the proportion of holdings that have transitioned to direct rule by 8 percentage points, or roughly two-thirds of the within-district standard deviation of this variable. These results are robust under numerous empirical specifications and to using varying subsets of the data, as discussed above (Appendix Section C). We also consider the possibility of spatial autocorrelation.[16]

[15] Reported results use observations with at least two years of population data, but results are unchanged when using all observations or the balanced panel subset (Appendix Sections C.2 and C.5).

[16] We compute Moran's-I Index of spatial autocorrelation for the residuals of all models by year. Using standard inverse-distance weights, we only find evidence of spatial autocorrelation for one of the cross sections (the 1550 cross-section of model (1), where we can reject the null of no spatial autocorrelation at the 5% level). For the rest of the cross sections, we find no evidence of spatial autocorrelation.

Table 1: Indigenous Population Collapse and Direct Rule: Difference-in-Differences

	Direct Rule (% of District)			
	Full Sample	Sample with Climate Covariates		
	(1)	(2)	(3)	(4)
Population (log)	-0.092**	-0.088**	-0.098**	-0.13***
	(0.042)	(0.043)	(0.048)	(0.042)
Climate Controls	No	No	Yes	Yes
Controls × Year FE	No	No	Yes	Yes
Year of European Contact × Year FE	No	No	No	Yes
Initial Population (log) × Year FE	No	No	No	Yes
Year FE	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Within-District Mean of DV	0.51	0.51	0.51	0.51
Within-District SD of DV	0.14	0.13	0.13	0.13
R sq.	0.84	0.83	0.84	0.85
Observations	314	296	296	296
Number of districts	122	114	114	114

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

These results provide strong support for the theorized negative relationship between population and the adoption of direct rule.

4.3 Instrumental-Variables Estimation

The differences-in-differences results provide strong evidence of the relationship between the population collapse and the transition to direct rule, but the identifying assumptions would be violated if there were any omitted, time-varying factors related to both population change and the adoption of direct rule. Reverse causality could pose an additional challenge if, for example, institutional arrangements directly influenced population dynamics. To address these and other concerns, we employ a second approach: an instrumental-variables empirical strategy based on the characteristics of a series of severe epidemics in the late 16th and early 17th centuries.

Most of the population collapse was due to disease (Gibson 1964; Hassig 1985; Knight 2002). While some outbreaks—such as the well-known smallpox of 1519–21—were caused by European diseases, others have been traced to a virulent disease known as "cocoliztli," which is believed to have been a rodent-transmitted pathogen similar to human hantavirus (Acuña Soto, Calderon Romero and Maguire 2000; Acuña Soto et al. 2002). Like other rodent-transmitted diseases, cocoliztli outbreaks

were climate-related, typically emerging during years of above-average rainfall immediately following severe droughts. During periods of drought, disease-carrying rodents concentrate around limited water and food resources, allowing the pathogen to spread among the rodent population. When climatic conditions improve, the rodent population rebounds, and rodents spread into agricultural fields and homes, infecting people when they breathe air contaminated with the virus from rodent droppings.[17]

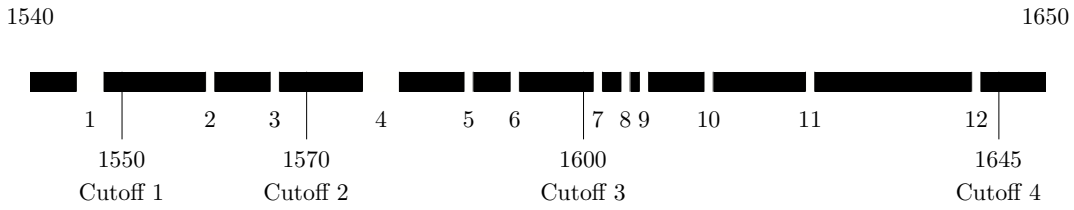
Building on the approach of Sellars and Alix-Garcia (2018), we construct instruments for the decline in population by identifying districts that experienced the specific sequence of climate conditions associated with cocoliztli outbreaks: severe drought followed immediately by a period of rainfall. We extend their cross-sectional approach focusing on the 1576–1580 epidemic to our panel setting using data on known cocoliztli outbreaks from Acuña Soto et al. (2002). Figure 3 presents a timeline of these outbreaks (numbered) alongside the time points of our population data. We extract district-year measures of climate conditions around each of the epidemics using data from the North American Drought Atlas (Cook and Krusic 2004). This source provides an estimate of the annual Palmer Drought Severity Index (PDSI) for a grid of points in North America based on a network of overlapping tree-ring chronologies that have been cross-validated using contemporary climate data. PDSI is measure of soil moisture relative to normal conditions at a given location, where negative values reflect drier-than-normal conditions. Using the Cook and Krusic (2004) grid, we interpolate a surface of estimated PDSI for each year, weighted by the inverse distance from the Atlas' central grid points.[18] We then extract the space-weighted average PDSI over the surface for each district-year in our sample.[19]

