

Fiscal Legibility and State Development: Theory and Evidence from Colonial Mexico^{*}

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Abstract

We examine how fiscal legibility, the ability of central authorities to observe local conditions for the purposes of taxation, shapes political centralization and state development. When rulers lack information about the periphery, they may benefit from ceding autonomy to tax-collecting intermediaries to encourage fiscal performance. As information quality improves, rulers become better able to monitor and sanction local officials, allowing them to tighten control over taxation and establish more direct state presence. Centralization, in turn, encourages investment in improving fiscal legibility, leading to long-term divergence in state development. We study the consequences of a technological innovation that dramatically improved the Spanish Crown's fiscal legibility in colonial Mexico: the discovery of the patio process to refine silver. We show that political centralization differentially accelerated in affected districts and that these areas subsequently saw disproportionate state investment in informational capacity, altering the trajectory of state development.

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What enables political centralization? The consolidation of power under a central authority lays the foundation for the construction of state capacity and longer-term institutional and economic development, for better (e.g. Lange 2004; Osafo-Kwaako and Robinson 2013; Michalopoulos and Papaioannou 2013) or worse (e.g. Iyer 2010; Ahmed and Stasavage 2020; Stasavage 2020). Though state centralization may be attractive for those in power, central authorities often lack the willingness or ability to seize political control from local elites in the periphery. Indirect forms of rule, which allow local elites to retain considerable autonomy from the center, can enable rulers to extend political authority and extract revenue from areas that are distant, underdeveloped, or physically impenetrable. However, reliance on indirect rule is also costly in that it requires sacrificing revenue and autonomy to local intermediaries (e.g. Gerring et al. 2011; Garfias and Sellars 2021).

When will a ruler benefit from transitioning to more direct forms of rule? A critical consideration is the level of *fiscal legibility*: the ability of central authorities to independently observe, measure, and assess populations, their wealth, and their activities for the purposes of taxation and control (e.g., Kain and Baigent 1992; Scott 1998; Lee and Zhang 2017). When central authorities are unable to observe local conditions, it can be advantageous to delegate the task of controlling and administering territory to regional elites with better local information (e.g., Levi 1988; Mayshar et al. 2017; Balán et al. 2022). As rulers become better able to independently monitor and police activity across the territory, they may wish to exert more direct control over intermediaries and avoid the political and economic costs of indirect rule.

Building fiscal legibility is often difficult and constrained by geographic, social, technological, and political factors. We examine how a sudden increase in fiscal legibility influences political centralization and longer-term state development. Building on work by Scott (2017), Mayshar et al. (2017), and Stasavage (2020), our theory focuses on the interdependence between political centralization and investment in state informational capacity. In areas of low fiscal legibility, exerting direct control over tax-collecting intermediaries is prohibitively costly. Without the ability to independently observe local economic conditions, a central ruler cannot tell whether a disappointing tax receipt is due to

poor conditions or poor intermediary performance. Rather than investing to improve monitoring capacity, rulers in low-information environments often rely on indirect forms of rule to encourage intermediary effort through increased autonomy and high compensation.

If fiscal legibility improves, however, it becomes easier for central authorities to identify poor performance and exert tighter control over intermediaries. This makes political centralization—the replacement of autonomous intermediaries with direct agents of the state—more attractive. Centralization in turn encourages rulers to invest in improving state informational capacity. Under indirect rule, the benefit of a small increase in informational capacity is minimal as rulers do not need to directly monitor the daily performance of intermediaries. Under direct rule, by contrast, marginal improvements in fiscal legibility pay immediate dividends by making it easier to monitor intermediaries and identify poor performance.

A sudden increase in state informational capacity can therefore lead to longer-term divergence in state development. As authorities centralize power and improve the fiscal legibility of affected areas, the benefits of direct rule increase, encouraging authorities to retain centralized control and continue to invest in legibility. In areas where legibility remains low, rulers continue to rely on indirect rule and thus have little incentive to invest in state informational capacity.

We provide empirical support for this argument using subnational data from colonial Mexico. In the early colonial era, the Spanish Crown administered territory through the *encomienda*, an institution of indirect rule through which elites were granted broad rights to extract tribute and labor in exchange for maintaining local political order and passing on tax revenue to the government. Over time, the Crown sought to centralize authority, replacing *encomiendas* with *corregimientos*, a more direct form of rule through which local intermediaries directly collected taxes, were hired and fired by the center, and were paid a set wage. The timing of this transition differed across space. Some areas moved to direct rule within a generation of the Conquest, while others remained in *encomienda* for centuries.

We focus on the short- and longer-term consequences of a technological innovation in silver mining that suddenly improved fiscal legibility in some areas: the discovery of the patio process in the 1550s. This technique relies on mercury amalgamation to extract pure silver from mined ores, reducing the cost of processing the silver sulfides common to the Americas (Brading and Cross 1972; Bakewell 1984; Guerrero 2017). Importantly, the amalgamation process produces silver using mercury in a known ratio. Because mercury was only produced at scale in a handful of locations worldwide—and not in Mexico—the Crown was able to institute and enforce a monopoly over its sale and distribution. This gave central authorities a direct and reliable way to observe fluctuations in silver production and thus insight into local economic conditions more generally.

Using a differences-in-differences empirical strategy, we show that this sudden, exogenous increase in fiscal legibility led to an acceleration in political centralization. Following the discovery of the patio process, the proportion of *encomiendas* that transitioned to direct rule in each decade was about 8–13 percentage points higher in mining relative to non-mining districts and relative to the earlier period. This result is empirically robust and substantively large, corresponding to up to a half of the within-district standard deviation of direct rule adoption in non-mining districts over the period of analysis.

We present additional evidence in support of our argument that the increase in fiscal legibility, and not simply the increase in revenue potential of mining areas, explains these findings. We examine a demand-driven price shock in another important commodity, cochineal dye. The cochineal boom greatly increased the profitability of local economic production and the revenue potential of cochineal-producing districts, but, unlike the discovery of the patio process, it did not affect fiscal legibility and thus did not influence political centralization. Consistent with our argument, we further show that the heterogeneous impacts of the introduction of the patio process were higher in districts where the informational consequences of this shock would have been most acute, not where the increase in profitability would have been largest.

Finally, we investigate how the shock to fiscal legibility shaped longer-term state development. We show that affected areas had better access to state-run post offices (*estafetas*) by the end of the colonial period, a measure of state investment in facilitating communication and local legibility. Using information on the exhaustion of some 16th-century mines by the late colonial period, we can rule out that the observed long-term relationships are due to the effects of ongoing silver production in these areas. Evidence on the location of contemporary post offices suggests that this divergence in state investment persisted long after the end of colonial rule.

