

The Seeds of Their Own Demise: Traditional Institutions and Land Titling in Russia

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Abstract

Why do traditional institutions succeed in resisting the expansion of state authority over land in some cases and fail in others? I argue that such resistance depends on how traditional institutions allocate land among their members. When an institution conditions members' future land access on its continued survival, it provides them with an incentive to maintain it. However, when the institution's land endowment is fixed and its pool of eligible claimants keeps growing, each member's expected entitlement shrinks, weakening their dependence on the institution. I test this argument using the case of Russia's 1906 land titling reform. Peasant communes that tied their members' land claims to demographic changes exhibited 40% lower titling rates than communes where claims were fixed, with this gap narrowing as the claimant pool expanded. These results indicate that the mechanisms contributing to the persistence of traditional institutions can, over time, precipitate their decline.

Keywords: land titling, property rights, traditional institutions, Russia

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1 Introduction

The ability to establish and enforce private property rights is often regarded as a core facet of state capacity (North and Weingast 1989; Acemoglu, Johnson, and Robinson 2001; Besley and Persson 2009). Yet the expansion of property rights in land has not been uniform around the world. In many settings, traditional institutions continue to exercise authority over land allocation, resisting state efforts to expand private property rights through land titling. Recent literature has established that the process of land titling is often shaped by traditional institutions themselves, as they determine the perceived costs and benefits of a transition to formalized property rights (Honig 2017; Gochberg 2021; Ribar 2026; Balan et al. 2026). Why, then, do traditional institutions succeed in resisting the expansion of state authority over land in some cases and fail in others?

One prominent explanation points to the strength of traditional institutions as a factor impeding land titling. Through the allocation of privileges and the sanctioning of defection, strong traditional institutions create incentives for customary elites and community members to sustain them (Honig 2022). In this account, institutional strength tends to be treated as fixed, embedded in historical legacies or social structures, with its drivers typically sought outside the institution’s own functioning (Baldwin and Ricart-Huguet 2023). This perspective, however, leaves two gaps in our understanding of the sources of institutional strength. First, different land tenure regimes are known to produce distinct patterns of distributive conflict (Boone 2014), but distributive conflict has rarely been connected back to institutional strength and its role in land titling (Baldwin 2025). Second, although institutional strength has been shown to promote cooperation among an institution’s members (Harris and Honig 2023), the conditions under which that strength erodes remain unexamined.

In this paper, I develop a theory of land titling in which institutional strength is continually reshaped by the institution’s own functioning. I first argue that institutional strength varies systematically with how an institution allocates land among its members. An allocation rule that makes future access to land dependent on the institution’s survival gives its

members an ongoing stake in maintaining it (Boone 2014; Honig 2022). The dependence on the institution’s continuing existence in turn contributes to its resilience against land titling. I then argue that institutional strength can erode endogenously if an institution allows for the expansion of the pool of members eligible to raise a claim to land. If the institution’s land supply is fixed, an increase in the number of claimants lowers each member’s expected future holding, weakening the very dependence that sustained the institution in the first place (Ostrom 1990). This process may ultimately push households towards titling, as a decline in expected landholding makes the security of formal title outweigh the value of remaining inside a distributive system that can no longer deliver on its promise.

I provide evidence for this theory using the case of the land titling reform in the Russian Empire at the beginning of the twentieth century. In historical Russia, peasant land was owned collectively by the institution of the peasant commune, which roughly corresponded to a village. Each commune allocated land holdings to individual households under temporary tenure and possessed the right to periodically reallocate land across its members — an arrangement found in a wide range of contexts from historical Jordan (Hartnett 2026) to modern-day China (Ren et al. 2022). Communal landownership prevented peasants from selling or collateralizing their land plots, stifling investment and reducing labor mobility (Chernina, Dower, and Markevich 2014; Dower and Markevich 2018). The reform of 1906, in turn, allowed peasants to title at no cost the land they were farming. Taking advantage of newly digitized historical data that recorded the outcomes of the reform in more than 2,500 communes, I show that different land allocation rules shaped the uptake of land titles.

Land allocation rules in Russian communes varied with respect to whether a land claim and the pool of claimants were tied to demographic changes. In some communes, each household was entitled to claim a land plot, and the amount of land it would receive depended on a household’s available labor, usually defined as the number of resident male family members. I refer to this arrangement as a *dynamic entitlement* rule. In others, a household’s land holding was kept intact, with or without periodic adjustments to its location, so that

the pool of claimants and the size of each claim remained fixed regardless of subsequent demographic change. I refer to this arrangement as a *fixed entitlement* rule. I find that communes employing a dynamic entitlement rule exhibited titling rates roughly 40% lower than communes with a fixed entitlement rule, consistent with members retaining a stake in an institution that matched land to labor.

I find further evidence consistent with the erosion of a dynamic entitlement rule’s redistributive promise leading to the uptake of private property rights. In communes employing a dynamic entitlement rule, land titling rose with demographic drift since the last land reallocation, eventually offsetting the difference with a fixed entitlement rule. As a rising number of claimants threatened to decrease the size of a land holding even for households whose entitlement was growing, mutual dependence on the peasant commune was breaking down, leading households to claim titles. The same relationship, in contrast, does not appear to be present among communes with a fixed entitlement rule. Taken together, these results suggest that institutional strength is both supported and depleted by the redistributive conflict that an institution’s own functioning produces, and that its depletion might undermine an institution’s resistance to the expansion of state-backed property rights in land.

My analyses are, however, prone to confounding. As every commune had the right to choose its own land allocation rule with a two-thirds vote at a communal assembly, its land tenure institutions evolved as an internal equilibrium. Unobserved characteristics, such as soil heterogeneity, land distribution, or social cohesion, might have affected both the choice of a reallocation rule and the uptake of land titling. To address this challenge and ensure the causal interpretation of my observational results, I exploit variation in climatic shocks on the eve of the last land reallocation to instrument the choice of a land allocation rule. According to historical sources, droughts, along with epidemics and randomly assigned military drafts, served as a major impetus for switching to a dynamic entitlement rule, as they led to labor-land imbalances that accumulated asymmetrically across families. I thus instrument the adoption of a dynamic entitlement rule with the average drought intensity over the ten years

preceding the commune’s last land reallocation. My instrumental variable strategy, along with extensive robustness checks and a sensitivity analysis, confirms my main estimates.

A long-standing literature has sought to explain why traditional institutions persist across geographic and historical contexts, despite their negative effects on economic development and democratic processes (Acemoglu, Reed, and Robinson 2014; Kadt and Larreguy 2018). One explanation attributes institutional persistence to deliberate state policies, which empower and entrench traditional authorities as intermediaries in local governance (Baldwin 2015; Neupert-Wentz and Müller-Crepon 2024). Another explanation highlights the effectiveness of traditional institutions in maintaining cooperation in the provision of public goods and informal insurance (Tsai 2007; Xu and Yao 2015; Magaloni, Díaz-Cayeros, and Ruiz Euler 2019). This paper shows that the same forces these explanations regard as sources of persistence — state-sanctioned authority and the ability to secure members’ access to a scarce resource — need not prevent the erosion of institutional strength from within. In the Russian Empire, the traditional institution of the peasant commune both served as an instrument of state governance over the rural population and sustained cooperation among its members. Nonetheless, the introduction of a state-backed alternative to traditional institutions, in the form of land titling, revealed variation in the peasant commune’s capacity to resist the expansion of state authority. My findings emphasize that institutions have the power to gradually reshape the very conditions that maintain them (Greif and Laitin 2004), suggesting that the study of institutional persistence would benefit from greater attention to processes of endogenous institutional change.

2 Theoretical Argument

Across a variety of historical and contemporary settings, farmers have cultivated land under communal tenure. Under this arrangement, property rights in land are vested in collective entities, such as clans or villages, rather than in individual farmers, who obtain land us-

age rights through their membership in that entity. The vesting of property rights in the collective often entitles individuals to multiple and overlapping rights in the same parcel of land. Examples of such overlapping rights, when someone other than the household currently farming a plot, whether a child or a neighbor, retains a realized or potential claim on it, range from rules of joint inheritance in western Kenya (Boone 2014) to periodic reallocation of land in accordance with family size in the Russian Empire (Scott 1976). Although tenure insecurity produced by overlapping rights has been shown to reduce investment and agricultural productivity (Besley 1995; Goldstein and Udry 2008), communal land tenure often resists formalization efforts by the state (Vendryes 2014; Le Rossignol, Lowes, and Montero 2024).

The successful resistance of communal land tenure to the expansion of state authority has been often attributed to the strength of traditional institutions. Following Levitsky and Murillo (2009) and Honig (2022), I conceptualize institutional strength as an institution's ability to enforce compliance among its members and sustain it over time. Where traditional institutions are strong, the cost of withdrawing land from their authority and forfeiting any gains in the future outweighs the benefits of acquiring state-enforced private property rights today. Although institutional strength can be built through multiple channels, such as social sanctioning or costly investment (Iannaccone 1992; Greif 1993; Fearon and Laitin 1996), my argument revolves around the rules guiding the allocation of land among the institution's members.

Land tenure institutions have the authority to allocate land use rights, determine who can claim them as a member, and settle disputes over them (Boone 2014). When the land endowment under an institution's authority is fixed, the institution's allocation decisions are subject to a binding constraint. If the number of members with a valid claim to land grows, the size of each household's allocation must shrink. To prevent allocations from shrinking indefinitely, institutions must adopt rules that define who may raise a claim and how land is distributed among the resulting pool of claimants (Ostrom 1990). While most institutions

prevent migrants or ethnic outsiders from acquiring land rights through membership, they must also determine how to manage claims that arise internally from demographic change.

Land allocation rules tend to vary in how responsive they are to demographic pressure. At one end, a *dynamic entitlement* rule conditions a household's land claim on its time-variable characteristic, for example, available labor. In doing so, an institution repeatedly renews each household's stake in its continuing existence. In particular, a household whose claim is growing has an incentive to sustain the institution in order to secure that gain, whereas a household whose claim is currently shrinking may nonetheless anticipate that its claim could increase in the future. At the other end, a *fixed entitlement* rule specifies a household's claim independently of subsequent demographic change, so that the pool of claimants and the size of each land holding are fixed once assigned. This distinction yields my first hypothesis:

H1. Traditional institutions employing a dynamic entitlement rule will exhibit a lower uptake of land titles than those with a fixed entitlement rule.

The adoption of a dynamic entitlement rule, however, creates conditions for the emergence of latent distributive conflict. Under a constant land endowment, at any given reallocation, a household's land holding can expand only by reducing the holdings of others. Over repeated reallocations, a household's expected land holding does not decrease, and may grow, as long as the pool of claimants remains constant or shrinks. However, if the pool of claimants expands, over time, the allocation assigned to any one household may ultimately fall in absolute terms even if its own entitlement is nominally growing. Furthermore, if a dynamic entitlement rule depends on a characteristic under a household's control, such as the number of children, all households face an incentive to maximize that characteristic in order to increase their own claim, creating a variant of the tragedy of the commons. The introduction of land titling provides households with an exit option, which secures their current holding from further dilution. This dynamic generates my second hypothesis:

H2. Within traditional institutions employing a dynamic entitlement rule, but not a fixed entitlement rule, land titling will increase with growth in the claimant population.

Taken together, Hypotheses 1 and 2 portray institutional strength as co-evolving with an institution's land allocation rule, in a way that is simultaneously self-reinforcing in the short run and self-undermining in the long run. In other words, a dynamic entitlement rule sustains resistance to land titling through the mechanism that will eventually erode it. By tying a household's future access to land to the institution's continued operation, it manufactures the very distributive pressure that, once the claimant pool grows large enough, makes exit through titling attractive.

