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Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
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JEL Classification: O11, O43, N13, N14

Keywords: Economic Growth, Public Policies, Russia, state capacity

Gerda Asmus - gerda.asmus@awi.uni-heidelberg.de
Heidelberg University

Raphael Franck - raphael.franck@mail.huji.ac.il
Hebrew University of Jerusalem and CEPR

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Gerda Asmus † Raphaël Franck ‡

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†Heidelberg University, Alfred-Weber-Institute for Economics, Heidelberg 69115, Germany. Gerda.Asmus[at]awi.uni-heidelberg.de

‡Hebrew University of Jerusalem, Department of Economics, Mount Scopus, Jerusalem 91905, Israel, CEPR & CESIfo. Raphael.Franck[at]mail.huji.ac.il

1 Introduction

Countries with strong state capacity successfully enforce a monopoly on violence and efficiently levy taxes (e.g., Acemoglu, 2005, Bardhan, 2016). Such state capacity can promote economic development by enforcing the rule of law as well as supporting institutions and policies that are conducive to industrial development, technology adoption, and human capital formation (e.g., Besley and Persson, 2011). It may also enable the development of an honest and efficient bureaucracy, a culture of cooperation, and improve the provision of public goods (e.g., Becker et al., 2016, Dell et al., 2018, Besley, 2020).

Yet, many strong states do not necessarily provide benefits to the majority of the population but instead serve the interests of members from a narrow elite. They levy taxes and armies to wage war abroad and occasionally repress internal opposition (North and Thomas, 1973, Tilly, 1992, Gennaioli and Voth, 2015). In the 20th century, the USSR was one of the most significant examples of this phenomenon (e.g. Harrison, 2017).

This study analyzes the impact of state capacity on local economic development in the long run by exploiting a quasi-natural experiment in the regional expansion of the state. For this purpose, it focuses on the aftermath of Yemelyan Pugachev's rebellion in Russia. A Cossack from the Don region, Pugachev succeeded in controlling an extensive territory in the Southern Urals between 1773 and 1775 with a loose alliance of Cossacks, peasants and religious traditionalists (Dubrovin, 1884, Golubtsov, 1926, Raeff, 1970). After putting down Pugachev's rebellion at a great human cost, Empress Catherine II (r. 1762–1796) sought to prevent another uprising in the Southern Urals by implementing reforms that modern research in political economy would identify as features of strong state capacity. Inside the territory that the rebels had managed to seize, she bolstered the presence of the Russian state by increasing the numbers of military installations and civil administrators to ensure the implementation of her administrative reforms and to efficiently levy taxes (e.g., Alexander, 1966, Avrich, 1972).

The empirical analysis assesses the causal impact of state capacity at the local level by exploiting the regional discontinuity created by the boundary of the rebel-held territory. This approach compares changes in economic outcomes in areas just inside the territory exposed to increased state presence to those that were not, and evaluates its effect at the boundary. In so doing, the empirical analysis can assess two aspects of strong state capacity. First, it can assess whether a change in local state capacity is not only conducive to the development of a state apparatus characterized by a higher number of civil servants, policemen and soldiers as well as by greater fiscal capacity, but also enables a rise in human capital and the development of industrial and service sectors. Second, because the change in state capacity occurred in one country, it can assess the local effects of national top-down policies implemented by the central state. Examples of such policies

include the educational programs of Alexander II (r. 1855–1881) in the mid-1860s as well as the Soviet policies of forced collectivization that sought to develop state-owned farms and factories (Gregory, 1994, Davies, 1998).

The paper is thus related to two strands of the economic literature but seeks to provide a different approach. First, it deals with the impact of state capacity on local economic development. Previous studies (e.g., Gennaioli and Rainer, 2007, Michalopoulos and Papaioannou, 2013, Grosfeld and Zhuravskaya, 2015, Acemoglu et al., 2015, Becker et al., 2016, Dell et al., 2018) focused on the impact of two or more historical states within a modern country or of local governments whose differences in administrative capacity can be traced to past events. Instead, this paper analyzes the long-run impact of the increase in the central state's capacity on local economic development within a region that the state already controlled and has ruled uninterruptedly since. By taking advantage of the regional discontinuity in state presence induced by the boundary of the rebel-held territory, the identification strategy allows for the area which did not experience the increase in state presence to be a valid counterfactual to the area which had been exposed to the expansion of the state.

Second, it pertains to the growing literature on Russian economic history and the causes of persistent regional disparities within Russia (see, e.g., Zhuravskaya et al., 2022, for a recent literature survey). While previous studies have focused on the consequences of serfdom and its abolition (Markevich and Zhuravskaya, 2018, Buggle and Nafziger, 2021), or agricultural and industrial policies in the 19th and 20th centuries (Cheremukhin et al., 2017, Markevich and Nafziger, 2017, Castañeda Dower and Markevich, 2019, Castañeda Dower et al., 2018, Gregg, 2020, Markevich et al., 2021), this study seeks to provide a long-run perspective by assessing how the change in state capacity in Russia differentially impacted local economic development from the late 18th century onward.

The data combine historical maps, official statistics from the Russian Empire and the USSR, present-day satellite images, crowd-sourced infrastructure data, and individual-level surveys. They allow us to document local variations in fiscal capacity, as well as human and industrial development in the long run. They also enable us to establish the random nature of the rebellion boundary with a series of balancing tests on geographic and pre-rebellion characteristics of state presence, population, and economic development.

In a first set of results, we establish the increase in state presence following the revolt within the territory held by the rebels. Our results show that the Russian state's increase of its military and fiscal presence as well as the development of public infrastructure along the border of Pugachev's rebellion had long-lasting effects on local state capacity. By WWI, the fiscal capacity of local governments as well as the number of civilian administrators and police officers were higher inside the rebellion's boundary. For instance, in 1910, the municipal debt of towns in formerly rebel-held areas was seven times higher. The positive effects of increased state capacity as proxied by public infrastructure

have persisted to this day in the form of more roads, more railway stops and more school buildings.

In a second set of results, we show that the local change in state capacity had a limited impact on economic growth until the central government targeted specific development objectives. Once the political objectives of the rulers led them to promote, e.g., human capital formation or industrialization, these national policies were not implemented uniformly throughout the country or in disadvantaged regions but in areas with preexisting strong state capacity. Hence, the education policies of Alexander II triggered the opening of one additional primary school in every other town within the rebellion boundary and an increase in primary school enrollment. Similarly, the early Soviet policies that supported small capitalist production units increased the presence of self-employed individuals within the rebellion boundary. Later on, Stalin's policies of agricultural and industrial collectivization led to the establishment of one additional state-owned farm every 100km^2 inside the formerly rebel-held area and one additional camp of forced labor every 200km^2. Nowadays, however, without the appropriate economic policies, we find that historical state capacity in the Southern Urals does not have any significant positive effect on local economic circumstances. It has been unable to prevent the industrial decline of the region and the associated fall in human capital that have become commonplace in areas that experienced industrialization in the 19th and early 20th centuries (Nissanov, 2017, Franck and Galor, 2021).

Our results are not driven by alternative explanations such as changes in population size, ethnic composition, and migration. Moreover, as the boundary of Pugachev's rebellion neither overlaps with the internal and external administrative boundaries of the Russian Empire nor with the boundary of previous rebellions, our main results cannot be explained by prior historical or administrative features of the region. In addition, we show that our main outcomes are not confounded by a potential catch-up effect that regions may experience in the wake of an economic response of the state to war and destruction (for a survey, see Rohner and Thoenig, 2021). Finally, our results are robust to accounting for spatial autocorrelation and using alternative estimation methods.

The remainder of the paper is organized as follows. Section 2 provides some historical background. Section 3 presents the data and Section 4 the empirical methodology. Section 5 analyzes the results, discusses alternative explanations and presents the robustness checks. Section 6 concludes.

2 Historical Background

2.1 The rebellion of Yemelyan Pugachev

In the second half of the 18th century, the Russian Empire was experiencing rapid economic and social transformations fostered by Catherine II who sought to modernize the country (for an overview see, e.g., Raeff, 1970, Kahan, 1985, de Madariaga, 1981). Nevertheless, protection of property and person remained inadequate for the majority of the empire's population who were mainly peasants and serfs tied to the landowners, and who had no option for political participation. For instance, a decree in 1767 prohibited direct petitions to the Tsarina. The general sense of discontent was aggravated by increasing taxes which Catherine II needed to pursue the Empire's territorial expansion and wage war against the Ottoman Empire. Another source of discontent stemmed from the reformation of the Orthodox Church in the 17th century that had created a group of disgruntled religious traditionalists known as the "Old Believers." Finally, frequent crop failures, plagues, and epidemics exacerbated the harsh living conditions of peasants.

Violence broke out in 1773 in the Southern Urals when a charismatic leader managed to attract a large band of followers. The illiterate Don Cossack Yemelyan Pugachev impersonated the late Emperor Peter III who had been killed a decade earlier under mysterious circumstances.[1] To gather support, Pugachev had one of his literate followers write decrees and manifestos promising to those who would join him "the rivers, seas and all benefits, pay and provisions, powder and lead, rank and honor and [...] liberty forever" (Dubrovin, 1884, p. 18) as well as "freedom of peasants from their lords" (Golubtsov, 1926, p. 25). He quickly gained support across major sections of society, i.e., soldiers, factory workers and peasants. The resulting revolt lasted a year and a half and covered a large swath of territory within the Southern Urals. Modern assessments of the revolt (Sukharev, 2010, O'Neill, 2016) suggest that Pugachev succeeded in controlling an area of about 850,000 km^2, which is approximately twice the size of California.[2]

The rebels did not have strategic military objectives aside from controlling as much territory as they could (Avrich, 1972). Their tactical movements were characterized by two features. On the one hand, they sought to pillage towns and villages, and punish the gentry. On the other hand, they moved haphazardly to shake off regular imperial detachments (Longworth, 1973). Eventually, the Tsarist army was able to defeat Pugachev's rebels in the course of 1774. Pugachev was then betrayed by other Cossacks in September 1774 and executed on January 21 1775.

[1] Several impersonators of Peter III appeared in the Russian Empire after 1762, but Pugachev mounted the most significant challenge to the throne.

[2] The rebels conquered 81 towns and besieged 10 other towns without conquering them. There were 43 major confrontations between rebel and tsarist forces, where the latter won 34 of them.

2.2 The State in the Southern Urals under Catherine II and her Successors

As Pugachev's rebellion had exposed the failures of the local Russian administration, Catherine II implemented policies to ensure that no such large-scale uprising would occur again (Alexander, 1966, Longworth, 1973, LeDonne, 1984). Inspired by Enlightenment ideas and *Cameralist* thinkers who sought to improve administrative practices in the absolutist monarchies of Austria and Germany, she herself drafted a reform of the *Guberniia* (the highest administrative division of the Russian Empire) to standardize their population number, size, and organization. However, she maintained the institution of serfdom which had united many of Pugachev's fighters. In the Appendix, we provide a short discussion of Catherine II's legal and economic reforms at the national level.

In the wake of Pugachev's rebellion, Catherine II also implemented specific policy changes in the Southern Urals, in particular to improve the efficiency and streamline the chain of military commands. She notably moved the capital of the gubernatorate from Orenburg to Ufa in 1782 so that the governor in Ufa would command the two main regional lines of forts (Orenburg and Trans-Kama). She also sought to erase any memory of Pugachev's rebellion by ordering the fast rebuilding of towns that had been destroyed and by renaming places of significance to the revolt. For instance, she changed the name of Pugachev's birth place from Zimoveyskaya to Potemkinskaya to avoid pilgrimage from former followers.[3] She also renamed the Yaik River into the Ural River and wanted the Yaik Cossacks to be called the Ural Cossacks.

Catherine II's attention to the Southern Urals can also be seen in her choice of governors. They were aristocrats with extensive experience in regional administration and military affairs as they all held the rank of Lieutenant-General before their appointment (LeDonne, 2000): Ivan Iakobi (1782–1783), Akim Apukhtin (1783–1784) and Osip Igelström (1784–1790).[4] Like the governors, most soldiers and civilian administrators assigned to the Southern Urals under Catherine II were not native to the region. This remained true by the turn of the 20th century when civilian administrators still belonged to a restricted group of individuals and few originated from the Southern Urals.[5]

Igelström's six-year stay in Ufa gave him time to implement Catherine II's long-term military policies. In 1786, troops were reorganized into three infantry regimes and six field battalions. It is estimated that there were already 15,520 soldiers in the region in the mid-1780s (LeDonne, 1984). Igelström also increased state presence by bringing the police as well as the Russian judicial and fiscal administrative institutions to the

[3]Grigory Potemkin (1739–1791) was an administrator and army officer who became Catherine II's favorite in the mid-1770s. As military commander, he took part in the fight against Pugachev.

[4]It is worth noting that Ivan Iakobi is regarded as "one of the great administrators of the reign"of Catherine II (LeDonne, 1984, p.278) while Igelström was a prominent member of the ruling elite who came from an important family of the Baltic aristocracy.

[5]Only 5,417 men held one of the four top ranks of the Russian civil service in 1914 (Lieven, 1987).

region. Police boards were established in Orenburg and Ufa while several new courts of justice for commoners and state peasants were instituted throughout the province. In 1788, the muftiate was established in Orenburg to operate within the framework of the Russian government. In so doing, Catherine II and Igelström were giving an official status to Islam within the empire while controlling the management of mosques and the composition of the Muslim religious personnel (Yemelianova, 2017). Finally, the fiscal regime was progressively reorganized to recognize the land ownership of Russians and of non-Russian groups. It enabled the Russian state to increase fiscal pressures on all segments of the population.[6]

Moreover, following Alexander II's national reforms in the 1860s that abolished serfdom, promoted primary schooling, and established local governments called zemstvo to assist the central government in collecting taxes and provide local public goods (especially education and healthcare), the Orthodox Church increased its missionary activities in the Urals with the support of the Russian State.[7] For instance, in the Perm bishopric, the Church established a missionary society in 1873, created in 1888 an office of diocesan missionary which answered to the archbishop and built a new monastery in 1891–1893 that soon hosted 400 monks and novices. The Church also ran schools for boys and girls throughout the region (Dukes, 2015, p.69).

Ultimately, Catherine II's policies of increased state presence and capacity in the Southern Urals, characterized by both increased security and efficient taxation, were successful insofar as no other major uprising took place in the area during her reign. In fact, as we show below in Section 5 (and in particular in Appendix Table C1), there was less unrest in that region during the 19th century. Finally, it is worth noting that neither the main events of the 1905 and 1917 revolutions (Ascher, 1988, Wade, 2005), nor fighting during WWI and WWII (Acemoglu et al., 2011, Winkler, 2015) took place on the boundary of Pugachev's rebellion.

2.3 The State in the Southern Urals beyond Regime Changes

The creation of the USSR changed the nature of state intervention in Russia. Until then, the imperial regime had pursued prudent macroeconomic policies that ultimately enabled the convertibility of the Russian currency with gold in 1897 (Markevich and Nafziger, 2017).

The increase in state intervention first began during the 1918–1921 period when the Bolsheviks implemented a policy of War Communism that directed the resources of the economy to win the Russian civil war. In 1921, however, Lenin chose to

[6] On the fiscal policies of the imperial regime after Catherine II, see Corcoran (2012), Kotsonis (2014) and Nafziger (2016).

[7] See, e.g., Dixon (2008), on the relationship between the Orthodox Church and the imperial government.

foster the development of the Soviet economy with a New Economic Policy (NEP) that was characterized (and sometimes criticized) as a retreat towards capitalism. The NEP enabled peasants to sell their products to private individuals or state agencies freely, both locally and nationally. Industrial firms with fewer than 20 employees were denationalized: they were either reverted to their former owners or leased to new industrialists. Furthermore, the wage system was restored, industrial firm owners could hire and fire employees while restrictions preventing workers from switching jobs were lifted (Gregory, 1994, Davies, 1998).

The NEP came to an end in 1928 with Stalin's Great Break and his announcement of a five-year plan that sought to transform agricultural and industrial production in the USSR. Stalin's policies were characterized by the forced collectivization of agriculture in state-owned farms known as sovkhozes. They contrasted with the agricultural cooperatives known as kolkhozes which had progressively emerged after 1917 by uniting small farms. Kolkhozes were only tolerated by communists who regarded them as an undesirable and intermediate stage of ideal agricultural collectivization represented by the sovkhozes. After 1928, the few remaining private farms and many, but not all, kolkhozes were turned into sovkhozes by force. Furthermore, Stalin's industrialization policy in the 1930s was characterized by the increased use of forced labor in newly established Gulags,[8] notably but not only in the Southern Urals, where one of the main economic objectives of the local party leaders was the modernization of the metallurgic sector from a wood-based to a coal-based industry (Harris, 1997, 1999, Dukes, 2015).