This article builds on an important line of research on state development. Scholars have shown how factors like demography (e.g., Carneiro 1970; Herbst 2000), external threat (e.g., Tilly 1990; Gennaioli and Voth 2015; Koyama et al. 2018), preexisting social and political structure (e.g., Boone 2003; Gerring et al. 2011), and domestic conflict (e.g., Slater 2010; Garfias and Sellars 2021) influence political centralization. Our focus is on the complementary role of fiscal legibility, building on work by Scott (1998; 2017) and Mayshar et al. (2017). Asymmetric information, conflicts of interest, and commitment problems create agency problems for central rulers, shaping institutional development (e.g., Kasara 2007; Sng 2014; Gailmard 2017; 2019; Hassan 2020). We highlight a connection between the quality of information available to rulers and the centralization of political control, a connection that has also been noted in work on ancient Egypt and Mesopotamia (Scott 2017; Mayshar et al. 2017), ancient and contemporary China (Stasavage 2020; Martinez-Bravo et al. 2022), early modern Europe (Johnson and Koyama 2014), and U.S. bureaucratic politics (e.g., Gailmard and Patty 2012; Patty and Turner 2021), for example. We extend these arguments to consider the interdependence between political centralization and informational capacity and the connection between endogenous and exogenous fiscal legibility.

Existing work has shown that inequality and redistributive considerations (e.g., Hollenbach and Silva 2019; Sánchez-Talanquer 2020; Suryanarayan and White 2021), political institutions (e.g., Ma and Rubin 2019; Brambor et al. 2020), electoral incentives (e.g., Christensen and Garfias 2021), and the design of government programs (e.g., Hunter and Brill 2016; Harbers 2020), among other

factors, can encourage or discourage investment in fiscal legibility through efforts like conducting censuses or constructing tax offices. Our argument highlights how these investment decisions also depend on existing informational capacity and the form of rule, connecting work on the *endogenous* determinants of state capacity with a complementary literature on its *exogenous* determinants like geography (e.g., Dal Bo et al. 2022; Fernández-Villaverde et al. 2020; Allen et al. 2022). There is little incentive to centralize and invest in improving the informational capacity of low-legibility areas, but a shock that suddenly increases legibility can shift incentives toward political centralization and long-term investment in state development. This divergence may explain why informational capacity acquired centuries ago can have a persistent effect on present-day fiscal outcomes (D'Arcy and Nistotskaya 2018).

This work also makes an empirical contribution. Most existing evidence on the link between fiscal legibility and state development comes from analytic narratives and case studies (e.g., Johnson and Koyama 2014; Mayshar et al. 2017; Ma and Rubin 2019; Slantchev and Kravitz 2019; Stasavage 2020) or primarily cross-sectional research designs (e.g., Sng 2014; Ahmed and Stasavage 2020). The features of our context allow us to provide quasi-experimental evidence on this relationship by tracing how an exogenous shock to fiscal legibility within an existing state shaped the trajectory of subnational political centralization and state development over several centuries. Our focus on the connection between political centralization and investment in state informational capacity complements work examining legibility and the state from other perspectives, such as that of Mayshar et al. (2022), who connect the cultivation of cereals (which are easier to monitor and tax than other crops) with the rise of complex hierarchies across countries and societies, and Sánchez de la Sierra (2020), who examines how different commodity price shocks affect state-like functions among militias in the DRC.

1. Theory

We examine the relationship between fiscal legibility, state centralization, and long-term state development. Building on a seminal literature, notably the writing of James Scott (1998; 2017), we conceive of fiscal legibility as a central authority's ability to independently observe local economic

production for the purposes of taxation and political control. This informational capacity allows rulers to contend with “exceptionally complex, illegible, and local social practices [...] and [create] a standard grid whereby [they can] be centrally recorded and monitored” (Scott 1998, p. 2). A ruler’s ability to do this depends both on the exogenous features of a district or territory—such as the characteristics of economic production, the ruggedness of the terrain, the presence of waterways, or the structure of human settlement—as well as on past and ongoing political decisions to improve informational capacity through efforts like administering censuses, creating cadastral records, or improving the communications network.

Our interest is in the interdependent relationship between fiscal legibility and political centralization. Political authorities in nearly every context rely on local intermediaries to collect taxes and administer territory. As other scholars have recognized (e.g., Levi 1988; Mayshar et al. 2017; Gailmard 2017; 2019; Balán et al. 2022), this presents a challenging agency problem. A central ruler generally lacks the ability to directly observe how much effort intermediaries put into completing the tasks that they have been delegated, and so they must instead rely on contracts or institutions to encourage compliance in the absence of direct observation. The specific institutional solutions to this agency problem have differed considerably across contexts. We compare two idealized contract types, which we call “indirect rule” and “direct rule.” These terms have been used to capture a variety of specific institutions (e.g., Gerring et al. 2011; Naseemullah and Staniland 2016). Drawing insights from work on delegated decision-making in organizations (e.g., Grossman and Hart 1986; Williamson 1981; Aghion and Tirole 1997; Mayshar et al. 2017), we focus on one important distinction between these contract types: how easy it is for central rulers to sanction and replace tax-collecting intermediaries who perform poorly.

Under indirect rule, local powerholders are granted wide-ranging political and fiscal autonomy in exchange for administering territory and collecting taxes. Examples include the contract between the monarch and lords under feudalism or the structure of British rule in much of Africa and South Asia, through which local authorities maintained considerable power and autonomy under the colonial

state. Intermediaries under indirect rule are generally given longer-term or indefinite contracts and frequently retain independent coercive power. This makes it very costly and difficult for central authorities to unseat or sanction them. Under these contracts, rulers must encourage performance via promising rewards, such as allowing intermediaries to retain a greater share of revenue.

Under direct rule, by contrast, a central ruler exerts tighter control over tax-collecting intermediaries through an institutionalized bureaucracy, making it easier to fire and replace those who perform poorly. By leaning on monitoring and punishment, the central authority can lower the amount of compensation offered to intermediaries in exchange for their cooperation, which allows the state to retain a greater share of tax revenue. However, establishing and sustaining direct rule is costly. To transition to this more centralized contract, a ruler must not only seize power from local potentates in charge of tax collection, but also invest in creating and maintaining a bureaucracy to administer territory.

The ruler thus faces a trade-off in determining whether to centralize authority. Direct rule offers the promise of greater revenue and control, but it is costlier to establish and often costlier to maintain than more indirect forms of rule. Drawing on the insights of recent work (Johnson and Koyama 2014; Mayshar et al. 2017; Stasavage 2020; Martinez-Bravo et al. 2022), we argue that the balance between these competing pressures depends on fiscal legibility, the quality of independent information available to the central ruler on conditions in the periphery. When fiscal legibility is low, a ruler cannot discern whether disappointing outcomes (such as lower-than-expected tax revenue) are due to poor intermediary effort or poor local conditions. This uncertainty makes it difficult and costly to monitor and sanction intermediaries directly. High-performing intermediaries may be incorrectly dismissed and replaced, which both raises the costs of bureaucratic administration and undercuts intermediaries' incentives to perform well to avoid dismissal. As fiscal legibility rises, a ruler is better able to tell when an intermediary's performance is poor, increasing the relative benefits of political centralization.

It is worth situating this argument in the broader literature on state centralization. As other work has emphasized, the ability to centralize authority is often constrained by the independent coercive power of local elites and the costs of setting up a direct bureaucracy (e.g., Gerring et al. 2011; Garfias and Sellars 2021). Our argument focuses on the conditions under which it is worthwhile for the ruler to pay these costs of transition to more centralized control in areas where this is feasible. Because the benefits of direct rule are increasing in information quality (and thus monitoring capacity), rulers should only be willing to pay these costs when fiscal legibility rises above a certain level. This argument connects the literature on the transition to direct rule with some classic work on the slow-moving geographic determinants of state development, such as those emphasizing the observability of grain production for hierarchical integration (e.g., Scott 1998; 2017; Mayshar et al. 2017).

