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Fading Legacies: Human Capital in the Aftermath of the  
Partitions of Poland

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## Fading Legacies: Human Capital in the Aftermath of the Partitions of Poland\*

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### Abstract

This paper studies the longevity of historical legacies in the context of the formation of human capital. The Partitions of Poland (1772-1918) represent a natural experiment that instilled Poland with three different legacies of education, resulting in sharp differences in human capital among the Polish population. I construct a large, unique dataset that reflects the state of schooling and human capital in the partition territories from 1911 to 1961. Using a spatial regression discontinuity design, I find that primary school enrollment differs by as much as 80 percentage points between the partitions before WWI. However, this legacy disappears within the following two decades of Polish independence, as all former partitions achieve universal enrollment. Differences in educational infrastructure and gender access to schooling simultaneously disappear after WWI. The level of literacy converges likewise across the former partitions, driven by a high intergenerational mobility in education. After WWII, the former partitions are not distinguishable from each other in terms of education anymore.

JEL Codes: N34, I20, O15, H75

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# 1 Introduction

The consensus of the empirical literature on economic history is that history matters (Nunn, 2009). Indeed, it would be rather surprising if history did not matter: As Wittenberg (2015) points out, *any* present outcome must necessarily result from *some* prior causal factor. A legacy from the past is therefore as much a product of history as a non-legacy.

This paper studies the longevity of historical legacies in human capital. The Partitions of Poland (1795-1918) represent a large-scale natural experiment that instilled the country of Poland with three different legacies of education. After having forcibly divided the Polish population among the empires of Austria, Prussia and Russia, the partitions bequeathed sharply diverging economic and social conditions by the time their territories were merged into a common Polish state again.

Investigating the longevity of these imperial legacies is particularly worthwhile considering the history of Poland *after* the partitions: World War I, the regained independence, World War II, the era of communism, and the transition to a democratic market economy all represent further far-reaching and drastic episodes of Polish history. How have these events interacted with and potentially altered the legacies of the partitions?

This paper provides an answer to this question by decompressing these episodes of Polish history in the spirit of Austin (2008). First, I present evidence on the actual extent to which the partitions had impacted human capital in Poland before WWI. Second, I examine how these differences have evolved over time after the downfall of the empires. Third, I study channels and drivers of this evolution.

For this purpose, I construct a unique georeferenced dataset on school enrollment and human capital covering the partition territories over the time period 1911-1961. Figure 1 displays the partition territories (a) within the national boundaries of the Polish state between 1918 and 1939 and (b) within the boundaries of Poland since 1944. Using the exogeneity of the partition borders for a spatial regression discontinuity (RD) design along the Austrian-Russian and Prussian-Russian borders, I find that primary school enrollment differs by as much as 80 percentage points between the partitions before WWI. However, my results obtained for subsequent time periods show that this legacy disappears within the following two decades of Polish independence, as all former partitions achieve universal enrollment. There is no evidence for a rebound during the communist era after WWII. The level of literacy converges likewise across the former partitions, driven by a high intergenerational mobility in education. After WWII, the former partitions are not distinguishable from each other anymore. My results hence correspond to those of Grosfeld & Zhuravskaya (2015), who find no educational disparities along the former partition borders in present-day Poland anymore.

I further explore what the evolution of human capital in the aftermath of the Partitions of Poland can teach about when history persists and when it does not persist. First, I consider the importance of the provision of an educational infrastructure as a precondition for the convergence of the former partitions in terms of school enrollment. Indeed, the data suggest substantial improvements in both the density of the school network and the quality of schools in the former Russian partition. Second, my analysis turns toward ethnic-religious characteristics of the population that might introduce heterogeneity to the convergence process. However, neither the presence of minorities, nor the emigration of Germans after WWI substantially influence the observed patterns of alignment. Third, I differentiate the convergence of the former partitions by gender: Primary school enrollment in the Russian partition was not only low, but also unequally distributed among the sexes to the detriment of females. After WWI, the gender imbalance in access to primary schooling disappears, suggesting that the Russian partition had no lasting effect in this regard neither.

In addition, this paper makes a methodological contribution: To the best of my knowledge, it is the only study so far which utilizes data from the early 19th century in order to test for pre-existing differences at the partition borders before the latter’s final definition in 1815. The results reinforce the validity of the partition borders for spatial RD designs.

More generally, human capital represents an intriguing object for the study of persistence in economic history. In contrast to institutions and technology, which have been found to be persistent by works such as Acemoglu et al. (2001), Michalopoulos & Papaioannou (2013) and Comin et al. (2010), human capital is characteristically tied to the human that has acquired it (Romer, 1990). Consequently, any persistence of human capital must also inevitably be embodied by the underlying population. While this may suggest a natural limit to this persistence, there is evidence for deep determinants of human capital accumulation that persist over long periods of time.

In this context, Bukowski (2019) also looks for long-run effects of the Partitions of Poland. He finds a legacy of the Austrian-Hungarian Empire on the intensive margin of education in the form of higher student test performance today on the Austrian side of the former border. Complementary evidence suggests that it was transmitted through positive social norms toward education resulting from the liberal Austrian rule. In contrast, I focus on the extensive margin of education in the form of enrollment and educational attainment, where I find no lasting impact of the partitions.

Valencia (2015) finds a positive long-run impact of Jesuit missions in Latin America on human capital today despite the abandonment of the missions already in the 18th century. He identifies occupational persistence, intergenerational knowledge transmission and indigenous assimilation as important channels of persistence. Given that my focus lies more on the

evolution of the historical legacy than on its existence, I rely entirely on historical data, which does not allow exploring these channels in the same depth. For the same reason, however, my study is able to estimate the effects of the partitions on human capital when the partitions are still in place, i.e. before WWI, while more than one century passes between the closure of the Jesuit missions and the first available outcome data in Valencia (2015).

Furthermore, Dupraz (2017) studies the persistence of a historical legacy in education along an arbitrarily drawn border. He finds that the former British part of colonial Cameroon originally had an advantage in education relative to the part colonized by the French. While this advantage initially disappears following Cameroonian independence, it reemerges at higher levels of education due to the persistence of detrimental French regulations in the educational system in the former French part. My results do not point to a similar reappearance in the Polish case and higher levels of education appear to not have been affected by the partitions.

My paper further contributes to the literature on the intergenerational transmission of human capital. Sacerdote (2005) studies the convergence of educational outcomes between former slaves and free blacks in the United States following the abolition of slavery. His results suggest that it takes about two generations for the descendants of the former slaves to catch up to the descendants of the free blacks, which is very similar to the duration of convergence found in the Polish case. Black et al. (2005) use regional variation in the expansion of compulsory schooling in Norway as an IV to examine the causal link between parents' education and that of their children. The schooling reform succeeds in increasing the education of the parents, but the latter's effect on the education of the children is weak. Card et al. (2018) find that educational quality was a strong determinant of upward educational mobility in the US during the first half of the 20th century. I observe a strong upward mobility in basic education at the low end of the human capital distribution after WWI, which is accompanied by an expansion of the educational infrastructure.

The remainder of the paper is structured as follows: Section 2 provides the historical context. Section 3 presents the data. Section 4 states the identification strategy and a discussion of its validity within the framework of the Partitions of Poland. Section 5 presents the results on the effects of the partitions on inputs and outputs of education production in Poland over the period 1911-1961, followed by a series of robustness checks. The same section further considers gender differences in access to education. Section 6 concludes.

## 2 Historical context

### 2.1 Prelude

The Partitions of Poland represent one of many drastic watersheds in Polish history. For more than a century, Poland did not exist as an independent state: In 1772, the three neighboring powers of the Polish-Lithuanian Commonwealth, namely Prussia, Austria and Russia, had forcefully begun to divide the territory of the large, but weakening Commonwealth among each other. These actions culminated in the dissolution of the Commonwealth and simultaneously in the end of Polish statehood in 1795. Only by the end of WWI, when the Austrian-Hungarian Empire had fallen apart, the Russian Empire had descended into civil war, and the German Empire had been forced to declare a truce, Polish independence was restored in form of the Second Polish Republic<sup>1</sup>.

However, Poland could hardly be called a unified nation in 1918. Its borders to the west were still to be finalized by the Treaty of Versailles, while its eastern borders were soon to be extended as a result the Polish-Soviet war (1919-1921). It was further still deeply divided within, as the three empires had clearly left their marks on the Polish lands. By the time the borders between the former partitions were lifted, the latter differed substantially along several dimensions, both materially and less visibly in terms of culture and institutions. At the brink of their independence, the Poles therefore saw themselves confronted with the task of consolidating the three former partitions into one national state. This challenge was particularly pronounced in the realm of education, where the empires had left behind drastically different legacies: Primary schooling had already been mandatory in Prussia and Austria-Hungary for decades; by contrast it had never been established in compulsory form in the Russian Empire. The empires hence created the conditions for the emergence of large disparities in educational attainment between the populations of the partitions. Consequently, addressing these disparities became the prime goal of educational policy in the following decades of Polish independence.

The accounts in the remainder of this section serve two purposes: First, I characterize the population composition of Poland from the time of the imperial partitions to the period of communism. Studying the evolution of Poland's human capital within the framework of the Polish partitions requires paying attention to the simultaneous evolution of the population that embodies the human capital at various points in time. If this population was prone to migrate between the partitions during the imperial era, these movements would represent a

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<sup>1</sup>While it was in fact an elective monarchy, the Polish-Lithuanian Commonwealth was called *Rzeczpospolita* (Republic) in Polish; hence the designation *Second* Polish Republic for the Polish state that existed between the world wars.

threat to the identification strategy outlined in Section 4.1. Skilled migration in particular has been shown to have long-run effects on development (Hornung, 2014); it could therefore obscure or inflate any causal effects of the partitions. Population movements that occurred after WWI would in turn raise the question whether migration operated as a mechanism of convergence (or divergence) in human capital besides the effects of educational reform. This question is considered in greater detail in Section 5.3. Second, I sketch the various educational policies that were in place over the course of time. Prior to WWI, they highlight why the three partitions diverged so strongly in terms of human capital under the different imperial reigns. After WWI, they express the efforts of the Polish authorities to reverse the past divergence by providing comprehensive access to education.

## 2.2 Population composition

The absence of a Polish state between 1795 and 1918 makes it necessary to rely on information other than nationality to characterize the population of the three partitions. The literature (both historic and contemporary) infers the number of Poles from either the mother tongue (Polish) or the religion (Roman-Catholic) of the imperial populations. Based on this approach, a compilation of imperial census statistics by Gawryszewski (2005, p.245) suggests that the majority of the population of the partition territories that are still part of Poland today was Polish at the turn of the 20th century. Only counties that bordered the remainder of the respective empires were more mixed in ethnic and linguistic terms. The urban areas of the Prussian partition posed an exception to Polish predominance: Poznan was the only major city in the partition where the number of Poles surpassed the number of Germans. Jews represented a sizable minority both in the Russian and Austrian partitions.