[17] Though some recent work has claimed that salmonella, rather than a hemorrhagic fever, may be responsible for the population collapse, rodents are also a key vector of salmonellosis (e.g., Center for Disease Control and Prevention 2018). Because our empirical strategy is based on the climatic correlates of rodent population dynamics, it should predict population loss due to any rodent-borne illness. See Sellars and Alix-Garcia (2018).

[18] We note that, even in the presence of measurement error in the instrument (for example induced by variable tree samples in different regions), the IV estimates remain consistent as long as these errors are not simultaneously correlated with population and direct rule, which we believe is unlikely. This would be the case even if the measurement error were non-classical.

[19] Because of the lack of usable tree rings in southeastern Mexico and the Yucatan peninsula, we do not have climate data for the southeastern portion of the sample and drop these observations in the instrumental-variables estimations. Estimated local average treatment effects from the IV strategy thus do not apply to these regions.

Figure 3: Population Observations and Cocoliztli Epidemics



We construct two instruments for the decline in population based on the sequence of climate conditions associated with cocoliztli. The first instrument is an indicator for whether a given district experienced a severe, over two-year drought that ended 1–2 years prior to any outbreak of cocoliztli in the period. For example, the indicator would take the value 1 in a given district at the 1570 cutoff if that district had experienced a long drought ending just prior to the cocoliztli outbreaks of 1559 (2) or 1566 (3).[20] The second instrument we construct is the numeric difference between the peak severity of a pre-outbreak drought (i.e., the lowest PDSI recorded in the drought ending 1–2 years prior to the outbreak) and the PDSI of the first non-drought year. Where a district experienced more than one pre-outbreak drought in a given period, we use the largest swing between severe drought and rainfall. The rationale for this instrument rests on the argument of Acuña Soto et al. (2002) that the swing from drought conditions to excess rainfall was conducive to the emergence and spread of cocoliztli.[21] Though drought itself could be related to other factors related to institutional adoption, the specific sequence of severe drought followed by rainfall in specified years is plausibly unrelated to the transition to direct rule except through affecting population dynamics.[22]

Formally, our IV estimating equations are:

$$lnPop_{it} = \delta DroughtRain_{it} + \Omega_t X_i + + \Phi U_{it} + \eta_t + \alpha_i + \nu_{it} \tag{2}$$

$$DirectRule_{it} = \beta \widehat{lnPop}_{it} + \Theta X_i + + \Pi U_{it} + \lambda_t + \gamma_i + \varepsilon_{it}, \tag{3}$$

where the $DroughtRain_{it}$ represents the climate instruments described above. All other variables are defined as in equation (1). To interpret β as a local average treatment effect of population decline,

[20] In Appendix Table B.3, we compare average values of our observables at the beginning of our panel (1550) between districts that subsequently experienced at least one of these drought-rain shocks and those that did not. Only the distance to Mexico City is significantly different between these groups, with affected areas being somewhat farther from the capital on average.

[21] See Figures 2 and 3 in Acuña Soto et al. (2002).

[22] In Appendix Section C.7, we present estimates using an alternative set of instruments that ignore the timing of known cocoliztli outbreaks and examine all climate swings conducive to cocoliztli.

our instruments—the specific sequence of severe drought followed by rainfall—must be relevant (i.e., $DroughtRain_{it}$ predicts population dynamics) and excludable from equation (3). In other words, this specific climate sequence should not independently affect the adoption of direct rule, and it should not be correlated with omitted variables that also influence the adoption of direct rule (i.e., $E(\varepsilon_{it}|DroughtRain_{it}, \Theta_t X_i, U_{it}, \lambda_t, \gamma_i) = 0$). We believe that these are reasonable assumptions. Because the Palmer Drought Severity Index is standardized across space, year-on-year fluctuations in this measure are likely to be orthogonal to geographic or historical confounds. It is also unlikely that the specific shock we identify (severe drought followed by excess rainfall in specific years) would have an independent effect on colonial institutions.