Importantly, we argue, the relationship between fiscal legibility and political centralization is interdependent and mutually reinforcing, and this has implications for longer-term state development. Fiscal legibility is a function not just of exogenous factors like geography but also state-led investments to collect and disseminate information. These investments are costly, and their benefits to the central authority vary depending on the form of rule. Because intermediaries under indirect rule are granted broad autonomy to carry out their work on a permanent or semi-permanent basis, a ruler gains little from marginally improving his day-to-day monitoring capacity under those arrangements. By contrast, under more direct forms of rule, even a small increase in fiscal legibility yields benefits. Better information about local conditions improves the ruler's ability to accurately monitor intermediaries under his supervision, which in turn allows him to tighten control. In other words, direct rule is only beneficial for rulers when fiscal legibility is sufficiently high, and it is only when governance is organized under direct rule (or when an imminent transition to direct rule is expected) that investing in improving fiscal legibility is worthwhile.

This argument implies a divergence in state institutions between areas of high or low initial legibility. Where legibility is very low, improving informational capacity to the point where it

would be advantageous to centralize political control would require a substantial investment over a long period, which may not be worthwhile. Where legibility is high enough, the ruler will move to centralize authority and then continue to invest in improving informational capacity, further reinforcing the benefits of centralization.¹

In the remainder of this paper, we provide empirical evidence in support of this argument, focusing on the following observable implications:

1. An exogenous increase in fiscal legibility should encourage political centralization by improving the ruler's ability to monitor intermediaries and thus the benefits of direct rule.
2. Because of the interdependence between fiscal legibility and political centralization, this shock should also increase state investment in informational capacity, leading to divergence in long-term state development.

2. Context

We examine the transition from indirect to direct rule in colonial Mexico around the time of a technological innovation that enhanced the Spanish Crown's ability to monitor local economic production in some areas.

2.1 Indirect Rule in Early Colonial Mexico

The Conquest and early political organization of New Spain relied on the cooperation of conquistadors and other elites to extend political control over the distant territory. The institution of the *encomienda* was central to this arrangement. Under the *encomienda*, an elite intermediary (*encomendero*) was given the right to extract tribute and labor from the local population in exchange for bearing the cost of local tax collection, pacification, and Christian conversion. Like British indirect rule in Africa or South Asia, the *encomienda* was built by adapting pre-existing institutions, most notably the tribute network of the Triple Alliance/Aztec Empire. This enabled the Crown to quickly extend its control over territory without having to invest in developing a centralized bureaucracy to

¹Though in theory there may be a point of diminishing returns to further investment in informational capacity, we believe that the early-colonial setting that we examine is far from that point and note that even high-capacity modern states continue to invest in improving legibility.

monitor, tax, and police the periphery (Zavala 1973; Knight 2002; García Martínez 2011; Garfias and Sellars 2021).

In the early colonial period, when the Crown had little information about its holdings and limited control over the territory, much of the colony was administered via the *encomienda*.² However, this arrangement was costly for the Crown. By ceding revenue and autonomy to *encomenderos*, it created a class of powerful elites with independent coercive authority who could not be easily supplanted. Within a generation of the Conquest, the Crown had begun to centralize power, gradually replacing *encomiendas* with *corregimientos*, public offices with salaried officials who could be hired and fired by the central government (Zavala 1973; Hassig 1985; Knight 2002).

The contract for the holders of these public offices, the *corregidores*³, differed substantially from that of the *encomenderos*. Though also physically present in their district, and thus at an informational advantage relative to the Crown, the terms of their contract kept *corregidores* under more direct control of central authorities. Unlike *encomenderos*, who typically held their position for the duration of their lives and could even pass on the office to their heirs, *corregidores* were typically appointed for a single year by viceregal authorities (Gibson 1964, p. 84).⁴ They could be, and often were, replaced at the end of their term and dispatched to other districts (Gibson 1964). Also unlike *encomenderos*, the *corregidores* received a salary from the government.⁵ The amount of compensation differed substantially from what was received by *encomenderos*, who were typically ceded a sizable share of

²Some areas, notably Tlaxcala and areas of low pre-colonial settlement, never received *encomiendas*. These areas are excluded from our analysis.

³Other terms used for these local civil authorities included *alcaldes mayores*, *justicias*, and *subdelegados*. There were a few minor differences between these offices in the early colonial period but little substantive distinction (Gibson 1964, p. 82; Gerhard 1993a, p. 14).

⁴Appointments were generally made by the viceroy, who had broad executive authority over the colony, and occasionally by the Council of Indies. In the region of Nueva Galicia, the head of the *Real Audiencia* also had the authority to dispatch these officials (Gerhard 1993b, p. 14–15).

⁵Salaries were initially drawn from locally collected tribute in a specified formula, though the compensation scheme evolved over time. There were more fundamental changes in this institution in the late 17th and early 18th centuries when investment in state development stagnated and office selling became prevalent (e.g., Pietschmann 1972; Guardado 2018; Garfias and Sellars 2020).

local tax revenue.⁶ As Gibson (1964) writes, for intermediaries “the smallest *encomiendas* yielded incomes larger than the best-paid *corregimientos*” (p. 83), leaving more surplus for the Crown.⁷

The move to *corregimiento* enabled the central government to exert greater control over intermediaries and retain more revenue from the tribute, a capitation tax on the Indigenous population. However, the transition to more centralized control was costly and difficult. *Encomenderos* controlled local coercive power, and they resisted attempts to centralize authority, at times by force (Gibson 1964; Yeager 1995; Knight 2002; Garfias and Sellars 2021). Moreover, the transition to direct rule meant that royal officials would shoulder the expenses of policing and monitoring the local population, tasks previously delegated to *encomenderos*, who generally possessed better local knowledge.

The transition to direct rule was uneven across space and time. Some *encomiendas* were dissolved by the early 1530s, while others were continuously reassigned to private holders, surviving for centuries until the end of the colonial period. Scholars have proposed several explanations for when, where, and why royal officials chose to centralize power, including differences in the value of holdings (Yeager 1995), in a district’s strategic military importance (Pastore 1998), or in the threat of domestic conflict (Garfias and Sellars 2021). We examine the complementary role of fiscal legibility: the Crown’s ability to observe local economic production.

The move to direct rule required the Crown to take on a stronger role in monitoring local officials, which required observing local conditions. As we argue in Section 1, the relative benefits of direct over indirect rule depend critically on a ruler’s ability to independently observe local conditions. In places with high initial legibility, such as around Mexico City, direct rule would have been more attractive. By contrast, in frontier zones or places of ongoing insurgency, it would have been difficult for officials to independently evaluate whether an intermediary was underperforming. The Crown

⁶*Encomendero* tribute revenues were in principle subject to the royal fifth, a 20 percent tax (Zavala 1973, p. 48, 69). Though extent of early implementation is unclear, by 1537 *encomenderos* were indeed being taxed according to royal officials (Zavala 1973, p. 70).