The rise in public economic intervention was accompanied by a similar rise in the size of the bureaucracy as exemplified by the number of administrative divisions in the Urals that rose from four in 1910 to seven in 1953 (Armstrong, 1972, Rowney, 1989).[9] It is, however, unclear whether individuals from the Southern Urals benefited from the growth of the state apparatus, either in their native region or in the rest of the country.[10] For instance, few, if any, agents of the Naródnyy Komissariát Vnútrennikh Del (NKVD, People's Commissariat for Internal Affairs) operating in the Southern Urals in the 1930s originated from the area (Leibovitch, 2008).[11]

Overall, in light of the historical evidence concerning the growth of the Soviet state and its bureaucracy, it can be conjectured that the increased local state capacity in the Southern Urals triggered by Catherine II would have persisted in the 1920s and 1930s. However, it is likely to have progressively subsided after WWII, as the continued growth

[8]Camps of forced labor, i.e., Gulags, appeared in the Soviet Union as early as the summer of 1918 (Ivanova, 2000, p.12).

[9]At the national level, the Russian empire had 100 internal administrative divisions in 1910 while the USSR had 166 in 1953 (Stewart, 1968).

[10]If many new individuals entered the civil service at the start of the Soviet regime, there remained mid-level civil servants who had served the Tsarist administration (in particular in the Central Statistical Administration) and who were only purged in the late 1920s (Orlovsky, 1994).

[11]In the mid 1930s, the NKVD was tasked with both public order and secret police activities.

of the state in the USSR increased the presence of civil servants as well as of police and military forces throughout the country.

3 Data

Our dataset combines four types of data sources: (*i*) historical maps, (*ii*) historical official censuses and household surveys, (*iii*) present-day satellite images and crowd-sourced infrastructure data, and (*iv*) present-day individual-level surveys. We use Geographic Information Systems (GIS) to extract geographic features from satellite images and from historical maps at the grid cell level, and to geocode the locations of towns in the surveys and censuses. Descriptive statistics and sources for all variables can be found in Appendix Table A1.

3.1 The Boundary of the Rebellion Territory

The movements of the rebels were not based on an ambitious strategic plan but on tactical considerations. The rebels either attacked towns and ambushed regular Tsarist deployments when they could, or avoided confrontation and fled when they were outnumbered. Furthermore, since the rebels traveled by horse, they were able to avoid roads and cut through fields.

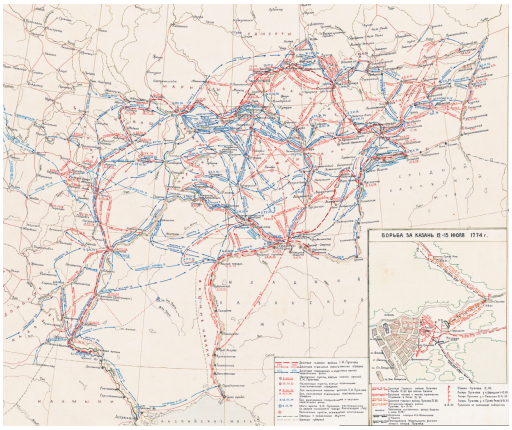
Our identification strategy therefore exploits the random nature of Pugachev's revolt to estimate a geographic discontinuity of state presence at the boundary of the rebel-held territory. It takes advantage of two features from the historical map of the rebellion in Panel (a) of Figure 1 (Sukharev, 2010, O'Neill, 2016) to delineate the rebellion area and account for the local intensity of the revolt.

The first feature of our identification strategy builds upon the locations of the battles and sieges during the rebellion. We define the rebellion boundary as the region bound by these locations through a concave hull: areas were exposed to the rebellion if they were just inside this concave hull and were not if they were just outside of it. However, such a boundary definition assumes that the whole region within the boundary was equally affected by the rebellion. There is consequently a potential limitation to using the location of battles and sieges as the sole component of our identification strategy as we cannot exclude that Pugachev and his allies considered some locations to be of particular importance.

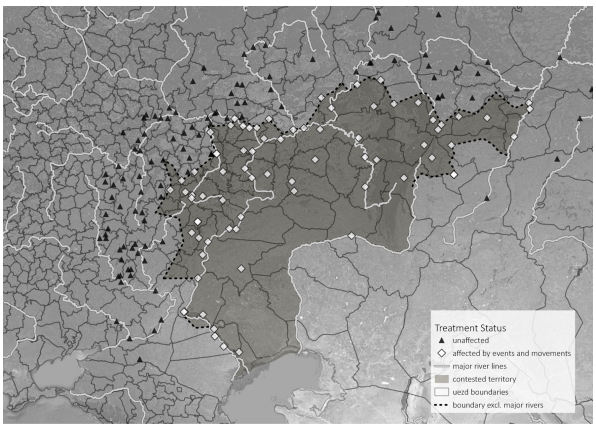
Therefore, the second feature of our identification strategy uses army and rebel movements to account for the local intensity of the rebellion. We consider areas inside the boundary which experienced such movements to be exposed more intensely to the rebellion and to have attracted Catherine's efforts afterwards. To further relieve endogeneity concerns that intense fighting would be correlated with specific geographic

Figure 1 – Yemelyan Pugachev's Rebellion 1773–1775

(a) Battles, Sieges & Troop Movements



(b) Area of the Rebellion



Notes: Panel (a) shows a historical map of the rebellion (Sukharev, 2010). Red and blue lines indicate rebel and tsarist troop movements respectively, while dots indicate battle, siege and victory locations, and rebel-held towns. Panel (b) shows the geographic extent of Pugachev's rebellion. The black dashed line indicates the boundary line that we employ in our empirical analysis. It follows the contested territory (grey shaded area), but excludes sections that follow major river lines (particularly in the southeast). Diamonds in white indicate towns that were affected (within the shaded area) both by the rebellion and by the troop movements. Black triangles indicate towns that were not exposed to the rebellion or troop movements. Note that we dropped towns which were too far from the rebellion boundary to focus on its vicinity for illustrative purposes.

factors, we exclude major towns at the time of the rebellion as well as locations in proximity to rivers as we explain in Section 4. Panel (b) of Figure 1 shows the rebellion boundary and distinguishes between locations that were exposed to the rebellion and those that were not. The black dashed line illustrates our boundary of interest, which excludes sections that align with rivers represented by white lines.

3.2 The Southern Urals

Our empirical strategy is based on the notion that the rebellion boundary within the Southern Urals is random. This implies that geographic features of the region as well as its pre-rebellion economic and institutional characteristics vary smoothly across the two sides of the boundary. To do so, we partition the rebellion and control area into grid cells at a resolution of 10 × 10 km and extract the relevant information from satellite images and maps.

Geographic features may impact historical outcomes and contemporary economic development. We therefore test for balance in geographic variables which are usually associated with agricultural and industrial development or lack thereof: elevation and slope (Jarvis et al., 2008), ruggedness (Nunn and Puga, 2012), precipitation and temperature (Willmott and Matsuura, 2001), wheat suitability (FAO/IIASA, 2011), and caloric suitability (Galor and Özak, 2016).

Furthermore, to test for balance over pre-rebellion economic and institutional development, we use data from Kabuzan (1963) on the population in 1763 at the town level. We also compute the distance between a grid cell's centroid and Moscow as well as St. Petersburg, the economic and political centers of the Russian Empire. Moreover we use geocoded data on pre-rebellion economic and state characteristics: these are the number of churches, monasteries, civilian administrators and military officers in 1727 (Kirilov, 1727, O'Neill, 2016) as well as the number of factories in 1745 and mines in 1762 (Blanchard, 1989).

3.3 State Capacity and Economic Development

To assess local variations in state capacity as well as in human and industrial development in the long run, we rely on several datasets. First, we aggregate the information in Pyadyshev's Atlas of the Russian Empire (Piadyshev, 1829) to the town level to assess the presence of the Russian state in the Southern Urals in 1820. These data provide information on public security and infrastructure such as military installations (fortresses, garrisons and military outposts), monasteries (which could also serve as military fortresses (Nossov, 2006)), and the extent of the postal road network.

Second, we use the town censuses of the Russian Empire and of the USSR from 1897, 1910 and 1926 to assess the impact of state capacity on economic development. They provide information on population, public infrastructure, security forces, fiscal capacity, and education. They also give information on industrial production and workers, distinguishing between factories and artisanal workshops where the former were characterized by more modern means of production than the latter. As an additional measure of local fiscal capacity, we use data from Nafziger (2011) on the number of members sitting on the executive councils (upravy) of the local zemstvo governments in 1883.

Third, we use the General Primary Education survey of the Russian Empire (Falbork and Charnoluskii, 1900) to assess human capital formation. It provides town-level information on the number of schools between 1860 and 1893, on religious and secular schools as well as on the number of male and female pupils in 1895.

Fourth, to assess the impact of increased state capacity on the level of crime and unrest, we use data from Castañeda Dower et al. (2018) that distinguish between all unrest and riots, large unrest and riots spanning several villages or districts, and unrest and riots listed in the Central State Archive of the October Revolution (TsGAOR). We also use data on the causes of death listed in a public health report from the Office of the Chief Medical Inspector in 1910 (Ministerstvo Vnutrennykh Del, 1912).

Fifth, we collect data from the GeoNames and Memorial databases to analyze the relationship between historical state capacity and the forced collectivization of agriculture

and industry. While the GeoNames database provides information on the location of sovkhozes and kolkhozes, the Memorial database indicates the location of Gulags and the number of years that they were in operation.

Finally, we use two types of contemporary data. We use OpenStreetMap (OSM) for a range of institutional and infrastructure variables. They include road length as well as the number of railway stops, of police stations and of religious buildings. They also include the shares of land used by military installations, farms, commerce and retail outlets, and by industries and quarries. Moreover, we rely on the Life in Transition Surveys (LiTS) that provide information on individuals currently living in transition countries. By using the geographic information on the location of the survey respondents, we assess whether individuals on either side of the rebellion boundary differ in terms of their income, education, and occupation.

4 Empirical Strategy

Our estimation strategy is motivated by the historical narrative where the border of the rebellion territory and the local intensity of the fighting was determined by the rebels' random tactics. This leads us to employ a fuzzy geographic regression discontinuity (GRD) design to estimate the discontinuous change in the central state's presence at the boundary of the rebellion. This approach is vindicated by tests of means showing that areas and nearby towns on opposite sides of the border have similar observable characteristics.

4.1 Fuzzy GRD Design

Our identification strategy relies on the battle and siege locations which formed the boundary of the rebellion as well as on the movements of the rebels and tsarist troops to assess the local intensity of the uprising. As discussed in Section 3.1, no observation from the control group is treated since all the affected units lie within the rebellion boundary by construction of the concave hull. However, there might be imperfect compliance as some locations within the rebel-held territories may have been more exposed to the revolt than others and may have consequently attracted more attention from Catherine II afterwards. This is why we implement a fuzzy GRD as it overcomes compliance issues of the treated units by accounting for the likelihood that assigned units received the treatment.[12]

The discontinuity in the treatment assignment occurs along the points forming the geographic boundary of the territory controlled by Pugachev's rebellion. The treatment

[12] A sharp GRD assumes perfect compliance, requiring all units assigned to the treatment to take the treatment. In Appendix Tables C12– C19, we report sharp GRD results and find, reassuringly, that the coefficients of both sharp and fuzzy estimands are very similar in size and significance levels.

T is the function of a vector X_i with two running variables–latitude and longitude–for each observational unit i. The treatment assignment is:

$$T_i = \mathbb{1}(X_{1i} > b_1) \times \mathbb{1}(X_{2i} > b_2), \tag{1}$$

where b_1 and b_2 denote the cutoff points (longitude and latitude) along the geographic boundary B. We compute each observational unit's distance $d_i(.)$ to the closest boundary point $b = (b_1, b_2) \in B$ and use it as a one-dimensional running variable.

We assign negative values and positive values to untreated and treated units respectively while boundary points have a distance $\bar{d}$ value of 0. The distance from the geographic location of a specific observation x_i to the nearest boundary point b_i can be denoted as $d_i(x)$.

The fuzzy GRD design uses an assignment rule where there is a jump in the probability of receiving the treatment at the cutoff. We consider locations within the treated area formed by the boundary to be more exposed to the rebellion if they were in direct proximity to the movements of the Tsarist army or those of the rebels. The observed treatment thus becomes:

$$D_i = T_i \times D_i(1) + (1 - T_i) \times D_i(0), \tag{2}$$

where T_i is the treatment assignment defined above and D_i is a binary indicator equal to 1 when a geographic unit is in direct proximity to the movements of Pugachev's rebels or those of the Tsarist army, and 0 otherwise. For some observations, it holds that $T_i \neq D_i$ since $D_1 - D_0 \neq 1$. In other words, the exclusion restriction in our framework is that the treatment assignment T_i affects potential outcomes only because it introduces a differential change in compliance with the treatment D_i.

Thus, the fuzzy GRD can be viewed as an estimation framework in two stages where the treatment assignment (the geographic boundary of the rebellion area) is an instrument for the treatment status (the proximity to rebel and Tsarist troop movements). The treatment effect τ_{FGRD} can then be written as a Wald estimator:

$$\tau_{FGRD} = \frac{\lim\limits_{d \uparrow 0} \mathbb{E}[Y_i | d_i(b) = d] - \lim\limits_{d \downarrow 0} \mathbb{E}[Y_i | d_i(b) = d]}{\lim\limits_{d \uparrow 0} \mathbb{E}[D_i | d_i(b) = d] - \lim\limits_{d \downarrow 0} \mathbb{E}[D_i | d_i(b) = d]}, \tag{3}$$

where Y_i is the outcome for unit i.

The numerator indicates the intention-to-treat effect, while the denominator estimates the first stage treatment assignment on the treatment compliance. Both are evaluated at the cut-off defined by the rebellion boundary.[13]

Another key element for regression discontinuities is the selection of an appropriate

[13]With perfect compliance, the denominator collapses to 1 so that the estimator becomes a sharp GRD.

bandwidth. A priori, it is not clear how to set the limits for the bandwidth in our geographic and historical context where the observational units can be individuals or house, towns and grid cells. Inference is not valid when the bandwidth is too large but there is under-smoothing and loss of power when the bandwidth is too narrow.

To avoid sample selection bias when choosing a bandwidth, we follow a data-driven approach that builds on asymptotic mean-squared-error (MSE) minimization to define an optimal bandwidth as formalized by Imbens and Kalyanaraman (2012), Calonico et al. (2014) and Keele et al. (2017). This approach estimates the asymptotic bias and corrects the standard errors accordingly to allow for a bias-corrected local-linear GRD estimate. Therefore, the bandwidths vary by outcome. In this study, they are equal to 79.31 km on average (std.dev. 24.58 km) for the main regression results. The robustness checks in Section 5.3.3 show that these main results are robust to using other specifications and in particular, to fixed bandwidths of 80 km, 100 km and 120 km.

4.2 Identifying Assumptions

There are two key identifying assumptions to our identification strategy: (*i*) smooth variation of pre-treatment characteristics aside from the treatment itself, and (*ii*) absence of compound treatments.

4.2.1 Balance

The first identifying assumption requires that pre-treatment characteristics vary smoothly at the boundary threshold, aside from the treatment itself. This assumption ensures that locations outside the rebellion area are an appropriate counterfactual to those inside of it.

In Table 1, we present a series of balancing tests: Panel (a) tests for geographic factors which may be associated with access to markets (elevation, slope, ruggedness as well as distances to St. Petersburg and Moscow); Panel (b), for measures of agricultural and industrial development (precipitation, temperature, wheat potential, caloric suitability index, factories in 1745 and mines in 1762); Panel (c), for variables related to population (in 1763), the presence of religious institutions (churches and monasteries in 1727) and of the state (civilian administrators and military officers in 1727). Reassuringly, Table 1 provides no evidence of differences for these characteristics across the boundary under either a sharp or fuzzy GRD.

4.2.2 Absence of Compound Treatments

The second assumption behind our identification strategy requires that the study area is not subject to compound treatments so that our treatment is the only one affecting the outcomes of interest. In particular, there may be two types of confounders.