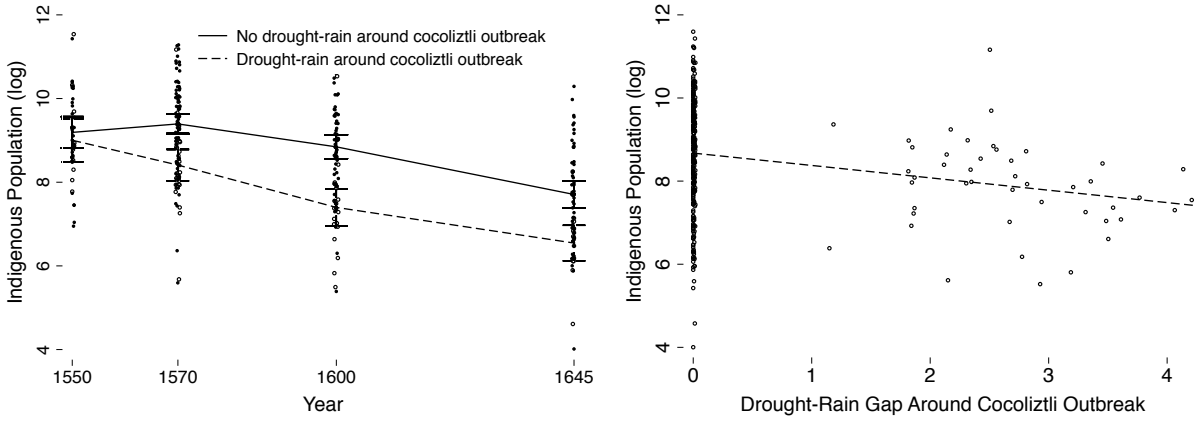
To further bolster the credibility of the exclusion restriction, we include the mean, the minimum, and the standard deviation of PDSI in each period as covariates (as we do in the difference-in-differences estimations) to account for the possibility that certain areas may be more susceptible to disease-related climate shocks (e.g., because climate conditions in those districts are variable). This also partially addresses the potential concern that droughts themselves could influence the adoption of direct rule through channels other than disease-driven demographic collapse (e.g., by reducing agricultural revenue or altering the threat of revolt).

4.4 Instrumental-Variables Results

We begin by graphically examining the evidence linking our climate instruments—the indicator for whether a severe drought that ended just prior to a cocoliztli outbreak and the absolute change in PDSI between the severest point in the drought and the rebound in rainfall—with population collapse and the adoption of direct rule. Figure 4 presents evidence on the first-stage relationship. In the left panel, we plot the trajectory of population over time in areas that experienced (dashed) and did not experience (solid) drought-rain shocks around the time of cocoliztli outbreaks. Areas affected with a drought-rain shock preceding epidemic years show a significant decline in population relative to unaffected areas. The effect of the climate shock on the decline in population is especially pronounced between the 1570 and 1600 cutoffs, which corresponds with the especially severe 1576–80 epidemic (Hassig 1985; Acuña Soto et al. 2002). The right panel of Figure 4 plots logged district-year population with the swing in PDSI between the most severe point of the drought and the maximum post-drought rainfall. Areas that experienced a larger swing in drought conditions around cocoliztli

outbreaks had a lower surviving population on average. We provide a more comprehensive analysis of first-stage estimates in Table 2.