3 Historical Background

3.1 Peasant Commune in the Russian Empire

The Russian Empire serves as a useful empirical setting for testing my argument. At the turn of the twentieth century, peasants, who comprised around eighty percent of the population of the Russian Empire, farmed land held under communal tenure. Property rights in peasant land were vested in the institution of the peasant commune. The peasant commune, which usually consisted of one or, less often, several villages, was responsible for allocating land, adjudicating conflicts, paying taxes, and regulating everyday peasant life (Gerschenkron 1962). For example, communal consent was required to take up work outside of the village. Even though agricultural production was performed by individual peasants, the commune also regulated the crop cycle, as peasant agriculture followed an open-field system, under which individual holdings were scattered in strips across the communal field.

Although peasant communes performing similar functions had long existed in Russia (Dennison 2011), the commune was established as a legal institution after the emancipation of serfs in 1861 to facilitate the governance of the newly freed rural population (Mironov

1985). Prior to the emancipation, only the royal family, the state, and noble landowners enjoyed property rights in land. They, in turn, allotted land plots to peasants in exchange for quitrent payments or unpaid labor on a landowner's demesne. The emancipation law transferred land from former owners to peasants under buyout contracts financed by state loans, with the size of each household's holding determined by the number of taxable male family members recorded in the last pre-emancipation census. Although buyout contracts were signed individually, the land would legally belong to the commune. As a result, peasants were deprived of the right to collateralize or sell their land plots.

The emancipation fixed peasants' initial land entitlements but left communes free to decide how to manage land allocation over time. Alongside numerous local variations, communes would allocate land usage rights in one of two ways, corresponding to the fixed entitlement and dynamic entitlement rules introduced in Section 2 (Vorontsov 1892; Zyrianov 1992). Under a fixed entitlement rule, communes preserved both the size of the land holding assigned to each household and the pool of eligible claimants as set at the time of emancipation. This implied that the size of the entitlement would remain unchanged and pass down within the household. Under a dynamic entitlement rule, in contrast, land holdings were conditioned on each household's current labor supply, usually defined as the number of resident male family members. The size of the entitlement thus followed demographic changes within the household, while the pool of claimants followed demographic changes within the commune.

Communes had the legal right to reallocate land among households, provided the decision was approved by a two-thirds majority at a communal assembly comprising all household heads. At each reallocation, the commune would choose which rule it would apply. Under a fixed entitlement rule, the reallocation altered only the physical location of a household's holding within the communal field. Under a dynamic entitlement rule, it redefined both the pool of claimants and the size of each household's entitlement, in addition to the holding's location. Historical sources suggest that the adoption of a dynamic entitlement rule was

usually triggered by imbalances in the allocation of land across families (Vorontsov 1892). Famines, epidemics, and military drafts, for which conscripts were selected by lottery, often struck households unevenly, so imbalances accumulated idiosyncratically across the commune over time. As land-poor and labor-rich households grew more numerous, they could vote for a reallocation once they reached a two-thirds majority. As a result, the adoption of a dynamic entitlement rule, though rare in the first two decades after the emancipation, eventually took off in the late 1870s – early 1880s.

3.2 The Land Reform of 1906

In 1906, the Russian government enacted a land reform aimed at dismantling communal landownership. The reform, commonly known as the Stolypin reform after its architect, Prime Minister Pyotr Stolypin, enabled peasants to apply for private land titles free of charge, with the administrative and surveying work funded by the state (Koefoed 1914).¹

To obtain a land title, a peasant would submit an application to a communal assembly. The peasant could claim at no cost the amount of land he would receive under the commune's latest entitlement rule if a reallocation was conducted at the moment of application. If he had extra land in current possession, it could be titled for a below-market price.² Within a month, the communal assembly and the peasant had to negotiate the terms of titling. If a negotiation failed and the commune turned down the application, the peasant had a right to complain to an overseeing bureaucrat, who was empowered to issue a land title without the commune's consent. All titles then had to be submitted to and approved by the district peasant administration.

By 1915, the last year for which systematic data on the implementation of the reform were published, around 2 million households across 39 provinces of the European part of the

¹The reform also included other forms of streamlining landownership, such as land consolidation under private or communal tenure, and the abolition of land interstripping between different communes or between communes and private landholders.

²Complete collection of laws of the Russian Empire. 28528. November 9, 1906.

Russian Empire had acquired land titles, constituting around 22% of all eligible households.³ After accounting for households who had submitted applications for titles but had not yet received them, the share increased to 30%. The aggregate number, however, hid substantial variation in titling rates, which ranged from 4% to 64% across provinces. Broad economic and geographic conditions, such as access to markets, off-farm employment, soil quality, and terrain flatness, have long been used to explain variation in the uptake of land titling by both contemporaries and historians (Koefoed 1914; Davydov 2022).

These explanations, however, operate largely at the level of provinces or districts, comparing regions that differed in market access, soil, or terrain. In the following sections, I instead focus on the factor largely underemphasized in the historical literature, that is, the variation in communal institutions. Neighboring communes not infrequently relied on dramatically different land allocation rules, even within the same district or township, offering an opportunity to isolate the effect of traditional land tenure institutions and their endogenous erosion from the broader economic and geographic determinants of land titling.

4 Data and Measurement

To examine the effect of land allocation rules on land titling under the reform of 1906, I take advantage of the peasant census of Simbirsk province (hereafter: the Simbirsk census). The province of Simbirsk was located in the southeastern part of European Russia, covering an area of 49.5 thousand square kilometers — roughly the size of present-day Slovakia — divided into eight districts and 153 townships.⁴ By 1911, around 1.9 million people lived in the province, 94% of whom were peasants. Economically, Simbirsk resembled much of European Russia at the time, with agriculture as the dominant sector and comparatively little industrial activity.⁵

³This and the following numbers come from Central Statistical Committee (1916).

⁴Figure B1 in the Appendix shows the location of the province within the Russian Empire.

⁵Simbirsk’s urbanization rate and the size of its agricultural sector were close to the empire’s median — 7%, compared to a median of 9%, and 60%, compared to a median of 58%, respectively; see Figure B2 in

Focusing on a single province thus allows me to hold broad economic and geographic conditions fixed, while observing fine-grained variation in communal institutions. The Simbirsk census, conducted by the provincial government in 1910–11, five years into the reform implementation, covers 2,521 communes in 1,645 villages of Simbirsk province and uniquely records both the number of land titles acquired under the 1906 reform and land allocation rules across the communes, along with a variety of their socio-economic characteristics, which I use as controls.

4.1 Outcome Variable: Land Titling

My outcome of interest is land titling rates, computed as the share of communal allotments titled by 1911. Figure 1 shows the distribution of titling rates in Simbirsk province. The distribution is skewed to the right, with around 30% of communes not reporting any titled allotments (colored in light green). The average titling rate is 17.6%, which lies very close to the aggregate titling rate of 17.7% across the entire European part of the Russian Empire by 1911, suggesting that the process of titling in Simbirsk province was fairly representative of the reform’s progress nationwide.⁶

4.2 Explanatory Variables: Traditional Land Tenure Institutions

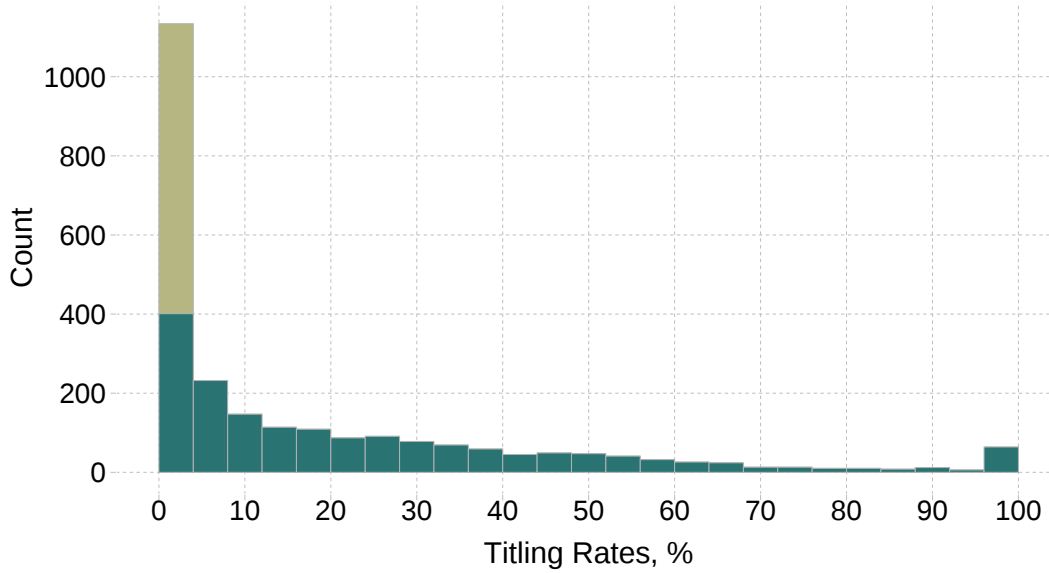
For each commune, the Simbirsk census recorded its land allocation rule, the year in which the last reallocation, if any, took place, and the number of claimants included under the latest reallocation. These data allow me to capture the distinction between fixed and dynamic entitlement rules, along with the change in the claimant pool since the last reallocation.

First, I classify communes into groups based on whether they employed a dynamic entitlement rule, under which both the location and size of a household’s holding were subject to periodic reallocation based on available family labor. Out of 2,519 communes with a

the Appendix.

⁶This number comes from Central Statistical Committee (1912).

Figure 1: Land Titling Rates in Simbirsk Province

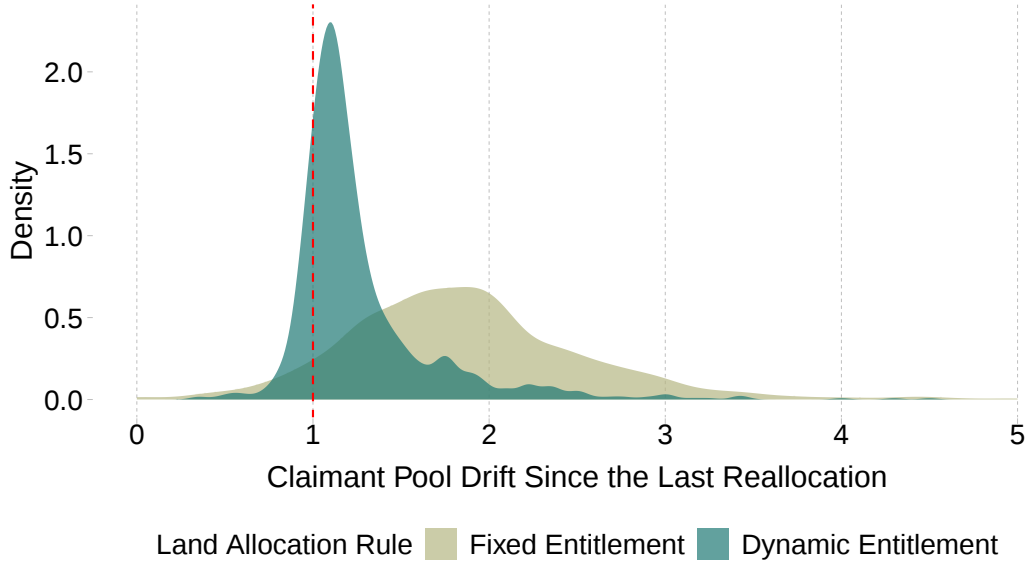


Notes: The distribution of the percentage of titled allotments across villages in Simbirsk province in 1911. Communes with zero titling rates are shown in light green.

known reallocation status, 42.5% employed a dynamic entitlement rule. Almost all of these communes defined the pool of claimants through resident male family members, with the exception of 20 communes, which allowed family members of both genders to raise a claim to land. Another 57.4% maintained a fixed entitlement rule. Among those, 642 communes had reassigned the location of a household's holding within the communal field at least once after 1861. The remaining 803 communes never reallocated land at all, so that the same plot was, in practice, passed down within a household since the emancipation. Table A1 in the Appendix summarizes this distribution along with the unconditional group averages of land titling rates under the reform of 1906. It appears that land titling, indeed, was associated with land tenure institutions, as titling rates under a dynamic entitlement rule were roughly half those under a fixed entitlement rule.