Table 1 – Balancing Tests

	Panel (a)—Geography									
							Distance to			
	Elevation		Slope		Ruggedness		St. Petersburg		Moscow	
	(1) Sharp	(2) Fuzzy	(3) Sharp	(4) Fuzzy	(5) Sharp	(6) Fuzzy	(7) Sharp	(8) Fuzzy	(9) Sharp	(10) Fuzzy
Rebellion	-11.27	-12.16	-0.0953	-0.104	-2.107	-2.303	11.58	12.29	9.068	9.562
	(8.053)	(8.646)	(0.0652)	(0.0707)	(1.458)	(1.581)	(26.05)	(27.53)	(29.30)	(30.93)
Mean	161.9	161.9	1.271	1.271	32.45	32.45	1573	1573	1089	1089
Std. Dev.	118.7	118.7	1.206	1.206	27.01	27.01	378	378	445.6	445.6
Optimal BW	48.42	48.42	42.64	42.64	42.51	42.51	60.13	60.13	64.53	64.53
Observations	3859	3859	3395	3395	3388	3388	4741	4741	5033	5033

	Panel (b)—Agricultural and Industrial Potential											
	Precipitation		Temperature		Wheat Potential		Caloric Suitability Index		Factories 1745		Mines 1762	
	(1) Sharp	(2) Fuzzy	(3) Sharp	(4) Fuzzy	(5) Sharp	(6) Fuzzy	(7) Sharp	(8) Fuzzy	(9) Sharp	(10) Fuzzy	(11) Sharp	(12) Fuzzy
Rebellion	-0.0185	-0.0202	-0.0810	-0.0880	-52.00	-56.18	11.80	12.81	-0.00178	-0.00188	0.0201	0.0214
	(0.0612)	(0.0655)	(0.202)	(0.217)	(95.64)	(102.3)	(36.40)	(39.41)	(0.0150)	(0.0159)	(0.0188)	(0.0198)
Mean	3.936	3.936	4.302	4.302	3497	3497	1264	1264	0.0286	0.0286	0.0483	0.0483
Std. Dev.	0.870	0.870	2.710	2.710	1330	1330	509	509	0.167	0.167	0.214	0.214
Optimal BW	50.65	50.65	49.31	49.31	52.60	52.60	42.60	42.60	62.88	62.88	60.02	60.02
Observations	4031	4031	3941	3941	4175	4175	3394	3394	4926	4926	4730	4730

	Panel (c)—Population, Church and State									
			Church in 1727				State in 1727			
	Population 1763		Churches		Monasteries		Civil Administrators		Military Officers	
	(1) Sharp	(2) Fuzzy	(3) Sharp	(4) Fuzzy	(5) Sharp	(6) Fuzzy	(7) Sharp	(8) Fuzzy	(9) Sharp	(10) Fuzzy
Rebellion	0.0108	0.0108	-0.0497	-0.0541	-0.0229	-0.0248	-0.0366	-0.0400	0.00751	0.00813
	(0.245)	(0.245)	(0.0320)	(0.0348)	(0.0259)	(0.0279)	(0.0328)	(0.0357)	(0.00992)	(0.0106)
Mean	10.60	10.60	0.0981	0.0981	0.0605	0.0605	0.0919	0.0919	0.0187	0.0187
Std. Dev.	0.417054	0.417054	0.297	0.297	0.238	0.238	0.289	0.289	0.135	0.135
Optimal BW	50	50	36.70	36.70	46.06	46.06	37.50	37.50	53.81	53.81
Observations	33	33	2929	2929	3670	3670	3000	3000	4263	4263

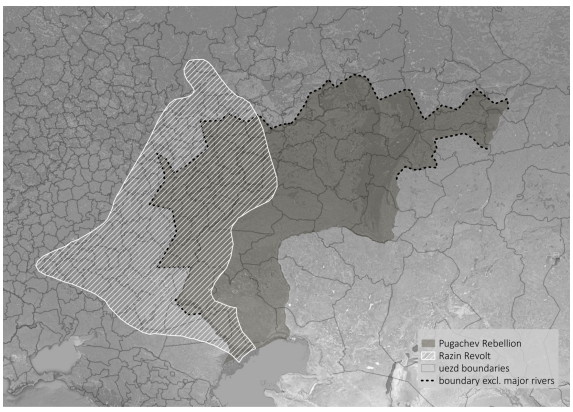
Notes: The table reports balancing tests for three sets of variables related to (i) geography, (ii) agricultural and industrial potential, and (iii) population, church and state. The unit of observation is the grid-cell, with the exception of *Population 1763* which is at the town level since we rely on Kabuzan (1963) and match the towns to the Uezd level for European Russia as coded in Castañeda Dower et al. (2018). For each outcome, the number of observations varies with the bandwidth. Sharp and fuzzy estimations are reported. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

First, compound treatments could arise if the border of the rebel-held territory coincided with the boundaries of other rebellions that happened before Pugachev's revolt or with other political borders such as administrative boundaries. Figure 2 maps the boundaries of the successive uprisings which took place in the Southern Urals in the late 17th and early 18th centuries: the 1670–1671 peasant uprising led by Stepan Razin, the 1704–1711 Bashkir revolt, the 1705–1708 Streltsy rebellion, the 1707–1708 Bulavin rebellion of the Don Cossacks and the 1708 Ukrainian Cossacks' revolt (Avrich, 1972). Reassuringly, Figure 2 shows that the boundary of Pugachev's rebellion does not overlap with the boundary of any of these rebellions.[14] In addition, panel (a) of Figure 3 shows that the administrative borders of the *uezds* (the second administrative subdivisions of the Russian Empire) do not align with the rebellion boundary.

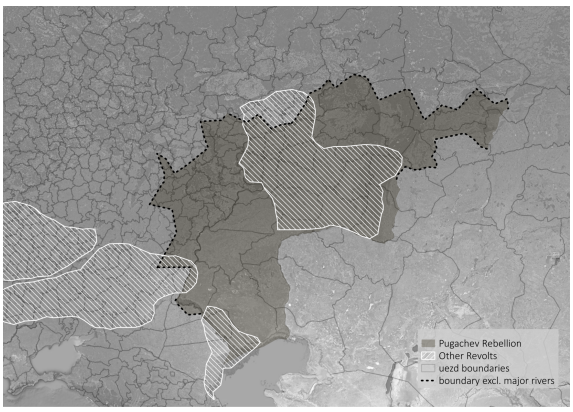
[14]While the boundaries of these revolts do not coincide with those of the Pugachev rebellion, they intersect in a limited number of points. Those intersections are, however, not problematic per se as they would equally impact (if at all) both the treated and control areas of Pugachev's rebellion.

Figure 2 – Late 17th and Early 18th Century Uprisings

(a) 1670–1671 Revolt of Stepan Razin



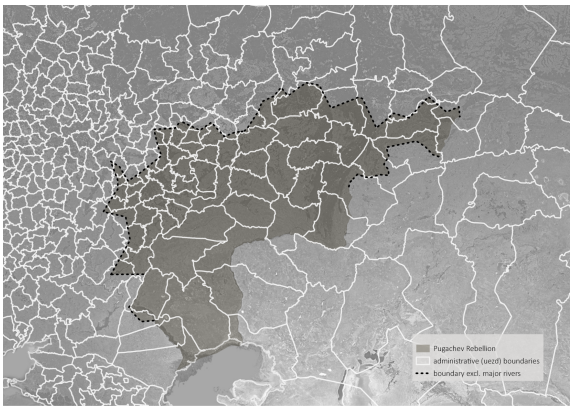
(b) 1705–1711 Revolts



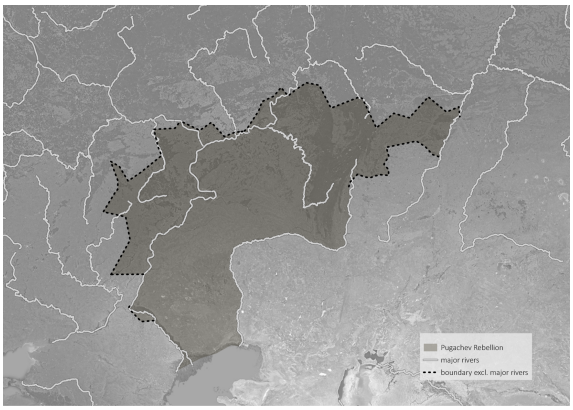
Notes: This figure shows that the boundaries of the main revolts in the 17th and 18th centuries as well as borders of administrative units do not coincide with the boundary of Pugachev's rebellion. The black dashed line indicates the boundary of Pugachev's rebellion. The white striped shapes indicate the areas of former peasant uprisings. Panel (a) highlights the area of the 1670–1671 peasant uprising led by Stepan Razin, while panel (b) highlights the boundary of four additional revolts, from left to right: the 1708 Ukrainian Cossack revolt, the 1707–1708 Don Cossack revolt led by Bulavin, the 1705–1708 Streltsy rebellion, and the 1708–1711 Bashkir rebellion. Second order administrative borders are shown in light grey in both panels.

Figure 3 – Administrative and Natural Boundaries

(a) Administrative Boundaries (Uezds)



(b) Major River Lines



Notes: This figure overlays the rebellion area with administrative unit (uezd) boundaries in panel (a), and major river lines in panel (b). Panel (a) shows that the boundary of Pugachev's rebellion does not coincide with the administrative units. Panel (b) shows that some sections of the major rivers coincide with the rebellion boundary and they are consequently excluded from our sample. The black dashed line indicates the effective boundary of Pugachev's rebellion in this study.

Second, both rivers and major towns could be confounders. They might have had specific characteristics which are conducive to economic growth in the long run but might also have been of tactical importance to the rebels and the Tsarist troops. Panel (b) of Figure 3 shows that the rebellion coincides with a limited number of river lines. Consequently, we exclude boundary sections which follow river lines within a proximity

of 5 km from our sample. We also exclude major towns from our analysis which we define as those whose population size prior to the rebellion in 1750 was sufficiently large to be listed in the population atlas of Bairoch et al. (1988). The list of towns included in our main sample, as well as the towns listed in Bairoch et al. (1988) that are excluded, can be found in the Appendix.

5 Results

In this section, we establish that the Russian state bolstered its presence at the rebellion boundary by building military installations and public infrastructure such as district postal roads as well as by increasing the number of civil servants and the fiscal capacity of local governments. We then analyze the impact of this increased state capacity on human capital formation as well as on industries and services. Finally, we discuss alternative explanations and present robustness checks.

5.1 The Change in State Capacity at the Rebellion Boundary

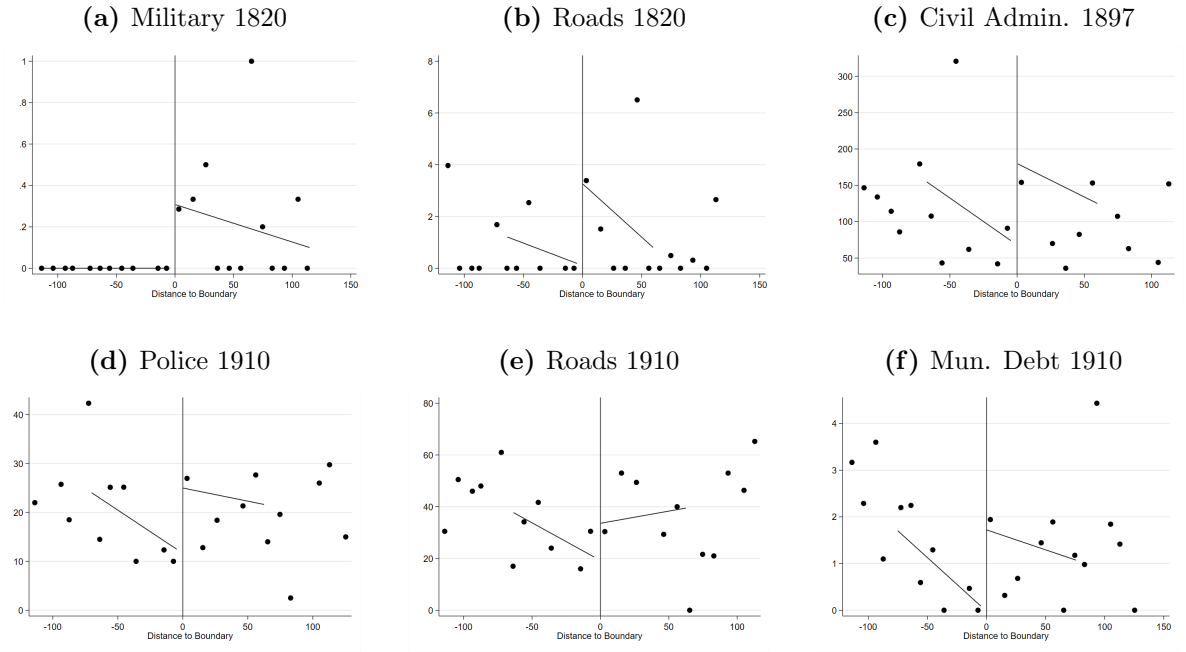
5.1.1 Under the Russian Empire

Table 2 analyzes the development of public security, infrastructure, civil administration, and fiscal capacity in the wake of Pugachev's rebellion until WWI. Figure 4 graphs the key significant results using regression discontinuity plots.

We find that areas exposed to the rebellion were 34.5% (one standard deviation) more likely to host a military installation (a fortress, garrison or military outpost) in 1820. By 1910, this additional military presence had given way to greater police presence: there were 18.37 additional policemen (0.51 of a standard deviation) inside the rebellion boundary. These areas were also 21.2% more likely to host monasteries in 1910. In other words, every fifth town at the rebellion boundary had a monastery. Conversely, the imperial regime's policies of religious control of the local Muslim population had a positive but insignificant effect on the number of mosques in 1910 within the rebellion boundary. It is likely that by the turn of the 20th century, the imperial regime saw no reason to change the policies toward the local Muslim population that Catherine II and Igelström had devised after Pugachev's rebellion.

It might be conjectured that this increase in security forces would decrease the level of crime and unrest. Indeed, we find in Appendix Table C1 that the increased presence of the state had a negative and significant impact on the frequency of unrest and riots in the 19th century. We also find that the effect of state presence on homicides in 1910 is negative but insignificant. In other words, the increase in state capacity might not have lowered non-political violence, but it eventually entailed an increase in police forces that acted as a deterrent against social and political agitation.

Figure 4 – Regression Discontinuity Plots for Main Outcomes



Notes: This figure shows regression discontinuity plots for the key significant outcome variables. Black dots indicate the average value of the specified variable within 10 km distance bins. The Distance to Boundary on the x-axis measures the distance between a town and the closest point to Pugachev's rebellion boundary measured in km. The solid vertical line represents the boundary of the rebellion where the distance is zero. Negative/positive values of Distance to Boundary indicate the distance between Pugachev's rebellion boundary and towns outside/inside the rebellion area.

Table 2 also shows that areas just within the rebellion boundary were likely to benefit from a larger network of roads in 1820 as well as in 1910: the average road network within a town exposed to Pugachev's rebellion was 3.78 km longer in 1820 (1.05 of a standard deviation) and 22.58 km longer in 1910 (0.69 of a standard deviation). In addition, Table 2 establishes that state capacity within the rebellion boundary was not only stronger with respect to the enforcement of the monopoly of violence but also in matters of civilian administration and fiscal capacity. In 1883, a zemstvo within the rebellion boundary had on average one additional member (0.82 of a standard deviation) sitting on its executive council, suggesting that historical state capacity geared the implementation of Alexander II's policy that sought to develop fiscally independent local governments. Within the rebellion boundary, there were also 159.7 additional civilian administrators (0.52 of a standard deviation) in 1897 while local municipal debt in 1910 was seven times higher (e^{β}–1 $\approx$ 7.39). Moreover Appendix Table C12 shows that in some of our robustness checks, towns within the rebellion boundary also had a higher level of tax receipts and public spending.

As such, Table 2 suggests that the Russian state bolstered its presence in the areas just inside the rebellion boundary. It built military outposts to prevent future rebellions and expanded the road network to facilitate army movements. By the turn of the 20th

Table 2 – Public Security and Public Infrastructure, Civil Administration and Fiscal Capacity in 1820, 1897, and 1910

	Military 1820 (1)	Military 1910 (2)	Police 1910 (3)	Monasteries 1910 (4)	Mosques 1910 (5)	Roads 1820 (6)	Roads 1910 (7)	Civil Admin. 1897 (8)	Executive Council 1883 (9)	Municipal Debt 1910 (10)
Rebellion	0.345***	26.50	18.37**	0.212*	0.348	3.780***	22.58***	159.7**	1.078***	2.127**
	(0.0726)	(114.2)	(7.809)	(0.114)	(0.381)	(1.159)	(6.811)	(67.99)	(0.325)	(0.869)
Mean	0.133	217.4	27.57	0.144	0.281	1.492	37.43	167.9	2.529	1.675
Std. Dev.	0.341	1041	36	0.369	0.760	3.601	32.77	306.2	1.709	2.020
Optimal BW	119.2	51.15	70.85	75.60	122.1	65.44	65.86	66.94	49.52	76.65
Observations	85	56	73	77	102	59	71	58	35	80

Notes: This table reports the estimated impact of Pugachev's rebellion on public infrastructure and public security in 1820 and 1910, on the numbers of executive council members of the local zemstvo governments in 1883 and civilian administrators in 1897, and on municipal debt in 1910 from the baseline specification (fuzzy GRD), using data from Piadyshev's Atlas of the Russian Empire in 1820, from Nafziger (2011) and from the town level censuses of the Russian Empire in 1897 and 1910. Column (1) reports results for military installations in the vicinity of a town (within 25km) in 1820, Column (2) for the military population in 1910, Column (3) for the number of municipal police officers in 1910, Column (4) for the number of male orthodox monasteries in 1910, Column (5) for the number of mosques in 1910, Column (6) for the length of the district postal road network of a town (in km) in 1910, Column (7) for the street network length (in km) in 1910, Column (8) for the male personal nobility who obtained their rank through military or civil service and officials of non aristocratic background in 1897, Column (9) for the number of executive council members of the local zemstvo governments in 1883, and Column (10) for municipal debt (measured in log of rubles) in 1910 averaged over three consecutive years and as reported on January 1 1910. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

century, this military presence had increased the numbers of police officers and of civilian administrators as well as the fiscal capacity of the local administration.