⁷Tribute was extracted in similar ways under *encomienda* and *corregimiento*. Differences in the regulation of labor in this period were modest in practice, and there is no evidence that centralization entailed a major shift in local labor relations. Reliance on uncompensated labor through either institution became increasingly rare by the 1540s, and the allocation of labor in tribute schedules was formally abolished in 1549 (e.g., Gibson 1964, p. 83, 223–6).

thus relied on indirect rule in low-legibility areas, allowing *encomenderos* to remain in their position indefinitely and retain the lion's share of tax receipts.

2.2 The Patio Process: An Exogenous Shock to Fiscal Legibility

We examine the consequences of a technological innovation that dramatically increased the Crown's ability to observe economic production in mining areas: the introduction of the patio (mercury amalgamation) process in the mid-16th century. The discovery of extensive silver deposits during the Conquest of northern Mexico reshaped the economic structure of the colony toward extracting bullion (e.g., Brading and Cross 1972; Knight 2002, p. 62–64). After rich surface ores in places like Zacatecas and Guanajuato had been depleted, attention turned to mining deeper deposits of silver sulfides, which were considerably more difficult to process (Brading and Cross 1972; Guerrero 2017). The primary processing technology available, smelting and cupellation, relied on heating ores to a high temperature and treating them with lead. This required a large amount of fuel wood and imported lead from England, limiting the profitability of processing ores of lower silver content (Brading and Cross 1972; Guerrero 2017).

The introduction of the patio process in the 1550s transformed Mexican silver production. This process relied on mercury amalgamation. Ores would be crushed using a stamp mill or other device and treated with salt and mercury, leaving the silver to form an amalgam with mercury that could be subsequently reheated to extract pure silver (e.g., Brading and Cross 1972, p. 552–6; Guerrero 2017, Ch. 4). This process encouraged the extraction of lower-grade silver sulfide ores common in the Americas (see Appendix Figure C.1 in p. 7), providing the basis for dramatically increasing local production (Brading and Cross 1972; Guerrero 2017).

Crucially, the shift toward refining silver through the patio process improved the Crown's ability to monitor economic production in mining areas. Processing ores required mercury, which had to be imported from Spain.⁸ Starting in 1559, the Crown maintained a monopoly over the production,

⁸During this period, there were only three areas where mercury could be mined at scale, all within the Spanish Empire: Almaden and Idria in Europe, and Huancavelica in Peru. Peruvian mines used locally sourced mercury, but virtually all mercury in colonial Mexico originated in Europe (Brading 1971; Brading and Cross 1972, p. 562).

sale, and distribution of mercury, which enabled officials to directly observe the demand for the input across the territory. Because silver production used mercury in a known ratio—approximately one mark of silver per pound of mercury—officials could infer how much silver was being produced in different areas (Lang 1977; Brading and Cross 1972).⁹ Control over the provision of mercury thus provided a simple and reliable way to cross-reference production figures in silver taxation, which was centrally administered from the beginning of the colonial period (e.g., Brading and Cross 1972, p. 570–1; TePaske 2010, p. 105). Access to mercury could also be conditioned on the prompt payment of back taxes, which aided tax enforcement (de Fonseca and de Urrutia 1853, p. 302).

This technology, paired with the monopoly on mercury, also improved the Crown’s knowledge about economic fluctuations in other sectors. An increase in silver mining stimulated local economies by increasing demand for inputs like salt, fuel, mining equipment, and especially labor, which accounts for a significant portion of the variable cost of smelting and amalgamation (Guerrero 2017, p. 315). Unlike in Peru, for example, laborers in the Mexican mining sector were generally compensated, even when labor was provided through the forced labor draft or *repartimiento* (Brading and Cross 1972, p. 557–8; Bakewell 1984, p. 123–5; Knight 2002, p. 65). This was particularly relevant for the collection of the tribute capitation tax. An increase in mining production should increase local wage payments and the demand for local agricultural products, making it easier for nearby communities to pay their tribute dues.

In short, the mining sector’s reliance on state-provided mercury became to the legibility of local economies what “surnames and the rolls of names that they generated were to the legibility of the population” and “what uniform measurement and the cadastral map were to the legibility of real property” (Scott 1998, p. 80). By observing the demand for mercury across space and time, the Crown could obtain useful information to determine whether a fall in the locally collected capitation

⁹The accuracy of this ratio, or *correspondencia*, depended in practice on the quality of the mercury and ore and on the skill of refiners. Miners could opt to refine silver through smelting and smuggle their production to avoid taxation, but this was generally unprofitable. The continued possibility of smelting did, however, somewhat constrain the Crown’s ability to enforce high taxes on silver production via mercury provision (see Guerrero 2017 and Appendix Section C, p. 7).

tax was attributable to poor conditions or to poor effort. Especially in distant areas with little pre-existing state presence, access to this independent source of information dramatically reduced the cost of monitoring and disciplining intermediaries, encouraging the adoption of direct rule. Though intermediaries could, and often did, resist efforts to centralize power, the decision to adopt the patio process was generally made by other actors—mining elites who profited handsomely from the new technology—and this surreptitiously opened the door to political centralization. We systematically assess how the introduction of the patio process altered the trajectory of political centralization using subnational panel data and a difference-in-differences empirical strategy.

3. Data

We digitize subnational data on institutions of indirect and direct rule (*encomiendas* and *corregimientos*) from 1521 (ca. the Conquest) until 1650. Our data come from Gerhard (1993a;b), who compiles a list of *encomiendas* in the early colonial period in central and north-central Mexico (New Spain and Nueva Galicia) at the level of the 1786 administrative region (district). These areas represented the core of the colonial state where a transition to direct rule would have been feasible by the time of the discovery of the patio process in the 16th century. The Gerhard data include the approximate dates at which each holding remained privately assigned to an *encomendero* or was centralized under Crown control. We calculate the proportion of holdings in each district that had transitioned to direct rule (i.e., *corregimiento*) by the end of each decade.¹⁰

Data on early colonial mines come primarily from Hillerkuss (2013), who lists the approximate starting decade of production for known silver and gold mines in colonial Mexico during the 16th century. Because Mexico's main silver and gold deposits are geologically found in the same locations (Guerrero 2017), we include all mines as the decision to extract silver or gold may be endogenous. We digitize these data and geographically assign each mine to a 1786 administrative region. We code two indicators: whether a district includes a mine and whether the district includes a mine that reported production prior to the introduction of the patio process around 1550. Production often

¹⁰We aggregate to the district level to merge with district-level mining data and other covariates. See Appendix A (p. 1) for a description of how each variable was constructed.

started prior to the dates reported in the Hillerkuss data, but we show results using the restrictive definition in Appendix Section B.1 (p. 5).

We also digitize a series of covariates for use in some specifications, including information on district climate, geographic position, decadal drought conditions, elevation, distance and walking time to Mexico City, and the approximate year of European contact. We describe each of these variables in Appendix Table A.1 (p. 1). Finally, we digitize and geocode several measures of longer-term endogenous fiscal legibility. We describe these data in Section 5.