Among communes that conducted at least one land reallocation after 1861, regardless of their entitlement rule, 90% had their last one within 20 years before the Simbirsk census. This number suggests that land reallocation remained an active practice up until the eve of the 1906 reform. At the same time, only 16% of all communes had their last land reallocation

Figure 2: Change of the Claimant Pool by Land Allocation Rule



Notes: The distribution of resident male population in 1911 relative to the claimant count under the last reallocation, separately by land allocation rule. For communes with a dynamic entitlement rule, colored in dark green, the plot shows the change in the claimant pool since the last reallocation. For communes with a fixed entitlement rule, it measures the male population change since the emancipation in 1861. The red dashed line denotes the perfect balance between male population and the pool of claimants. For a more direct comparison, the sample excludes communes that allocated land to family members of both genders.

after 1906, suggesting that if communes engaged in strategic reallocations as a response to the reform, this was not the predominant practice.⁷ Nonetheless, I exclude them from my main analysis to mitigate endogeneity concerns, as explained in Section 5.3.

Second, I construct a measure of the change in the claimant pool by dividing resident male population in 1911 by the number of claimants under the last land allocation. For communes with a dynamic entitlement rule, it explicitly measures the drift in the claimant pool since the last reallocation. For communes with a fixed entitlement rule, in contrast, it reflects the male population change since the emancipation in 1861. A value of 1 would represent the perfect overlap between the current male population and the pool of eligible claimants. Figure 2 shows the distribution of this variable separately for communes employing dynamic and fixed entitlement rules.

The distributions reflect differences in the functioning of communal institutions. Among

⁷Figure B3 in the Appendix shows the distribution of communes by their last land reallocation year.

communes employing a dynamic entitlement rule, the distribution is concentrated close to 1, with an average ratio equal to 1.3, implying that a dynamic entitlement rule successfully redefines the pool of claimants in response to demographic changes. Among communes employing a fixed entitlement rule, the distribution is much wider, with an average ratio of 2. These numbers suggest that, by repeatedly rematching land to available labor, a dynamic entitlement rule was able to address imbalances in the distribution of land that would otherwise accumulate under a fixed entitlement rule.

4.3 Additional Variables

To supplement my analysis with geographical data, I created a GIS shapefile of Simbirsk villages based on the topographic map of Simbirsk province compiled between 1859 and 1861. Out of 1,645 villages, I successfully geolocated 1,630. Using the shapefile, for each village, I computed the distances, in kilometers, to the centers of respective townships, the administrative centers of respective districts, and the nearest railroads. Since I lack information on the exact locations of communal fields, I calculated the average terrain ruggedness and the share of forest landcover within a 10-km radius surrounding each village to account for environmental conditions using data from Shaver, Carter, and Shawa (2019).⁸

To control for the supply of the reform by the state, I collected data on land captains, who were local bureaucrats who ran the reform on the ground. Each land captain in Simbirsk province, on average, oversaw four townships.⁹ I retrieved information about vacant land captain offices during the period of the reform implementation from memorandum books, which listed the names and addresses of local administrators. Between 1906 and 1912, three memorandum books were published in Simbirsk province. Relying on this source, I recorded whether a land captain's office had been vacant any time between 1906 and 1912.

Table A2 in the Appendix reports descriptive statistics for the full set of variables used

⁸According to Williams (2006), around 25% of peasants traveled a distance of up to 5 km to reach their most remote strips, and around 60% of peasants 10 km.

⁹This corresponded to the area of approximately 1,000 sq. km or 400 sq. miles and the average rural population of 37,000.

in the analysis, based on 2,100 communes that had their last land reallocation no later than 1906.

5 Empirical Strategy

5.1 Main Equation

To test Hypothesis 1, which posits that a dynamic entitlement rule should be associated with lower land titling under the reform of 1906, I estimate the following equation:

$$Titling\ Rates_{ij} = \beta_0 + \beta_1 Dynamic\ Entitlement\ Rule_{ij} + \mathbf{X}\mathbf{B} + \mu_j + \varepsilon_{ij}, \quad (1)$$

where $Titling\ Rates_{ij}$ is the share of allotments titled in commune i by 1911. The explanatory variable, $Dynamic\ Entitlement\ Rule_{ij}$, is a dummy variable that takes on a value of one if a commune reallocated land holdings based on the number of resident male family members. For a more straightforward comparison, I excluded twenty communes that reallocated land by the number of family members of both genders from the sample.¹⁰

The main set of covariates $\mathbf{X}$ is intended to control for pre-treatment characteristics, determined before the adoption of a land allocation rule. Specifically, I control for the logarithm of a commune's land endowment (in hectares), a dummy for former serfs, a dummy for an ethnically Russian commune, a dummy for the presence of fertile chernozem soils within a communal field, average terrain ruggedness, the percentage of forest land cover, and distances to a township center, to a district town, and to the nearest railroad (in kilometers). I also control for land captain office vacancy.

At an individual level, other economic factors might have determined the costs and benefits of land titling, such as the value of the land plot a household was farming at the moment of the reform or a household's productivity. In my data set, I have their aggregate

¹⁰The results stay the same if I combine these communes with communes that reallocated land by male family members.

counterparts, which themselves could be shaped by land tenure institutions. These include the average size of a family’s landholding, average family size, the percentage of households with no working males, the share of population residing outside the commune, and literacy rates. Because their inclusion as bad controls can introduce bias when estimating the effect of land allocation rules on titling rates, I exclude them from the main specification and instead report the results in the Appendix.

Unobserved district-level heterogeneity — for example, bureaucratic efficiency in reform implementation that might have varied across district administrations — is captured by district fixed effects μ_j . In an alternative specification, I include township-level fixed effects ν_l . It is, however, not my preferred specification, as it leads to the exclusion of singletons, and I report it in the Appendix. Throughout the paper, standard errors are adjusted for spatial autocorrelation within a 10 km radius, following Conley (1999). As a robustness check, I re-estimate standard errors for a range of radii between 8 and 50 km and report results in the Appendix.

5.2 Interaction Equation

To test Hypothesis 2, which posits that, in communes with a dynamic entitlement rule, growth in the claimant population will lead to higher land titling, I estimate the following equation:

$$\begin{aligned}
\textit{Titling Rates}_{ij} = & \gamma_0 + \gamma_1 \textit{Dynamic Entitlement Rule}_{ij} \\
& + \gamma_2 \textit{Claimant Pool Drift}_{ij} \\
& + \gamma_3 \textit{Dynamic Entitlement Rule}_{ij} \times \textit{Claimant Pool Drift}_{ij} \\
& + \mathbf{XB} + \mu_j + \epsilon_{ij},
\end{aligned} \tag{2}$$

Here, I interact my main explanatory variable, *Dynamic Entitlement Rule*_{ij}, with a measure of the change in the claimant pool relative to the last land reallocation, *Claimant Pool Drift*_{ij}.

For ease of interpretation, I center $Claimant\ Pool\ Drift_{ij}$ around its average value among communes with a dynamic entitlement rule, which is roughly equal to 1.3. Then, the coefficient γ_1 represents the titling gap between dynamic and fixed entitlement rules at this value, and I expect it to be negative. The coefficient γ_2 represents the relationship between the change in the claimant pool and land titling among communes with a fixed entitlement rule. I expect its estimate to be insignificant and close to zero in magnitude. Finally, my theory predicts that the coefficient on the interaction term, γ_3 , will be positive. The rest of the terms follow Equation 1.

5.3 Identification

Unobserved factors may have been at play that affected both the choice of a reallocation rule and the uptake of land titling at the commune level. To address this problem, I pursue three strategies. I first exclude communes that might have engaged in a strategic land reallocation after 1906. I then resort to an instrumental variable approach in which I exploit historical climatic shocks as a potential source of exogenous variation in reallocation practices. Finally, I conduct a sensitivity analysis to examine the robustness of my estimates to selection on unobservables.

Strategic reallocation. Some communes might have engaged in strategic land reallocation to prevent their best land from being titled and thereby removed from the communal pool. As shown in Section 4, around 16% of communes in Simbirsk province conducted their last reallocation after 1906. Around three-fourths of these communes reallocated land according to a dynamic entitlement rule, which might indicate the presence of strategic behavior. Nonetheless, in these communes, titling rates were nearly identical regardless of whether their last reallocation occurred before or after the reform. In communes with a fixed entitlement rule, by contrast, titling rates were substantially higher among those that reallocated after the reform than among those that had not, which might suggest an anticipatory effect. I therefore exclude from my main analysis all communes whose last reallocation

occurred after 1906, regardless of the rule, reporting the results for the full sample in the Appendix.

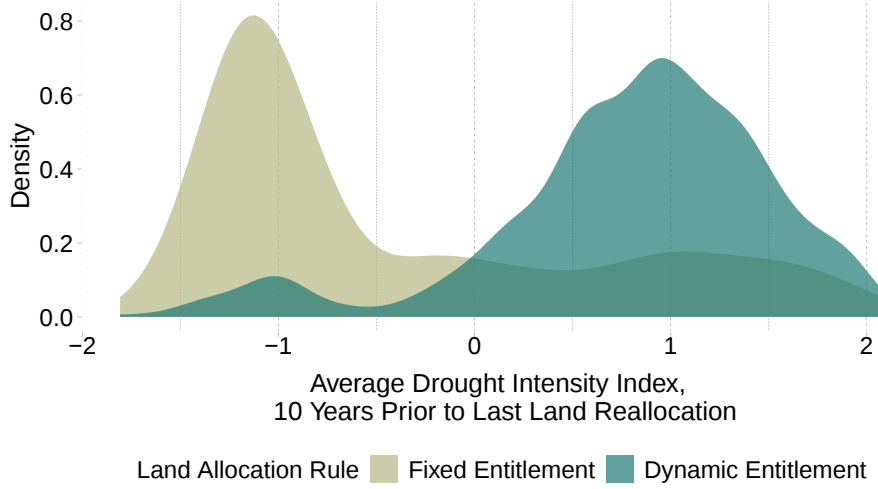
Exogenous variation in the adoption of a land allocation rule. The choice of a land allocation rule was necessarily a result of an intra-communal bargaining process and could be driven by unobserved characteristics, such as heterogeneity in land quality or social cohesion, that also shaped the subsequent uptake of land titling. To isolate plausibly exogenous variation in the adoption of a land allocation rule, I exploit the history of climatic shocks. Droughts, in particular, might have affected the choice of a land allocation rule by generating demographic imbalances across families through mortality that were unrelated to the unobserved determinants of their subsequent land decisions.¹¹ In an economy where less than 1% of households relied on hired agricultural labor, demographic shocks likely created a mismatch between family labor and land resources, which, in the absence of a land market, necessitated an alternative mechanism of land allocation. Such a mismatch, indeed, has been treated by contemporaneous authors as a major historical impetus for adopting a dynamic entitlement rule (Vorontsov 1892).

To measure commune-level climatic shocks, I compute the average historical Palmer Drought Severity Index (PDSI) for each commune over the 10 years prior to its last land reallocation, relying on data from Burnette (2021). I then use this measure as an instrument for the adoption of a dynamic entitlement rule. Figure 3 shows that communes experiencing more intense drought over this period were indeed substantially more likely to adopt a dynamic entitlement rule.¹² The choice of the pre-reallocation window reflects my expectation that imbalances in land distribution build up gradually over time. While a marginal imbalance might not be noticeable to a commune, a substantial one will create a strong demand for land reallocation. A 10-year window appears to be long enough to allow such

¹¹This appears to be a plausible assumption. Demographic shocks, such as famines or epidemics, tend to target first the most susceptible groups of the population, such as the children or the elderly, given that families tend to be at different stages of their life cycle.