While difficult to assess, population movements across the partition borders appear to have been a very limited phenomenon. For example, according to the Russian Imperial Census of 1897, only 1.3% of the inhabitants of the Kingdom of Poland were born in a foreign country (Gawryszewski, 2005). Similarly, only 1.2% of the inhabitants of Galicia were foreign-born according to the population census of the Austrian-Hungarian Empire of 1910 (Bureau der K.K. Statistischen Zentralkommission, 1914). This may not surprise given that the partition boundaries represented actual national borders. In addition, Davies (2005) suggests that border enforcement was particularly harsh on the Russian side.

The Second Polish Republic, lasting from 1918 to 1939, was at its core the composite of the three former partition territories. The eastern territories that Poland had annexed after the Polish-Soviet war did not remain part of Poland after WWII; therefore I disregard them in the following.



Due to the inherited heterogeneity of the three partitions, Poland between the world wars can be equally characterized as a multi-ethnic, multi-lingual, and multi-religious country. In some places, this diversity entailed conflict. While the Austrian-German presence in Galicia had already been very weak before WWI, the lands of the former Prussian provinces of Posen and West Prussia housed a sizable German minority on the verge of the Polish takeover. An emigration movement soon took hold of this population group for reasons outlined by Blanke (1993): While the Polish constitution of 1921 granted every citizen the right of preserving her/his nationality and developing her/his mother-tongue and national characteristics, the constitutional provisions quickly became subject to interpretations regarding whether they applied to entire minority groups, or just to individuals. In effect, German was never recognized as a second official language in the interwar republic. This created the necessity for German officials and associations to demonstrate their proficiency in Polish in order to keep their positions and accreditations; a necessity that many of them could not meet. Unrest among the German population therefore soon resulted in emigration. How much of the German exodus from the former Prussian partition was the result of panic among the Germans compared to deliberate emigration for economic reasons or forceful displacement remains a matter of historical debate. But that emigration took place at a large scale is an undisputed fact (Blanke, 1993): The pre-WWI German population of the Prussian partition and Upper Silesia consisted of approximately 1.1 million individuals. By the end of 1921, about 50% of them had already left Poland. In 1931, only about 300,000 native German speakers (and about the same number of Protestants) remained in the former Prussian provinces.

The emigration of Germans raises the question whether this process was followed up by a similar immigration of Poles from other parts of the country. According to the Polish population census of 1921, 85% of the inhabitants of the former Prussian partition were born on this partition's territory. An additional 8% were born outside of Poland's borders as of 1921. While the census does not specify the country of birth for this group, many of these foreign-born Poles potentially immigrated into the former Prussian partition from the neighboring territories that still remained part of Prussia after the Treaty of Versailles. As former citizens of the German Empire, they would have therefore received a similar treatment in terms of culture, institutions and education as the Polish inhabitants of the Prussian partition. There is hence no strong indication of mass immigration into the former Prussian partition from Poles that were born in one of the other two former partition territories. In the former Austrian and Russian partitions, 97% of the inhabitants in the year 1921 were born in the respective partitions, implying also only insubstantial migration flows into these territories.

Moving from the interwar Second Polish Republic to the era of the communist Polish People's Republic requires pointing to the drastic population changes and losses that Poland experienced during and after WWII. About 5.2-5.3 million Polish citizens are estimated to have perished between 1939 and 1945 (Eberhardt, 2011), amounting to about 15% of Poland's pre-WWII population. Further, several million Poles were deported from territories that the German Empire or the Soviet Union had annexed. They were sent into the German-controlled Generalgouvernement, abducted to Germany for forced labor, or kept in remote areas of the Soviet Union.

The liberation of the Polish territory from German occupation did not yet end the mass movement of people all across the Polish lands. In the Potsdam Agreement, the Allied powers agreed to shift Poland's borders westwards. Poland was to cede its eastern territories to the Soviet Union, where they became part of the Lithuanian, Byelorussian, and Ukrainian Soviet Socialist Republics. As compensation, Poland received the German territories of the dissolved Prussian state that were located east of the Oder-Neisse line. However, as their boundaries do not intersect with the partition borders, I exclude these territories from my analysis.

The population in the three former partitions, which continued to form the territorial core of Poland after WWII, was apparently much less affected by these drastic migrations: Census data from 1950 show that, at least at the level of provinces, on average more than 90% of the inhabitants of the former partitions had already lived in the same provinces in 1939 (GUS, 1955). Thus, despite the numerous population transfers during and after wartime, large-scale population *replacement* was confined to the Northern and Western Territories.

The Holocaust and the expulsion of Germans self-evidently changed the ethnic and religious composition of Poland's population. The communist period makes it difficult to quantify the size of the remaining minority groups due to the official agenda of a Polish nation united under socialism. However, it is historically accepted that the population of Poland has been much more ethnically homogeneous since the completion of the major population transfers after WWII. Eberhardt (2011) estimates that the share of ethnic Poles within the same pre- and post-WWII territories of Poland had already risen from 63.9% in 1939 to 85.7% in 1946. It further rose to 97.8% in 1950 due to the continued expulsion of Germans and the emigration of Jewish Holocaust survivors to Israel.

## 2.3 Educational policies

Both similarities and differences between the three imperial educational systems are reviewed comprehensively by Bukowski (2019). The Prussian and the Austrian systems were very

similar to each other in terms of their local institutions, duration of schooling, and curricula. In addition, school attendance was obligatory for the duration of eight in the Prussian and seven years in the Austrian Empire respectively. However, these two empires differed sharply in terms of their intentions behind providing education to their Polish citizens: While the Prussian system sought to Germanize the Poles by pushing back the usage of the Polish language in schools, the Austrian-Hungarian Empire granted its Polish citizens the right to operate the schools in Galicia in Polish language. As a consequence, while Prussia enforced high levels of enrollment, the schools in the Prussian partition were perceived as a means of German oppression and forced assimilation by the Poles, resulting in several protests and clashes at the beginning of the 20th century, when German nationalist policies intensified. Cinnirella & Schüler (2017) document that within Prussia, counties with a high degree of linguistic polarization were disadvantaged in terms of allocations of public funds for education. In contrast, the Galician schools were perceived as a means of preserving and fostering Polish culture and identity.

The Russian Empire, in turn, combined a sparse provision of educational infrastructure with a hostile attitude of the educational system toward the Polish citizens. Russia, in contrast to the Prussia and Austria, did not introduce compulsory schooling prior to WWI; correspondingly it also provided few educational facilities. Further, the primary schools in the Russian partition typically comprised only three consecutive classes, compared to the seven and eight classes in Austrian and Prussian primary schools. Education was carried out in Russian language only; thereby creating a similar association of public education with oppression and forced assimilation on the side of the Poles as in the Prussian partition.

Consequently, the first priority of the Second Republic with regard to education was to establish a network of primary (or “common”, Polish: *powszechny*) education in the former Russian partition where obligatory schooling had not previously existed. A decree issued in 1919 made elementary schooling compulsory for all children at school age, i.e. all children aged 7-14 years of life<sup>2</sup>. Similarly, the number of obligatory school years was set to seven nationwide, thereby decreasing it by one year in the former Prussian partition (Krzesiak-Firlej et al., 2014). The decree also mandated that a public school had to be provided by every community (smallest administrative unit, Polish: *gmina*) where the number of school-aged children in any settlement within the community had exceeded 40 in three consecutive years. Schooling statistics (MWRiOP, 1927) indeed suggest considerable improvements in primary schooling in the former Russian partition. For example, the number of pupils in primary school rose from about 370,000 in the school year 1911 to about 1,200,000 in 1921.

While the schools in the former Austrian partition had already been managed and staffed

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<sup>2</sup>Decree on compulsory schooling, Polish: *Dekret o obowiązkach szkolnym*. Issued on February 7, 1919.

by Poles, the integration of the educational system in the former Prussian partition posed more of a challenge. This has to be understood in the contexts of the pre-WWI Prussian educational policy and the post-WWI emigration process previously described: The educational system in the Prussian partition had been kept mostly under German control for fear of Polish nationalism and separatism. According to Blanke (1993), the past German policy resulted in strong repercussions for the educational system after the Polish annexation. The Polish state stopped payments to German schoolteachers while simultaneously, the latter also saw a sharp depreciation of their human capital because Polish replaced German as the primary language of instruction. Consequently, the propensity to emigrate was particularly high among German schoolteachers: Out of 9,000 residing in the former partition in 1918, 8,000 left over the course of the following years. Hence, when the Polish officials took control of the educational system in the former Prussian partition after WWI, the schooling infrastructure had remained intact, but the schools had been deprived of a large share of its teaching staff.

While the remaining German population was legally entitled to operate minority schools in school districts where the number of German-speaking children surpassed the threshold of 40, the continuing emigration made this requirement increasingly impossible to meet. Induced also by the closure of all German teacher-training facilities, primary schooling in German language dwindled quickly in the former Prussian partition after WWI.

Needless to say, the loss of lives during WWII also affected Poland's stock of human capital; in particular because both Soviet and German occupants specifically targeted the Polish intelligentsia. Eberhardt (2011) cites evidence that about every third Pole with a university education perished during wartime. Educational instructors were decimated with a similar bias toward the highly-educated ones: While about 28.5% of the university lecturers died, 5.1% of the primary school teachers perished. Educational infrastructure was not spared the intense destruction of physical assets during wartime: In the school year 1944/45, only 86.6% of the pre-WWII schools were operational on the congruent post-WWII territory (MWRiOP, 1946). The fall in the number of schools was roughly equally distributed across the country; only the province of Pomerania operated less than 70% of its facilities in 1944/45 compared to 1937/38.

In addition, the pre-WWII efforts to overcome illiteracy and to provide universal access to education were set back by the turmoil of war and occupation, which had severely constrained any organized education for half a decade. This resulted in 1.4 million illiterates among the Polish population in 1949 (Dobosiewicz, 1970). As a consequence, public literacy programs for adults were provided over the course of the next decade.

While WWII has therefore most certainly harmed the overall level of human capital in

Poland, it is less likely that the wartime occupations and atrocities interacted directly with the former partitions. For example, the German demarcation of the occupied Polish territory did not bear resemblance to the former partition borders: The Generalgouvernement comprised only parts of the territories that had previously formed the Austrian and Russian partitions, while other parts of the same former partitions were annexed directly to the territory of the German Empire.

Educational institutions and curricula were sweepingly harmonized under the socialist command after WWII. Following some regulatory turmoil in the early postwar years, the duration of obligatory primary education was set to the pre-WWII level of seven years in 1949. It was extended by one year not until 1961. (Dobosiewicz, 1970)

## 3 Data

### 3.1 Main outcomes

The two main outcomes considered in the following are the enrollment rates in public primary schools and the literacy rates of the population. School enrollment in a given territory reflects the extent to which the population - or at least the population at school age - invests into human capital. Literacy in turn is a cognitive skill that is acquired not only, but typically through the attendance of primary school. While school enrollment therefore denotes a fundamental input to any education production function (Bowles, 1970; Hanushek, 1986), literacy rates quantify a basic outcome of the education production process.