Figure 4: Drought-Rain Around Cocoliztli Outbreaks and Indigenous Population



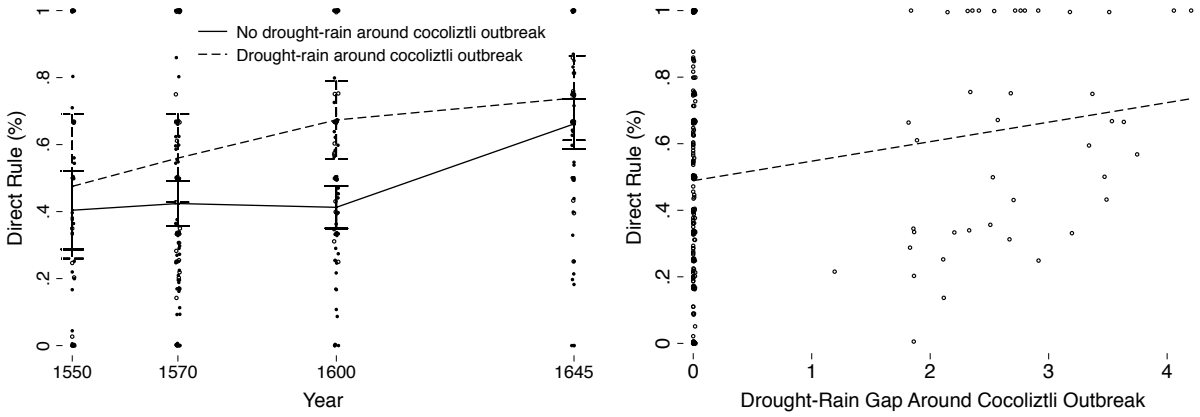
(a) Drought-Rain (b) Drought-Rain Gap

The figure on the **left** plots the mean logged population with a 95% confidence interval in each year, for those districts that experienced (dashed) and did not experience (solid) drought-rain shocks around the time of cocoliztli outbreaks. The figure on the **right** fits a linear regression of logged population on the swing in PDSI between the most severe point of the drought and the maximum post-drought rainfall. In both figures, the unit-of-analysis is the district-year.

Graphical evidence on the reduced-form relationship between the climate instruments and the adoption of direct rule is presented in Figure 5. The left panel plots the proportion of *encomiendas* that had been brought into direct rule by the Crown in districts that experienced (dashed) and did not experience (solid) cocoliztli-related climate shocks. As the figure illustrates, direct rule became more pervasive over time in areas that had experienced cocoliztli-related climate shocks. As with the first-stage results, the reduced-form impact is strong in 1570 and especially in 1600. The right panel illustrates the positive relationship between the magnitude of the climate shock and the adoption of direct rule. Population declined more precipitously in areas with cocoliztli-related shocks, which enabled the adoption of direct rule. We present comprehensive econometric evidence on these reduced-form relationships in Appendix Table C.1.

Our baseline instrumental-variables estimates of the effect of population collapse on the adoption of direct rule are reported in Table 2. The results in the first four columns present first-stage (1 and 2) and two-stage-least-squares (3 and 4) estimates using the gap in PDSI between drought severity

Figure 5: Drought-Rain Around Cocoliztli Outbreaks and Direct Rule



(a) Drought-Rain (b) Drought-Rain Gap

The figure on the **left** plots the mean direct rule with a 95% confidence interval in each year, for those districts that experienced (dashed) and did not experience (solid) drought-rain shocks around the time of cocoliztli outbreaks. The figure on the **right** fits a linear regression of direct rule on the swing in PDSI between the most severe point of the drought and the maximum post-drought rainfall. In both figures, the unit-of-analysis is the district-year.

Table 2: Indigenous Population Collapse and Direct Rule: Instrumental Variables

	Population (log)		Direct Rule (% of District)		Population (log)		Direct Rule (% of District)	
	First Stage: OLS		2SLS		First Stage: OLS		2SLS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Population (log)			-0.26**	-0.29**			-0.26**	-0.26**
			(0.12)	(0.12)			(0.12)	(0.11)
Drought-rain gap around outbreaks	-0.14***	-0.17***			-0.20*	-0.24		
	(0.042)	(0.058)			(0.11)	(0.19)		
Drought-rain around outbreaks					0.19	0.22		
					(0.38)	(0.54)		
Climate controls	No	Yes	No	Yes	No	Yes	No	Yes
Controls × Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within-District Mean of DV	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51
Within-District SD of DV	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Wald F statistic of excluded instruments	17.9	14.6			13.9	7.56		
Hansen J statistic			.	.			0.011	2.09
Hansen J p-value			.	.			0.91	0.15
R sq.	0.93	0.94	0.22	0.25	0.93	0.94	0.22	0.30
Observations	296	296	296	296	296	296	296	296
Number of districts	114	114	114	114	114	114	114	114

See equations (2) and (3) for the econometric specifications. The unit-of-analysis is the district-year. Standard errors (clustered at the district level) in parentheses.

and the rebound rainfall as the sole instrument. We repeat the analysis in columns 5–8 using both climate instruments: the drought-rain gap and the indicator for whether a district experienced a severe drought followed by rainfall around years of known cocoliztli outbreaks. First-stage estimates indicate that the drought-rain gap is robustly negatively related to population. The Wald F-statistics on the excluded instrument(s) vary from 17.9 in the baseline specification (column 1) and 14.6 in the specification including control variables (column 2), providing evidence of instrument relevance. F-statistics are somewhat smaller in the two-instrument regressions, though still above standard rules-of-thumb for relevance. However, given that the weak-instrument problem is exacerbated when clustering standard errors, we also estimate β using the Anderson-Rubin method, which is robust to weak instruments (Appendix Section C.6).