¹²Figure B4 in the Appendix shows the spatial distribution of the average drought intensity over the 10-year window.

Figure 3: What shaped the variation in the adoption of a land allocation rule?



Notes: The average values of the Palmer Drought Severity Index multiplied by negative one (to make larger values represent higher intensity) over the 10 years preceding the last land reallocation. The light green distribution represents communes that employed a dynamic entitlement rule in 1911. Data come from Burnette (2021).

imbalances to accumulate, while remaining short enough to reflect conditions specific to the period preceding a given reallocation, rather than a commune’s persistent climatic environment. I assess the sensitivity of the results to the choice of the length of the pre-reallocation window, re-running the analysis using 5- and 20-year windows and reporting the results in the Appendix.

For the instrumental variable strategy to be valid, historical drought intensity in the years preceding a commune’s last land reallocation must affect titling rates under the 1906 reform only through its effect on the commune’s choice of a reallocation rule. I examine the plausibility of the exclusion restriction with two placebo checks. I construct a first placebo instrument using drought intensity over the 10 years *following* the last reallocation. I construct a second placebo instrument using drought intensity over a 10-year window prior to a randomly chosen year between 1861, when serfdom was abolished, and 1906, when the land reform was implemented, excluding each commune’s true reallocation year. If persistent geographic and climatic conditions, rather than climatic shocks in the period leading up to a reallocation, were driving land titling, either placebo should generate an effect on titling

comparable to that of the actual instrument.

Unobserved confounders. The instrumental variable strategy, however, may still be susceptible to a violation of the exclusion restriction, because the *timing* of a commune’s last reallocation is itself an endogenous choice, which might respond to a commune’s capacity for collective action. For this reason, rather than relying entirely on the instrumental variable strategy, I also examine how sensitive my baseline OLS estimate is to the presence of unobserved confounders, following the framework developed by Cinelli and Hazlett (2020).

5.4 Specification

As shown in Figure 1, the distribution of land titling rates is highly right-skewed, with around 30% of communes reporting no titled allotments. The long right tail of the distribution can introduce bias into the coefficient estimates. At the same time, the data-generating process allows for zeroes in the dependent variable. This poses challenges for applying a log-like transformation to the dependent variable to “correct” for asymmetries in the distribution.

For log-like transformations, the presence of zero outcomes invalidates the interpretation of estimates in terms of average percentage change, as individual-level treatment effects are not defined for observations whose potential outcomes go from zero to non-zero (Chen and Roth 2024). In such cases, it is recommended to use Poisson regression, where the estimates express the average treatment effect as a percentage change relative to the average control outcome.¹³ Alternatively, it might be helpful to estimate the effect of the treatment on a dichotomized dependent variable that indicates if an individual outcome exceeds a certain threshold. For example, one might be interested in seeing how adopting a dynamic entitlement rule changes the probability that more than 25% of allotments will be titled in a commune. Below, I will follow both strategies. First, I will verify the OLS estimates against the Poisson QMLE estimates. Then, I will examine the effect of the choice of a land allocation rule on the probability of more than $\alpha\%$ of allotments having been titled

¹³More formally, Poisson regression will estimate $E[Y(1) - Y(0)]/E[Y(0)]$ instead of $E[(Y(1) - Y(0))/Y(0)]$.

in a commune, where α corresponds to the percentiles of the distribution of the dependent variable.

6 Results

6.1 Land Titling and Traditional Institutions

Traditional land tenure institutions indeed seem to have played an important role in shaping the uptake of land titling under the 1906 reform. Table 1 presents the results of estimating Equation 1. Columns (1) through (3) report coefficient estimates obtained using the OLS estimator. Column (1) examines the bivariate relationship between titling rates and the adoption of a dynamic entitlement rule. Column (2) adds the full set of controls, and Column (3) introduces district fixed effects. Finally, Column (4) reports the results of estimating the Poisson regression model using QMLE, including both the full set of controls and fixed effects. Standard errors adjusted for spatial correlation within a 10-km radius are reported in parentheses. Table A3 in the Appendix reports the full set of controls.

The results provide empirical support for Hypothesis 1, which predicts stronger resistance to land titling in communes with a dynamic entitlement rule. The coefficient on *Dynamic Entitlement Rule* is negative and highly significant across all specifications, even after accounting for total land endowment, climatic conditions, and local bureaucratic capacity.¹⁴ On average, titling rates in communes with a dynamic entitlement rule are around 9 percentage points lower than in communes with a fixed entitlement rule. The difference corresponds to a 53% decrease relative to the sample average of around 17.9%. The coefficient from the Poisson regression in Column (4) shows a similar magnitude of 40% difference in titling rates between communes that did and did not employ a dynamic entitlement rule.¹⁵

¹⁴Communal land endowment has a large, positive, and highly significant association with titling rates. Both terrain ruggedness and forest landcover, which constrain agricultural production, exhibit a negative and significant association with land titling. Bureaucratic capacity, measured as a vacancy in the land captain office at any time between 1906 and 1911, is negatively and marginally significantly associated with titling.

¹⁵The magnitude has been calculated as $100 \times (\exp(\hat{\beta}_1) - 1)$, which is the implied estimate of the propor-

Table 1: Land Titling and Traditional Institutions

	<i>Dependent variable:</i>			
	Titling Rates, %			
	(1)	(2)	(3)	(4)
Dynamic Entitlement Rule	−8.024*** (1.359)	−8.828*** (1.623)	−9.315*** (1.600)	−0.520*** (0.094)
Controls		✓	✓	✓
District Fixed Effects			✓	✓
Estimator	OLS	OLS	OLS	Poisson QMLE
Mean of DV	17.9	17.9	17.9	17.9
Standard deviation of DV	23.8	23.8	23.8	23.8
Observations	2,049	2,049	2,049	2,049
Adjusted R ²	0.026	0.089	0.103	—

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. The set of controls includes the logarithm of communal land endowment, dummy variables for former serfs, ethnic Russians, and chernozem soil, average terrain ruggedness, the share of forest landcover, and distances to the township center, the district administrative center, the nearest railroad, and a dummy for vacancy in the land captain office. Standard errors adjusted to spatial correlation within 10 km following Conley 1999 in parentheses.

*p<0.1; **p<0.05; ***p<0.01

This result is robust to multiple alternative specifications. First, introducing township fixed effects does not change the sign or significance of the coefficient on *Dynamic Entitlement Rule*, decreasing the magnitude only slightly, as shown in Table A4 in the Appendix. Among communes located within the same township, employing a dynamic entitlement rule was associated with 7 percentage points lower titling rates. Second, varying the distance cut-off used in adjusting standard errors for spatial autocorrelation does not change the result. As discussed in Section C in the Appendix, while standard errors grow as the distance cut-off increases, this growth is far from enough to make the coefficient insignificant. Third, the inclusion of communes that conducted their last land reallocation after 1906 does not change the magnitude of the estimated effect, as reported in Table A5 in the Appendix. Finally, I include additional variables capturing economic drivers of land titling that operate at an

tional treatment effect (Chen and Roth 2024).

individual level but may themselves be shaped by the choice of a land allocation rule. As reported in Section D in the Appendix, their inclusion does not invalidate the main result.

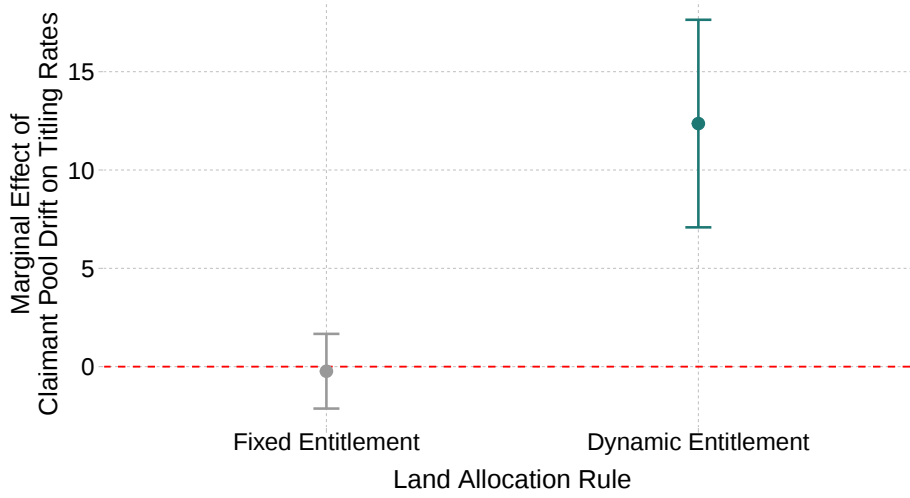
Figure B5 in the Appendix offers an alternative interpretation of the magnitude of the treatment effects. It presents the estimates of the effect of *Dynamic Entitlement Rule* on the probability that more than $\alpha\%$ of allotments were titled in a commune. The thresholds α correspond to percentiles of the titling rates distribution, ranging from the 25th percentile of 0% to the 90th percentile of 52% with a 5 percentage-point increment. The strongest effect is attained for thresholds between 7% and 10%, where the probability of a higher titling rate decreases by almost 0.3 if the commune employs a dynamic entitlement rule. At the same time, the effect shrinks more than threefold at the tails of the distribution. This result suggests that the resistance to land titling in communes with a dynamic entitlement rule is strongest at moderate titling rates.

6.2 Land Titling and the Erosion of Institutional Strength

In line with Hypothesis 2, the resistance of a dynamic entitlement rule to land titling appears to erode with the growth of the claimant pool since the last land reallocation. Table A6 in the Appendix reports the results of estimating Equation 2, which interacts *Dynamic Entitlement Rule* with *Claimant Pool Drift*, and Figure 4 plots the marginal effects of claimant pool drift on titling rates, estimated separately for dynamic and fixed entitlement rules. The coefficient on the interaction term is positive and highly significant, indicating that the association between claimant pool drift and titling rates differs systematically across land allocation rules.

Among communes with a dynamic entitlement rule, a one-unit increase in claimant pool drift is associated with a 12 percentage-point increase in land titling. The marginal effect is highly significant and sizable in magnitude. For comparison, moving a commune with a dynamic entitlement rule from roughly the 10th to the 90th percentile of its claimant pool drift distribution corresponds to a 9 percentage-point increase in titling rates — the

Figure 4: Land Titling and the Erosion of Institutional Strength



Notes: The marginal effects of the change in the claimant pool across fixed and dynamic entitlement rules, estimated from Equation 2. Claimant pool drift is measured as the resident male population in 1911 relative to the claimant count under the last reallocation. Raw coefficient estimates reported in Table A6 in the Appendix.

same difference estimated between communes with dynamic and fixed entitlement rules from Equation 1. In other words, the threat of the dilution of future land claims can reduce commune members' dependence on the commune's continuing existence and undermine the resistance to titling this dependence otherwise generates.

Among communes with a fixed entitlement rule, in contrast, the association between land titling and claimant pool drift, which here represents demographic change since the abolition of serfdom in 1861, is close to zero and statistically insignificant. As a fixed entitlement rule does not condition land allocation on family composition and does not alter the pool of claimants, demographic changes carry no implications for a household's expected future holding, and therefore do not weaken the dependence that ties households to the institution in the first place. This provides further support for Hypothesis 2, suggesting that the erosion of resistance to titling documented among communes with a dynamic entitlement rule does not stem from long-term demographic changes, but rather is a consequence of the institution's land allocation rule.

This interpretation, however, is subject to two potential concerns. First, as the measure of

claimant pool drift is not directly comparable across the two groups, the observed difference in its relationship with land titling could reflect a measurement discrepancy rather than an institutional difference across land allocation rules. Second, the results above may capture the mechanical effect of growing land pressure rather than an effect of institutions. Table A7 in the Appendix addresses these concerns. There, instead of the claimant pool drift, I first use the share of landless households as an alternative measure of institutional dependence and then the ratio of male resident population to the communal land endowment as a measure of land pressure.