4. Exogenous Shock to Fiscal Legibility and the Transition to Direct Rule

Our argument suggests that an exogenous increase in fiscal legibility should encourage political centralization. We use a difference-in-differences design to compare changes in the adoption of direct rule in districts with and without silver mines before and after the introduction of the patio process in the 1550s, which increased the Crown’s ability to monitor economic conditions in mining areas.¹¹ We estimate:

$$Direct\ Rule_{it} = \beta_1 Mine_i \times PostPatio\ Process_t + \Theta_t X_i + \Pi U_{i,t} + \lambda_t + \gamma_i + \varepsilon_{it}, \quad (4.1)$$

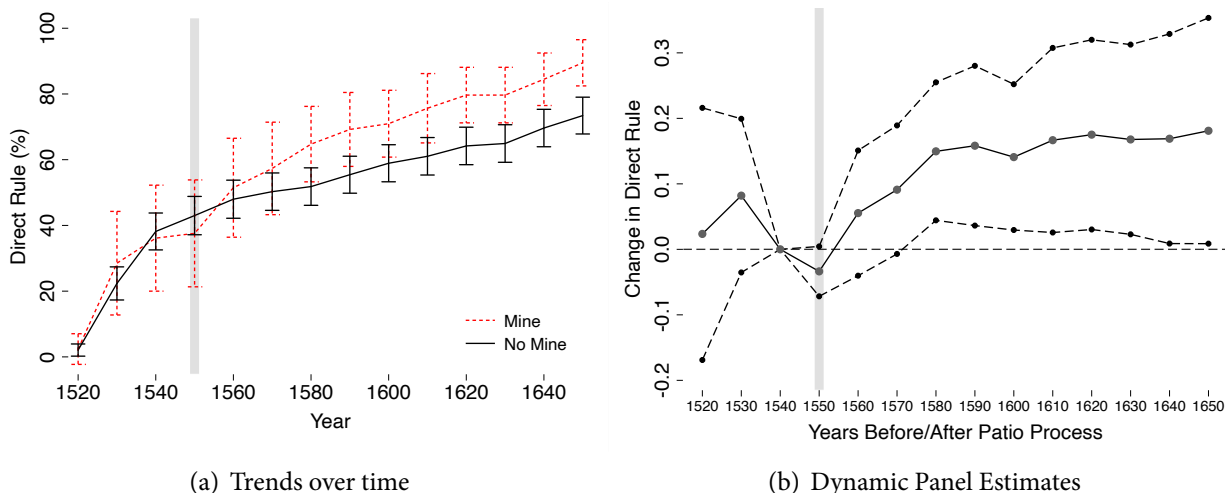
where $Direct\ Rule_{it}$ is the proportion of *corregimientos* (direct rule) in district i by decade $t \in [1520, 1650]$; $Mine_i \times PostPatio\ Process_t$ is an indicator for having at least one silver mine in the district after the discovery of the patio process; λ_t and γ_i are decadal and district indicators respectively; X_i are district-specific controls (malarial zone, maize suitability, elevation, log surface area, log walking hours to Mexico City, year of Spanish contact, latitude, and longitude) interacted with each year indicator to allow the trajectory and the level of direct rule adoption to vary by these observables; $U_{i,t}$ are time-varying climate covariates; and ε_{it} is an error term. We cluster standard errors at the district level and also compute Conley standard errors that allow for serial correlation within districts and spatial correlation between districts (Conley 1999; Fetzer 2015).

In the left panel of Figure 1, we present descriptive trends in the adoption of direct rule during this

¹¹In Appendix Table A.3 (p. 3), we report baseline covariate differences between mining and non-mining districts. Mining districts are somewhat more likely to be in malarial zones and be located in the west (see Appendix Figure A.1, p. 1), but are otherwise similar on average to non-mining districts.

time period. We plot the proportion of *encomiendas* converted into *corregimientos* over the period of analysis for districts with (dashed line) and without (solid line) mines. As described in the historical literature, there is a steep increase in political centralization in the decades after the Conquest in both groups. This rapid initial centralization occurred primarily in areas that were previously controlled by the Triple Alliance, where fiscal legibility was plausibly higher as the new colonial administration took control of Aztec fiscal institutions and existing records. Following the discovery of the patio process in the 1550s, mining and non-mining areas begin to diverge as centralization continues at an accelerated rate in districts with mines and slows in districts without mines.

Figure 1: Patio Process and Direct Rule



The figure on the **left** plots the average proportion of holdings under direct rule with 95% confidence intervals for mining and non-mining districts in each decade. The figure on the **right** displays the point estimates and 95% confidence intervals of decade-by-mining district interactions from a panel regression that includes district and decade fixed effects.

The right panel of Figure 1 presents a similar pattern, plotting the coefficients of linear interactions between the mining district indicator and indicators for each decade from a panel regression with direct rule as the outcome and including district and decade fixed effects. Relative to 1540 (the omitted category), there is no clear difference in direct rule adoption in districts with and without mines before the 1550s. After the introduction of the patio process, however, districts with mines experience a relative increase in the transition to direct rule.

Table 1: Patio Process and Direct Rule: Difference-in-Differences

	Direct Rule (% of District)			
	New Spain & Nueva Galicia		New Spain	
	(1)	(2)	(3)	(4)
Any Mine \times Post-Patio Process	0.13** (0.04) {0.04}	0.12** (0.04) {0.04}	0.08* (0.03) {0.03}	0.11* (0.05) {0.05}
Climate Controls	No	Yes	No	Yes
Controls \times Year FE	No	Yes	No	Yes
Year of European Contact \times Year FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes
Within Non-Mining District Mean of DV	0.50	0.50	0.49	0.50
Within Non-Mining District SD of DV	0.24	0.24	0.22	0.22
R sq.	0.78	0.82	0.80	0.83
Observations	2016	1960	1680	1624
Number of districts	144	140	120	116

OLS estimations. Unit of analysis is the district-decade. Standard errors clustered at the district level in parentheses, with $^{\dagger}p < 0.1$, $*p < 0.05$, $**p < 0.01$. Standard errors allowing for serial correlation within districts and spatial correlation between districts within 500 km are in curly brackets. Time-varying climate data are not available for four districts, which are omitted in the estimations using covariates.

We present the difference-in-differences estimates in Table 1 across two samples. In the left two columns, we present estimates using the full sample of districts in New Spain and Nueva Galicia. In the right two columns, we exclude the north-central region of Nueva Galicia, which was conquered later than New Spain and had a separate administrative structure, to allow for the possibility that the territorial logic of centralization may have differed in this region.

The results indicate that the adoption of the patio process had a substantial effect on the transition to direct rule in affected areas. There is a sizable increase—of about 12–13 percentage points across the entire sample (columns 1 and 2) and of between 8–11 percentage points in the core territory of New Spain (columns 3 and 4)—in direct rule adoption in mining relative to non-mining areas

following the discovery of mercury amalgamation in the 1550s . This amounts to between a third and a half of the within-district standard deviation in the adoption of direct rule in non-mining districts. The estimates are statistically significant across specifications, both with and without the vector of time-varying and time-interacted controls. Results are unchanged if we restrict attention to mining districts that had documented production before the introduction of the patio process in 1554 as the treatment group (Appendix Section B.1, p. 5).