The IV coefficient estimates are negative and of roughly the same magnitude across specifications. They are somewhat larger than those of the OLS difference-in-differences models. The estimates in column (4), for instance, suggest that a within-district standard deviation decrease in population—a dramatic decline of 0.9 log units—is associated with a 23 percentage-point increase in the proportion of holdings under direct rule, or close to twice the within-district standard deviation of the dependent variable. Substantively, these results are supportive of the key role that demographic collapse played in the transition to direct rule in this setting.

We believe that there are several plausible reasons why our baseline difference-in-differences models might understate the effect of the demographic collapse on direct rule adoption. First, the *encomienda* had direct harmful consequences on the indigenous population, and there is some evidence that it may have exacerbated mortality by forcing the population into slavery-like work conditions, imposing restrictions on internal movement, and depriving villages of food through the over-extraction of tribute (e.g., Gibson 1964; Zavala 1973; Knight 2002). If mortality were higher in areas where the *encomienda* survived because of these reasons, this would introduce a positive countervailing relationship between population and direct rule (negatively related in our theory), possibly leading to a downward bias in the OLS estimates. Measurement error provides an additional reason that OLS estimates may be attenuated toward zero. Though there is strong evidence that the Gerhard data capture meaningful variation in local population (Sellars and Alix-Garcia 2018),

measurement error remains a concern given that we rely on subnational data from the 16th and 17th centuries, and this could introduce significant attenuation bias in the OLS estimates.

A final possibility is that the local average treatment effect of the population collapse in the places affected by our instrument is larger than the average treatment effect for the entire sample. Our instrument leverages differences in the disease environment to identify the effect of population loss, focusing on the fall in population size due to cocoliztli. The pattern of mortality in these epidemics was distinctive in that it disproportionately targeted healthy young people as opposed to the elderly or sick (Gibson 1964; Hassig 1985, p. 180–5). Because the biggest threat of rebellion arguably came from this subpopulation, the effect of the population decline due to cocoliztli on the transition to direct rule may be therefore be greater than the effect of demographic collapse on the population as a whole. We discuss potential heterogeneity of the effect of the population collapse in the following subsection.

4.5 Additional empirical evidence

The previous subsections demonstrate that the transition to direct rule occurred more rapidly in areas that experienced a steeper decline in population during the early colonial period, which is consistent with our argument that the transition to direct rule occurred faster where the threat of popular rebellion and elite revolt had been weakened by the spread of disease. The evidence above casts doubt on several alternative theories about when, where, and why the Crown was able to centralize power (see Appendix D for a more extensive discussion). If the choice to move from indirect to direct rule had been a simple revenue-maximization decision, as has been conjectured by other scholars (e.g., Pastore 1998), we would expect the Crown to centralize more populous areas first given that these areas would generate more revenues. Instead, we see faster centralization in less populous and wealthy areas. Similarly, if the downward shock to revenues had inspired greater elite resistance, perhaps because of anxiety over lost status, we would expect to see less centralization in disease-affected regions, which is inconsistent with the empirical evidence. These results also cannot be explained by differences in direct rule adoption in frontier and central jurisdictions (our results condition on distance to Mexico City), efforts to rein in the most powerful local elites as argued by Yeager (1995) (indirect rule persisted in places like the Yucatan, where local elites were powerful but the threat of rebellion remained high), or royal attempts to protect indigenous villages in areas

of scarce population (reliance on the *encomienda* persisted in some population-scarce areas where the threat of rebellion remained high, such as parts of the north and southeast). To provide further evidence in support of our theory over competing explanations, we examine several additional observable implications of our argument in this subsection and in Appendix D.