Similar to claimant pool drift, landlessness has a positive and statistically significant association with land titling among communes with a dynamic entitlement rule, and no association among communes with a fixed entitlement rule. In contrast, the effect of land pressure does not vary across institutional settings, with the main coefficient on land pressure being negative and statistically significant. This result may reflect a smaller entitlement available for titling as land pressure rises, lowering its benefit regardless of the underlying allocation rule. Taken together, these exercises suggest that the results reported in this section reflect the erosion of institutional strength in communes with a dynamic entitlement rule, which in turn decreases resistance to land titling.

6.3 Instrumenting Land Allocation Rules

To account for possible endogeneity between the choice of a land allocation rule and the uptake of land titling, I instrument the adoption of a dynamic entitlement rule by a commune with average historical drought intensity over 10 years prior to the commune’s last land reallocation.

Table 2 reports the results of the instrumental variables estimation. Columns (1) and (3) instrument *Dynamic Entitlement Rule* with the average drought intensity over the 10 years prior to the last land reallocation, and Columns (2) and (4) with the placebo drought intensity averaged over the 10 years prior to a randomly selected year between 1861 and

Table 2: Instrumenting Land Allocation Rule

	<i>Dependent variable:</i>			
	Titling Rates, %			
	2SLS		Poisson QMLE	
	(1) 10 years	(2) Placebo	(3) 10 years	(4) Placebo
<i>Panel A: Reduced Form</i>				
Drought Intensity	−1.945*** (0.673)	−0.184 (0.593)	−0.106*** (0.036)	−0.012 (0.032)
<i>Panel B: Second Stage</i>				
Dynamic Entitlement Rule	−11.130*** (3.733)	14.858 (51.46)	−0.658*** (0.193)	0.92 (176.4)
Effective F	223.0	1.89	223.0	1.89
Anderson-Rubin Test	8.432***	0.097	—	—
Anderson-Rubin CI	[−18.4; −3.74]	[−∞; ∞]	—	—
Full controls	✓	✓	✓	✓
District fixed effects	✓	✓	✓	✓
Mean of DV	17.9	17.9	17.9	17.9
Standard deviation of DV	23.8	23.8	23.8	23.8
Observations	2,049	2,049	2,049	2,049

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. The instrumental variable is the average drought intensity over the 10 years prior to the last land reallocation. The placebo drought intensity is computed by averaging over the 10 years prior to a randomly selected year between 1861 and 1906, excluding the true reallocation year. Standard errors clustered at the level of villages in parentheses. Bootstrapped standard errors reported in Columns (4) and (5) of Panel B.

*p<0.1; **p<0.05; ***p<0.01

1906, excluding the true reallocation year. Coefficient estimates are obtained using the 2SLS and Poisson QMLE estimators in Columns (1) and (2) and Columns (3) and (4) respectively. Following the recommendations by Lal et al. (2024), I report an effective first-stage F -statistic that accounts for village-level clustering, along with the Anderson-Rubin test and confidence intervals that are robust to weak instruments.

The instrumental variable approach confirms my baseline estimate, suggesting that communes with a dynamic entitlement rule exhibit 11 percentage points lower titling rates than communes with a fixed entitlement rule. Drought intensity appears to be a strong instru-

ment for the adoption of a dynamic entitlement rule; the effective first-stage F -statistic equals 229.0, well above the conventional threshold of 10. In contrast, it is only 1.7 for the placebo instrument. The Anderson-Rubin test rejects the null hypothesis of no reduced-form effect at the 5% significance level for the average drought intensity but fails to do so for the placebo instrument. While the 2SLS coefficient on *Dynamic Entitlement Rule* retains its negative sign and significance when instrumented with actual historic drought intensity, it becomes positive, large in magnitude, and statistically insignificant when instrumented with the placebo.

Table A8 in the Appendix replicates the analysis using drought intensity computed over the 20 and 5 years prior to the last land reallocation, as well as the 10 years after the last land reallocation. Among the pre-reallocation windows, both the reduced-form and instrumented effects of a dynamic entitlement rule on titling rates remain negative and statistically significant, growing in magnitude as the window increases from 5 to 20 years, consistent with the baseline 10-year estimate reported in the main text. In the placebo specification, in contrast, the reduced-form coefficient on drought intensity is small, positive, and statistically insignificant, and the corresponding 2SLS estimate is similarly indistinguishable from zero. These results indicate that drought intensity predicts land titling only when measured over the years preceding a commune’s last reallocation, and not when measured over an equivalent window following it.

6.4 Robustness to Unobserved Confounders

To examine the robustness of my OLS estimates to unobserved confounders, I conduct a sensitivity analysis following the framework suggested by Cinelli and Hazlett (2020). It quantifies how strong an unobserved confounder’s association with both the treatment and the outcome would need to be in order to overturn the estimated effect. To gauge whether such a confounder is plausible, I benchmark the sensitivity threshold against the explanatory power of the total communal land endowment, the strongest observed predictor of titling rates

in my data. Land endowment appears to be a natural benchmark for the sensitivity analysis. It shapes both land availability and, plausibly, local land prices, while also determining the scale of the collective action problem a commune must solve to conduct a reallocation according to a dynamic entitlement rule.

Table A9 in the Appendix reports the results of the sensitivity analysis. The robustness value $RV_{q=1}$ indicates that an unobserved confounder would need to explain at least 14.4% of the residual variance in both the treatment and the outcome, after conditioning on the full set of controls, in order to reduce the estimated effect to zero. A confounder explaining 10.6% of the residual variance in both would be sufficient to render the estimate statistically insignificant at the 5% level. For comparison, a confounder with the same relative association with the treatment and the outcome as the land endowment would need to be roughly four times as strong to bring the estimated effect of a dynamic entitlement rule on land titling close to zero.¹⁶ The existence of such a confounder appears unlikely, lending further credibility to the main result.

7 Conclusion

The success of traditional land tenure institutions in resisting the expansion of state-backed private property rights in land has often been viewed as dependent on their institutional strength (Honig 2022). Through the threat of dismantling coordination and cutting off access to informal insurance, strong institutions can reduce the perceived benefits of private property rights among their members (Gochberg 2021; Le Rossignol, Lowes, and Montero 2024). In this paper, focusing on land allocation rules, I argue that the same mechanisms that make strong traditional institutions resistant to the expansion of state authority over land may, over time, undermine their own resistance. When an institution promises each member future land access, it makes its members dependent on the institution’s continued existence. However, if the pool of members entitled to claim land keeps growing while the

¹⁶For a visual representation of the sensitivity benchmarking, see Figure B6 in the Appendix.

land endowment remains fixed, each member's expected share will eventually shrink, eroding the members' dependence on the institution's survival.

I provide empirical evidence for this argument by studying the land titling reform in the Russian Empire, where the traditional institution of the peasant commune governed land access among 80% of the country's population up until the 1917 Revolution. While some communes conditioned a household's land claim on its current size, dynamically recalculating land entitlements as families grew or shrank, others fixed each household's claim, regardless of later demographic change. Using newly digitized records from more than 2,500 communes in one province of the Russian Empire, I show that an institutional choice shaped how communes responded to the introduction of formal land titles in 1906. Communes allocating land based on dynamic land claims exhibited roughly 40% lower titling rates than those with fixed claims, consistent with their members retaining a stronger stake in the institution's survival.

Yet it appears that the same institutional feature that sustained the peasant commune's resistance to land titling also carried the seeds of its own demise. I show that among communes with dynamic land claims, titling rose systematically with the growth of the pool of claimants, while no such relationship appeared among communes with fixed claims. However, as the choice of a land allocation rule was itself the outcome of intra-communal bargaining, I instrument the adoption of dynamic claims with historical drought exposure, a plausible source of the demographic imbalances that, according to historical accounts, pushed communes toward recalculation in the first place. The instrumented estimates, along with extensive robustness checks and a sensitivity analysis, confirm my main result.

The argument's scope is bounded by two features of the institutional environment. First, it applies where the resource under the institution's authority is fixed in supply, so that the growth of the claimant pool necessarily dilutes individual entitlements. Where institutions can expand their resource endowment, for example, through land clearing or migration, the mechanism I describe should be attenuated. Second, it requires the availability of an outside

option that allows a household to convert its current holding into a claim independent of continued membership. Absent such an option, the erosion of an institution’s redistributive promise may generate exit in other forms, such as migration or open conflict.

More broadly, my findings suggest that the persistence and the demise of traditional institutions cannot be fully understood by looking only at the external forces, such as state policies or economic shocks. As demonstrated in this paper, institutions can gradually generate the conditions of their own erosion through the same mechanisms that sustain them (Greif and Laitin 2004). Thus, accounting for endogenous institutional change may be essential to explaining when and why traditional authority ultimately gives way to the state.

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Appendix to ‘The Seeds of Their Own Demise: Traditional Institutions and Land Titling in Russia’

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July 2026

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A Additional Tables

Table A1: Communes by Land Allocation Rule

		(1)	(2)	(3)	(4)
		Land Reallocations	N of communes	% of communes	Titling, %
Dynamic Entitlement	Men	✓	1049	41.61	12.7
Dynamic Entitlement	Men		5	0.20	10.9
Dynamic Entitlement	Both Genders	✓	20	0.79	13.5
Fixed Entitlement		✓	642	25.47	24.5
Fixed Entitlement			803	31.85	18.6
Fixed Entitlement		Unknown	2	0.08	—
Total			2,521	100	17.6

Notes: Column (1) indicates whether land reallocations were practiced within each group. Column (3) reports group means. Around 10% of communes with a dynamic entitlement rule imposed various age restrictions. Such restrictions can be interpreted as a reaction to high infant and child mortality, aimed at preventing households from acquiring land for children unlikely to survive (Natkhov and Vasilenok 2023).

Table A2: Summary Statistics

Variable	Mean	Std. Dev.	Med	Min	Max	N
Titling Rates, %	17.8	23.7	7.0	0.0	100	2,099
Dynamic Entitlement Rule	0.4	0.5	0	0	1	2,100
Land Endowment, ha	691.4	1,074.2	293.4	1.1	11,259	2,100
Former Serfs	0.8	0.4	1	0	1	2,100
Ethnic Russians	0.6	0.5	1	0	1	2,100
Chernozem	0.7	0.5	1	0	1	2,100
Average Ruggedness	47.7	11.1	46.8	19.1	122.0	2,071
Forest Landcover, %	25.3	19.6	19.2	0.0	87.2	2,071
Distance to Township Center, km	7.2	5.5	6.4	0.0	42.7	2,079
Distance to District Town, km	52.1	27.3	49.9	0.0	121.1	2,071
Distance to Railroad, km	28.1	21.2	24.8	0.0	95.2	2,071
Vacant Land Captain Office	0.2	0.4	0	0	1	2,071
Claimant Pool Drift	1.7	0.9	1.5	0.0	14.1	2,100
Land Pressure	0.8	0.9	0.6	0.0	18.5	2,100
Landless Households, %	13.5	13.5	10.0	0.0	89.9	2,094
Average Drought Intensity (−10 years)	−0.0	1.1	−0.2	−1.8	2.1	2,071
Average Drought Intensity (−20 years)	−0.3	0.5	−0.5	−1.8	0.9	2,071
Average Drought Intensity (−5 years)	0.2	1.2	0.3	−2.8	2.4	2,071
Average Drought Intensity (+10 years)	−0.1	0.8	−0.2	−1.6	2.0	2,071
Placebo Drought Intensity	−0.6	0.4	−0.7	−1.6	0.6	2,071
Average Family Land Holding	5.0	2.8	4.8	0.1	30.9	2,100
Average Family Size	5.6	1.0	5.6	1.0	12.0	2,100
Migrants, %	7.9	9.7	5.3	0.0	100.0	2,100
No Working Males, %	8.4	7.8	7.5	0.0	100.0	2,100
Literacy, %	14.9	8.2	14.8	0.0	73.0	2,100

Notes: The unit of analysis is a commune of Simbirsk province. The sample consists of 2,100 communes that had their last land reallocation no later than 1906. Sample sizes for individual variables vary due to missing data.