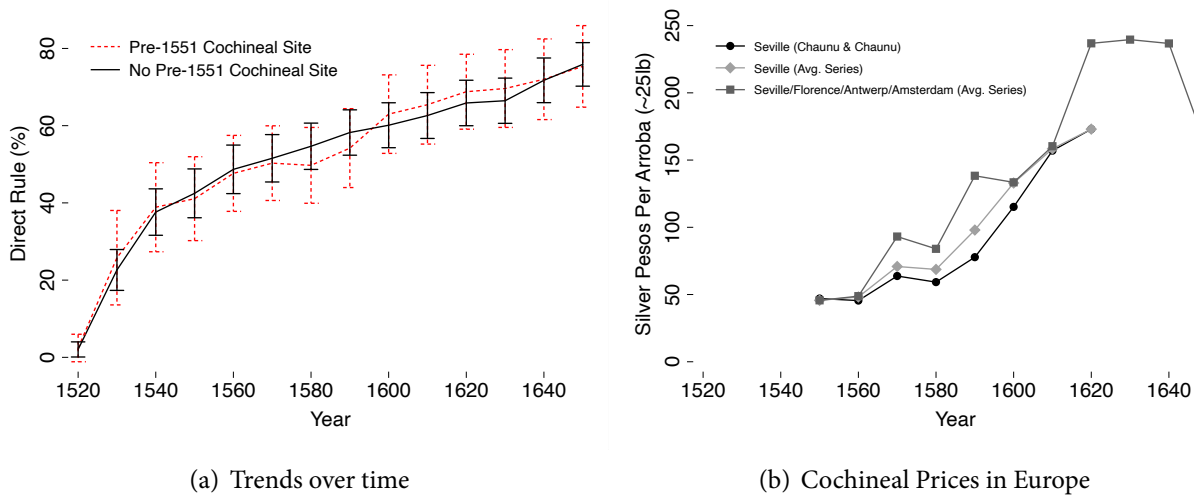
4.1 Evidence on the Legibility Mechanism

The results of the previous subsection are consistent with our argument. However, it is reasonable to wonder whether the observed increase in centralization in mining areas following the introduction of the patio process was due to the rise in fiscal legibility as opposed to other factors. In addition to enabling the Crown to better monitor production, the patio process increased the profitability of mining silver ores across of Mexico (Guerrero 2017; see also Appendix Section C, p. 7), which could have influenced the transition to direct rule through other mechanisms. While silver taxation itself was always collected centrally, it is possible that an increase in mining revenue may have made it easier for surrounding communities to pay the tribute capitation tax, potentially increasing the benefits of greater control over local taxation through the *corregimiento*. Alternatively, the Crown might have sought to more tightly control the supply of inputs and labor to profitable mines through direct rule over nearby communities or elites. In this subsection, we consider whether increased mining profitability or revenue potential, rather fiscal legibility, might explain our findings.

Because there is little direct information on mining profits across districts and over time in this period, we adopt a series of indirect strategies to assess this alternative set of mechanisms. We first examine the consequences of a sudden increase in the value of another commodity, cochineal dye, on the adoption of direct rule. Cochineal was an important commodity extracted from the colony, second only to silver and gold in its importance to the Crown. Between 1580 and 1620, the international market price for cochineal increased threefold, driven by a sharp increase in European demand. This led to a dramatic increase in the profitability of cochineal production, a small-scale

and labor-intensive production process. This profitability shock was in fact significantly larger than the estimated increase in the profitability of mining silver due to the introduction of the patio process (see Appendix Section C, p. 7). The cochineal price shock did not, however, influence the fiscal legibility of affected areas. We combine information on cochineal production prior to the shock and European price trends to assess whether this rise in profitability also led to a disproportionate increase in political centralization in cochineal-producing districts.

Figure 2: Cochineal-Producing Sites, Cochineal Price Shock, and Direct Rule



The **left** figure plots the average proportion of holdings under direct rule with 95% confidence intervals for cochineal-producing and non-producing districts in each decade. The **right** figure displays a cochineal price series from various sources. See Appendix Section C.2 (pp. 12–13) for a description of the construction of the data.

Figure 2 compares the average proportion of holdings under direct rule in cochineal-producing and non-producing districts around the time of the price shock (left) alongside market prices for cochineal in Europe over time (right). As the plots show, despite the dramatic demand-driven increase in European cochineal prices beginning in the late 16th century, there was no corresponding acceleration in direct rule adoption in cochineal-producing districts. We present a more detailed analysis of these data in Appendix Section C.2 (pp. 12–15), where we estimate an equation similar to (4.1), now interacting an indicator for cochineal production in a district with the price of cochineal over time. Across all specifications, these estimates are not statistically distinguishable from zero and

are very small in magnitude, indicating that the remarkable increase in the profitability of cochineal production did not lead to a differential adoption of direct rule in cochineal-producing districts.

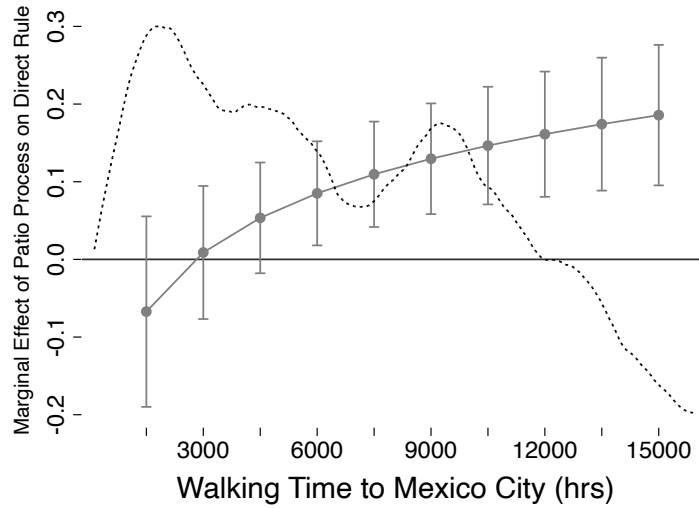
The cochineal boom greatly increased the revenue potential of cochineal-producing areas, benefiting both cochineal traders, who were typically local or national elites, as well as local producers, who were mostly Indigenous tributaries (Baskes 2000; Diaz-Cayeros and Jha 2016). This should have increased the extraction potential of cochineal-producing districts. Yet, unlike the patio process, the cochineal price shock did not lead to a corresponding increase in fiscal legibility. Direct monitoring and taxation remained difficult in cochineal-producing areas, and this substantial boom did not increase political centralization.

Though the profitability impact of the cochineal boom was comparable in size to (and probably even larger than) that of the introduction of the patio process (Appendix C, p. 7), silver production is distinctive in other ways. As a second strategy to assess the competing impact of profitability on centralization, we examine how the impact of the introduction patio process on centralization differed across different types of mining districts. Figure 3 presents the heterogeneous effect of this shock by distance to the capital using a model that interacts the post-patio process indicator with the logged walking hours to Mexico City, which is constructed using data on colonial-era land cover, elevation, and terrain slope.¹² As the figure illustrates, the effect of the patio process on centralization was higher in areas *farther* from Mexico City, where there would have been less prior information on local economic and political conditions. This is consistent with our legibility-focused argument but difficult to reconcile with a profitability-related mechanism as the value of increasing silver production would have been lower, not higher, in areas farther from trade networks and the capital. In Appendix Section C.1 (pp. 9–12), we additionally show that the introduction of the patio process had a more pronounced impact in areas *outside* the tribute network of the Triple Alliance where the Spanish lacked useful information on tax collection in the precolonial period and a smaller impact

¹²See Appendix Section A.2 (p. 4) for a description of the construction of our walking-time measures.

where the cost of transition was plausibly higher due to the threat of rebellion, though this evidence is only suggestive.¹³

Figure 3: Silver Mining, Patio Process, and Direct Rule Heterogeneous Effects



The figure plots estimates and 95% confidence intervals of the differential change in direct rule following the introduction of the patio process for different least-cost walking hours to Mexico City. A kernel density of this variable is overlaid.