The enrollment rates in public primary schools are constructed by combining disaggregated schooling and population statistics for each sample period. Prior to WWI, this implies the necessity to find statistics that are sufficiently comparable across the three empires. Fortunately, all three empires conducted county-level censuses of their public primary school systems in the year 1911 (Königlich Preussisches Statistisches Landesamt in Berlin, 1912; Pokrowskoho, 1914; Pilata, 1913). The focus on public schooling is based on a number of reasons: In the Prussian partition, private schooling was irrelevant due to the dense public school network. In Galicia, the number of private primary schools amounted to less than 5% of the number of public primary schools (Pilata, 1913), suggesting a minor importance of private schooling there as well. Furthermore, the Galician private schools were concentrated in the city of Lwów and its surroundings which are not part of the sample due to their location on the territory of present-day Ukraine. While the city of Kraków also exhibited a relative high number of private schools, the empirical strategy captures differential characteristics of urban counties. The importance of private schooling in the Russian partition is difficult to

assess given that any private schooling likely had the intention to subvert the Russian ban on education in Polish language. Hence, private schools in the Russian partition were probably forced to operate in hiding. On the one hand, this could diminish the representativeness of the Russian school census for the state of schooling in the Russian partition. On the other hand, the census covers a wide range of school types, including religious schools. Moreover, it was also consulted by later Polish statistical publications which sought to display the evolution of the school network since the imperial era, thereby underlining the census' comprehensiveness.

Given that the Prussian and Austrian school statistics do not report the age of the pupils enrolled in primary school, I rely on gross primary enrollment rates, defined as the share of primary school students among the population at school age, in the following. However, their calculation is complicated by the fact that only the Prussian school census directly provides the number of children at primary school age along with the number of primary school students. Therefore, I complement the data on the number of students in the Austrian and Russian partitions with population statistics. The Austrian-Hungarian Empire conducted a population census in 1910 that provides the corresponding data on the number of children at school age at the county level (Bureau der K.K. Statistischen Zentralkommission, 1914a). The Russian Empire, however, conducted a complete and disaggregated population census only in 1897. While Polish sources provide data on the county-level population in the Russian partition in 1910, these figures are not decomposed by age. Falski (1925) provides the county-level share of children at school age among the population in 1897, with school age defined in terms of the laws of interwar Poland. Applying this definition to the Russian partition prior to WWI is in a sense arbitrary, as there was no legal school age in the Russian Empire. However, the age statistics of pupils in the Russian school census show that about 95% of the students in primary school in 1911 fell into the post-WWI school age. Therefore, assuming that the population share computed by Falski (1925) did not change considerably between 1897 and 1910, I multiply it by the total county population in 1910 to obtain an estimate of the number of children at school age and thereupon the county-level enrollment rates in the Russian partition.

Public primary school enrollment between WWI and WWII is observed in two time periods: The Polish Central Statistical Office (GUS, 1922) provides disaggregated data on the state of primary education in the school year 1920/21. This series is succeeded by a comparable publication of primary school statistics for the school year 1932/33 (GUS, 1934). The Polish population censuses conducted in 1921 (GUS, 1927) and 1931 (GUS, 1938) respectively provide the county-level number of children at school age. This information is then used to compute the gross primary enrollment rates for both years. The sources further

show that private primary schools accounted for less than 2% of all primary schools in every sample region in 1920/21.

Similarly, primary school statistics for the school year 1960/61 (GUS, 1962) are combined with population census data on the number of children at school age in 1960 (GUS, 1965) to obtain the gross primary enrollment rate during this period of communist Poland<sup>3</sup>. Earlier statistics of the post-WWII period lack information on the number of children at school age, while later data sources are difficult to compare to the interwar period due to an increase in the years of compulsory education and substantial changes in the system of administrative boundaries soon after 1960.

The level of literacy is difficult to assess prior to WWI. In the early 20th century, the state of literacy was not recorded anymore in the population censuses of the German Empire, as literacy had essentially become universal. The Austrian Empire continued to collect data on literacy, but literacy in the Russian partition is only observed in 1897. In addition, each empire measured literacy in terms of the respective empire's official language; hence the state of literacy before WWI is not necessarily comparable to the state of literacy in terms of Polish language which became the object of interest after the reestablished Polish independence.

Consequently, I collect data on literacy rates only for the periods after WWI. The Polish population censuses of 1921, 1931 and 1960 all provide the corresponding information. The censuses of 1921 and 1960 additionally provide information on the educational attainment of the population. Attainment is classified as 'self-taught', 'basic', 'medium', 'professional' (1921 only), 'higher', and 'unknown'. This information is analyzed in Section 5.2.3.

Section 5.1.2 considers the importance of educational infrastructure for the convergence of the primary school enrollment. Consequently, I collect the number of primary schools, primary school classes and primary school teachers from the available school statistics. The information on schools is used to calculate the number of public primary schools per 1000 inhabitants of primary school age for each county from 1911 to 1961 as a proxy for school supply and density<sup>4</sup>. The corresponding school classes per 1000 inhabitants of primary school age proxy for school quality because they denote how many different grades of a school are taught within the same classroom. This measure takes into account that the schools in the Russian partition were ill-equipped compared to the ones in the Austrian and Prussian partitions. The number of primary school teachers per 1000 school-aged inhabitants provides

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<sup>3</sup>In the following, the year 1911 subsumes the census year 1910 and the school year 1911, 1921 subsumes the census year 1921 and the school year 1920/21, 1931 subsumes the census year 1931 and the school year 1931/32, and 1961 subsumes the census year 1960 and the school year 1960/61.

<sup>4</sup>I use the number of inhabitants of primary school age because the number of primary school students is endogenous to the supply of primary schools.

another quality-related indicator for the educational infrastructure. A shortcoming of the data, however, is that the data on classes and teachers are only available for the first two sample periods 1911 and 1921.

## 3.2 Controls

Section 5.3 considers the role of various population characteristics for the convergence process. County-level data on the religious composition of the partition populations are available prior to WWII. Given that Protestants and Jews were the relevant religious minorities during this period, I compute their population shares for every sample year. The data on the place of birth relative to the place of residence, which is recorded in the population census of 1921, further allow the computation of the county-level share of inhabitants that migrated from one (former) partition territory into another at some point in their lives. This share therefore captures population movements that have occurred between the dissolution of the imperial borders in the course of WWI and the early years of the Second Polish Republic.

Following Grosfeld & Zhuravskaya (2015) and Bukowski (2019), I control for geographical discontinuities at the partition borders in terms of altitude, precipitation, and temperature. The corresponding data are obtained from WorldClim 1.4 (Hijmans et al., 2005). Section 4.3 further considers whether the geographical discontinuities translate into discontinuities in agricultural suitability. Data on the latter are provided by two sources: the Caloric Suitability Index (CSI) (Galor & Özak, 2016) and the historical croplands dataset (Ramankutty et al., 1999). The CSI provides four grid cell-level estimates of caloric suitability: average potential caloric yield attainable given the set of crops that are suitable for cultivation pre-/post-1500CE and maximum potential caloric yield attainable given the set of crops that are suitable for cultivation pre-/post-1500CE. I select the two estimates that refer to the post-1500CE era. The historical croplands dataset ignores potential or actual yields and instead provides estimates of permanent cropland areas (as the share of cropland in a grid cell's total land cover) for several centuries, from which I select the periods 1800 and 1900.

## 3.3 Pre-treatment outcomes

The existing literature has to the best of my knowledge not used historical data for testing the absence of pre-treatment discontinuities at the partition borders. A compilation by Grossman (1925) represents a rare source of disaggregated population statistics that originate from the short-lived reign of the Duchy of Warsaw in 1810. The Duchy was constituted by Napoleon I in 1807. It comprised, in addition to the core territories around Warsaw, most of what became the Prussian partition in 1815 and some parts of the future Austrian partition. While the



first Partition of Poland had already taken place in 1772, the partition borders were finalized only at the Congress of Vienna in 1815. Admittedly, the partition borders remained rather stable along the Austrian territory of Galicia in the interim period. However, the Prussian-Russian borders drawn before the Napoleonic campaigns bore only little similarities to the finalized Prussian-Russian border course in 1815.

Grossman (1925) complements the population data from the Duchy of Warsaw with comparable information on towns and cities in Galicia. Overall, the data are disaggregated into larger cities, as well as into small settlements. Due to the lack of a map of the lower-level administrative divisions of the Duchy of Warsaw, I georeference each observation individually. The logarithm of the local population is then computed as a rough proxy for prosperity on either side of the future partition borders.

### 3.4 Maps and administrative boundaries

The spatial RD design requires both the geolocation of every county in the sample and the geolocation of the historical partition borders. The main reference for the pre-WWII era is a county-level administrative map of the Second Polish Republic (WIG 1934)<sup>5</sup>. The internal regional boundaries of the Second Polish Republic coincided with the former imperial boundaries, such that the former partition borders can be easily reconstructed. While Poland, on the verge of its regained independence, also adopted most of the internal county boundaries from the three empires, several counties were merged, split up, or rearranged between 1921 and 1931. I draw on a repository of legal acts, including administrative changes, of the Polish parliament (ISAP, 2015), subcounty population data based on the 1921 population census (GUS, 1925), and additional georeferenced maps provided by the Mosaic project (MPIDR and CGG, 2011, 2012a, 2012b) for the construction of population weights to restore the state of counties in 1921, which can then be matched to the pre-WWI divisions. All edits and computations are performed in ArcGIS.

The Polish province of Silesia, which consisted of the eastern part of the Prussian province of Upper Silesia, saw numerous changes of its internal administrative boundaries between the world wars due to its urban character and small territorial units. I therefore exclude Silesia and thereby a short Prussian-Austrian partition border segment from all sample periods. Data on Silesia are missing in the population census of 1921 anyway because the status of this territory had not been ultimately determined by that time.

The county boundaries in 1961, likewise obtained from MPIDR and CGG (2012a), do not bear close resemblance to the pre-WWII boundaries anymore. The former partition borders

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<sup>5</sup>The map was georeferenced and publicly provided by Paul Dziemiela under the Open Data Commons Public Domain Dedication and License.

now cut through a small number of counties, which I therefore exclude from the sample. Holding a bandwidth of 65 km fixed at each side of each border, the sample size is reduced by only one county at the Prussian-Russian border in 1961 compared to the pre-WWII sample. However, it increases by 16 at the Austrian-Russian border due to the creation of new counties. While it would be possible to merge some of the new counties in order to bring the sample size closer to the one available for the earlier years, a larger sample size in 1961 might reduce the risk of incorrectly accepting the null hypothesis of an insignificant partition effect due to imprecise estimation, which is why I leave the county boundaries unchanged.