Table A3: Land Titling and Traditional Institutions

	<i>Dependent variable:</i>			
	Titling Rates, %			
	(1)	(2)	(3)	(4)
Dynamic Entitlement Rule	−8.024*** (1.359)	−8.828*** (1.623)	−9.315*** (1.600)	−0.520*** (0.094)
Land Endowment, Log		2.232*** (0.421)	1.891*** (0.425)	0.104*** (0.023)
Former Serfs		−3.181* (1.736)	−3.643** (1.706)	−0.187** (0.082)
Ethnic Russians		7.866*** (1.856)	5.532*** (1.904)	0.398*** (0.136)
Chernozem		1.642 (1.457)	1.674 (1.417)	0.115 (0.083)
Average Ruggedness		−0.193*** (0.063)	−0.186** (0.074)	−0.011** (0.005)
Forest Landcover, %		−0.146*** (0.040)	−0.155*** (0.045)	−0.009*** (0.003)
Distance to Township Center, km		−0.040 (0.116)	−0.057 (0.114)	−0.004 (0.006)
Distance to District Town, km		0.010 (0.025)	−0.035 (0.029)	−0.001 (0.002)
Distance to Railroad, km		−0.135*** (0.033)	−0.057 (0.041)	−0.002 (0.002)
Vacant Land Captain Office		−3.726** (1.504)	−3.167* (1.654)	−0.183* (0.101)
District Fixed Effects			✓	✓
Estimator	OLS	OLS	OLS	Poisson QMLE
Mean of DV	17.9	17.9	17.9	17.9
Standard deviation of DV	23.8	23.8	23.8	23.8
Observations	2,049	2,049	2,049	2,049
Adjusted R ²	0.026	0.089	0.103	—

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. Standard errors, adjusted to spatial correlation within 10 km following Conley (1999), in parentheses.

*p<0.1; **p<0.05; ***p<0.01

Table A4: Land Titling and Traditional Institutions (Township Fixed Effects)

	<i>Dependent variable:</i>			
	Titling Rates, %			
	(1)	(2)	(3)	(4)
Dynamic Entitlement Rule	−9.315*** (1.600)	−9.309*** (1.607)	−6.473*** (1.740)	−0.340*** (0.099)
Controls	✓	✓	✓	✓
Fixed Effects	District	District	Township	Township
Estimator	OLS	OLS	OLS	Poisson QMLE
Mean of DV	17.9	17.9	17.9	17.9
Standard deviation of DV	23.8	23.8	23.8	23.8
Observations	2,049	2,045	2,045	2,045
Adjusted R ²	0.103	0.103	0.198	—

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. The set of controls includes the logarithm of communal land endowment, dummy variables for former serfs, ethnic Russians, and chernozem soil, average terrain ruggedness, the share of forest landcover, and distances to the township center, the district administrative center, the nearest railroad, and a dummy for vacancy in the land captain office. Standard errors adjusted to spatial correlation within 10 km following Conley 1999 in parentheses.

*p<0.1; **p<0.05; ***p<0.01

Table A5: Land Titling and Traditional Institutions
(Including Communes with Post-1906 Land Reallocations)

	<i>Dependent variable:</i>			
	Titling Rates, %			
	(1)	(2)	(3)	(4)
Dynamic Entitlement Rule	−8.658*** (1.328)	−8.205*** (1.576)	−8.799*** (1.533)	−0.486*** (0.091)
Controls		✓	✓	✓
District Fixed Effects			✓	✓
Estimator	OLS	OLS	OLS	Poisson QMLE
Mean of DV	17.6	17.6	17.6	17.6
Standard deviation of DV	24.4	24.4	24.4	24.4
Observations	2,444	2,444	2,444	2,444
Adjusted R ²	0.031	0.093	0.113	—

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. The set of controls includes the logarithm of communal land endowment, dummy variables for former serfs, ethnic Russians, and chernozem soil, average terrain ruggedness, the share of forest landcover, and distances to the township center, the district administrative center, the nearest railroad, and a dummy for vacancy in the land captain office. Standard errors adjusted to spatial correlation within 10 km following Conley (1999) in parentheses.

*p<0.1; **p<0.05; ***p<0.01

Table A6: Land Titling and the Erosion of Institutional Strength

	<i>Dependent variable:</i>				
	Titling Rates, %				
	(1)	(2)	(3)	(4)	(5)
Dynamic Entitlement Rule	−7.921*** (1.406)	−8.636*** (1.382)	−10.250*** (1.630)	−10.450*** (1.619)	−0.611*** (0.095)
Claimant Pool Drift (Centered)	0.151 (0.892)	−0.886 (1.024)	−0.390 (0.941)	−0.234 (0.934)	−0.007 (0.048)
Dynamic Entitlement Rule × Claimant Pool Drift		13.213*** (2.804)	14.051*** (2.814)	12.596*** (2.811)	0.611*** (0.131)
Controls			✓	✓	✓
District Fixed Effects				✓	✓
Estimator	OLS	OLS	OLS	OLS	Poisson QMLE
Mean of DV	17.9	17.9	17.9	17.9	17.9
Standard deviation of DV	23.8	23.8	23.8	23.8	23.8
Observations	2,049	2,049	2,049	2,049	2,049
Adjusted R ²	0.026	0.040	0.104	0.115	—

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. Claimant pool drift is measured as the resident male population in 1911 relative to the claimant count under the last reallocation and centered around its average value in the dynamic entitlement rule subgroup. The set of controls includes the logarithm of communal land endowment, dummy variables for former serfs, ethnic Russians, and chernozem soil, average terrain ruggedness, the share of forest landcover, and distances to the township center, the district administrative center, the nearest railroad, and a dummy for vacancy in the land captain office. Standard errors adjusted to spatial correlation within 10 km following Conley (1999) in parentheses.

*p<0.1; **p<0.05; ***p<0.01

Table A7: Land Pressure and Landlessness

	<i>Dependent variable:</i>			
	Titling Rates, %			
	(1)	(2)	(3)	(4)
Dynamic Entitlement Rule	−9.923*** (1.653)	−0.577*** (0.097)	−9.185*** (1.535)	−0.459*** (0.092)
Landless Households, % (Centered)	0.086 (0.061)	0.004 (0.003)		
Dynamic Entitlement Rule × Landless Household, %	0.333** (0.150)	0.020*** (0.007)		
Land Pressure (Centered)			−3.784*** (0.786)	−0.617*** (0.123)
Dynamic Entitlement Rule × Land Pressure			3.764 (2.716)	0.397 (0.351)
Controls	✓	✓	✓	✓
District Fixed Effects	✓	✓	✓	✓
Estimator	OLS	Poisson QMLE	OLS	Poisson QMLE
Mean of DV	17.9	17.9	17.9	17.9
Standard deviation of DV	23.8	23.8	23.8	23.8
Observations	2,044	2,044	2,049	2,049
Adjusted R ²	0.109	—	0.118	—

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. Land pressure is measured as the resident male population in 1911 relative to the communal total land endowment. Both land pressure and landlessness are centered on their respective average values in the dynamic entitlement rule subgroup. The set of controls includes the logarithm of communal land endowment, dummy variables for former serfs, ethnic Russians, and chernozem soil, average terrain ruggedness, the share of forest landcover, and distances to the township center, the district administrative center, the nearest railroad, and a dummy for vacancy in the land captain office. Standard errors adjusted to spatial correlation within 10 km following Conley (1999) in parentheses.

*p<0.1; **p<0.05; ***p<0.01

Table A8: Instrumenting Repartition Rule with Climatic Shocks

	(1)	(2)	(3)	(4)
	−20 years	−10 years	−5 years	+10 years
<i>Panel A: First Stage</i>				
	<i>Dependent variable:</i>			
	Dynamic Entitlement Rule			
Drought Intensity	0.339*** (0.027)	0.175*** (0.012)	0.124*** (0.011)	0.153*** (0.014)
Mean of DV	0.37	0.37	0.37	0.37
Standard deviation of DV	0.48	0.48	0.48	0.48
Effective F	163.6	223.0	128.2	111.4
<i>Panel B: Reduced Form</i>				
	<i>Dependent variable:</i>			
	Titling Rates, %			
Drought Intensity	−5.671*** (1.364)	−1.945*** (0.673)	−1.178* (0.613)	0.700 (0.874)
Mean of DV	17.8	17.8	17.8	17.8
Standard deviation of DV	23.8	23.8	23.8	23.8
<i>Panel C: Two-Stages Least Squares</i>				
	<i>Dependent variable:</i>			
	Titling Rates, %			
Dynamic Entitlement Rule	−16.710*** (3.968)	−11.13*** (3.733)	−9.524* (4.989)	4.583 (5.739)
Mean of DV	17.9	17.9	17.9	17.9
Standard deviation of DV	23.8	23.8	23.8	23.8
Anderson-Rubin Test	17.424***	8.432***	3.72*	0.646
Anderson-Rubin CI	[−24.6; −9.09]	[−18.3; −3.74]	[−19.6; 0.16]	[−6.67; 16.1]
Controls	✓	✓	✓	✓
District Fixed Effects	✓	✓	✓	✓
Observations	2,049	2,049	2,049	2,049

Notes: The unit of analysis is a commune of Simbirsk province. The dependent variable is the percentage of allotments titled by 1911. The instrumental variable is the drought intensity index averaged over 20 years (Column 1), 10 years (Column 2), and 5 years (Column 3) preceding the last land reallocation, and 10 years following it (Column 4). The set of controls includes the logarithm of communal land endowment, dummy variables for former serfs, ethnic Russians, and chernozem soil, average terrain ruggedness, the share of forest landcover, and distances to the township center, the district administrative center, the nearest railroad, and a dummy for vacancy in the land captain office. Standard errors clustered at the village level in parentheses. Effective F -statistic and Anderson-Rubin CI calculated using the `ivDiag` package (Lal et al. 2024).

*p<0.1; **p<0.05; ***p<0.01

Table A9: Robustness to Unobserved Confounders

Dependent Variable: <i>Titling Rates</i> , %						
Treatment:	Est.	S.E.	t-value	$R^2_{Y \sim D \mathbf{X}}$	$RV_{q=1}$	$RV_{q=1, \alpha=0.05}$
<i>Dynamic Entitlement Rule</i>	-9.315	1.336	-6.971	2.3%	14.3%	10.5%
$df = 2030$	<i>Bound (1x Land Endowment):</i> $R^2_{Y \sim Z \mathbf{X}, D} = 1.4\%$, $R^2_{D \sim Z \mathbf{X}} = 6.5\%$					

Notes: The reported estimate corresponds to the baseline OLS specification in Table 1, Column (3), with the full set of controls and district fixed effects. $R^2_{Y \sim D|\mathbf{X}}$ reports the partial R^2 of the treatment with the outcome, conditional on the controls in $\mathbf{X}$. $RV_{q=1}$ is the robustness value measured as the minimum partial R^2 with both treatment and outcome that an unobserved confounder would need to have in order to fully explain away the estimated effect of the dynamic entitlement rule on titling rates. As a benchmark, the reported bound expresses the strength of a confounder as strong as the logarithm of a commune's land endowment. The table has been generated using the `sensemakr` package developed by Cinelli and Hazlett (2020).