5.1.2 Beyond Regime Changes

Table 3 examines whether the change in state capacity in the formerly rebel-held area under the imperial regime has persisted to this day. It establishes that in 2016, there was no significantly higher military and police presence on either side of the rebellion boundary, most likely as a result of the policies of state surveillance during the Soviet Union. However, Table 3 also shows that the impact of increased state presence has persisted in modern forms of public infrastructure. In 2019, tertiary roads were 21.79 km longer (1.06 of a standard deviation) and there were 1.28 additional railway stops (0.84 of a standard deviation).

Moreover, Table 3 shows that greater historical state presence within the rebellion territory could still be seen in 2019 in the form of more Orthodox churches and more mosques. While we noted in Table 2 that the state-sponsored policies of religious proselytism led to an increase in the number of Orthodox monasteries in 1910, it is unclear that this present-day result is a direct consequence of greater historical state presence. Such an interpretation could neither account for the destruction of churches and other religious buildings that took place during the Soviet Regime nor for the greater

Table 3 – Public Security and Infrastructure in 2016 and 2019

	Police	Military	Public Sector &	Railway	Road Length by Type			Orthodox		
	Stations	Area	Administration	Stop	Primary	Secondary	Tertiary	Monasteries	Churches	Mosques
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Rebellion	-2.092	0.004	-0.457*	1.278**	12.15	-0.638	21.79**	-0.019	0.058*	0.160**
	(2.514)	(0.006)	(0.243)	(0.532)	(8.550)	(10.55)	(8.853)	(0.113)	(0.031)	(0.072)
Mean	1.608	0.003	0.150	0.824	15.32	20.31	30.88	0.047	0.047	0.116
Std. Dev.	3.509	0.017	0.358	1.522	19.76	20.18	20.46	0.276	0.240	0.437
Optimal BW	128.9	119.1	129.7	66.30	73.14	76.93	56.41	104.5	39.05	43.57
Observations	191	183	301	126	136	136	112	164	91	94

Notes: This table reports the estimated impact of state capacity on measures of contemporary public security and infrastructure from the baseline specification (fuzzy GRD), using data from LiTS and OSM. Column (1) reports results for the number of police stations in 2019, Column (2) for the share of land used by military installations (in km^2) in 2019, Column (3) for respondents of the LiTS that work in the public sector or the public administration in 2016, Column (4) for the number of railway halts, Columns (5–7) for the primary, secondary and tertiary road network length (in km) in 2019, Columns (8–9) for the number of orthodox monasteries and churches, and Column(10) for the number of mosques. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

number of mosques (Yemelianova, 2017). However, there is another explanation which could also account for the slightly negative and significant effect at the 10% level of historical state presence on the share of individuals working in the public sector and public administration: the state has encouraged religious groups to provide welfare services which were once under its provision, and in so doing has enabled the construction of churches and mosques.[15] As such, while the literature on the economics of religion has often shown that increased public spending crowds out religious activities (for a survey, see, e.g., Iyer, 2016), the results in Table 3 suggest the inverse relationship whereby the decline in state presence has enabled a revival of religiosity.

5.2 Local State Capacity and National Economic Policies

This section examines the impact of state capacity on education provision and human capital formation in the formerly rebel-held area from the imperial regime until present. Furthermore, it explores whether state presence in the aftermath of Pugachev's rebellion has contributed to the growth of industries, services and income in the Southern Urals.

5.2.1 Human Capital Formation

Table 4 documents that the increased presence of the state had no effect on the number of school buildings until 1860. However, in the wake of the educational reforms promoted by Alexander II from the 1860s onward, the areas which had experienced the rebellion

[15]For example, in the Urals, the Bolshoi Zlatoust church in Ekaterinburg was destroyed in 1930 but its reconstruction began in 2006 and it was reopened for religious services in 2010. Furthermore, after the fall of the USSR, two large mosques were built in Ufa (Lala Tulpan Mosque and Mosque of the Twenty-Five Prophets) and two large ones were built in Uchaly (Uchaly Nur Mosque and Zaynulla Rasulev Mosque).

and consequently more state presence, began to experience a rise in the number of school openings which persisted until the end of the 19th century. Given that the coefficient associated with the impact of state presence on schools in 1891–1893 is 0.78 (0.71 of a standard deviation) and that the average number of schools in our sample is 0.59, our results suggest that Alexander II's education policies led to the opening of one additional school in every other town within the rebellion boundary.

Table 4 – School Openings in the 19th century

	Until	Between		
	1860	1866–1870	1881–1885	1891–1893
	(1)	(2)	(3)	(4)
Rebellion	-1.061	0.623***	0.975**	0.778*
	(0.688)	(0.173)	(0.460)	(0.446)
Mean	1.081	0.430	0.837	0.585
Std. Dev.	1.093	0.641	1.288	1.089
Optimal BW	52.78	64.06	50.02	66.48
Observations	51	59	50	59

Notes: This table reports the estimated impact of state capacity on the number of school opening in the second half of the 19th century from the baseline specification (fuzzy GRD), using data from the General Primary Education survey at the town level. Column (1) reports results for the number of new schools until 1860, and Columns (2–4) for numbers of schools opening between 1866-1870, 1881-1885, and 1891-1893, respectively. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table 5 – School Types and Pupils in 1895 and 1910

	School Types 1895		Pupils 1895		School Types 1910			Pupils 1910	
	State Secular	Christian Orthodox	Female	Male	Coeducational	All Female	All Male	Female	Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rebellion	0.109	1.733*	155.6**	178.8**	2.365***	1.373***	1.185	185.6*	311.7***
	(0.0750)	(0.941)	(68.34)	(89.21)	(0.870)	(0.529)	(1.072)	(97.76)	(120.5)
Mean	0.0741	1.215	177.1	317	2.090	1.946	3.353	303.9	522.1
Std. Dev.	0.290	1.874	167.8	273	3.018	2.190	3.168	328.5	463.9
Optimal BW	64.31	82.72	72.96	80.80	56.01	63.12	64.19	51.64	79.65
Observations	59	69	64	68	62	70	71	57	80

Notes: The table reports the estimated impact of state capacity on the number of pupils in 1895 and 1910 from the baseline specification (fuzzy GRD), using data from the General Primary Education survey and the census from those years. Columns (1) and (2) report results for the number of state secular and christian orthodox schools in 1895, Columns (3) and (4) for the number of female and male pupils in 1895, Columns (5–7) for the number of coeducational, all female, and all male schools in 1910, and Columns (8) and (9) for the number of female and male pupils in 1910. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Furthermore, Table 5 shows the impact of state presence on the type of schools. While there was no significant difference between the rebel-held and non-rebel held areas in the number of state-funded secular schools in 1895, there were 1.73 additional private Christian Orthodox schools (0.92 of a standard deviation). These Christian Orthodox

schools satisfied the demand for education in smaller towns that the state did not cater to.[16] Moreover, there were significantly more coeducational primary schools and all female primary schools, but no more all male primary schools. There were significantly more female and male primary school pupils in 1895 and 1910. Namely, in 1910, there were 185.6 additional female pupils (0.56 of a standard deviation) and 311.7 additional male pupils (0.67 of a standard deviation) in towns inside the rebellion boundary. Thus, Table 5 suggests that state policies fostered primary schooling for girls while parents favored primary schooling for boys.[17]

Table 6 – Schools and Post-Secondary Education in 2016 and 2019

	School	Post-Secondary Education		
	Buildings	Respondent	Father	Mother
	(1)	(2)	(3)	(4)
Rebellion	2.431**	-0.691***	-0.311	-0.317
	(1.028)	(0.222)	(0.267)	(0.270)
Mean	1.276	0.697	0.529	0.526
Std. Dev.	2.495	0.460	0.500	0.500
Optimal BW	60.28	103.6	138.6	138.6
Observations	119	301	286	293

Notes: The table reports the estimated impact of state capacity on the number of school buildings in 2019 and the share of respondents with higher education attainment in 2016 from the baseline specification (fuzzy GRD), using data from LITS and OSM. Columns (1) reports results for the number of schools in 2019, Columns (2–4) for share of respondents, their father, and mother with post-secondary education levels in 2016. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Finally, Table 6 shows that in 2019, historical state capacity still had an impact as two additional school buildings (one standard deviation) were still located in towns within the rebellion boundary. However, Table 6 also shows that individuals living inside the rebellion boundary were 69.1% less likely to have post-secondary education, even though their parents show no significantly different level of post-secondary education compared to those just outside the boundary. To understand the differences between Tables 4, 5 and 6 whereby areas which were more literate in late 19th century Russia lost their advantage in human capital accumulation, we offer an explanation pertaining to the consequences of historical state presence on industrialization during the Russian imperial regime and the USSR.

[16] This interpretation of our results is supported by the robustness checks in Table C15 showing that there were more state-funded secular schools in the major towns within the former rebel-held areas.

[17] These results should be put in perspective with those from studies on active education policy interventions in currently developing countries that have been shown to benefit girls more than boys (see e.g., Orazem and King, 2008).

5.2.2 Industries, Services, and Income

Tables 7, 8 and 9 assess the impact of greater historical state presence on industries and services under the Russian Empire, under the Soviet regime and in present times. Table 7 establishes that locations inside the boundary of the rebellion were 27% more likely to host a factory in 1820 (0.85 a standard deviation), but this significant effect had disappeared by 1910. In addition, these locations did not have significantly higher numbers of artisanal workshops or open-air markets in 1910. Yet, Table 7 suggests that in 1910, increased state presence had a limited, but nonetheless positive and significant effect on the development of modern factories. Inside the rebellion area, factories employed more workers and the yearly production value per factory worker was about 1 million rubles higher (0.25 of a standard deviation). However, we find no similar effect on the production value per worker in artisanal workshops.

Table 7 – Factories, Workshops, Market Activities in 1820 and 1910

	Factories	Factories	Workshops	Open Markets	Share Workers	Production per Worker	
	1820	1910	1910	1910	1910	Factory 1910	Workshop 1910
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rebellion	0.268***	-2.074	10.21	0.598	0.133**	1.084*	-0.0292
	(0.0922)	(6.337)	(7.052)	(0.658)	(0.0606)	(0.601)	(0.0926)
Mean	0.111	7.246	12.35	2.144	0.0592	1.152	0.227
Std. Dev.	0.315	17.70	40.64	1.831	0.164	4.377	0.553
Optimal BW	61.53	53.02	35.82	80.96	88.58	39.07	50.93
Observations	58	58	46	80	84	47	57

Notes: The table reports the estimated impact of state capacity on factories, workshops and market activities in 1820 and 1910 from the baseline specification (fuzzy GRD), using data from Piadyshev's Atlas of the Russian Empire in 1820 and from the town level census of the Russian Empire in 1910. Column (1) reports results for the presence of at least one factory in the vicinity of a town (within 25km) in 1820, Columns (2–4) for the numbers of factories, workshops, and open markets in 1910, Column (5) for the share of workers in the total population, and Columns (6) and (7) for the production per factory worker and per workshop worker in million rubles in 1910. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

In addition, Table 8 establishes that the NEP which had begun in 1921 had a larger impact within the former rebel-held area. By 1926, each family household had almost one additional member (2.73 of a standard deviation) who was self-employed while every other household had one additional industry worker (16.2 of a standard deviation). Furthermore, following Stalin's policies of forced collectivization after 1928, there was one additional sovkhoz for every 10 grid cells (i.e., 100 km^2) within the rebellion area (0.21 of a standard deviation). However, historical state capacity had no significant effect on the presence of kolkhozes, which had only been tolerated by the communist leadership as an undesirable state of agricultural collectivization. Moreover, we find that there was one additional Gulag every 200 km^2 within the boundary of the rebellion (0.20 of a standard deviation) and that these operated four additional years on average (0.98 of a standard deviation). As such, Table 8 shows that the early economic policies pursued

by the USSR shared a common trait with the development of educational structures in Russia under Alexander II: they were neither implemented uniformly across the country nor in the areas which might potentially have needed them the most (or the least) but where the state, i.e., civil servants and public infrastructure, was already located.[18]

Table 8 – Workforce, Collectivization and Forced Labor in the Soviet Union

	Family households 1926		Collectivization		Gulag	
	Self-Employed	Industrial Workers	Sovkhoz	Kolkhoz	Count	Years in Operation
	(1)	(2)	(3)	(4)	(5)	(6)
Rebellion	0.972**	0.613**	0.101***	-0.0375	0.0569**	4.112**
	(0.435)	(0.269)	(0.0360)	(0.0863)	(0.0247)	(1.984)
Mean	1.805	0.290	0.132	0.187	0.0354	3.489
Std. Dev.	0.356	0.379	0.486	0.844	0.280	4.183
Optimal BW	88.46	46.64	44.40	44.89	53.87	27.22
Observations.	29	19	4585	4636	5544	90

Notes: The table reports the estimated impact of state capacity on industrial development, collectivization, and forced labor from the baseline specification (fuzzy GRD), using data from the town level census of the USSR in 1926 as well as the GeoNames and Memorial databases. Columns (1) and (2) report results for the ratios of self-employed individuals and industry workers to family households in 1926, Columns (3) and (4) for the number of sovkhoz and kolkhoz farms, Columns (5) and (6) for the number of Gulags and the number of years each Gulag operated. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Finally Table 9 shows that in 2016, household incomes were significantly lower inside the rebellion boundary. It also establishes that greater historical state presence has almost no impact on the industrial sector nowadays, in spite of its positive effect in 1926 in Table 8. The share of land in the rebellion area was only 4.2% more likely (1.81 of a standard deviation) to be occupied by industrial plants and quarries in 2019 while the share of the workforce employed in industries in 2016 within the rebellion area was not significantly different from that outside the rebellion area. Table 9 also shows that increased state capacity had no significant impact on the share of land used by commercial and retail outlets in 2019 but a large negative and significant effect on the workforce of the service sector in 2016: an individual within the rebellion boundary was 87.6% less likely to work in the service sector.

Overall, the results in Table 9 on income and the workforce are in line with the negative impact of state presence on human capital formation which we noted above in Table 6 whereby individuals inside the rebellion boundary were less likely to have post-secondary

[18]While there is always some uncertainty about the reliability of official statistics, these concerns may be heightened when it comes to the quality of Soviet data. However, there is no reason to suspect that the civil servants who collected data at the local level or those who worked in the higher echelons of the Soviet bureaucracy systematically biased local statistics to show that the NEP had a positive and significant effect just within the boundary of Pugachev's rebellion. Such data falsification would serve no obvious purpose, and in particular, no propaganda objective of the Soviet regime. If anything, the regressions in Columns (3)–(6) of Table 8 rely on crowd-sourced infrastructure data and show the impact of historical state capacity on the implementation of Soviet policies, thereby providing additional support for the validity of the regressions in Columns (1)–(2).

Table 9 – Income, Occupations and Land Use in 2016 and 2019

	Household	Occupation		Land Use		
	Income	Industry	Services	Commercial & Retail	Industry & Quarry	Farm
	(1)	(2)	(3)	(4)	(5)	(6)
Rebellion	-1.152***	0.191	-0.876***	0.0008	0.0416***	-0.0930*
	(0.340)	(0.217)	(0.283)	(0.0012)	(0.0126)	(0.0508)
Mean	10.39	0.178	0.281	0.0009	0.0199	0.0631
Std. Dev.	0.784	0.383	0.450	0.003	0.026	0.111
Optimal BW	85.74	123.2	112	131.6	49.64	57.03
Observations	232	301	301	194	104	112

Notes: The table reports the estimated impact of state capacity on a household's income, occupations, and the use of land in 2016 and 20219 from the baseline specification (fuzzy GRD), using data from LiTS and OSM. Column (1) reports results for a household's income, Columns (2) and (3) for respondents that work in industry and services, Columns (4–6) for the proportion of the land used by activities of commerce and retail, industry and quarry, and farms. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

education than those outside the boundary. Just as in formerly industrialized regions in Western Europe and in the USA where the workforce did not adapt to changing economic conditions (Franck and Galor, 2021), industrialization within the rebellion boundary entailed a predisposition towards limited investments in human capital. This eventually slowed the acquisition of higher human capital and thus, the transition to modern profitable skill-intensive occupations. As such, these results suggest that greater historical state capacity inside the rebellion boundary did not prevent the industrial decline of the Southern Urals.