The sample counties within the 65 km bandwidth along the historical partition borders are displayed in Figure 3 for the period 1911 to 1931 and in Figure 4 for 1961. Summary statistics of the main variables are presented in Table A1 for the Prussian-Russian border and in Table A2 for the Austrian-Russian border in the appendix.

## 4 Identification strategy

### 4.1 Spatial regression discontinuity design

The Partitions of Poland allow estimating the long-run causal effects of the three partitioning powers on human capital in Poland by applying a spatial regression discontinuity design at each of the two partition borders.

Any regression discontinuity design exploits a context in which assignment to treatment is determined by an assignment variable exceeding a threshold. If in addition, participants have imprecise control over the assignment variable, then assignment to treatment is randomized just below and above the threshold respectively. As a consequence, all characteristics determined prior to the realization of the assignment variable should evolve smoothly around the threshold. (Lee & Lemieux, 2010)

In the spatial context, the assignment variable is typically understood as the distance of a spatial object, in this case a county, to a multidimensional object in space, in this case a partition border. The assignment variable exceeding the threshold then translates into crossing this border from one partition territory into another, with the respective territorial affiliation corresponding to either treatment or control status. In the geographical-historical context of Poland, assignment to treatment is determined by a county's distance to either the Prussian-Russian or the Austrian-Russian partition border. In the following, a negative distance to one of the borders indicates that a county was located in the Russian partition. Treatment is hence determined by the territorial affiliation of a county to one of the three partition powers before WWI. Given that no territory under Polish self-government existed

during the time of the partitions, I consider the counties in the Russian partition as the control group in the following. A county therefore received treatment if it belonged either to the Austrian or the Prussian Empire.

## 4.2 Econometric specification

In the simplest case, the causal treatment effect can be identified by comparing the means of the outcome variable on both sides of a border to each other. The literature that employs spatial RD designs distinguishes a one-dimensional and a two-dimensional parametric approach. In the one-dimensional approach, the forcing variable, in this case a county's Euclidean distance  $Distance_i$  to the closest partition border, enters the regression model linearly. An  $Empire_{ij}$  dummy indicates the county's treatment status. Interacting the distance measure with the treatment indicator further allows the effect of distance to vary at each side of each border. Adding the county's longitude  $X_i$ , latitude  $Y_i$ , and a vector of controls  $\mathbf{C}_i$  results in the following regression model that can be estimated by OLS:

$$y_{it} = \alpha_t Empire_{ij} + \beta_{1,t} Distance_i + \beta_{2,t} Empire_{ij} Distance_i + \gamma_{1,t} X_i + \gamma_{2,t} Y_i + \delta_t \mathbf{C}_i + \epsilon_{it} \quad (1)$$

The parameter  $\alpha_t$  then identifies the causal effect of an empire on the outcome  $y$  in period  $t$ . It is estimated separately for each time period in the sample ( $t = \{1911, 1921, 1931, 1961\}$ ) and at each partition border ( $j = \text{Austria, Prussia}$ ). The two-dimensional approach proposed by Dell (2010) is not interested in the direct effect of distance to the border as the forcing variable. Instead, it uses a polynomial of latitude and longitude  $f(X_i, Y_i)$  in order to flexibly control for a county's geographic location along the border:

$$y_{it} = \alpha_t Empire_{ij} + f(X_i, Y_i) + \delta_t \mathbf{C}_i + \epsilon_{it} \quad (2)$$

Given the reliance on county-level data, the number of observations within a reasonable distance to the partition borders is relatively small. It precludes the utilization of more data-intensive nonparametric methods for estimating the effect of spatial discontinuities.

The choice of the bandwidth in both specifications involves a trade-off: A wider bandwidth increases the number of observations and thereby statistical power, but it also casts doubt on the linearity assumption on the forcing variable or the ability of the polynomial to appropriately control for the geographic characteristics. For the baseline specification, I choose a bandwidth of 65 km on each side of the partition border under consideration. Grosfeld & Zhuravskaya (2015) and Bukowski (2019) choose narrower bandwidths of 60 and 50 km respectively; however, their data are disaggregated to the municipality level, thereby providing more observations. Similarly, the choice of the functional form of the

longitude-latitude-polynomial  $f(X_i, Y_i)$  in the two-dimensional specification invokes a trade-off: Raising the order of the polynomial increases flexibility, but it also amplifies the threat of overfitting the data. Following the recommendation of Gelman & Imbens (2016), I choose a (relatively low-order) quadratic polynomial of latitude and longitude for Equation 2.

### 4.3 Validity of the spatial RD design

In order for the parameter  $\alpha$  to identify the causal effect of the partitions, a set of assumptions has to hold: First, the partition borders had to be drawn by the three empires in disregard of local conditions that would influence the outcome besides the actual imperial treatments. These conditions, whether observable or unobservable, should therefore evolve smoothly at the two borders (Dell, 2010). Second, the inhabitants of the dissolved Polish-Lithuanian Commonwealth were not to be granted the possibility to determine the exact course of the border, as any such influence would represent a form of manipulating assignment to treatment. Third, migrations across the partitions prior to WWI, in particular if they occurred due to more promising educational opportunities in the Austrian and Prussian empires, would represent another form of manipulation in the treatment status.

In Figure 2, I present a simple overlay the internal divisions of the Polish state prior to its partitions with the final partition borders of 1815. Apparently, the regional borders of the Polish-Lithuanian Commonwealth in 1770 (MPIDR and CGG, 2012a) and the partition borders are hardly congruent and in areas where they do overlap, they mostly both follow rivers.

Next, I present evidence on potential pre-treatment discontinuities in terms of the partitions' (log) population in 1810. On the one hand, population is arguably a crude proxy for development. On the other hand, the results represent the first quantitative evidence on the smoothness of non-geographic factors prior to the partitions. Estimating the one-dimensional RD specification (Eq. 1) with log population as the outcome variable does not indicate such pre-existing discontinuities (Table 1). While the partition indicator is statistically significant estimate at the Austrian-Russian border when all observations on both sides of the border are included (column 5), the significance vanishes as soon as the bandwidth is narrowed below 100km on each side of the border. Estimating the two-dimensional specification (Eq. 2) does not yield any indication of a statistically significant pre-treatment discontinuity (Table 2).

It is furthermore common practice to check whether geographical characteristics are smooth at the borders of interest. Discontinuities in geography may indicate that local geography played a role in constructing the border and might therefore confound the outcome. Following Grosfeld & Zhuravskaya (2015) and Bukowski (2019), I test for geographical

discontinuities by estimating Equation 1 and Equation 2 with altitude, precipitation, and temperature respectively as the outcome variables. Results are reported in Table 3. Using a bandwidth of 65 kilometers, the discontinuities in geography at the Prussian-Russian border are small and mostly insignificant (Panel A), except for temperature in the two-dimensional specification (Panel B). The graphical representations do not indicate any substantial discontinuities (Figure 8). However, I find statistically significant discontinuities in all three geographic variables at the Austrian-Russian partition border in both the one- (Panel C) and the two-dimensional (Panel D) regression designs. The estimates are of similar magnitude to those reported by Bukowski (2019), who refers the discontinuities to the local riverbed of the Vistula. Indeed, plotting the three geographic variables against the distance to the border reveals that altitude and precipitation steadily increase on both sides of the border despite the negative sign of the Austrian partition coefficient (Figure 7). This suggests that while counties on the Austrian side of the border are on average more elevated than those on the Russian side, the partition border does not reflect an abrupt change that lifts all observations on the Austrian territory to a different level of altitude. I follow Grosfeld & Zhuravskaya (2015) and Bukowski (2019) and include all three geographic variables as controls in the following regressions at both borders.

However, the geographic discontinuities might translate into discontinuities in the agricultural suitability of the sample territories. Agricultural suitability, in turn, might affect the opportunity cost of schooling both before and after the erection of the partition borders. This raises the question whether the geographic controls alone are sufficient to capture this potential channel. I therefore test whether the crop yield and the historic cropland, as two measures of agricultural suitability, are discontinuous at the partition borders when including the three geographic measures.

Results are presented in Table 4. Without controlling for the geographic variables, the estimated discontinuities in both average and potential crop yields are large and significant at the Austrian-Russian border in both RD specifications, suggesting a substantially higher yield at the Austrian side (columns 1 and 3 in Panel A and B). However, the effect becomes negative and insignificant when altitude, precipitation, and temperature are included (columns 2 and 4). At the Prussian-Russian border, crop yield is significantly lower at the Prussian side in the one-dimensional specification both with and without the geographic controls (Panel C). However, the difference is hardly of economic importance: Average caloric yield is 2025 at the Prussian-Russian border; the estimated discontinuity of 91 amounts to less than five percent of this average. It is therefore unlikely to account for the large differences in schooling between the Prussian and the Russian partition. In addition, both employment in agriculture and school enrollment were more prevalent in the Prussian than

in the Russian partition, thereby not pointing at a relevant trade-off between the two. The discontinuities are furthermore statistically insignificant and small in magnitude in the two-dimensional specification (Panel D). The measure of historical cropland is not discontinuous at any border neither in 1800 nor 1900 (columns 5-8). Taken together, the evidence suggests that the three geographic controls largely absorb discontinuities in agricultural suitability at the partition borders.

Finally, the exogeneity of the partition borders is supported by Grosfeld & Zhuravskaya (2015), who review numerous historical sources that suggest that the partition borders did not reflect pre-existing economic, ethnic or religious divisions. There is also no historic evidence that the local Polish population along the partition borders had any possibility for manipulating their assignment to treatment, i.e. for influencing the decision on which side of an imperial border their municipality or city would be located after 1815. This is in accordance with the absolutist character of the three partitioning powers. Population movements across the partitions would pose another threat to identification if they occurred during the era of the partitions. However, the discussion in Section 2.2 provides no indications for such migrations prior to WWI.

## 5 Results

### 5.1 Inputs to education production

#### 5.1.1 Enrollment

Table 5 presents estimates of the discontinuity in primary enrollment at the Prussian-Russian partition border over the period 1911 to 1961 using the two-dimensional RD specification.<sup>6</sup> In addition to the estimates of the partition effect, I also report the mean of the dependent variable at the Russian side of the border for each sample period.

In 1911, primary enrollment is estimated to be more than 80 pp higher in the Prussian partition than in the Russian partition. This large and statistically highly significant gap contrasts the educational policies of the two empires. While primary enrollment averages only 16% in the Russian partition, it is essentially universal in the Prussian partition.

However, in 1921 and hence only two years after the introduction of compulsory schooling in the Second Republic of Poland, the enrollment gap between the former Prussian and Russian partitions is cut in half to 40 pp. This improvement is entirely due to increasing

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<sup>6</sup>Estimating the one-dimensional specification yields very similar results. The distance to the border is not of particular interest in the current setting, which is why I omit the results obtained from the one-dimensional RD design. They are available on request.

enrollment on the former Russian border side. The estimated discontinuity is still highly significant in statistical terms.