We look more directly at the link between mining profitability and centralization in additional analyses. In Appendix Section C.3 (pp. 15–19), we examine variation in the local availability of firewood, a minor factor for mercury amalgamation but a critical input for smelting, which had been the main technology for refining silver prior to the discovery of the patio process. We show that the large and positive increase in direct rule adoption after 1550 persists even in districts with the most convenient access to firewood, where the introduction of the patio process would have had a smaller impact on profitability. More qualitatively, we examine evidence from boom-and-bust cycles in two major mining areas, Taxco and Pachuca, for which we have information on production trends over the period of analysis. We show that there is no evident break in the trajectory of political

¹³Though all coefficients are in the expected direction and of a similar magnitude across specifications, they are not statistically distinguishable from 0 when including the full set of covariates (Appendix Table C.1, p. 10).

centralization even under sizable shifts in the perceived value of local silver production, casting doubt that the changes in profitability alone can explain our findings (Appendix Section C.4, pp. 19–21). Alongside the evidence presented earlier, these findings suggest that the increase in legibility due to the adoption of the patio process, and not just the increase in profitability, facilitated political centralization.

5. Long-Term State Development

The prior section shows that the introduction of the patio process facilitated political centralization in early colonial Mexico. Through its royal monopoly over the distribution and sale of mercury, the Crown gained insight into local economic conditions that would have been otherwise difficult to observe, enabling the transition to direct rule. We now explore a second set of empirical implications of our argument related to the dynamic interaction between fiscal legibility and political centralization.

Our theory predicts that political centralization should encourage investment in state informational capacity to improve monitoring and strengthen the effectiveness of direct rule. A single exogenous increase in fiscal legibility can therefore lead to longer-term divergence in state institutions. In affected areas, authorities should seek to centralize authority and continue to invest in improving state informational capacity. Where fiscal legibility remains low, by contrast, the ruler should continue to rely on indirect forms of rule and thus have little incentive to invest in either political centralization or in improving fiscal legibility.

We assess this divergence argument by examining a common measure of state capacity and public investment: the placement of state post offices (e.g., Acemoglu et al. 2016; Rogowski et al. 2022). Post offices facilitate communication between the periphery and the center. The creation and staffing of these offices thus represent an important state investment in local fiscal legibility. In colonial Mexico, postal operations had been delegated to private agents (*Correos Mayores*) before being integrated into the fiscal administration in 1766. As the Marquis of Sonora noted in the 1770s, there were benefits in expanding postal access in under-served areas, “even if they [yielded] little revenue” (quoted in Velarde et al. 1908, p. 338) to expedite information transmission among private actors, and between

local officials and the central government.

Our data come from Stangl (2019), who identifies the location of state post offices (*estafetas*) at the end of the colonial period using archival records. We construct two variables: whether a district contained a post office by the early 19th century and the least-cost walking time from the district to the nearest post office. We also examine the present-day coverage of the Mexican postal service as our divergence argument suggests that baseline differences in fiscal legibility and state presence should persist despite substantial changes in postal administration.¹⁴

We present conditional correlations between exposure to the legibility shock in the 1550s (i.e., districts with mines in the early colonial period) and longer-term investment in legibility in Table 2. We include the time-invariant covariates described in equation (4.1), also adding an indicator for early cochineal production. We report standard errors that are robust to heteroskedasticity and to spatial correlation between districts within 500 km of each other (Conley 1999).

One concern is that mining districts may vary substantially from non-mining areas along a number of unobserved dimensions. To partially address this concern, we present an alternative comparison that seeks to more closely isolate the role of legibility (as opposed to ongoing mining profitability or other related factors) in explaining these long-term outcomes. We identify districts that had an active silver or gold mine in the 16th century, and were therefore affected by the introduction the patio process, but where mining activities had ceased prior to the mid-18th century due to, for instance, resource depletion. We then compare these defunct mining districts to districts that did not have mines in either period to rule out ongoing mining as a factor to explain long-term institutional divergence. To construct this alternative comparison group, we use information from the 1746 *Theatro Americano*, as transcribed and organized by Commons and Coll-Hurtado (2002). The *Theatro* was an exhaustive and confidential official report that provided geographic, sociodemographic, and economic information of districts across the territory during the 1740s, including information on

Table 2: Divergence in Long-Term Fiscal Legibility

Panel A:	Districts in Regions with Indirect/Direct Rule Institutions					
	Walking Hours to Colonial Post Office (log)		Any Colonial Post Office (1766–1810)		Any Present-Day Post Office	
	(1)	(2)	(3)	(4)	(5)	(6)
16th Century Mine	-1.25** (0.21) {0.31}	-1.04** (0.30) {0.16}	0.24** (0.04) {0.05}	0.20** (0.06) {0.03}	0.28** (0.03) {0.07}	0.02 (0.03) {0.04}
Controls	No	Yes	No	Yes	No	Yes
Mean of DV in Non-Mining Districts	1.25	1.25	0.76	0.76	0.38	0.38
SD of DV in Non-Mining Districts	2.32	2.32	0.43	0.43	0.49	0.49
R sq.	0.04	0.26	0.05	0.25	0.05	0.33
Observations	150	150	150	150	1781	1781

Panel B:	Exhausted Mines vs Non-Mining Districts (Excluding Districts with Ongoing Mining by 1740)					
	Walking Hours to Colonial Post Office (log)		Any Colonial Post Office (1766–1810)		Any Present-Day Post Office	
	(1)	(2)	(3)	(4)	(5)	(6)
16th Century Mine	-1.25** (0.21) {0.31}	-0.74 [†] (0.44) {0.31}	0.24** (0.04) {0.05}	0.15 [†] (0.08) {0.05}	0.30** (0.04) {0.09}	0.08* (0.04) {0.06}
Controls	No	Yes	No	Yes	No	Yes
Mean of DV in Non-Mining Districts	1.25	1.25	0.76	0.76	0.38	0.38
SD of DV in Non-Mining Districts	2.32	2.32	0.43	0.43	0.49	0.49
R sq.	0.02	0.26	0.02	0.25	0.03	0.34
Observations	137	137	137	137	1608	1608

OLS estimations. Unit of analysis is the district in columns 1–4 and contemporary municipality in columns 5–6. Robust standard errors in parentheses, with [†] $p < 0.1$, * $p < 0.05$, ** $p < 0.01$. Standard errors that allow for spatial correlation between districts within 500 km of each other in curly brackets. Covariates include an indicator for cochineal production in the 16th century and malarial zone, maize suitability, elevation, log surface area, log walking hours to Mexico City (log distance for present-day outcomes), year of Spanish contact, latitude, and longitude.

ongoing mining production.