5.3 Alternative Explanations and Robustness Checks

This section shows that our main results are not driven by changes in population composition and migration. They are also not explained by a potential standard recovery effect that could affect areas experiencing substantial destruction in physical and human capital during conflicts. Finally, they are also robust to accounting for spatial autocorrelation and using alternative estimation methods.

5.3.1 Population Size, Ethnic Composition and Migration

While our results establish the long-term impact of increased state capacity on local economic development, another explanation for these findings could stem from migratory movements, either free or forced, that occurred after the rebellion. It may indeed be hypothesized that after Pugachev's rebellion, sections of the population moved out of the region because they feared another uprising in the future.[19] Conversely, others may have moved into the region because of opportunities created by the increase in

[19]There is no historical evidence that some individuals moved out of the rebellion area to escape the reach of the state. For a general discussion, see, e.g., Scott (1998).

public infrastructure. Furthermore, Russia experienced substantial migratory movements during the 20th century, some of which were triggered by WWII while others were caused by Stalin's policies of forced relocation of specific ethnic groups. Still, there is no historical evidence suggesting that the rebellion boundary was a focal point for migratory movements after 1775 (Polian, 2004).

To evaluate whether our results might be driven by population movements, we assess the impact of Pugachev's rebellion on the population size and its composition in 1864, 1910 and 2010 in Tables C2 and C3. The results suggest that the change in state capacity at the rebellion's boundary neither entailed differential outcomes in terms of the total population or urban population in 1864, nor on the total population and its ethnic composition in 1910. We also find no effect on the total population in 2010. These robustness checks suggest that our main regression results are unlikely to be driven by migratory movements.

5.3.2 State Response and Catch-up Effect in the Aftermath of Rebellions

It might be hypothesized that the increase in state capacity within Pugachev's rebel-held territory was not a one-time push decided by Catherine II but the usual response of the Russian state to major rebellions. It may also be conjectured that the economic changes inside the rebellion boundary, characterized by higher education following Alexander II's 1860s reforms, forced industrialization in the 1930s and economic decline nowadays, are attributable to the consequences of a standard catch-up effect that follows the destruction of human and physical capital after rebellions as opposed to increased state capacity.

For this purpose, we re-estimate our main results in Tables 2–9 over the boundary of Stepan Razin's rebel-held territory in 1670–1671 in Appendix Tables C4–C11.[20] It was the largest peasant revolt in 17th century Russia and only second to Pugachev's rebellion in Russian history. As can be seen in panel (a) of Figure 2, the territory controlled by Razin at the height of his rebellion had an area size of 690,352 km^2, i.e., 73% of the territory held by Pugachev (O'Neill, 2016).

The results in Table C4 show that the towns within Razin's rebellion territory had a significantly lower fiscal capacity than those outside of it in 1910. While those towns had a more developed road network in 1820, this effect turned out not to be persistent in 1910. In addition, Razin's rebellion had no significant effect on the presence of monasteries, civilian administrators as well as military officers and police forces. Hence, in line with the historical evidence, the robustness checks in Table C4 suggest that neither Tsar Alexis I, who ruled Russia during Razin's revolt, nor his successors (including Catherine II) increased state capacity within the territory held by Razin's rebels.

[20] We estimate a sharp GRD for the boundary of Razin's rebellion, as we lack the information on the movements of the rebels and the Tsarist army to use a fuzzy GRD.

Furthermore, Tables C6, C7 and C9 show that the border of Razin's territory did not experience any major and long-lasting change in economic and educational outcomes under the imperial regime. Thus, our main results in Tables 4, 5 and 7 regarding the impact of Alexander II's state-driven educational policies and the limited development of industries before 1917 cannot be explained by a standard catch-up effect that the Southern Urals could have experienced after the destruction of physical and human capital caused by Pugachev's rebellion.

Finally, Table C5 establishes that nowadays, Razin's former territory is unlike that of Pugachev insofar as it bears no marker of historical state capacity, either in the form of public infrastructure or religious buildings. This lack of historical state capacity is in line with Table C10 showing the insignificant effect of Razin's boundary on the number of Gulags, whose presence proxies for the collectivization of industry during the 1930s. It is also in line with the significant effect of Razin's boundary on the number of kolkhozes and its insignificant impact on the number of sovkhozes, thus suggesting that there was no differential state support for extensive agricultural collectivization in the area during the same time period. It also explains why Tables C8 and C11 show that in 2016, individuals living within Razin's rebellion boundary were richer, less likely to work in the industrial sector and more likely to have a post-secondary degree. This confirms our results in Tables 6 and 9 that the policies of intensive industrialization within Pugachev's territory ultimately had negative effects on economic growth.

5.3.3 Alternative Specifications and Spatial Autocorrelation

To ensure the robustness of our main results in Tables 2–9, we report alternative specifications in Appendix Tables C12–C19. For each variable, Column (1) shows the original result as presented in the main text for reference, Column (2) reports the results using the sharp GRD and Column (3) uses the fuzzy GRD baseline specification with an updated sample that includes the major towns formerly excluded in the main regressions. Column (4) employs Conley standard errors to account for spatial autocorrelation (Conley, 1999, Colella et al., 2019). Column (5) clusters the standard errors at the province level or, when the data allow it, at the sampling unit level (in Tables C13 and C16) or at the grid cell level (in Tables C18 and C19). Columns (6), (7) and (8) use bandwidths of 80 km, 100 km and 120 km respectively. Reassuringly, the size and significance of the estimated coefficients remain similar throughout.

To further test that our main results are not driven by spatial autocorrelation (for a discussion see, e.g., Kelly, 2019), we report Moran's I measures and related statistics in Appendix Tables C20-C27. Overall, as we discuss in more detail in the Appendix, spatial autocorrelation does not seem to be a major issue in our analysis.

6 Conclusion

This study analyzes the effects of increased state capacity on local economic development. It focuses on the aftermath of Yemelyan Pugachev's rebellion in the Southern Urals between 1773 and 1775. To prevent another uprising in that region, Catherine II engineered an increase in state capacity at the border of the formerly rebel-held area that we exploit to assess the long-run impact of state presence at the local level. Focusing on a specific instance of an increase in local state capacity comes at the cost of external validity. Still, it avoids the issues associated with studies that focus on the local long-term effects of two (or more) historical states within a modern country or with cross-country analyses since the Russian state has governed the Southern Urals uninterruptedly since the 18th century. As such, our approach alleviates concerns that the findings can be driven by an omitted variable bias related to differences in cultural and political institutions.

Our results suggest that a change in local state capacity has limited effects on economic growth on its own but fosters the development objectives of the central government at the regional level. Namely, our results show that under the Russian Empire, the local increase in state capacity had been conducive to the development and persistence of activities provided by the state by their very nature, such as national security and public infrastructure. However, increased state capacity did not affect local human capital formation until there was a national political commitment to improve the provision of education from the 1860s onward. Moreover, during the interwar period, the pre-existing local state capacity developed by the imperial regime shaped Soviet economic policies. When Soviet leaders sought to foster small private enterprises, places within the boundary of Pugachev's rebellion experienced a rise in the number of self-employed individuals within family households. Later, when they implemented policies of forced collectivization, the area witnessed an increase in the number of collective farms and camps of forced labor. However, in the absence of relevant public policies, historical state capacity in the Southern Urals has not prevented the present decline in industrial employment or enabled the rise of a service sector. In fact, individuals currently living inside the formerly rebel-held area are poorer and less educated than those living just outside of it.

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Appendix

A Variable Definitions and Descriptive Statistics

A.1 Variable Definitions and Sources

Table 1

Elevation: Average physical elevation in meters within a 10 × 10 km grid-cell. Source: Jarvis et al. (2008).

Slope: A function of a grid-cells surrounding elevation in degrees within a grid-cell. Source: Jarvis et al. (2008), authors' calculation.

Ruggedness: Terrain Ruggedness Index in meters within a grid-cell. Source: Nunn and Puga (2012).

Distance to St. Petersburg: Great circle distance between a grid cells centroid and the centroid of St. Petersburg. Source: Authors' calculation.

Distance to Moscow: Great circle distance between a grid cells centroid and the centroid of Moscow. Source: Authors' calculation.

Precipitation: Long-term average over monthly mean for 1981–2010 in centimeter within a grid-cell. Source: Willmott and Matsuura (2001).

Temperature: Long-term average over monthly mean for 1981–2010 in degree Celsius within a grid-cell. Source: Willmott and Matsuura (2001).

Wheat Potential: Agro-climatically attainable yield in kilogram of dry matter per hectare within a grid-cell. Source: FAO/IIASA (2011).

Caloric Suitability Index: Post-1500 crop based data for the average calories including crops with zero yield within a grid-cell. Source: Galor and Özak (2016).

Factories 1745: Binary indicator equal to one if grid-cell within 25km of a factory or a site of craft production (including iron, glass, brick, leather and textiles) in 1745. Source: Kirilov (1727), geocoded by O'Neill (2016).

Mines 1762: Binary indicator equal to one if grid-cell is within 25km of an open copper mine in 1762. Source: Blanchard (1989).

Population 1763: Logged count (+1) of the population at the district level for European Russia 1763. Source: Kabuzan (1963), coded to mach European Russia as in Castañeda Dower et al. (2018).

Churches 1727: Binary indicator equal to one if grid-cell is within 25km of a church in 1727. Source: Kirilov (1727), geocoded by O'Neill (2016).

Monasteries 1727: Binary indicator equal to one if grid-cell is within 25km of a monastery in 1727. Source: Kirilov (1727), geocoded by O'Neill (2016).

Civil Administrators 1727: Binary indicator equal to one if grid-cell is within 25km of Tsarist officials assigned to chancelleries and other offices. Source: Kirilov (1727), geocoded by O'Neill (2016).

Military Officers 1727: Binary indicator equal to one if grid-cell is within 25km of posted soldiers and officers in 1727. Source: Kirilov (1727), geocoded by O'Neill (2016).

Table 2

Military 1820: Binary indicator equal to one if grid-cell is within 25km of a fortress, forepost, cordon or redoubts in 1820. Source: Piadyshev (1829), geocoded by O'Neill (2016).

Military 1910: Number of military population at the town level in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Police 1910: Number of local police stations at the town level in 1910. Source: Ministerstvo Vnutrennykh Del (1914)

Monasteries 1910: Number of monasteries at the town level in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Mosques 1910: Number of mosques at the town level in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Roads 1820: Length of a district postal road network in km per grid-cell in 1820. Source: Piadyshev (1829), geocoded by O'Neill (2016).

Roads 1910: Length of the road network in km per grid-cell in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Civil Administrators 1897: Number of personal nobility and bureaucrats at the town level in 1897. Source: Troynitsky (1897).

Executive Council 1883: Number of executive council members, uprava, at the local zemstvo administration in 1883. Source: Nafziger (2011).

Municipal Debt 1910: Municipal debt of the town measured in rubels, averaged over three consecutive years, reported as of January 1 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Table 3

Police Stations 2019: Number of police stations at the town level in 2019. Source: OpenStreetMap.

Military Area 2019: Military installations as a share of land use at the town level in 2019.

Source: OpenStreetMap.

Public Sector and Public Administration 2016: Respondent works in the public sector or the public administration at the town level in 2016. Source: Life in Transition Survey.

Railway Stop 2019: Number of railway stops at the town level in 2019. Source: OpenStreetMap.

Primary Roads 2019: Length of the primary road network in km at the town level in 2019. Source: OpenStreetMap.

Secondary Roads 2019: Length of the secondary road network in km at the town level town in 2019. Source: OpenStreetMap.

Tertiary Roads 2019: Length of the tertiary road network in km at the town level in 2019. Source: OpenStreetMap.

Orthodox Monasteries 2019: Number of orthodox monasteries at the town level in 2019. Source: OpenStreetMap.

Orthodox Churches 2019: Number of orthodox churches at the town level in 2019. Source: OpenStreetMap.

Mosques 2019: Number of mosques at the town level in 2019. Source: OpenStreetMap.

Table 4

Schools Opening until 1893: Number of schools opening until 1860, between 1866–1870, between 1881–1885, and between 1891–1893 at the town level. Source: Falbork and Charnoluskii (1900).

Table 5

School Types 1895: Number of state secular and christian orthodox schools at the town level in 1895. Source: Falbork and Charnoluskii (1900).

Pupils 1895: Number of female and male pupils at the town level in 1872. Source: Falbork and Charnoluskii (1900).

School Types 1910: Number of coeducational, all female, and all male schools at the town level in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Pupils 1910: Number of male and female pupils in 1910.
Source: Ministerstvo Vnutrennykh Del (1914).

Table 6

Schools 2019: Number of schools at the town level in 2019. Source: OpenStreetMap.

Post-Secondary Education, Respondent 2016: Respondent has post-secondary education at the town level in 2016. Source: Life in Transition Survey.

Post-Secondary Education, Father 2016: Respondent's father has post-secondary education at the town level in 2016. Source: Life in Transition Survey.

Post-Secondary Education, Mother 2016: Respondent's mother has post-secondary education at the town level in 2016. Source: Life in Transition Survey.

Table 7

Factories 1820: Binary indicator equal to one if grid-cell is within 25km of a factory in 1820. Source: Piadyshev (1829), geocoded by O'Neill (2016).

Factories 1910: Number of factories in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Workshops 1910: Source: Number of workshops in 1910. Ministerstvo Vnutrennykh Del (1914).

Open Markets 1910: Number of open air markets in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Share Workers 1910: Number of all, factory, and workshop workers in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Production per Worker 1910: Production per factory and workshop worker in million rubles at the town level in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Table 8

Self-Employed 1926: Ratio of self-employed individuals to family households at the town level in 1926. Source: Ministerstvo Vnutrennykh Del (1926).

Factory Workers 1926: Ratio to industrial factory workers to family households at the town level in 1926. Source: Ministerstvo Vnutrennykh Del (1926).

Sovkhoz: Number of sovkhozes at the grid cell level. Source: GeoNames.

Kolkhoz: Number of kolkhozes at the grid cell level. Source: GeoNames.

Gulags Count: Number of Gulags at the grid cell level. Source: Memorial.

Gulags Years Open: Number of years each Gulag was in operation at the grid cell level. Source: Memorial.

Table 9

Household Income 2016: Log household net monthly income at the town level in 2016. Source: Life in Transition Survey.

Industry 2016: Respondent works in the industrial sector at the town level in 2016. Source: Life in Transition Survey.

Services 2016: Respondent works in the service sector at the town level in 2016. Source:

Life in Transition Survey.

Land Use, Commercial and Retail 2019: Commercial and Retail areas as a share of land used at the town level in 2019. Source: OpenStreetMap.

Land Use, Industry and Quarry 2019: Industrial and quarry areas as a share of land used at the town level in 2019. Source: OpenStreetMap.

Land Use, Farm 2019: Farm land areas as a share of land used at the town level in 2019. Source: OpenStreetMap.

Table C1

Frequency of Unrest 19th Century: Proportion of years between 1851–1863 for which a disturbance is recorded, devided into all, "large" unrests which spanned several villages or districts, and unrests listed in the Central State Archive of the October Revolution (TsGAOR) at the district level in the 19th century. Source: Castañeda Dower et al. (2018).

Homicides 1910: Number of violent deaths in 1910 at the town level. Source: Ministerstvo Vnutrennykh Del (1912).

Total Deaths 1910: Number of total deaths in 1910 at the town level. Source: Ministerstvo Vnutrennykh Del (1912).

Homicides/Deaths 1910: Ratio of homicides to deaths in 1910 at the town level. Source: Ministerstvo Vnutrennykh Del (1912).

Table C2

Population 1864: Logged count (+1) of the population at the district level for European Russia 1864. Source: Castañeda Dower et al. (2018).

Population 1910: Logged count (+1) of the population at the town level in 1910. Source: Ministerstvo Vnutrennykh Del (1914).

Population 2010: Logged count (+1) of the population at the town level in 2010. Source: All-Russian Population Census 2010.