In 1931, the effect of the Prussian Empire on primary enrollment drops further below 10 pp, but it remains statistically significant. In parallel, (gross) enrollment in the former Russian partition reaches almost 100 percent in this period. In 1961, the estimated discontinuity between these two former partitions is close to zero and not statistically significant anymore.

The controls for large cities and geography which are included in the regressions reported in columns 2 and 3 increase the precision of the estimates, but they do not affect their magnitudes. The evolution of the Prussian partition effect over the four sample periods is depicted in Figure 9. The quadratic fit indicates a strong linear relationship between enrollment and distance to the border on both sides of the (former) Prussian-Russian border. The linearity corroborates the choice of the low-order polynomial in the identification strategy.

Table 6 reports the corresponding estimates at the Austrian-Russian border. The highly significant discontinuity suggests that primary enrollment in 1911 is 40-50 pp higher in the Austrian partition than in the Russian partition. Primary enrollment averages 19% in the Russian counties along this partition border, implying a smaller positive effect of the Austrian Empire on enrollment in comparison to the Prussian effect. This implies further that primary school attendance in Galicia in 1911 is not nearly as universal as in Prussia.

In 1921, the effect of the Austrian Empire is halved in magnitude compared to 1911. While primary enrollment in the former Russian partition increases by 36 pp between 1911 and 1921, the estimated discontinuity shrinks by less than 30 pp and remains highly significant. Thus, enrollment increases at both sides of the former Austrian-Russian border.

In 1931, primary enrollment averages 98% in the former Russian partition along the former Austrian-Russian border. Simultaneously, the estimated discontinuity in enrollment drops to zero and is statistically insignificant. The same applies to the estimates obtained for the period 1961.

While the geographical controls reduce the magnitude of the Austrian partition effect in the periods 1911 and 1921 (column 3), they do not reserve the temporal pattern. A graphical representation of the results is displayed in Figure 10.

Hence, both the Austrian and the Prussian Empires have built up large positive effects on primary enrollment during their reign over Poland in comparison to the Russian Empire. However, the reunification of Poland after WWI initiates a convergence process of enrollment rates between the former partitions. 13 years after the end of WWI, enrollment in the former Russian partition reaches a level that is not statistically distinguishable from the one in the former Prussian partition anymore. In the south of Poland, the former Russian

and Austrian counties close the enrollment gap between them, while they simultaneously converge to universal enrollment. The absence of any discontinuities in 1961 validates that the imperial enrollment divide has not persisted.

### 5.1.2 Educational infrastructure

The results shown in Table 7 highlight that prior to WWI, the Prussian Empire operates a much more developed educational infrastructure than the Russian Empire, resulting in similar discontinuities as with regard to enrollment. The network of primary schools in the Prussian partition is both denser and of better quality in 1911: The average number of primary schools per 1000 school-age children is about 250% higher in the Prussian partition, while the discontinuities in classes and teachers per 1000 school-age children imply an advantage of the Prussian partition of about 700% and 450% respectively.

Similar to the pattern in enrollment, the estimated discontinuities in educational infrastructure at the former Prussian-Russian border decrease considerably in magnitude over the subsequent sample periods. In 1921, primary schools and classes triple in the former Russian partition, with the number of teachers growing at an even higher rate. However, the difference between the two former partitions with regard to the density of schools remains sizable in 1931, as it shows a slight rebound compared to 1921. Only in 1961, the point estimate of the discontinuity turns negative and weakly significant.

Notably, as reported in Table 8, there is no discontinuity in school density at the Austrian-Russian border in 1911. However, the Austrian partition exerts a positive effect on school quality as measured by the number of classes and teachers in the same period. Thus, the advantage of the Austrian over the Russian partition appears to run through the quality and not the number of schools. This advantage, however, is much smaller than that of the Prussian partition. It furthermore declines over time, while the supply of both classes and teachers increases on either side of the Austrian-Russian border. In 1961, the remaining discontinuity in school density is small, negative and only weakly statistically significant.

Prior to WWI, the results in this section point out the poor state of primary schooling infrastructure in the Russian partition. After Polish independence, they suggest a similar equalization between the former partitions as with regard to primary enrollment, at least in terms of school density.



## 5.2 Outputs of education production

### 5.2.1 Literacy

A central question in the specific context of the Partitions of Poland is whether the imperial differences in the provision of schooling actually matter for the educational outcomes of the Polish population when Polish is the official language in all former partitions after WWI. For example, the benefit of high primary school enrollment in the Prussian partition might be severely discounted by the usage of German as the language of instruction. However, summary statistics indicate that this is not the case: In 1921, the former Prussian partition is by far the most literate (89.6%) of the three former imperial territories. While 76.8% of the population of the former Austrian partition is literate in the same year, this is the case for only 60.3% of the inhabitants of the former Russian partition. Plotting the literacy rate in 1921 against the primary enrollment rate in 1911 confirms that imperial schooling matters for later literacy in Polish language regardless of the former empire (Figure 11): While there is only little variation within each former partition, there is a strong positive and linear relationship between literacy in 1921 and imperial enrollment in 1911 across the three former partitions.

This assessment notwithstanding, Figure 11 also points out that the differences in literacy between the former partitions in 1921 are smaller than the previously estimated imperial differences in enrollment in 1911 would suggest. This applies in particular to the former Russian partition, where enrollment averaged only 18% in 1911, but where the literacy rate only ten years later is more than three times as high. I suggest a number of explanations: First, the literacy rate in 1921 is partly determined by large and young cohorts that already had better access to primary schooling between 1911 and 1921 than the cohorts who had been at school age in 1911. Second, enrollment in the Russian partition in 1911 is calculated relative to the number of children at the hypothetical compulsory school age 7-13, as no official school age regulation existed in the Russian Empire. Hence, a considerable number of children might have received at least *some* schooling instead of no schooling at all. This limited amount of schooling, in turn, might have been sufficient for qualifying as literate in the 1921 census. Third, the low level of public education provision might have induced a particularly strong transmission of human capital within Polish families. In this way, the schooling obtained by one family member could have benefited other family members as well, at least up to a rudimentary proficiency of literacy.

Applying the RDD, Table 9 reports the effect of the Prussian partition on the literacy of the Polish population over the three post-WWI sample periods. In 1921, literacy is 26 pp higher in the former Prussian partition relative to the former Russian partition. This

discontinuity is furthermore highly statistically significant. As enrollment in the former Russian partition rises, the literacy advantage of the former Prussian partition narrows to 18 pp in 1931. Thirty years later, it is not statistically different from zero anymore. A graphical representation is shown in Figure 12.

As displayed in column 1 of Table 10, the discontinuity in literacy at the former Austrian-Russian border is of similar magnitude as at the former Prussian-Russian border if no controls are used. Adding the city and geographical controls decreases the magnitude by 8 pp (column 3). Given that primary enrollment in 1911 was lower in the Austrian than in the Prussian partition, this finding supports the conjecture that the benefit of high enrollment in the Prussian partition was diminished by the fact that German was the language of instruction. Hence, the lower enrollment in the Austrian partition is partly compensated by having used Polish as the language of instruction prior to WWI.

The effect of the Austrian partition decreases by a magnitude of 7 to 10 pp, depending on the controls, between 1921 and 1931. In 1961, the effect is still very pronounced in terms of statistical significance, but with 4 pp, the remaining difference is small in magnitude. Literacy in the counties on the former Russian side of the Austrian-Russian border averages 94% by that time. The evolution of the discontinuities in literacy at the former Austrian-Russian border is illustrated in Figure 13.

Taken together, the partitions created substantial differences in literacy among the Poles. While these differences also turn out to not persistent, they unsurprisingly disappear slower than the gaps in primary enrollment. The illiterate population that inhabited the former Russian partition after WWI was beyond school age when schooling became more accessible. Hence, the former continued to embody the legacy of the Russian Empire. The speed of convergence is therefore a demographic matter, as the older, poorly schooled cohorts gradually exit the population.

### 5.2.2 Intergenerational mobility

The strong growth in enrollment and the increasing literacy in both the former Austrian and Russian partitions suggest that young cohorts of the Polish population experienced substantial upward mobility in terms of basic human capital after WWI. In order to quantify this mobility more precisely than by observing only the overall literacy rate of the population, I exploit the information on the literacy of various age groups in the Polish population census of 1921. I select the 14-year-olds and those aged between 40 and 49 for comparison for two reasons: The former reached primary school age by the time when the Poles in the Russian partition began to take control of the educational system in the turmoil of WWI. The latter, by contrast, had reached the end of school age long before the advent of any Polish self-

governance. While this is also the case for age cohorts in-between the two, these cohorts of adolescents and young adults show a large surplus of women in the population count, possibly due to casualties among Poles fighting in WWI and ongoing military service in the Polish-Soviet War.

Panel A of Table 11 reports that the discontinuity in literacy at the Prussian-Russian border is very pronounced for the age group 40-49 in 1921: Literacy is on average 35.4 pp higher for members of this group living at the former Prussian side of the border. By contrast, the literacy advantage amounts to only 14.9 pp for 14-year-olds in the former Prussian partition in comparison to their age-mates in the former Russian partition. While already 76.5% of the 14-year-olds in the former Russian partition are literate in 1921, the same applies only to 56.4% of the age group 40-49 in the same territory and period.

As reported in Panel B of Table 11, the discontinuity in literacy at the former Austrian-Russian border amounts to 20 pp for the age group 40-49 in 1921. Only 48% of the 40-49-year-olds are literate in the former Russian partition counties along this border. These figures are in accordance with the lower enrollment in the Austrian compared to the Prussian partition before WWI. For the 14-year-olds, however, the discontinuity is of similar magnitude as at the former Prussian-Russian border, with 71.1% of the 14-year-olds being literate in the former Russian counties in 1921. Thus, while the human capital of the older cohorts in 1921 still strongly reflects the impact of the partitions on their education, the human capital of the young 14-year-old cohort is not only higher on average due to improved access to schooling, but also more equalized along the former borders.

Figure 14 provides a visual impression of the intergenerational upward mobility by plotting the county-level literacy rates of the 14-year-olds against those of the 40-49-year-olds. Apart from small perturbations at the top end of the literacy scale, all observations are located above the 45° line. Hence, the 14-year-olds are on average more literate than the 40-49-year-olds in every county, which suggests that upward mobility took place in all three former partitions. Further, the vertical distance between the observations and the 45° line decreases in the literacy rate of the 40-49-year-olds. This pattern implies that the largest gains in literacy between the two age groups were achieved where the literacy of the older group had been the lowest. Put differently, the intergenerational mobility was strongest where the older generation had previously been most deprived of education.