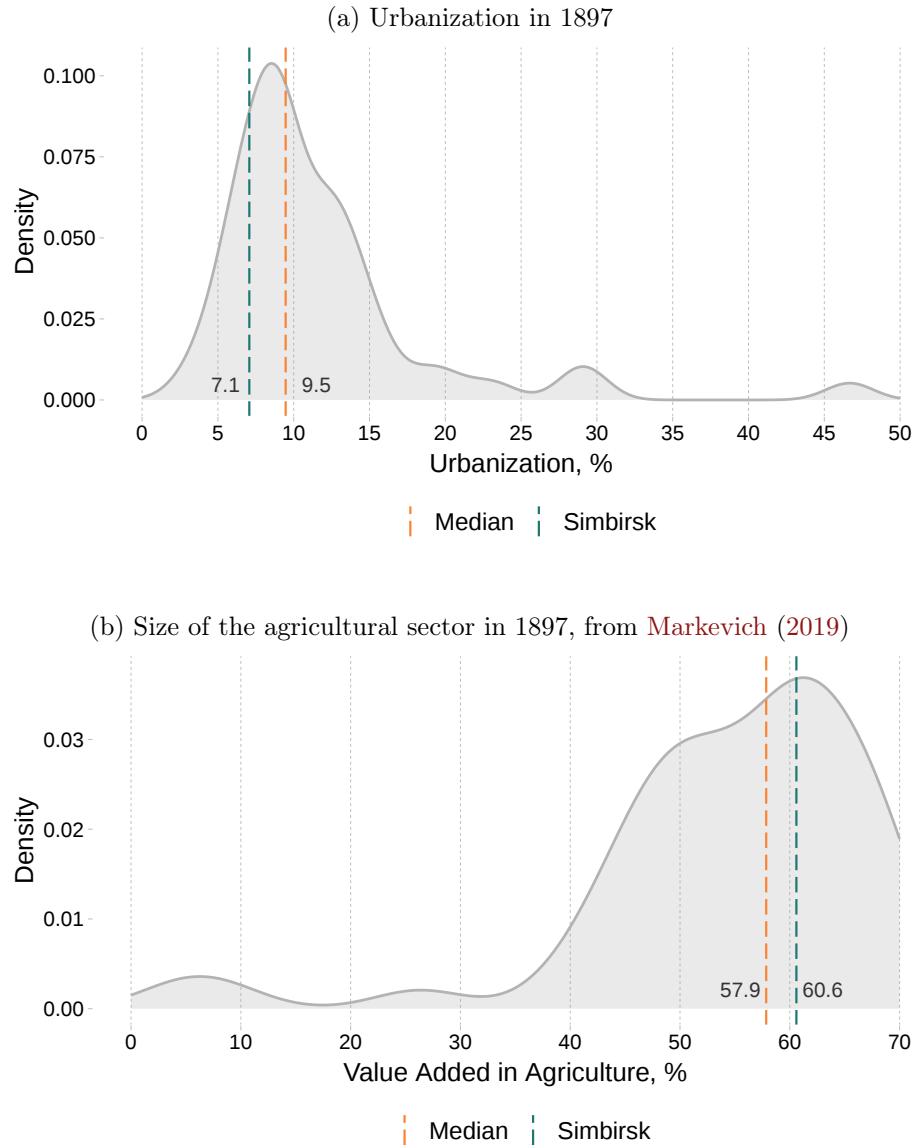
B Additional Figures

Figure B1: Simbirsk province within the Russian Empire



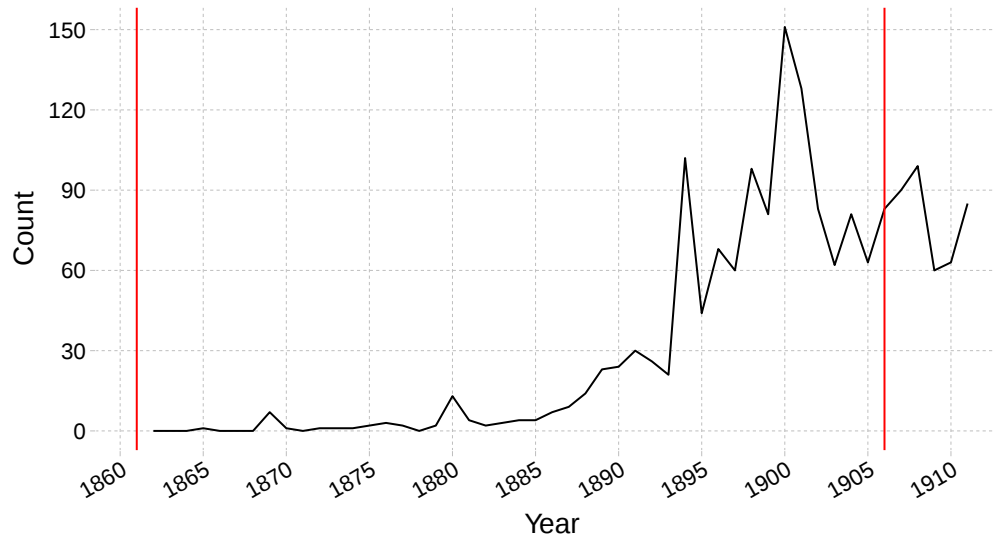
Notes: The boundaries of 50 provinces in the European part of the Russian Empire. Black triangles denote St. Petersburg, the capital of the Russian Empire, Moscow, the second biggest city, and Simbirsk, the provincial center of Simbirsk province. Simbirsk province is colored in yellow. Blue line represents the Volga River.

Figure B2: Comparison between Simbirsk province and the Russian Empire



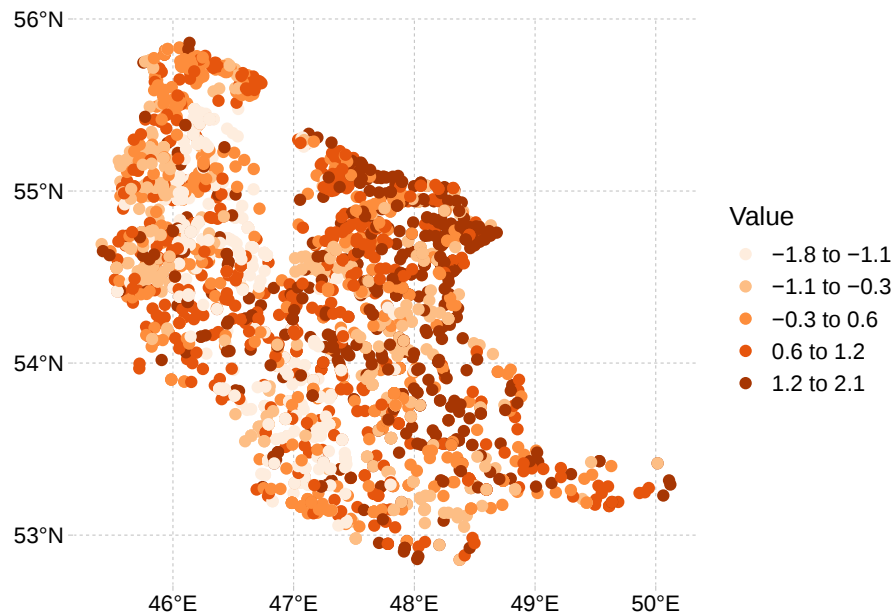
Notes: The distributions of urbanization rates and the agricultural sector sizes in 1897 across the provinces of the Russian Empire. The orange dashed line represents the median value across the entire sample. The green dashed line represents the value for Simbirsk.

Figure B3: Year of the Last Land Reallocation



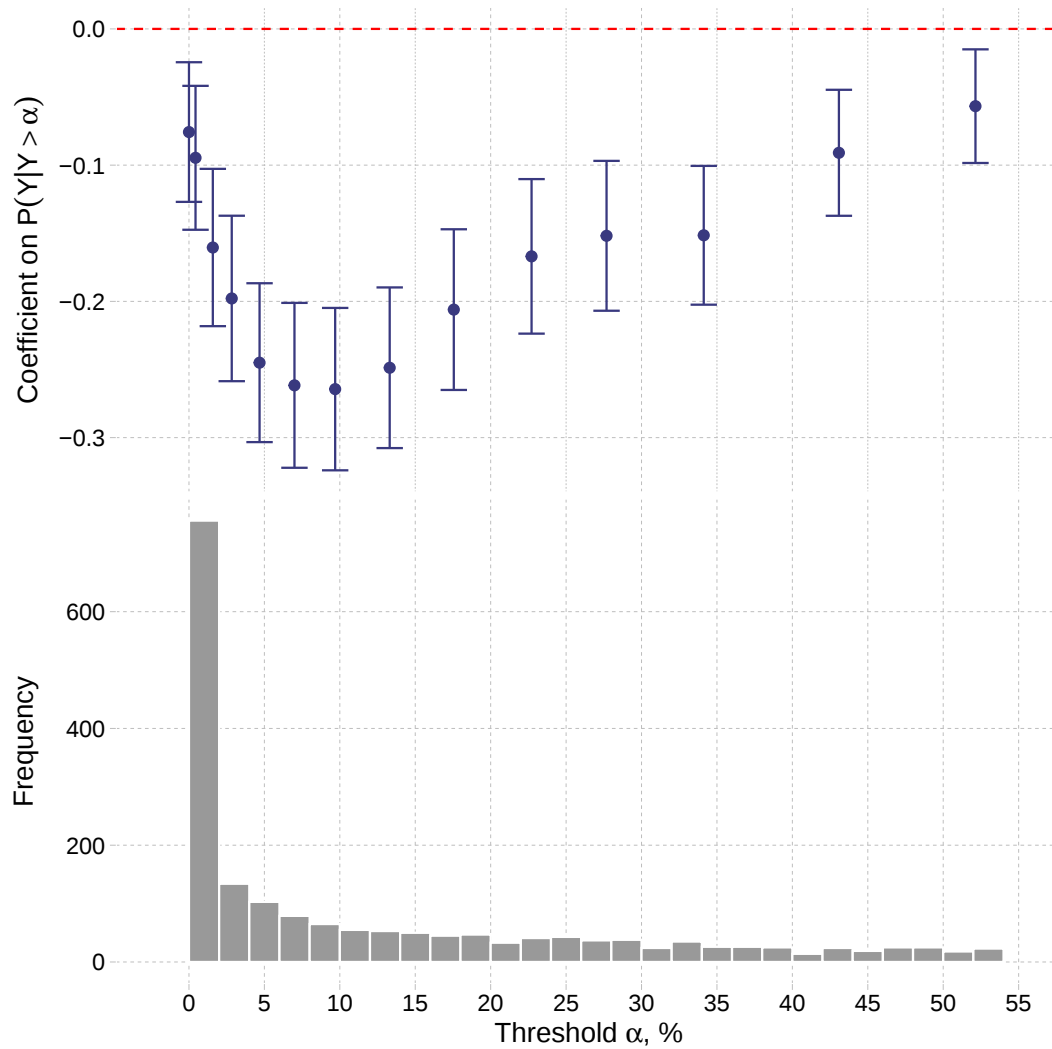
Notes: The number of communes that conducted their most recent land reallocation in a given year. Red vertical lines mark the abolition of serfdom in 1861 and the Stolypin reform of 1906. The plot does not include communes that did not conduct land reallocations since the abolition of serfdom in 1861. Note that the plot does not depict the dynamics of reallocations over time; the data come from a single cross-section of communes collected in 1910–11.