Table C3

Nationalities 1910: Logged count (+1) of the following populations out of the total population at the town level in 1910: Russians, Armenians, Finns, Germans, Jews, Poles, Turco-Tartars. Source: Ministerstvo Vnutrennykh Del (1914).

A.2 Descriptive Statistics

The following descriptive statistics are organized by table in the main body of the paper and are reported for the standardized bandwidth of 100 km into each side of the boundary.

Table A1 – Descriptive Statistics

	N	*Mean*	*SD*	*Min*	*Max*
Variables from Table 1					
Elevation	7,442	182.6	133.6	-26.18	1,040
Slope	7,442	1.338	1.160	0	10.18
Ruggedness	7,442	33.79	25.87	0	295.5
Distance to St. Petersburg	7,442	1,582	356.5	872.0	2,224
Distance to Moscow	7,442	1,083	419.8	285.9	1,866
Precipitation	7,442	3.802	0.776	1.491	5.669
Temperature	7,442	4.330	2.448	-0.574	11.66
Wheat Potential	7,442	3,514	1,273	1,348	5,805
Caloric Suitability Index	7,442	1301.201	423.544	271.875	2155.32
Factories 1745	7,442	0.0313	0.174	0	1
Mines 1762	7,442	0.0623	0.242	0	1
Population 1763	33	10.601	0.417	8.834	11.265
Churches 1727	7,442	0.113	0.317	0	1
Monasteries 1727	7,442	0.0656	0.248	0	1
State: Civil Administrators 1727	7,442	0.0998	0.300	0	1
State: Military Officers 1727	7,442	0.0161	0.126	0	1
Variables from Table 2					
Military 1820	75	0.173	0.381	0	1
Military 1910	89	117.3	300.1	0	2,213
Police 1910	90	24.08	27.99	0	169
Monasteries 1910	90	0.100	0.302	0	1
Mosques 1910	90	0.322	0.872	0	6
Roads 1820	75	1.754	3.889	0	19.93
Roads 1910	90	34.60	26.62	0	150
Civil Administrators 1897	73	162.7	298.2	4	1,589
Executive Council 1883	62	2.887	1.320	0	6
Municipal Debts 1910	90	1.491	1.939	0	6.306
Variables from Table 3					
Police Stations 2019	156	1.968	4.720	0	40
Military Area 2019	156	0.00419	0.0218	0	0.237
Public Sector & Administration 2016	301	0.159	0.367	0	1
Primary Roads 2019	156	16.43	22.96	0	126.9
Secondary Roads 2019	156	22.12	22.51	0	129.5
Tertiary Roads 2019	156	30.45	22.11	0	136.8
Railway Halt 2019	156	0.878	1.686	0	10
Mosques 2019	156	0.103	0.344	0	2

Table A1 Descriptive Statistics, Continued

	N	*Mean*	*SD*	*Min*	*Max*
Variables from Table 4					
Schools opened until 1860	75	1.093	1.117	0	7
Schools opened 1866-1870	75	0.413	0.639	0	2
Schools opened 1881-1885	75	0.747	1.079	0	5
Schools opened 1891-1893	75	0.493	1.167	0	9
Variables from Table 5					
State Secular Schools 1895	75	0.0800	0.273	0	1
Christian Orthodox Schools 1895	75	1.147	2.110	0	16
Female Pupils 1895	75	163.1	177.8	0	1,157
Male Pupils 1895	75	297.8	304.9	0	1,990
Coeducational primary schools 1910	90	1.933	2.647	0	14
All female primary schools 1910	90	1.811	1.817	0	11
All male primary schools 1910	90	3.067	2.543	0	15
Female Pupils 1910	90	274.9	281.9	0	1,624
Male Pupils 1910	90	465.8	386.5	0	2,022
Variables from Table 6					
Schools 2019	156	1.276	2.906	0	25
Post-Secondary Education Respondent 2016	301	0.748	0.435	0	1
Post-Secondary Education Father 2016	286	0.594	0.492	0	1
Post-Secondary Education Mother 2016	293	0.587	0.493	0	1
Variables from Table 7					
Factories 1820	75	0.107	0.311	0	1
Factories 1910	90	6.822	20.81	0	163
Workshops 1910	90	9.444	25.52	0	141
Open Markets 1910	90	1.822	1.555	0	7
Share Workers 1910	90	0.0628	0.198	0	1.526
Production per Factory Worker 1910	90	0.697	1.495	0	8.099
Production per Workshop Worker 1910	90	0.147	0.457	0	3.088
Variables from Table 8					
Occupation Self-Employed 1926	33	1.799	0.427	0.157	2.579
Occupation Factory Workers 1926	33	0.252	0.333	0.00158	1.451
Collectivization Sovkhoz	9,939	0.139	0.460	0	6
Collectivization Kolkhoz	9,939	0.277	0.940	0	10
Gulag Count	9,939	0.0432	0.341	0	6
Gulag Years Open	248	2.710	2.908	0	12
Variables from Table 9					
Household Income 2016	245	10.25	0.603	6.909	11.78

Table A1 Descriptive Statistics, Continued

	N	*Mean*	*SD*	*Min*	*Max*
Occupation Industry 2016	301	0.176	0.382	0	1
Occupation Services 2016	301	0.286	0.453	0	1
Land Use Farm 2019	156	0.0520	0.0845	0	0.462
Land Use Commercial and Retail 2019	156	0.00121	0.00436	0	0.0364
Land Use Industry and Quarry 2019	156	0.0195	0.0248	0	0.150
Variables from Table C1					
Freq. of Unrest 19th Century	62	0.223	0.1643859	0	0.6
Freq. of Unrest (large events) 19th Century	62	0.071	0.0837387	0	0.3
Freq. of Unrest (TsGAOR) 19th Century	62	0.076	0.0899644	0	0.3
Homicides	123	33.130	108.382	0	866
Total Deaths	123	1778.789	5276.153	45	40153
Homicides/Deaths	123	.017	.0172	0	.117
Variables from Table C2					
Population 1864	62	11.829	0.409	10.552	12.627
Urban Population 1864	62	8.41	1.77	0	11.071
Population 1910	91	9.065	0.984	7.098	11.256
Population 2010	155	10.417	1.258	5.595	13.968
Variables from Table C3					
Population 1910	91	9.065	0.984	7.098	11.256
Russians 1910	91	8.567	2.133	0	11.541
Armenians 1910	91	0.415	1.141	0	4.6245
Finns 1910	91	0.318	1.019	0	4.727
Germans 1910	91	1.392	1.698	0	6.732
Jews 1910	91	1.999	2.117	0	7.184
Poles 1910	91	1.777	1.875	0	7.409
Turco-Tartars 1910	91	3.327	2.677	0	8.837

B Historical Background and the Geography of the Rebellion

B.1 Catherine II's national reforms in the wake of Pugachev's rebellion

In the aftermath of Pugachev's rebellion. Catherine II implemented several political, legal and economic reforms at the national level. Her March 17 1775 decree, which was enacted two months after Pugachev's execution, did not only grant 47 "favors" to various segments of the population but also entailed a set of reforms that progressively rationalized the tax base (officially, the decree celebrated the ratification of the peace treaty with the Ottoman Empire). Catherine II abolished inefficient taxes and redefined the fiscal obligations of the urban population which was divided between a merchant elite and burghers. As she was keen to prevent the merchant elite from monopolizing trade and manufacturing, she stipulated that freed serfs could be a part of the burghers to reaffirm her commitment that free enterprise was open to her subjects. In modern terms, such policies can be seen as a small but significant step toward more cohesive and inclusive institutions.

Catherine II also wanted to strengthen security, notably by rationalizing the selection process of the overseers of local security in the countryside and towns. To this end, she enacted the Police Code on April 8 1782 as well as the twin charters to the nobility and the towns on April 21 1785 that regulated the privilege of Russian aristocrats and redefined the governance of urban society. Those two charters ended the legislative reforms which had begun with the March 17 1775 decree.

It must also be pointed out that Catherine II's policies were not necessarily a break from the past, but sometimes the continuation of the undertakings of Peter I (r. 1682–1725) and his successors. This was particularly true in the case of road construction. Catherine II had already stressed the importance of roads in her 1767 Instruction (Nakaz) and in her April 8 1768 Supplement to the Instruction, but the aftermath of Pugachev's rebellion served as a new impetus to road building. Naturally, the actual construction and management of roads were left to her trusted administrators (Busch, 2008). In turn, the presence of more administrators, as was the case in the Southern Urals after Pugachev's rebellion, meant that more roads would be built.

B.2 Towns in official censuses and in Bairoch's atlas

As discussed in Section 4.2, major towns at the time of the rebellion are a potential confounding factor to our identification strategy. This is because major towns could have already been on a specific economic trajectory prior to the events of 1773–1775 and could also have been of tactical importance to the rebels or to the Tsarist army. Therefore, to mitigate concerns of endogeneity and avoid biased sample selection, we choose to exclude major towns from our analysis. For this purpose, we rely on the population atlas of Bairoch et al. (1988) which highlights major towns in 1750, i.e., before Pugachev's

rebellion. The excluded towns are therefore (using the French spelling of Bairoch et al. (1988)): Astrakhan, Borissoglebsk, Elatma, Kazan, Koungour, Kozmodemiask, Krasnoslobodsk, Mourome, Nijni-Novgorod, Orenbourg, Oufa, Perm, Petrovsk, Pronsk, Saransk, Saratov, Skopine, Tambov, Tcheboksary, Verkhni-Lomov, Volsk, Voronege.

The following list reports locations documented by province as used from the 1910 town level census data. The spelling corresponds to the French original transcription as provided by the Census.

Akmolinsk: Atamansky Khoutor;

Astrakhan: Bolkhouny, Enotaevsk, Kapoustine-Iar, Khanskaya Stavka, Prichib, Sredne-Aktoubinskoe;

Daghestan: Petrovsk, Temir-Khan-Choura;

Ekaterinoslav: Alexandrovsk, Sofievka;

Jaroslavi: Petrovsk;

Kazan: Arsk, Iadrine, Leichev, Mamadyche, Merrinsky Possad (Bourgade), Porokhovya Sloboda, Spassk, Sviajsk, Tchistopol, Tetiouchi,Troitsky Possad (Bourgade), Tsarevokokchaisk, Tsivilsk;

Kostroma: Varnavine, Vetlouga;

Moscou: Bogorodns;

Nijni-Novgorod: Ardatov, Arzamas, Balakhna, Gorbatov, Kniaguinine, Loukoyanov, Piansky Perevose, Potchinki, Semenov, Sergatch, Sormovo, Vassilsoursk;

Orenbourg: Beloretsky (usine), Tcheliabinsk, Troitsk, Verkhneouralsk;

Oufa: Birsk, Koussinsky (usine), Menzelinsk, Satkinsky (usine), Sterlitamak, Zlatoust;

Ouralsk: Lbistchensk (Kalmukov), Temir;

Penza: Bessonovka, Chichkeev, Gorodichtche, Insar, Kerensk, Mokchane, Narovtchate, Ninjni-Lomov, Penza, Tchembar, Troitsk;

Perm: Alopayevsk, Beresovksy (usine), Chadrinsk, Dedioukhine, Dolmatov, Ekaterinbourg, Irbite, Kamychlov, Krasnoonfimsk, Kyehtymsky (usine), Laslinksky (usine), Louchvinsky (usine), Lysvensky (usine), Motovilikha (usine), Nadejdlinsky (usine), Neviansky (usine), Niase-Petrovsky (usine), Nijne-Serguinsky (usine), Nijne-Taguilsky (usine), Okhansk, Ossa, Solikamsk, Verkh-Issetsky (usine), Verkhne-Oufaleisky (usine), Verkhotourie;

Riazan: Kassimov, Ranenbourg, Riajsk, Sapojok, Spassk;

Samara: Balakovo, Bolchaya Glouchitsa, Bougoulma, Bougoulrouslane, Bouzoulouk, Ekaterinenstadt, Novo-Ouzensk, Orlov-Gay;

Saratov: Atkarsk, Balachov, Doubovka (bourgd), Ielane, Kamychine, Khvalynsk, Kouznetsk, Serdobsk, Traritsyne;

Simbirsk: Alatur, Alatyrsky Iamskoy possad, Ardatov, Bouinsk, Karsoun, Kourmyche, Senghiley, Syzrane;

Tambov: Chatsk, Kadome, Kirsanov, Kozlov, Lipetsk, Morchansk, Ousmane, Rasskasovo, Spassk, Temnikov;
Territoire du Don: Constantinovskaya stanitsa, Kamenskaya stanitsa, Nijne-Tchirskaya stanitsa, Ourst-Medveditskaya stanitsa, Ourupinskaya stanitsa, Velikokniajskaya stanitsa;
Tobolsk: Berezov, Ialoutorovsk, Ichime, Kourgane, Tara, Tioumene, Tobolsk, Tourinsk;
Tourgai: Koustanai;
Viatka: Elobouga, Glazov, Iaransk, Ijevsky (usine), Katelnitch, Malmyge, Nolinsk, Orlov, Ourjoume, Sarapoul, Tsarevosantchour, Viatka, Votkinsky (usine);
Vladimir: Gorockhovets, Gousj-Chrostalnu, Melenki, Nikolskoe-Orechovo, Viazniki;
Voronege: Birloutch, Bogoutchar, Boutorlinovka, Constantinova, Kalatch, Kozlovka, Makarovo, Manima, Ninjny-Mamone, Novaya-Tchigia, Novokhopersk, Ourasovo, Pesky, Staraya Krioucha, Troitskoe, Verkhny Mamone.

C Robustness and Placebo Tests for Main Results

C.1 Additional Outcomes

This sub-section presents regression results for the additional outcomes discussed in the main text.

Table C1 – Frequency of Unrest in the 19th Century, and Crime in 1910

	Frequency of Unrest					
	All	Large Events	TsGAOR	Homicides	Total Deaths	Homicides/Deaths
	(1)	(2)	(3)	(4)	(5)	(6)
Rebellion	-0.0109***	-0.00139	-0.00865***	-0.0656	-4.497	0.000184
	(0.00141)	(0.000967)	(0.00241)	(0.471)	(24.68)	(0.000412)
Mean	0.199	0.0634	0.0578	19.43	1061	0.0206
Std. Dev.	0.162	0.0788	0.0798	33.88	1716	0.0293
Optimal BW	46.21	59.78	37.75	200+	200+	200+
Observations	35	42	25	14	14	14

Notes: This table reports the estimated impact of Pugachev's rebellion on the frequency of unrest in the 19th century and the level of crime in 1910. Columns (1–3) use data on 19th century unrest from Castañeda Dower et al. (2018) at the district level for European Russia to test whether districts affected by Pugachev's rebellion experienced more riots. The estimated coefficients are based on a sharp regression discontinuity only, since the movement layer which is used to identify the fuzzy treatment crosses through all districts and therefore does not lead to a different variation. Columns (4–6) report the relationship between Pugachev's rebellion and crime in 1910 at the town level measured by the total number of deaths, deaths by homicides and homicides relative to deaths. We limit the reported towns to our study area which only leads to 14 observations. We consequently refrain from employing an optimal bandwidth selection but choose to include all observations leading to a left-hand side bandwidth of 206 km and a right-hand side bandwidth of 279 km. Resulting estimates suggest a negative but insignificant sign for columns (4) and (5). For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C2 – Population in 1864, 1910 and 2010

	Population			
	Total 1864	Urban 1864	Total 1910	Total 2010
	(1)	(2)	(3)	(4)
Rebellion	-0.004	-0.003	0.713	-0.882
	(0.005)	(0.014)	(0.452)	(0.739)
Mean	11.62	8.730	9.174	10.38
Std. Dev.	0.478	1.302	0.964	1.340
Optimal BW	52.78	64.06	75.66	71.22
Observations	36	43	77	131

Notes: This table reports no difference in population size for those areas located within the treated region compared to those outside in logged (+1) values. Columns (1) and (2) use data for 1864 from Castañeda Dower et al. (2018) at the district level for European Russia. The estimated coefficients are based on a sharp regression discontinuity as the movement layer which is used to identify the fuzzy treatment crosses through all districts and therefore does not lead to a different variation. Columns (3) and (4) for report the population size based on the 1910 town census and the 2010 census data of contemporary towns. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C3 – Population and Ethnic Composition in 1910

	Total Population (1)	Russians (2)	Armenians (3)	Germans (4)	Jews (5)	Turco-Tartars (6)
Rebellion	0.713	0.222	0.0955	0.723	1.269	0.180
	(0.452)	(0.871)	(0.395)	(0.837)	(1.135)	(1.805)
Mean	9.174	8.624	0.454	1.638	2.275	3.191
Std. Dev.	0.964	2.185	1.156	2.007	2.167	2.739
Optimal BW	75.66	45.94	93.75	80.93	91.66	102.8
Observations	77	53	87	80	86	92

Notes: This table reports the lack of impact of Pugachev's rebellion on the logged total population and logged ethnic groups using the town level census of the Russian Empire in 1910. For each outcome, the number of observations varies with the bandwidth. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

C.2 State Response and Catch-up Effect in the Aftermath of Rebellions

Following our discussion in section 5.3.2, this sub-section presents placebo tests for the results in Tables 2-9 over the boundary of Stepan Razin's territory in 1670–1671.