### 5.2.3 Educational attainment

Table 12 provides evidence on the imperial legacies on educational attainment of the Polish population in 1921. Notably, significant discontinuities exist only at the lower end of the educational spectrum. In both the former Austrian and Prussian partitions, the share of the

self-taught population is about 25 pp lower than in the former Russian partition (column 1), while the share of the population with basic education is about 35 pp higher in comparison to the latter (column 2). The former partitions do not differ significantly from each other in terms of higher levels of educational attainment (columns 3-5). The remaining difference between the shares of the self-taught and those with basic education is absorbed by the significant discontinuity in the share of the population for which the level of education could not be determined (column 6). Taken together, the detected discontinuities are a consequence of the low level of primary school enrollment in the Russian Empire, as large population shares in the former Russian partition have not received formal primary education. This lack of initial education does not translate into differences at higher levels of educational attainment, but the share of the population that has completed more than basic education is generally very low in all three former partitions.

By 1961, all discontinuities in educational attainment at the former Prussian-Russian border have disappeared, as shown in Panel A of Table 13. The share of the self-taught population now amounts to only 5.4% in the former Russian partition, while the share of the population for which the level of education is unknown has fallen below 1%. At the former Austrian-Russian border (Panel B of Table 13), a similar picture emerges. Only the share of the self-taught is still 3.8 pp points lower in the former Austrian partition, but the corresponding mean on the former Russian side is not higher than at the Prussian-Russian border (column 1).

Overall, the introduction of compulsory schooling has succeeded in formalizing education in the former Russian partition. Furthermore, there is no indication that the previous advantages of the Austrian and Prussian partitions in terms of basic education have translated into advantages regarding higher levels of educational attainment in the course of time. Conversely, there is also no evidence that the intergenerational mobility at the lower end of the human capital distribution displayed in Section 5.2.2 extended to higher levels of attainment.

## 5.3 Robustness

### 5.3.1 Robustness of enrollment

Table 14 presents a series of robustness checks on the observed patterns in the enrollment outcome. Column 1 shows again the results from estimating the two-dimensional RD specification with enrollment as the dependent variable. Column 2 shows the effect of adding partition border segment dummies to the regression model. The border segments coincide with province borders before and after WWI, as the latter were constructed along the former partition borders after the reconstitution of the Polish state. Along each partition border,

there are two provinces on each side of each border. Neither direction, size, nor significance of the estimates are altered by the inclusion of the border segment dummies, with the exception of the school year 1921 at the Austrian-Russian border, where the dummies render the discontinuity estimate insignificant. Next, the bandwidth is lowered to 50 instead of 65 km on each side of every partition border. Doing so reduces the sample size by about 20%. As displayed in column 3, the point estimates rather increase at the Austrian-Russian border in 1911 and 1921. At the Prussian-Russian border, they remain virtually unchanged in comparison to the 65 km bandwidth.

I further assess the potential importance of the pre-WWII population composition for the convergence of the former partitions in terms of enrollment. First, I add the shares of Jews and Protestants among a county's population to Equation 2 in every time period from 1911 to 1931. Protestantism and ethnic-linguistic affinity to Germany are closely correlated with each other in the Prussian partition such that Protestantism captures the latter as well. Second, I control for the share of a county's population in 1921 that was not born in the same former partition that it currently resides in. As indicated in Subsection 2.2, this share is negligible at the former Austrian-Russian border, but not at the former Prussian-Russian border due to the partial emigration of the German population after WWI. While this measure is not informative on the magnitude of emigration or the exact origin of the immigrants, it captures the extent of recent population replacement. In turn, the population shares of the two religions simply pick up changes in the relative sizes of ethnic-religious minorities.

In general, the population controls do not affect the estimated effects of the Prussian partition sufficiently to suggest that the population composition represents a driving force behind the evolution of education and human capital at the Prussian-Russian border. Compared to the baselines reported in column 1 of Table 15, the point estimate of the partition effect changes by less than 10 pp when adding the various population shares (columns 2 and 3). More importantly, the tendency of the partition effect to decline over time is not affected.

The measure of population replacement in 1921 has no effect in 1911, validating that it indeed captures more recent population movements. The estimates presented in column 3 suggest that population replacement has a negative effect on primary enrollment in the year 1921. This result is in accordance with the disruptions in the course of the Polish takeover of the educational system described in Section 2.3. However, these disruptions appear to have been overcome by the year 1931, as the population replacement effect is insignificant by then. When controlling for all three population measures, the Prussian partition effect is not statistically different from zero anymore in 1931; however none of the population measures themselves exert a significant influence on enrollment then. The population composition

controls affect neither size nor significance of the estimated partition effects at the Austrian-Russian border (see Table 16), thereby confirming the presumption that the population composition has been very persistent along this border.

Finally, I conduct a placebo exercise by shifting the partition borders 65km into the Russian partition. The counties in the Russian partition that previously formed the control groups at the Austrian and Prussian borders respectively are now considered the placebo treatment groups, while the counties which are located deeper within the Russian partition form the placebo control groups. Table 17 reports results from estimating Eq. 2 at the Prussian placebo border for the four sample years. Most importantly, there is no evidence of significant or sizable discontinuities in enrollment at the placebo border within the Russian partition in 1911. Thus, the placebo treatment group closer to the partition borders has not received a different treatment by the Russian Empire in terms of schooling than the placebo control group. Ten years later, enrollment at the placebo Prussian-Russian border is about 10 pp higher in the counties closer to the treatment partition border in 1921. While this discontinuity is considerably smaller than the one estimated at the treatment Prussian-Russian border for the same year, it is nevertheless statistically significant. However, the visual inspection of the discontinuity (Figure 15) suggests that the placebo treatment group is far from outpacing the placebo control group. Instead, the difference appears to be driven by two counties of which one is located on either side of the placebo border. The two counties differ strongly in terms of enrollment; this difference is then emphasized by the second-order polynomial. Controlling for latitude and longitude linearly instead (not reported here) reduces the magnitude of the discontinuity by more than 50% and renders it insignificant. In 1931, the discontinuity has disappeared and it does not reappear in 1961. Further, the treatment group at the placebo Austrian-Russian border does not show any sign of a differential development than the control group (Table 18). The visual patterns of enrollment at this placebo border are in accordance with the regression results (Figure 16).

### 5.3.2 Robustness of literacy

Table 19 shows the first set of robustness checks for the literacy outcome. Column 1 reports again the results obtained in Section 5.2.1 when controlling for both cities and geographic characteristics. Size and significance of the coefficients across all four time periods are unaffected by the inclusion of border segment dummies (column 2) and the lowering of the bandwidth to 50km (column 3).

As shown in Table 20 and Table 21, the ethnic-religious population controls are not significantly associated with the level of literacy at any of the two borders in any time period.

The placebo exercises suggest that the initial discontinuities in literacy at the actual partition borders indeed identify the legacies of the partitions, as opposed to a spurious pattern: All coefficients estimated at the two placebo borders are small in magnitude and insignificant in statistical terms (Table 22 and Table 23). Hence, the placebo treatment and control counties do not differ from each other in 1921 when the convergence at the actual former borders just begins, and the placebo control counties do not exhibit a different speed of convergence than the placebo treatment counties over the following decades. The simultaneous improvements in literacy on both sides of the two placebo borders are displayed in Figure 17 and Figure 18.

## 5.4 Gender differences

The Russian school statistics suggest that access to primary education in the Russian partition was not only limited in general, but also unequally distributed across genders. Calculating the quotient of the number of female by the number of male students enrolled in primary school in 1911 results in a gender parity index (GPI) of 0.62 across the sample counties in the Russian partition. Enrollment in the other two partitions is not characterized by a comparable level of inequality in the same period: Repeating the calculation using the Prussian schooling data results in a GPI of 0.99 for the Prussian sample. While the Galician school statistics of 1911 do not differentiate the gender of the primary students at the county level, more aggregate sources (Bureau der K.K. Statistischen Zentralkommission, 1914b) indicate that the GPI in the primary schools in the Crown land of Galicia amounted to 0.98 in the same year.

This large gender imbalance in access to primary education between the Russian and the other two partitions prior to WWI raises the question whether this imbalance persisted to some extent into the post-imperial era. Section 5.1.1 shows that overall primary enrollment reaches more than 90% by 1931. However, this convergence toward universal enrollment could be driven unevenly by the enrollment of males versus the enrollment of females. The initial imbalance in the Russian partition hence presents the opportunity to study the mechanisms of persistence and non-persistence along the gender dimension: On the one hand, the gender imbalance in the Russian partition may have simply reflected a combination of the lack of a comprehensive educational infrastructure and a culture that e.g. gave preference to males when schooling could be provided for only one child per family. It could have also resulted from an institutional discrimination against females on the side of the Russian-controlled educational system. In both cases, the imbalance is not expected to persist after WWI given the expansion of the educational infrastructure and the remodeling of



the educational institutions. On the other hand, if the pre-WWI imbalances reflected a more deeply ingrained culture of general discrimination against females, then persistent traces of this culture may still be found in the post-WWI educational data.

The Polish school statistics from the post-WWI period differentiate the gender of the primary school students for the school year 1921; hence they allow the computation of the GPI for all three former partition samples. Panel A in Table 24 reports results from estimating Equation 2 with the GPI as the outcome variable at the Prussian-Russian border. In 1911, the discontinuity is large and highly significant, suggesting that the GPI is on average 0.298 points higher at the Prussian side. In 1921, the magnitude of the discontinuity amounts to only 0.05 points, resulting from an increase in the GPI at the former Russian side by 0.249 points compared to 1911. This increase further renders the discontinuity statistically insignificant; the gender imbalance in access to primary education has hence been essentially resolved at the former Prussian-Russian border. While the discontinuity cannot be estimated at the Austrian-Russian border in 1911 due to the lack of disaggregated Austrian data, the average GPI at the Russian side is even lower than in the Russian partition counties at the Prussian-Russian border in the same year (0.541 vs. 0.679). Estimating the discontinuity in 1921 (Panel B in Table 24) yields a statistically significant effect of the former Austrian partition on the GPI in the magnitude of 0.104 points. However, while this result indicates that the gender imbalance in access to primary education has not been fully resolved yet in the former Russian territories bordering the former Austrian partition by 1921, it is worth noting that the GPI has on average increased by 0.331 points in this part of the former Russian partition between 1911 and 1921. This increase in the GPI is larger than in the counties at the Prussian-Russian border. Hence, there is evidence for substantial improvement in female access to primary education in the former Russian partition at both former partition borders. Graphical representations of the evolving discontinuities in the GPI are shown in Figure 19 and Figure 20 respectively.

Further, there is no indication that this trend toward equal access to primary education weakens or reverses in subsequent periods: Calculations using province data from the Polish school statistics for the year 1931 yield a GPI of 0.99 in the former Russian partition. If anything, the gender imbalance in access to primary education in the former Russian partition is therefore resolved *faster* than the general access to primary education.