Figure B4: Spatial Distribution of the Instrumental Variable



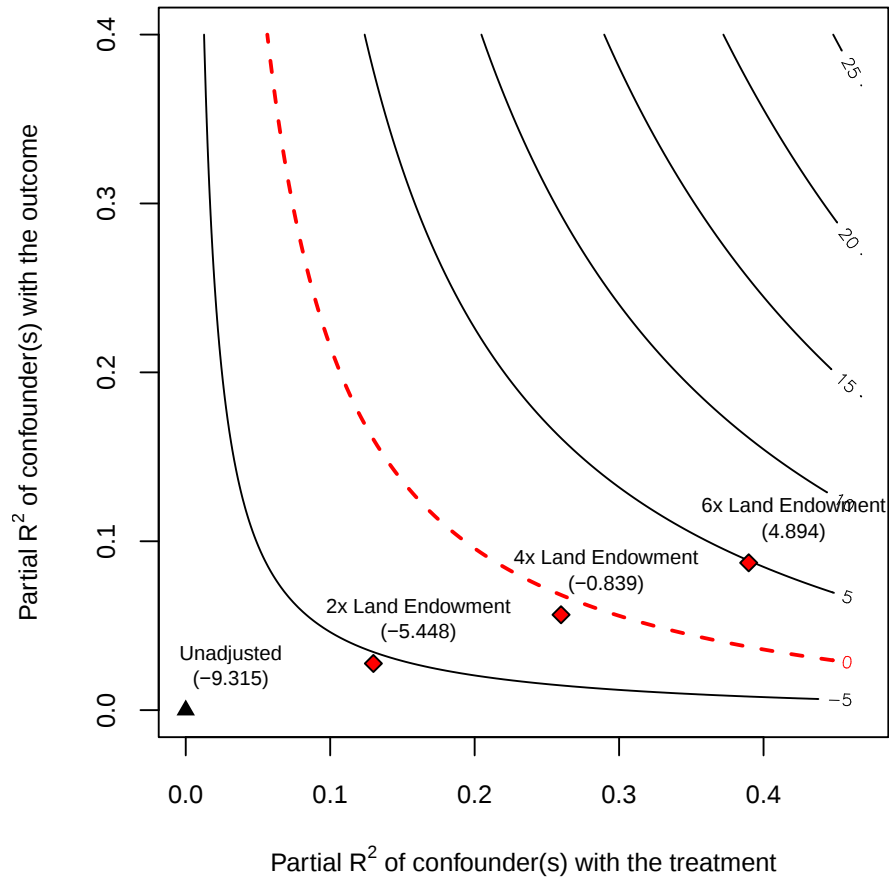
Notes: Average drought intensity over the 10-year window prior to the last land reallocation across villages of Simbirsk province. Coloring scheme based on quintiles of the average drought intensity distribution.

Figure B5: Dynamic Entitlement Rule and Probability of Exceeding a Titling Rate



Notes: Figure reports the OLS coefficient estimates of the effect of *Dynamic Entitlement Rule* on the probability that more than $\alpha\%$ of allotments were titled in a commune with 95% confidence intervals. The thresholds α correspond to percentiles of the titling rates distribution, ranging from the 25th percentile of 0% to the 90th percentile of 52% with a 5 percentage-point increment. Standard errors adjusted for spatial correlation within 10 km following Conley (1999) in parentheses.

Figure B6: Robustness to Unobserved Confounders



Notes: Sensitivity contour plot of the point estimate in the partial R^2 scale with benchmark bounds. Plot produced using the `sensemkr` package (Cinelli and Hazlett 2020).

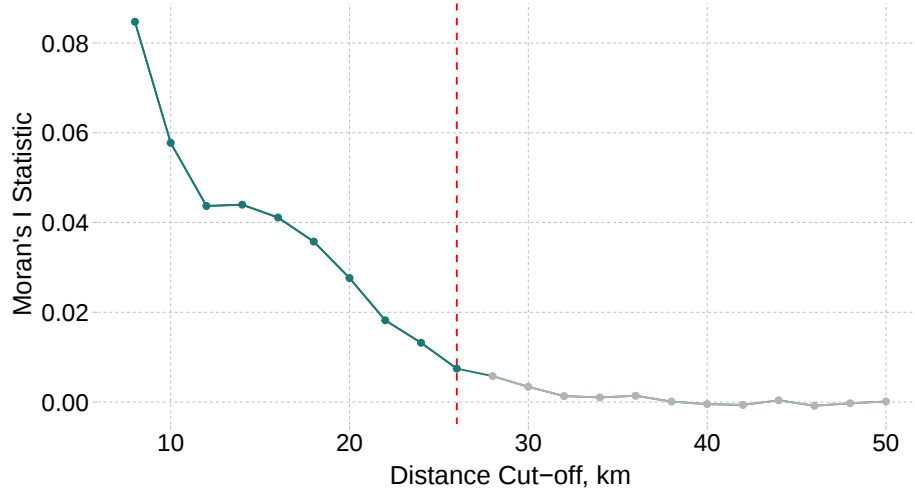
C Robustness to Spatial Dependence

According to Tobler’s first law of geography, closer objects tend to be more similar to each other than more distant ones. For this reason, spatial correlation across units may create geographic “clusters” and thereby inflate standard errors. In this section, I will assess whether spatial interdependence is present in my data and how it affects my results.

The common approach in the literature involves conducting Moran’s test for spatial interdependence in residuals. To compute the Moran’s I statistic, which relies on the correlation between a variable and its neighboring values, one must supply a neighborhood matrix. This, in turn, requires defining a distance cut-off for points to be considered neighbors. For example, when a distance of 10 km is used, all points within 10 km of point i are treated as i ’s neighbors. Below, I compute Moran’s I statistics for distance cut-offs ranging from 8 km, the average distance to a township center in my sample, to 50 km. For comparison, the average distance to a district center in my sample is 43 km. Figure C7 shows that the null of no spatial autocorrelation is rejected for all cut-offs under 26 km, indicating that spatial interdependence may pose a problem for inference even with a chosen cut-off of 10 km, reported in the main text.

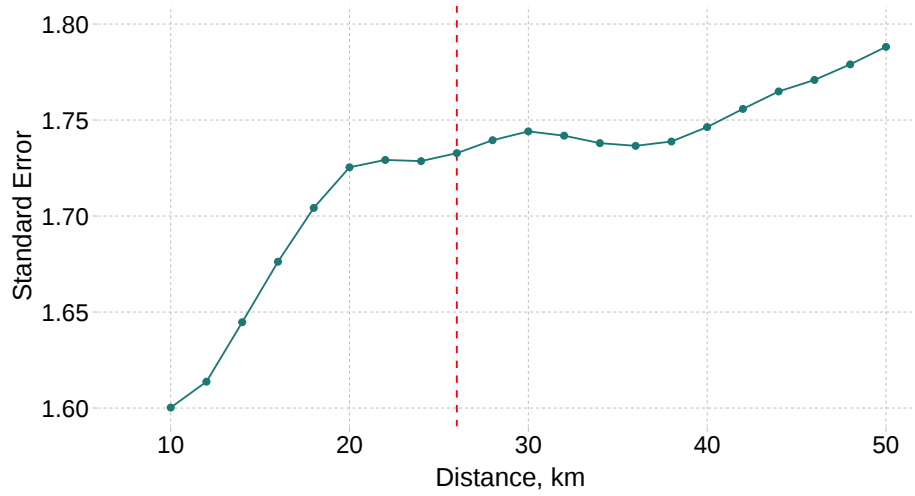
I therefore compute standard errors adjusted for spatial autocorrelation within a radius ranging from 8 to 50 km following Conley (1999). Figure C8 shows how the magnitude of standard errors for the estimated coefficient on my independent variable of interest, *Dynamic Entitlement Rule*, reported in Table 1, varies across distance cutoffs. Even though the standard errors increase from 1.6 to 1.75 as the cutoff distance grows to 26 km, the threshold beyond which the Moran’s I test no longer rejects the null of no spatial autocorrelation, and rise only marginally further, to 1.8, as the cutoff reaches 50 km. Despite a rise in standard errors, the coefficient remains statistically significant at the 1% level throughout, indicating that the results are robust to spatial autocorrelation.

Figure C7: Moran's I



Notes: Moran's I statistic against the distance cut-off values used to compute the neighborhood matrix. For gray dots, the null hypothesis of no spatial autocorrelation cannot be rejected at the 95% significance level. Permutation inference has been used to compute p-values.

Figure C8: Conley Standard Errors Across Distance Cut-offs



Notes: Conley standard errors for the estimated coefficient on *Dynamic Entitlement Rule* from Table 1 across distance cut-offs ranging from 8 to 50 km.

D Economic Drivers of Land Titling

Both historical literature and contemporaneous sources suggest that an individual's decision to claim a private title under the reform of 1906 depended on a variety of characteristics of one's own and neighboring households, such as the size of an individual's land holding, family structure, education, or migration.

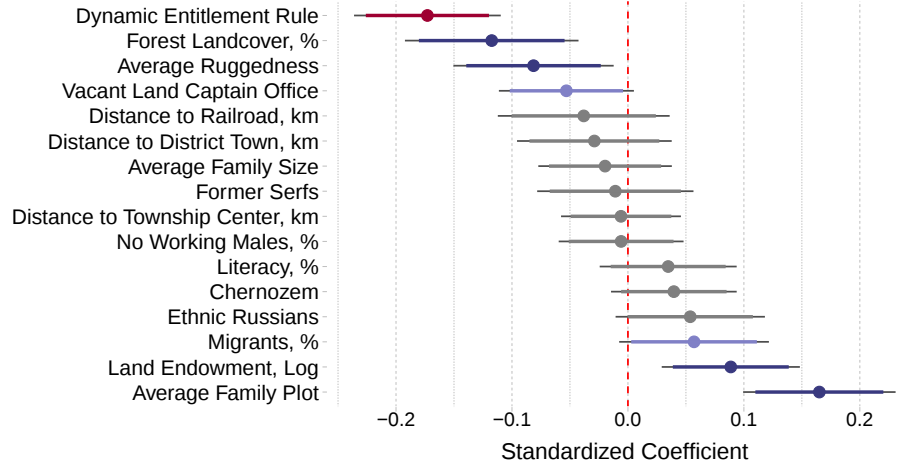
An individual's decision to claim a title must have depended on expectations about changes in land size and quality after reallocation. For example, peasants who had received higher-than-average-quality land in a previous reallocation had an incentive to secure their plot before a new one was announced. Similarly, peasants who expected to lose land might have also preferred to title. Peasants whose claims were most vulnerable to a reallocation, such as widows, the elderly, and families with no working men, faced a similar incentive, often to monetize a claim they were otherwise unable to defend (Chernyshov 1917a, 1917b).

Migration, though not very widespread in rural areas, appears to have affected land titling in two ways.¹⁷ First, migrants themselves often returned to their home communes to claim a land plot. Even in San Francisco, Russian peasants rushed to the local consulate to claim their land plots with the intention of selling them (Zyrianov 1992). Second, the prospect of returning migrants often induced commune members to seek titles preemptively. Because distributing land to returning migrants would dilute the claims of existing members, members in communes with a substantial share of migrants often preferred to title before migrants could raise their own claims (Peshekhonov 1909). Moreover, land titling often resulted in migration, since the Russian government encouraged resettlement to Siberia as part of the 1906 reform (Chernina, Dower, and Markevich 2014).

The Simbirsk census allows me to compute commune-level counterparts of individual-level drivers of land titling, namely, the average size of a family's landholding, average family size, the percentage of households with no working males, the share of population residing outside

¹⁷According to the 1897 Census of the Russian Empire — the only census conducted before the 1917 Revolution — 96% of rural residents of Simbirsk province were born locally.

Figure D9: Economic Drivers of Land Titling



Notes: Standardized coefficients from Equation 1 with 95% and 90% confidence intervals (thick and thin lines respectively). Estimates significant at the 10% level in light purple. Standard errors adjusted for spatial correlation within 10 km following Conley (1999).

the commune, and literacy rates. As discussed in Section 5.1, however, these commune-level measures might themselves have been affected by land allocation rules and hence could introduce bias if used as controls. For example, a dynamic entitlement rule might have discouraged migration, since a household that left the commune would have risked losing its claim to future land reallocations. For these reasons, I do not include these variables in the main specification, instead using them as a robustness check.

Figure D9 reports standardized coefficients from estimating Equation 1 with the inclusion of additional variables, for ease of comparison. The coefficient on *Dynamic Entitlement Rule* remains robust to the inclusion of new variables, with its unstandardized magnitude moving from -9.5 to -8.5 . The size of the effect, however, remains the largest in absolute terms, surpassing those of the average size of a family's landholding, total communal land endowment, and the share of forest landcover in a communal field. As predicted in the literature, the association between migration and land titling is positive and marginally significant, whereas the rest of the newly included variables do not appear to be associated with land titling.

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