Table C4 – Razin's Revolt: Placebo Test for Table 2

	Military 1820 (1)	Police 1910 (2)	Monasteries 1910 (3)	Roads 1820 (4)	Roads 1910 (5)	Civil Admin. 1897 (6)	Municipal Debt 1910 (7)
Rebellion	-0.191	12.70	0.105	1.622**	-29.48	173.6	-0.424
	(0.216)	(24.45)	(0.108)	(0.825)	(21.32)	(150.3)	(0.888)
Mean	0.0474	32.28	0.119	1.327	46.13	158.7	1.818
Std. Dev.	0.213	51.31	0.385	3.194	45.76	289.1	2.091
Optimal BW	80.58	53.32	34.55	74.19	74.69	82.52	85.05
Observations	74	65	50	65	96	81	112

Notes: This table presents placebo checks for Table 2 as discussed in section 5.3.2. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C5 – Razin's Revolt: Placebo Test for Table 3

	Police Stations (1)	Military Area (2)	Public Sector & Administration (3)	Railway Stop (4)	Road Length by Type: Primary (5)	Road Length by Type: Secondary (6)	Road Length by Type: Tertiary (7)	Orthodox Monasteries (8)	Orthodox Mosques (9)
Rebellion	-0.0954	-1.61e-05	-0.263	0.169	-5.483	0.961	2.784	2.784	-0.437
	(0.120)	(1.58e-05)	(0.202)	(0.364)	(5.340)	(10.01)	(8.346)	(8.346)	(0.301)
Mean	0.0466	2.95e-05	0.171	0.161	4.273	6.788	17	0	0.0573
Std. Dev.	0.503	0.000335	0.377	0.640	13.95	15.76	21.06	0	0.300
Optimal BW	51.74	32.26	881.3	78.70	50.29	65.57	108.1	108.1	72.20
Observations	52	35	543	80	50	67	128	128	73

Notes: This table presents placebo checks for Table 3 as discussed in section 5.3.2. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C6 – Razin's Revolt: Placebo Test for Table 4

	Until	Between		
	1860	1866–1870	1881–1885	1891–1893
	(1)	(2)	(3)	(4)
Rebellion	0.722	0.195	1.747**	1.380
	(0.673)	(0.345)	(0.819)	(0.890)
Mean	1.076	0.455	0.782	0.791
Std. Dev.	1.048	0.731	1.265	1.395
Optimal BW	89.72	65	55.72	62.22
Observations	79	57	45	55

Notes: This table presents placebo checks for Table 4 as discussed in section 5.3.2. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C7 – Razin's Revolt: Placebo Test for Table 5

	School Types 1895		Pupils 1895		School Types 1910			Pupils 1910	
	State Secular	Christian Orthodox	Female	Male	Coeducational	All Female	All Male	Female	Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rebellion	0.326**	1.261	167.1	126.6	6.367	0.990	-0.113	378.7	263.5
	(0.153)	(1.311)	(153.7)	(188.4)	(4.035)	(1.871)	(2.479)	(238.4)	(282.4)
Mean	0.0513	1.325	201.3	362.6	3.500	2.059	3.904	340.3	612.2
Std. Dev.	0.221	1.882	234.1	344.3	6.006	3.439	5.083	471.5	637.9
Optimal BW	52.35	85.20	102.7	77.10	53.72	100.9	99.06	74.06	91.62
Observations	50	87	103	80	72	146	145	103	131

Notes: This table presents placebo checks for Table 5 as discussed in section 5.3.2. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C8 – Razin's Revolt: Placebo Test for Table 6

	School	Post-Secondary Education		
	Buildings	Respondent	Father	Mother
	(1)	(2)	(3)	(4)
Rebellion	-0.143	0.807***	1.278***	1,325
	(0.214)	(0.216)	(0.228)	(6,495)
Mean	0.0681	0.757	0.619	0.605
Std. Dev.	0.423	0.429	0.486	0.489
Optimal BW	72.95	704.1	582.7	77.72
Observations	73	543	525	121

Notes: This table presents placebo checks for Table 6 as discussed in section 5.3.2. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C9 – Razin's Revolt: Placebo Test for Table 7

	Factories	Factories	Workshops	Open Markets	Share Workers	Production per Worker	
	1820	1910	1910	1910	1910	Factory 1910	Workshop 1910
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rebellion	-0.127	13.71*	-0.377	0.110	0.0119	1.014	-0.730
	(0.147)	(8.190)	(14.06)	(1.417)	(0.0247)	(2.274)	(0.863)
Mean	0.0569	7.262	8.579	2.713	0.0285	1.612	0.332
Std. Dev.	0.232	18.34	32.78	1.918	0.107	8.335	2.266
Optimal BW	75.81	37.09	41.81	52.51	51.70	30.52	52.84
Observations	69	53	59	65	64	43	65

Notes: This table presents placebo checks for Table 7 as discussed in section 5.3.2. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C10 – Razin's Revolt: Placebo Test for Table 8

	Family households 1926		Collectivization		Gulag	
	Self-Employed	Industrial Workers	Sovkhoz	Kolkhoz	Count	Years in Operation
	(1)	(2)	(3)	(4)	(5)	(6)
Rebellion	5.801	0.565	-0.0153	0.0395**	0.00964	2.021
	(5.436)	(0.568)	(0.0521)	(0.0186)	(0.0138)	(1.783)
Mean	1.978	0.304	0.134	0.132	0.0293	2.593
Std. Dev.	1.820	0.390	0.556	0.817	0.239	2.582
Optimal BW	147.8	62.82	36.34	21.50	41.43	55.13
Observations	28	13	2812	1668	3215	115

Notes: This table presents placebo checks for Table 8 as discussed in section 5.3.2. Robust standard errors in parentheses. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C11 – Razin's Revolt: Placebo Test for Table 9

	Household	Occupation		Land Use		
	Income	Industry	Services	Commercial & Retail	Industry & Quarry	Farm
	(1)	(2)	(3)	(4)	(5)	(6)
Rebellion	1.377***	-0.353*	0.0970	-2.68e-05	-0.00554	-0.0152
	(0.497)	(0.215)	(0.233)	(2.43e-05)	(0.00455)	(0.0712)
Mean	10.59	0.204	0.260	6.22e-06	0.00302	0.0505
Std. Dev.	1.011	0.404	0.439	4.36e-05	0.0250	0.125
Optimal BW	906.9	839.6	859.2	113.7	42.82	102.2
Observations	421	543	543	134	42	119

Notes: This table presents placebo checks for Table 9 as discussed in section 5.3.2. Robust standard errors in parentheses. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

C.3 Alternative specifications and spatial autocorrelation

Alternative specifications. Following our discussion in section 5.3.3, we present in Appendix Tables C12– C19 alternative specifications to ensure the robustness of our main results in Tables 2–9. Reassuringly, the size and significance of the estimated coefficients remain similar throughout.

Spatial autocorrelation. To test that our main results are not driven by spatial autocorrelation (for a discussion see, e.g., Kelly, 2019), we report Moran's I measures and related statistics for the regression residuals of each significant variable of Tables 2–9 in Appendix Tables C20–C27. To avoid endogenous concerns due to changes in the boundaries of the Russian provinces, we define the distance threshold as the sum of the average distance between all locations as measured by the Vincenty formula and its standard deviation.

For most of our significant outcomes in Tables 2-9, Appendix Tables C20–C27 show that we cannot reject the null hypothesis that there is no spatial autocorrelation at the 5%-level. The only exceptions are some of the educational variables (Christian Orthodox Schools 1895, Schools between 1891-—1893, Schools in 2019, Post Secondary Education of Respondent in 2016), Railway Stops in 2019, Sovkhozes and Gulags as well as present-day measures of income, occupations and land use (Household Income and Occupation Services in 2016 as well as Land Use Farm and Land Use Industry & Quarry in 2019). These results may not be surprising. The development of the school network and of the railroad system would reflect some spatial pattern designed to reach most of the population. Conversely Gulags were usually built in remote areas. Finally, the clustering of agricultural sovkhozes, industries and services (and hence of household income) would reflect agglomeration economies. As such, spatial autocorrelation does not seem to be a major issue in our results, and in any case, does not explain our main findings regarding the increase of state presence in the Southern Urals in the aftermath of Pugachev's rebellion and the local impact of national economic policies.

Table C12 – Robustness Checks for Table 2

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—Military 1820							
Rebellion	0.345***	0.298***	0.344***	0.308***	0.308**	0.304***	0.312***	0.308***
	(0.0726)	(0.0700)	(0.0782)	(0.103)	(0.120)	(0.0884)	(0.0857)	(0.0824)
Effective Obs.	85	85	68	85	85	68	75	85
	Panel (b)—Military 1910							
Rebellion	26.50	23.83	-202.3	120.5*	120.5*	69.33	60.06	120.5*
	(114.2)	(102.0)	(267.4)	(64.58)	(68.34)	(95.76)	(75.83)	(67.53)
Observations	56	56	46	100	100	79	89	100
	Panel (c)—Local Police 1910							
Rebellion	18.37**	16.66**	27.88	14.72*	14.72**	17.81**	11.08	14.72*
	(7.809)	(7.242)	(17.94)	(8.384)	(6.094)	(7.882)	(7.837)	(8.253)
Observations	73	73	90	101	101	80	90	101
	Panel (d)—Monasteries 1910							
Rebellion	0.212*	0.190*	0.289	0.122**	0.122*	0.158*	0.217**	0.122*
	(0.114)	(0.104)	(0.176)	(0.0572)	(0.0665)	(0.0834)	(0.0940)	(0.0713)
Observations	77	77	85	101	101	80	90	101
	Panel (e)—Mosques 1910							
Rebellion	0.348	0.301	0.902	0.328	0.328	0.241	0.256	0.328
	(0.381)	(0.344)	(0.581)	(0.287)	(0.314)	(0.348)	(0.301)	(0.276)
	Panel (f)—Roads 1820							
Rebellion	3.780***	3.357***	3.552***	2.808**	2.808**	3.138***	2.607**	2.808**
	(1.159)	(1.038)	(1.091)	(1.204)	(1.254)	(1.029)	(1.075)	(1.169)
Observations	59	59	74	85	85	68	75	85
	Panel (f)—Roads 1910							
Rebellion	22.58***	20.61***	24.38*	10.88	10.88	19.71*	17.35**	10.88
	(6.811)	(6.345)	(12.87)	(9.840)	(8.650)	(10.71)	(7.405)	(7.710)
Observations	71	71	62	101	101	80	90	101
	Panel (g)—Civil Administrators 1897							
Rebellion	159.7**	141.1**	485.4**	73.13	73.13	116.3	65.81	73.13
	(67.99)	(60.86)	(213.5)	(87.94)	(92.44)	(74.31)	(88.16)	(89.15)
Observations	58	58	57	84	84	66	73	84
	Panel (h)—Executive Council 1883							
Rebellion	1.078***	1.078***	1.078***	1.078***	1.078**	0.685	0.204	-0.203
	(0.325)	(0.325)	(0.325)	(0.340)	(0.392)	(0.428)	(0.437)	(0.516)
Observations	35	35	35	35	35	52	62	73
	Panel (i)—Municipal Revenues 1910							
Rebellion	1.447	1.274	1.301	1.270**	1.270**	1.083	1.158*	1.270**
	(1.009)	(0.902)	(1.008)	(0.620)	(0.572)	(0.736)	(0.647)	(0.610)
Observations	83	83	90	101	101	80	90	101
	Panel (j)—Municipal Expenses 1910							
Rebellion	1.374	1.209	1.406	1.237**	1.237**	1.050	1.111*	1.237**
	(1.007)	(0.900)	(0.997)	(0.630)	(0.582)	(0.739)	(0.652)	(0.615)
Observations	83	83	90	101	101	80	90	101
	Panel (k)—Municipal Debt 1910							
Rebellion	2.127**	1.886**	2.405***	1.877***	1.877**	1.744***	1.911***	1.877***
	(0.869)	(0.768)	(0.791)	(0.555)	(0.719)	(0.592)	(0.591)	(0.553)
Observations	80	80	80	101	101	80	90	101

Notes: This table presents robustness checks for Table 2 as discussed at the beginning of Section C.3. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C13 – Robustness Checks for Table 3

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—Police Stations 2019							
Rebellion	-2.092	-1.990	-1.657	-1.819	-1.819	-1.874	-2.233	-1.885
	(2.514)	(2.372)	(2.482)	(1.843)	(1.755)	(2.579)	(2.488)	(2.190)
Observations	191	191	163	191	191	139	156	183
	Panel (b)—Military Area 2019							
Rebellion	0.00399	0.00386	-0.00198	0.00456	0.00456	-0.000426	0.00109	0.00456
	(0.00551)	(0.00522)	(0.00605)	(0.00461)	(0.00445)	(0.00533)	(0.00470)	(0.00467)
Observations	183	183	146	183	183	139	156	183
	Panel (c)—Public Sector & Administration 2016							
Rebellion	-0.158**	-0.158**	-0.158**	-0.0812	-0.0812	-0.117	-0.0998	-0.0998
	(0.0716)	(0.0716)	(0.0716)	(0.0674)	(0.0648)	(0.0913)	(0.0904)	(0.0904)
Observations	540	540	540	540	540	341	401	401
	Panel (d)—Railway Stop 2019							
Rebellion	1.278**	1.246**	1.329**	1.043***	1.043**	0.561	0.783	0.565
	(0.532)	(0.513)	(0.547)	(0.230)	(0.378)	(0.435)	(0.482)	(0.436)
Observations	126	126	118	126	126	139	156	183
	Panel (e)—Primary Road Length 2019							
Rebellion	12.15	11.94	13.42	10.32	10.32	9.043	4.608	9.691
	(8.550)	(8.315)	(8.706)	(6.320)	(6.134)	(6.617)	(6.233)	(5.869)
Observations	136	136	118	136	136	139	156	183
	Panel (f)—Secondary Road Length 2019							
Rebellion	-0.638	-0.637	10.93	-1.520	-1.520	-1.498	1.661	-1.042
	(10.55)	(10.29)	(14.72)	(6.040)	(6.511)	(8.097)	(7.754)	(6.608)
Observations	136	136	113	136	136	139	156	183
	Panel (g)—Tertiary Road Length 2019							
Rebellion	21.79**	21.45**	20.83**	18.29***	18.29**	9.068	10.93*	5.935
	(8.853)	(8.660)	(8.865)	(7.010)	(7.931)	(7.224)	(6.565)	(6.246)
Observations	112	112	118	112	112	139	156	183
	Panel (h)—Orthodox Monasteries 2019							
Rebellion	-0.0196	-0.0196	0.482*	-0.0561	-0.0561	-0.0176	-0.0497	-0.0244
	(0.113)	(0.109)	(0.261)	(0.109)	(0.102)	(0.111)	(0.120)	(0.124)
Observations	164	164	108	164	164	139	156	183
	Panel (i)—Orthodox Churches 2019							
Rebellion	0.0580*	0.0558*	0.0520*	0.0230	0.0230	-0.0505	-0.0890	-0.0680
	(0.0307)	(0.0296)	(0.0302)	(0.0223)	(0.0229)	(0.0562)	(0.0620)	(0.0559)
Observations	91	91	92	91	91	139	156	183
	Panel (j)—Mosques 2019							
Rebellion	0.160**	0.154**	0.157**	0.112**	0.112**	0.0517	0.0889	-0.0351
	(0.0720)	(0.0700)	(0.0706)	(0.0508)	(0.0531)	(0.0800)	(0.100)	(0.0947)
Observations	94	94	98	94	94	139	156	183

Notes: This table presents robustness checks for Table 3 as discussed at the beginning of Section C.3 with the exception of Column (5) for panel (c) which is clustered at the LiTS primary sampling unit level. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C14 – Robustness Checks for Table 4