The disappearing gender gaps in access to primary schooling are reflected in the literacy gaps between males and females of different age groups in the 1921 census. Panel A of Table 25 reports that the literacy rate of men aged 40-49 living in the former Russian partition in 1921 is 9.5 pp higher than the literacy rate of women of the same age group living in the same territory. Moreover, this gender literacy gap is 5.4 pp lower for the same



age group in the former Prussian partition, which is a statistically significant difference. However, with the full set of controls added to the regression, this gap is actually positive for the 14-year-old group and statistically insignificant. Hence, females in the young cohort living in the former Russian partition have already sufficiently benefited from the improved access to schooling to equalize the relative position of young males and females in terms of literacy. At the former Austrian-Russian border (Panel B), both the literacy gap between 40-49 year old males and females on the former Russian side (15.2 pp), as well as the difference to the former Austrian side (8 pp) are higher than along the former Prussian-Russian border. For the 14-year-old group, the gender literacy gap is still significantly lower in the former Austrian partition, but its magnitude is only half of what it is for the 40-49-year-old group. This result corresponds to the previous finding that access to primary schooling has not been fully equalized yet along this former partition border, but that considerable progress has already been made by 1921.

Again, this literacy gap between genders is considerably smaller than the past gender gap in primary enrollment would suggest. The possible explanations are similar to those given in Section 5.2.1: Females might have received at least some schooling, which was sufficient to qualify as literate in the 1921 census, while the limited access to schooling might have induced human capital transmission outside of schools, e.g. from male to female family members. Still, the GPI in primary enrollment in 1911 strongly predicts the literacy of older females in 1921, as shown in Figure 21; hence, the past gender inequality in access to education mattered for the educational outcomes of the affected cohorts of Polish women.

## 6 Conclusion

Taking stock of the empirical results, the decompression of history reveals that the partitions have a pronounced and divisive effect on human capital in Poland in the early 20th century before the outbreak of WWI: While primary enrollment is universal in the Prussian Empire, it barely reaches 20% in the Russian partition. Also the Austrian partition exhibits substantially higher enrollment than the Russian partition, but it is far apart from providing universal schooling. After WWI, these differences disappear entirely within less than 15 years since the reconstitution of the Polish state. They do not reappear during the communist period of Polish history following WWII.

Together with the large-scale expansion of the public school network, the surge in school enrollment induces a strong intergenerational upward mobility in education after WWI. This mobility is concentrated at the low end of the human capital distribution, where it results in the formalization of the basic level of educational attainment. Further, literacy

becomes universal across the populations of the former partitions, as older cohorts that had no comprehensive access to schooling exit the population. Higher levels of attainment are not affected by the partitions neither before nor after WWII.

What do these findings imply for the longevity of historical legacies in human capital? The cohort analysis in Section 5.2.2 shows that the persistence of the poor education provided by the Russian Empire is tied to those age cohorts that grew up in the Russian partition before WWI. In turn, the non-persistence of the effect of the Russian partition already arises and manifests itself in the higher human capital of the young cohorts that were educated after the outbreak of WWI.

This simultaneous evolution of persistence and non-persistence is driven by the sweeping interventions in a number of determinants of human capital formation. These determinants have in common that they are rather malleable: The reform of educational institutions was a matter of legislation, while the expansion of educational infrastructure was essentially a result of state capacity. The example of enrollment in particular reverts back to the notion of Wittenberg (2015) that history is composed of both change and persistence: For two decades, enrollment in the former Austrian and Russian partitions is subject to tremendous change. But after it has become universal across Poland in the 1930s, it also proves itself to be robust to the catastrophic shock of WWII. Hence, it has become a persistent condition. Over the same time period, both enrollment and literacy have been persistent at high levels where they had already been universal under foreign rule, i.e. in the Prussian partition.

However, clearly not all determinants of human capital formation are malleable to such an extent: Grosfeld & Zhuravskaya (2015) find various persistent cultural legacies of the partitions and Bukowski (2019) specifically finds a cultural legacy of the Austrian partition in terms of positive norms towards schooling. While these norms do not affect school attendance or basic skills like literacy in present-day Poland, they are effective at the quality margin of education. My analysis suggests that any potential cultural legacies of the three empires could not restrain the convergence of the three former partitions in terms of enrollment and literacy. However, the existing evidence on cultural persistence implies an upper limit regarding the depth of this convergence: Remodeling and unifying the institutions and means of education has been proven to be feasible, while erasing, replicating or transplanting the positive cultural norms towards schooling has not.

The paper furthermore contributes to several strands of the literature related to human capital. The strong intergenerational mobility in education after WWI complements the finding of Black et al. (2005) that there is only a weak causal link between the human capital of parents and that of their children during an expansion of mandatory education. In Poland, the intergenerational transmission of human capital was to a large extent overridden

by the sudden increase in primary school enrollment after WWI, which drove up the human capital investment of the young cohorts in the formerly disadvantaged territories. This result underlines the ability of a public education system to achieve a sustained transformation of a society's state of education by generating upward mobility in human capital.

Further, the duration of convergence implied by my findings is remarkably similar to the duration of catch-up between former slaves and free blacks estimated by Sacerdote (2005). While Sacerdote (2005) is able to differentiate between blacks that remain in the US south after the abolition of slavery and those that have moved elsewhere, he considers his estimates rather as bounds on the persistent effect of past slavery due to the potential selectivity of migration. In the Polish case, the sharp demarcation of the populations at the partition borders and the spatial persistence of the Polish population after WWI allow a precise estimation of the remaining differences in human capital that were caused by the partitions, admittedly at the cost of lower external validity. Both Sacerdote (2005) and this paper find that it takes about 50 years or two generations for comparable measures of human capital to converge.

The Polish case also suggests that an educational infrastructure that has been constructed and governed by essentially a foreign power (Prussia) can, with some short-run frictions, be successfully taken over and maintained at a high level of capacity, which corresponds to the findings of Huillery (2009) in French West Africa. Further, the non-persistence of previously substantial gender imbalances in access to schooling complements the evidence on gender differences in historical perspective (Giuliano, 2017).

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# Tables

Table 1: Log population at partition borders in 1810

Dep. Variable	Log Population in 1810							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prussian Side = 1	0.036 (0.137)	-0.126 (0.184)	0.078 (0.234)	-0.017 (0.267)				
Austrian Side = 1					0.323** (0.141)	0.247 (0.157)	0.131 (0.184)	0.077 (0.219)
Observations	621	245	165	137	621	251	187	145
R-squared	0.140	0.125	0.136	0.076	0.152	0.163	0.198	0.227
Distance, Distance×Partition	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude/Longitude, City	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bandwidth	.	100km	65km	50km	.	100km	65km	50km

Notes: The dependent variable is the logarithm of the population in 1810. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. One-dimensional RDD, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 2: Log population at partition borders in 1810

Dep. Variable	Log Population in 1810							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prussian Side = 1	-0.088 (0.148)	-0.120 (0.179)	-0.002 (0.220)	-0.064 (0.237)				
Austrian Side = 1					0.119 (0.141)	0.251 (0.155)	0.195 (0.184)	0.263 (0.204)
Observations	538	245	165	137	470	251	187	145
R-squared	0.128	0.136	0.147	0.077	0.183	0.179	0.217	0.243
2nd order Polynomial, City	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bandwidth	.	100km	65km	50km	.	100km	65km	50km

Notes: The dependent variable is the logarithm of the population in 1810. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 3: Discontinuities in geographic characteristics

Dep. Variable	Altitude (m)		Precipitation (mm)		Temperature (°C)	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Prussian-Russian Border</b>						
<i>Panel A: One-Dimensional RDD</i>						
Prussian Side = 1	11.001 (16.798)	1.221 (8.568)	0.021 (15.112)	-2.993 (8.610)	-0.047 (0.290)	-0.051 (0.063)
Observations	54	54	54	54	54	54
R-squared	0.213	0.802	0.003	0.651	0.010	0.950
Distance, Distance×Prussian Side	Yes	Yes	Yes	Yes	Yes	Yes
<i>Panel B: Two-dimensional RDD</i>						
Prussian Side = 1	10.694 (9.330)	11.253 (8.501)	-0.737 (6.940)	-0.483 (6.742)	-0.133** (0.065)	-0.136** (0.060)
Observations	54	54	54	54	54	54
R-squared	0.714	0.792	0.664	0.701	0.916	0.933
2nd Order Polynomial	Yes	Yes	Yes	Yes	Yes	Yes
<b>Austrian-Russian Border</b>						
<i>Panel C: One-Dimensional RDD</i>						
Austrian Side = 1	-102.805*** (34.641)	-94.181*** (29.948)	-31.772 (34.414)	-31.391** (13.800)	0.631*** (0.168)	0.549*** (0.164)
Observations	44	44	44	44	44	44
R-squared	0.370	0.647	0.417	0.909	0.403	0.492
Distance, Distance×Austrian Side	Yes	Yes	Yes	Yes	Yes	Yes
<i>Panel D: Two-dimensional RDD</i>						
Austrian Side = 1	-117.012*** (29.096)	-110.687*** (28.448)	-48.946*** (9.216)	-46.137*** (8.907)	0.657*** (0.164)	0.631*** (0.164)
Observations	44	44	44	44	44	44
R-squared	0.741	0.760	0.960	0.965	0.484	0.498
2nd Order Polynomial	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes

*Notes:* The dependent variable in columns (1) and (2) is the average altitude in meters. The dependent variable in columns (3) and (4) is the average precipitation in millimeters. The dependent variable in columns (5) and (6) is the average temperature in degree Celsius. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. One- and two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table 4: Discontinuities in agriculture

Dep. Variable	Average Caloric Yield		Optimal Caloric Yield		Cropland 1800		Cropland 1900	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Austrian-Russian Border</b>								
<i>Panel A: One-Dimensional RDD</i>								
Austrian Side = 1	186.077** (91.586)	-18.295 (56.696)	407.150* (229.682)	-70.439 (154.235)	-0.017 (0.047)	-0.069 (0.045)	-0.033 (0.060)	-0.101 (0.060)
Observations	44	44	44	44	44	44	44	44
R-squared	0.405	0.830	0.446	0.790	0.538	0.770	0.500	0.751
Distance,								
Distance×Austrian Side	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude/Longitude, City	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geo Controls	No	Yes	No	Yes	No	Yes	No	Yes
<i>Panel B: Two-Dimensional RDD</i>								
Austrian Side = 1	199.198*** (61.451)	-21.583 (21.751)	498.364*** (127.118)	60.065 (81.472)	0.015 (0.032)	-0.015 (0.042)	0.014 (0.042)	-0.026 (0.056)
Observations	44	44	44	44	44	44	44	44
R-squared	0.663	0.950	0.706	0.949	0.818	0.828	0.791	0.804
2nd Order Polynomial, City	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geo Controls	No	Yes	No	Yes	No	Yes	No	Yes
<b>Prussian-Russian Border</b>								
<i>Panel C: One-Dimensional RDD</i>								
Prussian Side = 1	-80.511* (45.155)	-90.582** (36.098)	-227.352* (118.438)	-214.485** (103.037)	0.006 (0.019)	0.009 (0.016)	0.007 (0.025)	0.012 (0.021)
Observations	54	54	54	54	54	54	54	54
R-squared	0.636	0.745	0.650	0.753	0.417	0.566	0.411	0.562
Distance,								
Distance×Prussian Side	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Latitude/Longitude, City	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geo Controls	No	Yes	No	Yes	No	Yes	No	Yes
<i>Panel D: Two-Dimensional RDD</i>								
Prussian Side = 1	-45.711* (23.579)	-27.849 (20.215)	-197.538** (81.034)	-82.676 (61.883)	-0.020 (0.019)	-0.014 (0.019)	-0.027 (0.024)	-0.019 (0.026)
Observations	54	54	54	54	54	54	54	54
R-squared	0.882	0.918	0.801	0.902	0.529	0.579	0.529	0.576
2nd Order Polynomial, City	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geo Controls	No	Yes	No	Yes	No	Yes	No	Yes