The first four columns of Table 2 indicate that areas with 16th-century mines had substantially better access to postal services by the end of the colonial period than those without. Districts with

¹⁴We code a municipality as being exposed to the patio-process shock if it overlaps an affected colonial district as contemporary administrative boundaries do not nest within colonial political units.

early colonial mines are about half of a within-district standard deviation closer to a post office relative to non-mining districts, and they are between 20 and 24 percentage points more likely to have a post office in the district (Panel A). The estimates are similar when excluding districts with ongoing silver mining by the 1740s (Panel B), though the magnitude of the coefficient in models with the full set of covariates is somewhat smaller. Even today (columns 5 and 6), contemporary municipalities that overlap colonial districts with early mines are more likely to have a post office than those that do not, including when focusing only on districts where large-scale mining no longer took place by the 1740s, though this difference is smaller and not statistically significant in the full sample when including covariates.

This evidence is consistent with the argument that the initial boost in fiscal legibility led to longer-term divergence in state development, even in areas where mining had been abandoned, and even long after the colonial period. While we caution that this analysis is not causal—for example, there may be other mechanisms through which early colonial mining altered longer-term state investment—the fact that these post offices were constructed decades (and often centuries) after mining extraction had ended suggests a longer-term legacy like the one proposed is possibly at work.¹⁵

In Appendix Section D.2 (pp. 23–26), we examine a separate measure of state investment in local fiscal legibility: the construction of *Cajas Reales* or royal treasuries across space and time. As we argue in that appendix, treasury placement facilitated information transmission to central authorities, even as they also had other purposes plausibly related to mining. Consistent with our argument about the complementarity between endogenous and exogenous sources of legibility, we find suggestive evidence that the introduction of the patio process encouraged the establishment of treasuries in the core region of New Spain using a similar difference-in-differences research design as in Section 4, though the evidence is more ambiguous when including the north-central region

¹⁵In Appendix Table D.1 (p. 23) we show that, by the 1770s, early mining districts were perceived to be of equal extractive value as non-mining districts. We also find that, if anything, districts with early mines that had been exhausted had less extraction potential than never-mining districts on average. This further reinforces our interpretation that the observed disproportionate state investment in former mining areas is not due to ongoing economic production or extraction.

of Nueva Galicia. Taken together, these analyses suggest that the introduction of the patio process encouraged investment in state informational capacity, even centuries later.

6. Conclusion

How does a change in fiscal legibility—the ability of central authorities to observe local conditions for the purposes of taxation and control—alter a ruler’s incentive to centralize power and further invest in informational capacity? We argue that a ruler can be better off ceding autonomy and revenue to local elites in low-information environments as a way to encourage performance when the cost of monitoring is high. As fiscal legibility improves, it becomes easier for the ruler to discern when intermediaries are performing poorly. This makes it possible for the ruler to tighten political control and retain a greater proportion of tax revenues. Political centralization in turn encourages additional investment in improving fiscal legibility to make it easier for central authorities to monitor and sanction tax-collecting intermediaries in the periphery.

This relationship generates path dependence in fiscal legibility and the form of rule over time. In areas of low initial legibility, the central authority relies on indirect rule and thus does not benefit from investing to improve informational capacity. A sudden increase in fiscal legibility has the potential to alter this trajectory by lowering the barriers to centralization and making it advantageous for the ruler to start investing in improving legibility for the future. A single shock to fiscal legibility can thus have important long-term consequences on institutional development.

We provide empirical support for the theory using subnational data from colonial Mexico. In the aftermath of the Conquest, the Spanish Crown yielded considerable authority to local elites as a way of maintaining political control over newly conquered territory. Efforts to centralize power differed considerably across space and time. An important technological innovation in silver refining, the introduction of the patio process in the 1550s, greatly increased the Crown’s ability to independently observe economic conditions in mining districts. Using a difference-in-differences empirical strategy, we show that mining areas saw a differential increase in centralization efforts following this technological innovation. We provide evidence that the observed increase in political

centralization was due to the informational consequences of this shock, as opposed to the change in the profitability of silver extraction, by examining a major increase in the profitability of another important commodity, cochineal dye, which did not influence legibility and thus did not shift the trajectory of political centralization. Examining the heterogeneous effects of the patio process across mining districts, we present additional evidence that is consistent with our legibility-based theory and not necessarily with alternative profitability-related arguments.

We finally document some of the longer-term consequences of the sudden increase in fiscal legibility. We show that affected districts saw disproportionate state investment in improving informational capacity through the establishment of state-run post offices, contributing to additional divergence in fiscal legibility. These long-term results persist even when restricting attention to areas without ongoing silver production by the 1740s, ruling out that they are driven by the economic potential of mining areas. This evidence further illustrates the connection between fiscal legibility, political centralization, and state development.

The features of our empirical context allow us to provide quasi-experimental evidence on the connection between fiscal legibility and political centralization, a link that others have examined theoretically, qualitatively, and cross-sectionally (e.g., Sng 2014; Ma and Rubin 2019; Ahmed and Stasavage 2020; Stasavage 2020). Fiscal legibility and political centralization are complex processes driven by a variety of factors, including geography, demography, and the pressures of domestic and international conflict, among others. As our theory highlights, these processes are also interdependent in that fiscal legibility facilitates political centralization and political centralization encourages investment in fiscal legibility. By tracing the effect of a sudden and exogenous increase in fiscal legibility over a long period of time, we can empirically disentangle the influence of fiscal legibility on political centralization as well as provide insights into the reverse process. Though the introduction of the patio process in colonial Mexico was a unique event in many ways, it provides an opportunity to gain a better understanding of the more general relationship between fiscal legibility and state development, a relationship that is typically endogenous.

The connection that we observe between fiscal legibility and political centralization is not unique to colonial Mexico. Others have established that differences in the observability of local agricultural production in Egypt and Mesopotamia led to very different paths of state development, including via differing incentives for political centralization (Mayshar et al. 2017; Scott 2017). Similarly, Stasavage (2020) suggests that the adoption of forms of legible agricultural production in ancient China led to the development of an early and relatively centralized bureaucracy. In early modern European polities, including the Dutch Republic and France, the presence of highly heterogeneous and fragmented local economies has been linked to the persistence of indirect tax collection, in part to save on the high costs of monitoring agents (Johnson and Koyama 2014). Recent work on the rise and decline of local elections in China posits a similar connection between local informational capacity and incentives to centralize authority (Martinez-Bravo et al. 2022).

This paper clarifies how the form of rule depends on fiscal legibility and when investments in improving legibility—such as conducting censuses, creating property registers, or constructing tax offices and post offices—are likely to be worthwhile for central authorities. This argument illustrates an important connection between endogenous and exogenous sources of fiscal legibility, which has important implications for understanding longer-term divergence in state development. In peripheral areas where initial legibility is very low, there may be no compelling reason for central authorities to move toward more direct forms of rule and thus little incentive to invest in state informational capacity. Conversely, a move toward political centralization can encourage additional investment in fiscal legibility, helping to consolidate more direct control over territory. A single shock that raises fiscal legibility can thus have far-reaching consequences, enabling central authorities to tighten control, retain more revenue, and build a more centralized state for the future.

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