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—Schools Opened Until 1860							
Rebellion	-1.061	-0.962	-0.0405	-0.667*	-0.667	-0.0566	0.181	0.105
	(0.688)	(0.618)	(0.666)	(0.389)	(0.487)	(0.493)	(0.441)	(0.406)
Observations	51	51	78	51	51	68	75	85
	Panel (b)—Schools Opened Between 1866-1870							
Rebellion	0.623***	0.553***	0.842***	0.479***	0.479**	0.511***	0.423**	0.336**
	(0.173)	(0.159)	(0.250)	(0.164)	(0.170)	(0.155)	(0.170)	(0.166)
Observations	59	59	68	59	59	68	75	85
	Panel (c)—Schools Opened Between 1881-1885							
Rebellion	0.975**	0.897**	1.709***	0.768***	0.768**	1.173***	0.821***	0.679**
	(0.460)	(0.407)	(0.547)	(0.288)	(0.343)	(0.362)	(0.307)	(0.302)
Observations	50	50	73	50	50	68	75	85
	Panel (d)—Schools Opened Between 1891-1893							
Rebellion	0.778*	0.694*	1.003**	0.539	0.539	0.699*	0.387	0.695*
	(0.446)	(0.400)	(0.401)	(0.349)	(0.359)	(0.372)	(0.337)	(0.395)
Observations	59	59	68	59	59	68	75	85

Notes: This table presents robustness checks for Table 4 as discussed at the beginning of Section C.3. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C15 – Robustness Checks for Table 5

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—State Secular Schools 1895							
Rebellion	0.109	0.1000	0.366*	0.107*	0.107*	0.111*	0.0738	0.0944*
	(0.0750)	(0.0669)	(0.208)	(0.0581)	(0.0584)	(0.0574)	(0.0603)	(0.0550)
Observations	59	59	78	59	59	68	75	85
	Panel (b)—Christian Orthodox Schools 1895							
Rebellion	1.733*	1.490*	2.133***	1.325*	1.325*	1.311*	0.933	1.286*
	(0.941)	(0.822)	(0.812)	(0.723)	(0.645)	(0.769)	(0.673)	(0.682)
Observations	69	69	68	69	69	68	75	85
	Panel (c)—Female Pupils 1895							
Rebellion	155.6**	135.1**	230.8***	118.7***	118.7**	120.9**	130.5**	110.8**
	(68.34)	(60.50)	(67.90)	(44.66)	(43.57)	(52.81)	(53.54)	(50.86)
Observations	64	64	68	64	64	68	75	85
	Panel (d)—Male Pupils 1895							
Rebellion	178.8**	153.8**	295.3***	143.5**	143.5**	143.5*	147.4*	147.1*
	(89.21)	(78.24)	(92.19)	(66.86)	(61.55)	(77.22)	(84.72)	(83.28)
Observations	68	68	70	68	68	68	75	85
	Panel (e)—Coeducational Schools 1910							
Rebellion	2.365***	2.192***	2.364***	2.051***	2.051**	1.289**	0.740	1.101
	(0.870)	(0.809)	(0.632)	(0.670)	(0.778)	(0.582)	(0.745)	(0.767)
Observations	62	62	80	62	62	80	90	101
	Panel (f)—All Female Schools 1910							
Rebellion	1.373***	1.262***	1.919**	1.039***	1.039**	0.597	0.924*	0.535
	(0.529)	(0.484)	(0.902)	(0.372)	(0.370)	(0.438)	(0.537)	(0.499)
Observations	70	70	101	70	70	80	90	101
	Panel (g)—All Male Schools 1910							
Rebellion	1.185	1.090	2.266	1.079	1.079*	0.734	0.709	0.782
	(1.072)	(0.979)	(1.460)	(0.682)	(0.568)	(0.697)	(0.717)	(0.694)
Observations	71	71	99	71	71	80	90	101
	Panel (h)—Female Pupils 1910							
Rebellion	185.6*	167.6*	226.8**	159.3**	159.3*	150.5**	146.3*	133.6*
	(97.76)	(86.33)	(113.7)	(68.46)	(85.02)	(66.33)	(78.68)	(67.91)
Observations	57	57	90	57	57	80	90	101
	Panel (i)—Male Pupils 1910							
Rebellion	311.7***	276.3**	626.0***	255.7**	255.7**	255.7**	257.4**	282.4**
	(120.5)	(110.2)	(241.6)	(104.7)	(118.8)	(103.9)	(126.1)	(128.0)
Observations	80	80	103	80	80	80	90	101

Notes: This table presents robustness checks for Table 5 as discussed at the beginning of Section C.3. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C16 – Robustness Checks for Table 6

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—School Buildings 2019							
Rebellion	2.431**	2.366**	3.205***	1.956***	1.956**	0.215	-0.0337	-0.0662
	(1.028)	(0.988)	(1.031)	(0.709)	(0.742)	(0.906)	(0.882)	(0.836)
Observations	119	119	98	119	119	139	156	183
	Panel (b)—Post-Secondary Education Respondent 2016							
Rebellion	-0.690***	-0.690***	-0.368***	-0.479	-0.479	-0.415**	-0.479**	-0.479**
Observations	301	301	540	301	301	241	301	301
	Panel (c)—Post-Secondary Education Father 2016							
Rebellion	-0.305	-0.305	-0.536***	-0.292	-0.292	-0.264	-0.292	-0.292
	(0.279)	(0.279)	(0.0623)	(0.465)	(0.520)	(0.226)	(0.225)	(0.225)
Observations	286	286	188	286	286	232	286	286
	Panel (d)—Post-Secondary Education Mother 2016							
Rebellion	-0.320	-0.320	-0.559***	-0.299	-0.299	-0.240	-0.299	-0.299
	(0.286)	(0.286)	(0.0872)	(0.420)	(0.472)	(0.227)	(0.225)	(0.225)
Observations	293	293	487	293	293	235	293	293

Notes: This table presents robustness checks for Table 6 as discussed at the beginning of Section C.3 with the exception of Column (5) for panels (b)–(d) which are clustered at the LiTS primary sampling unit level. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C17 – Robustness Checks for Table 7

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—Factories 1820							
Rebellion	0.268***	0.239***	0.260**	0.212**	0.212	0.176**	0.151	0.122
	(0.0922)	(0.0809)	(0.101)	(0.102)	(0.123)	(0.0843)	(0.0937)	(0.0962)
Observations	58	58	64	58	58	68	75	85
	Panel (b)—Factories 1910							
Rebellion	-2.074	-1.852	3.373	-0.829	-0.829	3.803	4.503	6.751**
	(6.337)	(5.650)	(3.893)	(4.812)	(4.876)	(2.682)	(2.880)	(3.193)
Observations	58	58	80	58	58	80	90	101
	Panel (c)—Workshops 1910							
Rebellion	10.21	9.379	17.38*	11.50**	11.50*	12.38**	12.33**	11.11**
	(7.052)	(6.444)	(10.27)	(5.031)	(5.618)	(5.693)	(5.161)	(4.624)
Observations	46	46	54	46	46	80	90	101
	Panel (d)—Open Markets 1910							
Rebellion	0.598	0.527	0.330	0.683	0.683	0.683	0.771	0.765
	(0.658)	(0.588)	(0.688)	(0.567)	(0.584)	(0.558)	(0.538)	(0.491)
Observations	80	80	81	80	80	90	101	
	Panel (e)—Share Workers 1910							
Rebellion	0.133**	0.117**	0.124**	0.110**	0.110*	0.0706	0.0980*	0.0914*
	(0.0606)	(0.0544)	(0.0600)	(0.0457)	(0.0558)	(0.0451)	(0.0496)	(0.0461)
Observations	84	84	96	84	84	80	90	101
	Panel (f)—Production per Factory Worker 1910							
Rebellion	1.084*	0.993*	-0.815	0.774*	0.774	0.562	0.321	0.245
	(0.601)	(0.554)	(1.604)	(0.432)	(0.440)	(0.451)	(0.489)	(0.493)
Observations	47	47	113	47	47	80	90	101
	Panel (g)—Production per Workshop Worker 1910							
Rebellion	-0.0292	-0.0262	0.00286	-0.0130	-0.0130	-0.0237	0.0362	0.0243
	(0.0926)	(0.0826)	(0.0957)	(0.0669)	(0.0644)	(0.0719)	(0.0741)	(0.0666)
Observations	57	57	64	57	57	80	90	101

Notes: This table presents robustness checks for Table 7 as discussed at the beginning of Section C.3. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C18 – Robustness Checks for Table 8

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—Self-Employed in Family Households 1926							
Rebellion	0.972**	0.895**	0.628**	0.786**	0.786*	0.683*	0.646*	0.535*
	(0.435)	(0.383)	(0.285)	(0.307)	(0.372)	(0.359)	(0.346)	(0.304)
Observations	29	29	31	29	29	28	33	40
	Panel (b)—Industrial Workers in Family Households 1926							
Rebellion	0.613**	0.562**	0.512**	0.335*	0.335	0.624*	0.298	0.198
	(0.269)	(0.250)	(0.220)	(0.175)	(0.204)	(0.346)	(0.184)	(0.164)
Observations	19	19	26	19	19	28	33	40
	Panel (c)—Collectivization Sovkhoz							
Rebellion	0.0789**	0.0727**	0.101***	0.0792*	0.0792**	0.0634**	0.0723***	0.0770***
	(0.0385)	(0.0360)	(0.0360)	(0.0453)	(0.0314)	(0.0249)	(0.0225)	(0.0208)
Observations	4,004	4,004	4,585	4,004	4,004	6,116	7,442	8,705
	Panel (d)—Collectivization Kolkhoz							
Rebellion	-0.0435	-0.0396	-0.0375	-0.0535	-0.0535	-0.131**	-0.110**	-0.0239
	(0.111)	(0.103)	(0.0863)	(0.110)	(0.0870)	(0.0597)	(0.0514)	(0.0468)
Observations	3,585	3,585	4,636	3,585	3,585	6,116	7,442	8,705
	Panel (e)—Gulag Count							
Rebellion	-0.0498**	-0.0486**	0.0569**	-0.0441	-0.0441**	-0.0243	-0.0549***	-0.0591***
	(0.0247)	(0.0239)	(0.0247)	(0.0697)	(0.0207)	(0.0218)	(0.0199)	(0.0183)
Observations	6,772	6,772	5,544	6,772	6,772	6,116	7,442	8,705
	Panel (f)—Gulags Years in Operation							
Rebellion	2.868	2.868	4.112**	2.046	2.046	-0.691	-0.232	3.226***
	(1.861)	(1.861)	(1.984)	(1.307)	(1.551)	(1.014)	(0.948)	(1.084)
Observations	44	44	90	44	44	136	177	222

Notes: This table presents robustness checks for Table 8 as discussed at the beginning of Section C.3 with the exception of Column (5) for panels (c)–(f) which are clustered at the grid cell level. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C19 – Robustness Checks for Table 9

	Baseline			Standard Errors		Bandwidth		
	Fuzzy	Sharp	Major Towns	Conley	Clustered	80km	100km	120km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (a)—Household Income 2016							
Rebellion	-1.166***	-1.166***	-1.939	-0.734**	-0.734	-0.740***	-0.717***	-0.717***
	(0.321)	(0.321)	(1.836)	(0.368)	(0.427)	(0.257)	(0.256)	(0.256)
Observations	221	221	151	221	221	198	245	245
	Panel (b)—Occupation in Industry 2016							
Rebellion	0.185	0.185	0.0119	0.113	0.113	0.0893	0.113	0.113
	(0.221)	(0.221)	(0.0762)	(0.117)	(0.140)	(0.157)	(0.156)	(0.156)
Observations	301	301	540	301	301	241	301	301
	Panel (c)—Occupation in Services 2016							
Rebellion	-0.876***	-0.876***	-0.316***	-0.685***	-0.685***	-0.678***	-0.685***	-0.685***
	(0.296)	(0.296)	(0.101)	(0.181)	(0.196)	(0.213)	(0.212)	(0.212)
Observations	301	301	540	301	301	241	301	301
	Panel (d)—Land Use: Commercial & Retail 2019							
Rebellion	0.000786	0.000751	0.00146	0.000489	0.000489	0.000991	0.000471	0.000626
	(0.00115)	(0.00109)	(0.000976)	(0.00107)	(0.000970)	(0.00106)	(0.00107)	(0.00103)
Observations	194	194	146	194	194	139	156	183
	Panel (e)—Land Use: Industry & Quarry 2019							
Rebellion	0.0416***	0.0408***	0.0339***	0.0368***	0.0368***	0.0128	0.00680	0.00265
	(0.0126)	(0.0123)	(0.00814)	(0.00897)	(0.0103)	(0.00796)	(0.00788)	(0.00768)
Observations	104	104	92	104	104	139	156	183
	Panel (f)—Land Use: Farm 2019							
Rebellion	-0.0930*	-0.0916*	-0.0906*	-0.0800*	-0.0800	-0.0431	-0.0281	-0.0225
	(0.0508)	(0.0495)	(0.0484)	(0.0463)	(0.0521)	(0.0380)	(0.0413)	(0.0368)
Observations	112	112	117	112	112	139	156	183

Notes: This table presents robustness checks for Table 9 as discussed at the beginning of Section C.3 with the exception of Column (5) for panel (a) which is clustered at the LiTS primary sampling unit level. Robust standard errors in parentheses. $^{***}: p < 0.01$; $^{**}: p < 0.05$; $^{*}: p < 0.1$.

Table C20 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 2

	Military 1820 (1)	Police 1910 (2)	Monasteries 1910 (3)	Roads 1820 (4)	Roads 1910 (5)	Civil Admin. 1897 (6)	Municipal Debt 1910 (7)
Moran I	0.001	-0.005	-0.012	-0.007	0.002	-0.010	-0.009
Moran I z-score	1.710	0.195	-1.583	0.162	1.922	-0.546	-0.832
Moran I p-value	0.087	0.846	0.114	0.871	0.055	0.585	0.405
Distance Threshold	1111.711	1129.356	1129.356	1111.711	1129.356	1154.814	1129.356

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 2.

Table C21 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 3

	Public Sector & Administration 2016 (1)	Railway Stop 2019 (2)	Tertiary Roads 2019 (3)	Orthodox Churches 2019 (4)	Mosques 2019 (5)
Moran I	0.002	0.015	0.012	-0.008	-0.005
Moran I z-score	2.597	8.585	7.004	-2.386	-0.733
Moran I p-value	0.009	0.000	0.000	0.017	0.464
Distance Threshold	1152.158	1140.077	1140.077	1140.077	1140.077

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 3.

Table C22 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 4

	Schools Opened Between		
	1866–1870 (1)	1881–1885 (2)	1891–1893 (3)
Moran I	-0.009	-0.004	0.001
Moran I z-score	-0.336	0.618	1.808
Moran I p-value	0.737	0.537	0.071
Distance Threshold	1111.711	1111.711	1111.711

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 4.

Table C23 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 5

	Christian Orthodox	Pupils 1895		School Types 1910		Pupils 1910	
	School 1895 (1)	Female (2)	Male (3)	Coeducational (4)	All Female (5)	Female (6)	Male (7)
Moran I	0.009	-0.004	-0.002	0.001	-0.003	-0.009	-0.005
Moran I z-score	3.371	0.654	1.117	1.770	0.670	-0.639	0.156
Moran I p-value	0.001	0.513	0.264	0.077	0.503	0.523	0.876
Distance Threshold	1111.711	1111.711	1111.711	1129.356	1129.356	1129.356	1129.356

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 5.

Table C24 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 6

	Schools 2019 (1)	Post-Secondary Education Respondent 2016 (2)
Moran I	0.014	-0.008
Moran I z-score	8.126	-2.574
Moran I p-value	0.000	0.010
Distance Threshold	1140.077	1152.158

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 6.

Table C25 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 7

	Factories 1820 (1)	Share Workers 1910 (2)	Production per Factory Worker 1910 (3)
Moran I	-0.010	0.001	-0.011
Moran I z-score	-0.535	1.827	-1.536
Moran I p-value	0.593	0.068	0.125
Distance Threshold	1111.711	1129.356	1129.356

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 7.

Table C26 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 8

	Family households 1926			Gulag	
	Self-Employed (1)	Industrial Workers (2)	Sovkhoz (3)	Count (4)	Years in Operation (5)
Moran I	-0.021	-0.012	-0.002	-0.003	0.015
Moran I z-score	-0.512	0.290	-79.610	-111.058	13.200
Moran I p-value	0.609	0.772	0.000	0.000	0.000
Distance Threshold	1186.886	1186.886	1283.008	1283.008	1107.659

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 8.

Table C27 – Moran's I for Spatial Autocorrelation in Regression Residuals of Table 9

	Household	Occupation	Land Use	
	Income (1)	Services (2)	Industry & Quarry (3)	Farm (4)
Moran I	0.034	0.002	0.022	0.045
Moran I z-score	16.075	2.792	11.750	23.014
Moran I p-value	0.000	0.005	0.000	0.000
Distance Threshold	1097.471	1152.158	1140.077	1140.077

Notes: The table presents Moran's I test and associated statistics where the null hypothesis is that there is no spatial autocorrelation in the residuals of the regressions with significant results in Table 9.