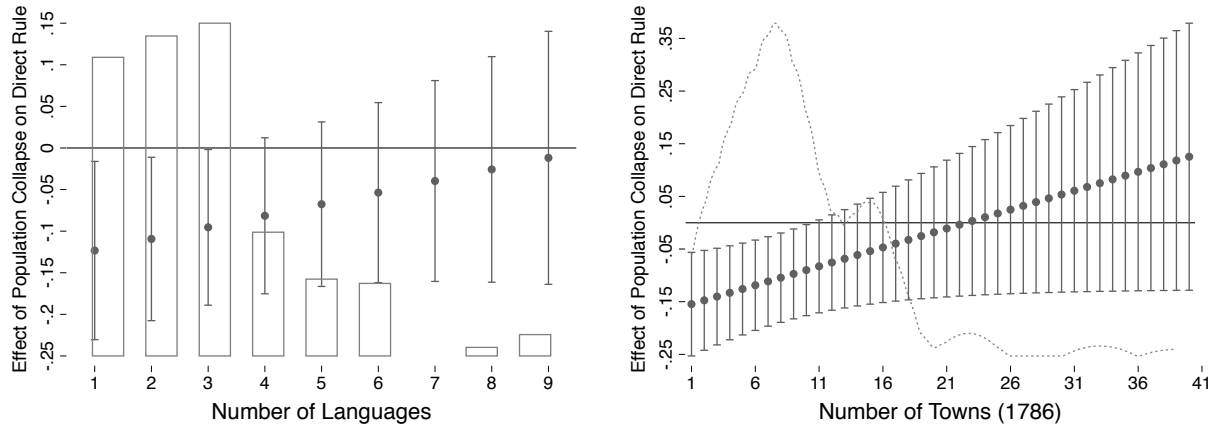
First, our theory predicts that the effect of the population collapse on the transition to direct rule should be magnified where the latent threat of rebellion[23] would have been higher (Hypothesis 2). This is because the mollifying effects of disease on revolt should be especially salient in areas where the Crown feared rebellion and may have otherwise preferred to continue relying on intermediaries to provide order. To assess this hypothesis, we examine heterogeneity in the effect of the population collapse on the adoption of direct rule by a district's potential for rebellion. We amend our baseline empirical strategy, interacting our population measures with three measures of the latent potential for rebellion in each district: the number of languages spoken, the number of towns as of 1786,[24] and an indicator for whether there was an organized resistance to the Spanish Conquest. We argue that the threat of rebellion should be higher in districts with a history of resistance to Spanish control and in places where coordination is not complicated by the existence of numerous unintelligible languages or a large number of dispersed settlements. Full estimating equations and results for these regressions are presented in Appendix Section D. As suggested by our theory, the estimates indicate that the marginal effect of population is larger in areas with a higher latent threat of rebellion, though the difference is not always precisely estimated.

Figure 6 plots the estimated marginal effect of population on the adoption of direct rule using the languages (left panel) and settlements (right panel) measures of the ease of collective action. In line with the theory, the negative marginal effect of population on the adoption of direct rule is largest in places where the threat of resistance would have been highest (i.e., at low levels of language heterogeneity and when individuals are concentrated in fewer settlements) and is not distinguishable from zero where collective action would have been difficult.

[23] We note that rebellion is non-linearly related to population in our formal model because of the discontinuity in repressive capacity when the ruler transitions to direct rule. See Appendix Figure A.1.

[24] We note that, if interpreted causally, the estimates of equation (A1) could be subject to post-treatment bias when including the number of towns in 1786 given that our measure was recorded after the population collapse. There is

Figure 6: Heterogeneous Effect of Population Collapse on Direct Rule, by Rebellion Potential



(a) Number of languages (b) Number of towns (1786)

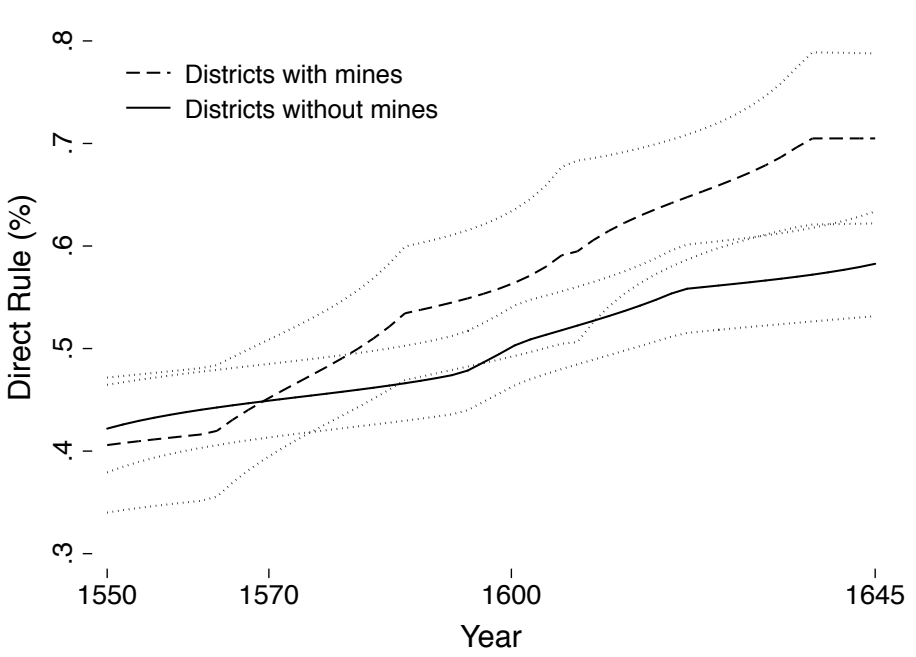
The figures plot the marginal effect of population on direct rule adoption from equation (A1) (in the Appendix) at different values of rebellion potential, as measured by the number of languages (**left**) and by the number of towns in 1786 (**right**). The lines correspond to the 95% confidence intervals using standard errors clustered by district. The distribution of these measures in the sample is graphed in the background. For full results, see columns 4 and 6 in Appendix Table D.1.

Our theory also predicts that both the effect of the population collapse (Hypothesis 3) and the overall level of direct rule adoption (Hypothesis 4) should be higher where elites had more attractive outside earnings options. This is because local elites should be less willing to resist Crown attempts to centralize power and less willing to invest in providing local order in areas where they could amass wealth through other means. To assess this possibility, we use information on the location of colonial mines from UNAM (2007) to compare the adoption of direct rule in areas with and without mining wealth (a major alternative source of income for elites). Full estimating equations and results of this exercise are presented in Appendix Section D, where we provide suggestive evidence that both the level of direct rule adoption and the responsiveness to the population shock were higher in areas where elites had access to mining wealth. In Figure 7, we plot the adoption of indirect rule in districts with (red) and without (black) mines, illustrating the more rapid transition to direct rule in mining areas.

Taken as a whole, the empirical evidence is strongly supportive of the importance of domestic conflict on the adoption of direct rule and the role that the demographic collapse played in ameliorating

a strong correlation in the overall concentration of population across districts before the collapse and following the recovery of Mexico's indigenous population in the 17th century (Sellars and Alix-Garcia 2018). However, this subsection is intended to provide suggestive evidence on the theory, and the results should be interpreted with caution.

Figure 7: Indigenous Population and Direct Rule, by Elite Outside Options



The figure plots Nadaraya-Watson regressions of direct rule on year, for those districts with mines (dashed) and without them (solid). The dotted lines are 95% confidence intervals. Bandwidths are selected using the Rule-of-Thumb estimator. The unit-of-analysis is the district-year.

this conflict. The transition to direct rule happened faster in areas experiencing a larger decline in population, and this effect was amplified where the threat of rebellion from below was higher and where local elites had more profitable outside options.

5. Conclusion

How, when, and why are rulers able to centralize power, enhancing state capacity and setting the stage for future development? Our theory highlights how a decline in the threat of domestic conflict—both elite revolt and mass rebellion—can open the door to state centralization. As long as the threat of rebellion and elite resistance remain high, a ruler may be willing to forgo the benefits of centralization by delegating fiscal and military autonomy to local elites, who can establish control over the population at a relatively low cost. When the threat of internal conflict is diminished, such as following a sharp decline in local population, it becomes less risky for a ruler to centralize power and the transition to direct rule becomes more likely.

We provide empirical support for this argument using evidence on the transition from *encomienda* to *corregimiento* in colonial Mexico. This transition took place during a severe population collapse, which reduced the threat of rebellion and the bargaining power of local elites. Exploiting subnational

variation in the disease environment, we show that the transition to direct rule occurred more quickly in areas that experienced a more rapid decline in population. We further show that this effect was magnified in areas with a greater latent threat of rebellion and in places that offered more profitable outside earnings opportunities for elites, providing support for our theory. Fiscal authority was centralized in some areas within a generation of the Conquest, while indirect rule arrangements persisted for over 200 years in others. The uneven political development of colonial Mexico (e.g., Knight 2002) was shaped by the demographic collapse, which dramatically altered the threat of revolt among the population and the relationship between local elites and the Crown.

Past work has offered a number of theories on the uneven implementation of colonial rule. The decisions of colonial authorities to govern through direct or indirect rule have been explained by differences in the ruling philosophy of European powers, the availability of different technologies of tax collection, and initial demographic conditions, among other factors (Mamdani 1996; Boone 2003; Lange 2004; Cederman and Girardin 2010; Acemoglu et al. 2014). In line with these explanations, the initial adoption of the *encomienda* in colonial Mexico was driven both by demographic priors and by historical precedent. However, these factors do not explain the observed variation in the survival of this institution across space and time. By focusing on the strategic interaction between the Crown and local elites, mediated by the threat of rebellion from below, we call attention to how a temporary reduction in the threat of internal conflict facilitated this institutional transition. By providing a window to centralize power while the threat of elite and common resistance was low, the waves of epidemics enabled the Crown to seize power from local elites in some areas. In others, indirect rule persisted for centuries and the Crown remained politically dependent on local elites. The centralization of power may have been attractive for the Crown, but, as in many other settings, rupturing existing institutions was difficult in the absence of a major shock.

While neither the *encomienda* nor the *corregimiento* remain in existence, this institutional transition had long-reaching consequences for development. The persistent effect of direct and indirect rule arrangements on subsequent political and economic development has been established in numerous contexts across the world (e.g., Mamdani 1996; Lange 2004; Hariri 2012; Acemoglu et al. 2014). Our data on Mexico indicate that a longer history of direct rule is associated with more present-day postal and public prosecutor offices, suggesting a persistent legacy of colonial centralization on

state presence (see Appendix Table E.1). This represents an additional way in which the population collapse and early colonial institutions shaped contemporary outcomes in the country (e.g. Mahoney 2010; Diaz-Cayeros and Jha 2016; Sellars and Alix-Garcia 2018).

Beyond colonial institutions and legacies, our work illustrates how population scarcity can aid rather than impede the centralization of state authority under certain conditions. Implementing direct rule in extremely population-scarce environments, such as frontier areas, is not always possible or attractive. In this context, population scarcity was a temporary shock brought on by the waves of epidemics in places already under political control of the Empire. In areas like these, where establishing direct rule might be feasible, our theory suggests that a drop in population can decrease the threat of generalized rebellion and reduce the rents available to local elites. This undermines the bargaining power of elite intermediaries and clears the way for centralization. In Mexico, when disease-affected areas rebounded in population, they thus faced a different institutional environment than places that never experienced a severe population decline. These mechanisms are distinctive from those highlighted in classic works on population dynamics and the development of state capacity in Western Europe (e.g., Tilly 1990; Gannaioli and Voth 2015) or in population-scarce areas like sub-Saharan Africa (e.g., Herbst 2000; Boone 2003).

Most broadly, this paper provides theory and evidence on how and why efforts to centralize political authority might be undertaken and might succeed in other environments. Building state capacity remains a challenge in much of the world, and indirect rule is not a uniquely historical phenomenon. Many modern states rely on similar institutional arrangements, delegating the direct responsibility for maintaining political control to local elites or traditional authorities in places where the reach of the state might not otherwise extend (Boone 2003; Gerring et al. 2011; Naseemullah and Staniland 2016). Today, as in the colonial era, this institutional bargain often entails ceding considerable political and economic power to these elites. From Ottoman Iraq to contemporary Afghanistan, the centralization of power at the expense of elite intermediaries has often been destabilizing (Hetcher and Kabiri 2008; Murtazashvili 2016). This complicates efforts to build state capacity for future development. Though prior work has been divided on the consequences of internal conflict for state centralization (e.g., Slater 2010; Besley and Persson 2011; Dincecco and Wang 2018; Garfias 2018), this paper illustrates how even a temporary decline in the threat of rebellion from below can enable states to centralize

authority while the bargaining power of intermediaries is low. The paper also highlights why central authorities might choose to maintain indirect rule where the threat of rebellion remains high even if this entails a loss of revenue and control to local potentates.

Few areas have experienced a population collapse as severe as that of colonial Mexico. However, disease is not the only factor that may influence internal conflict and thus state centralization. Resource price shocks, shifts in international intervention, and changes in information technology, for example, have been found to affect the likelihood of rebellion in other settings. Our argument also draws attention to factors that may alter the willingness of elites to resist centralization efforts, such as the attractiveness of outside earnings opportunities, which can vary across contexts. While the specifics may vary from the setting we examine, the implications of our argument travel beyond colonial Mexico. Interventions that reduce the threat of internal conflict can increase the feasibility of, and the incentives for, political centralization.

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