Notes: The dependent variable in columns (1) and (2) is the average caloric yield. The dependent variable in columns (3) and (4) is the optimal caloric yield. The dependent variable in columns (5) and (6) is the share of cropland in 1800. The dependent variable in columns (7) and (8) is the share of cropland in 1900. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. One- and two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5: Primary enrollment at Prussian-Russian border 1911-1961

	(1)	(2)	(3)
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911	Primary Enrollment 1911
Prussian Side = 1	0.822*** (0.016)	0.822*** (0.016)	0.832*** (0.015)
Observations	54	54	54
R-squared	0.996	0.996	0.997
Mean on Russian Side	0.164	0.164	0.164
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921	Primary Enrollment 1921
Prussian Side = 1	0.354*** (0.042)	0.355*** (0.042)	0.378*** (0.044)
Observations	54	54	54
R-squared	0.875	0.888	0.902
Mean on Russian Side	0.562	0.562	0.562
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931	Primary Enrollment 1931
Prussian Side = 1	0.097*** (0.027)	0.098*** (0.026)	0.098*** (0.026)
Observations	54	54	54
R-squared	0.410	0.528	0.550
Mean on Russian Side	0.961	0.961	0.961
Dep. Variable	Primary Enrollment 1961	Primary Enrollment 1961	Primary Enrollment 1961
Prussian Side = 1	-0.027 (0.026)	-0.027 (0.027)	-0.031 (0.037)
Observations	53	53	53
R-squared	0.183	0.187	0.215
Mean on Russian Side	1.081	1.081	1.081
2nd Order Polynomial	Yes	Yes	Yes
City Dummy	No	Yes	Yes
Geographic Controls	No	No	Yes

Notes: The dependent variable is the gross public primary enrollment rate. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses.  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6: Primary enrollment at Austrian-Russian border 1911-1961

	(1)	(2)	(3)
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911	Primary Enrollment 1911
Austrian Side = 1	0.495*** (0.032)	0.499*** (0.033)	0.400*** (0.043)
Observations	43	43	43
R-squared	0.926	0.927	0.945
Mean on Russian Side	0.194	0.194	0.194
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921	Primary Enrollment 1921
Austrian Side = 1	0.226*** (0.036)	0.232*** (0.037)	0.156*** (0.045)
Observations	44	44	44
R-squared	0.835	0.838	0.870
Mean on Russian Side	0.554	0.554	0.554
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931	Primary Enrollment 1931
Austrian Side = 1	-0.007 (0.020)	0.005 (0.019)	-0.009 (0.027)
Observations	44	44	44
R-squared	0.441	0.653	0.662
Mean on Russian Side	0.981	0.981	0.981
Dep. Variable	Primary Enrollment 1961	Primary Enrollment 1961	Primary Enrollment 1961
Austrian Side = 1	-0.012 (0.011)	-0.010 (0.012)	-0.002 (0.014)
Observations	59	59	59
R-squared	0.114	0.139	0.192
Mean on Russian Side	1.062	1.062	1.062
2nd Order Polynomial	Yes	Yes	Yes
City Dummy	No	Yes	Yes
Geographic Controls	No	No	Yes

Notes: The dependent variable is the gross public primary enrollment rate. *Prussian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 7: Schools, classes, teachers at Prussian-Russian border 1911-1961

	(1)	(2)	(3)
Dep. Variable	Schools 1911	Classes 1911	Teachers 1911
Prussian Side = 1	5.408*** (0.535)	16.559*** (0.591)	11.305*** (0.642)
Observations	54	54	54
R-squared	0.936	0.981	0.977
Mean on Russian Side	2.143	2.262	2.413
Dep. Variable	Schools 1921	Classes 1921	Teachers 1921
Prussian Side = 1	1.684** (0.632)	7.894*** (0.891)	3.463*** (0.741)
Observations	54	54	54
R-squared	0.740	0.810	0.603
Mean on Russian Side	6.659	7.915	9.377
Dep. Variable	Schools 1931		
Prussian Side = 1	2.374*** (0.575)		
Observations	54		
R-squared	0.818		
Mean on Russian Side	6.042		
Dep. Variable	Schools 1961		
Prussian Side = 1	-1.595* (0.917)		
Observations	53		
R-squared	0.868		
Mean on Russian Side	7.024		
City, Geo Controls	Yes	Yes	Yes
2nd Order Polynomial	Yes	Yes	Yes

*Notes:* The dependent variable in column (1) is the number of primary schools per 1,000 children in primary school age. The dependent variable in column (2) is the number of primary school classes per 1,000 children in primary school age. The dependent variable in column (3) is the number of primary school teachers per 1,000 children in primary school age. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 8: Schools, classes, teachers at Austrian-Russian border 1911-1961

	(1)	(2)	(3)
Dep. Variable	Schools 1911	Classes 1911	Teachers 1911
Austrian Side = 1	-0.089 (0.574)	4.998*** (0.959)	4.500*** (0.948)
Observations	44	44	44
R-squared	0.448	0.879	0.884
Mean on Russian Side	2.47	2.648	3.144
Dep. Variable	Schools 1921	Classes 1921	Teachers 1921
Austrian Side = 1	-2.338** (0.865)	0.852 (0.863)	2.196** (0.994)
Observations	44	44	44
R-squared	0.580	0.609	0.838
Mean on Russian Side	5.71	8.154	9.01
Dep. Variable	Schools 1931		
Austrian Side = 1	1.06** (0.471)		
Observations	44		
R-squared	0.692		
Mean on Russian Side	4.751		
Dep. Variable	Schools 1961		
Austrian Side = 1	-0.881* (0.500)		
Observations	59		
R-squared	0.838		
Mean on Russian Side	6.024		
City, Geo Controls	Yes	Yes	Yes
2nd Order Polynomial	Yes	Yes	Yes

*Notes:* The dependent variable in column (1) is the number of primary schools per 1,000 children in primary school age. The dependent variable in column (2) is the number of primary school classes per 1,000 children in primary school age. The dependent variable in column (3) is the number of primary school teachers per 1,000 children in primary school age. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 9: Literacy at Prussian-Russian border 1921-1961

	(1)	(2)	(3)
Dep. Variable	Share of Literates 1921	Share of Literates 1921	Share of Literates 1921
Prussian Side = 1	0.261*** (0.015)	0.260*** (0.014)	0.261*** (0.013)
Observations	54	54	54
R-squared	0.948	0.958	0.966
Mean on Russian Side	0.632	0.632	0.632
Dep. Variable	Share of Literates 1931	Share of Literates 1931	Share of Literates 1931
Prussian Side = 1	0.187*** (0.010)	0.186*** (0.010)	0.182*** (0.011)
Observations	54	54	54
R-squared	0.960	0.967	0.971
Mean on Russian Side	0.768	0.768	0.768
Dep. Variable	Share of Literates 1961	Share of Literates 1961	Share of Literates 1961
Prussian Side = 1	0.003 (0.010)	0.003 (0.009)	0.011 (0.009)
Observations	53	53	53
R-squared	0.735	0.787	0.862
Mean on Russian Side	0.936	0.936	0.936
2nd Order Polynomial	Yes	Yes	Yes
City Dummy	No	Yes	Yes
Geographic Controls	No	No	Yes

*Notes:* The dependent variable is the literacy rate. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 10: Literacy at Austrian-Russian border 1921-1961

	(1)	(2)	(3)
Dep. Variable	Share of Literates 1921	Share of Literates 1921	Share of Literates 1921
Austrian Side = 1	0.240*** (0.031)	0.227*** (0.030)	0.163*** (0.049)
Observations	44	44	44
R-squared	0.823	0.859	0.885
Mean on Russian Side	0.572	0.572	0.572
Dep. Variable	Share of Literates 1931	Share of Literates 1931	Share of Literates 1931
Austrian Side = 1	0.146*** (0.020)	0.137*** (0.020)	0.088*** (0.029)
Observations	44	44	44
R-squared	0.760	0.801	0.849
Mean on Russian Side	0.732	0.732	0.732
Dep. Variable	Share of Literates 1961	Share of Literates 1961	Share of Literates 1961
Austrian Side = 1	0.046*** (0.007)	0.041*** (0.007)	0.040*** (0.007)
Observations	59	59	59
R-squared	0.574	0.740	0.769
Mean on Russian Side	0.934	0.934	0.934
2nd Order Polynomial	Yes	Yes	Yes
City Dummy	No	Yes	Yes
Geographic Controls	No	No	Yes

*Notes:* The dependent variable is the literacy rate. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 11: Literacy at partition borders by age groups 1921

	(1)	(2)
<b>Panel A: Prussian-Russian Border</b>		
Dep. Variable	Literacy 40-49 y/o 1921	Literacy 40-49 y/o 1921
Prussian Side = 1	0.355*** (0.017)	0.354*** (0.015)
Observations	54	54
R-squared	0.968	0.979
Mean on Russian Side	0.564	0.564
Dep. Variable	Literacy 14 y/o 1921	Literacy 14 y/o 1921
Prussian Side = 1	0.148*** (0.013)	0.149*** (0.013)
Observations	54	54
R-squared	0.852	0.878
Mean on Russian Side	0.765	0.765
<b>Panel B: Austrian-Russian Border</b>		
Dep. Variable	Literacy 40-49 y/o 1921	Literacy 40-49 y/o 1921
Austrian Side = 1	0.285*** (0.034)	0.196*** (0.058)
Observations	44	44
R-squared	0.841	0.899
Mean on Russian Side	0.480	0.480
Dep. Variable	Literacy 14 y/o 1921	Literacy 14 y/o 1921
Austrian Side = 1	0.186*** (0.032)	0.124** (0.052)
Observations	44	44
R-squared	0.758	0.810
Mean on Russian Side	0.711	0.711
City, Geo Controls	No	Yes
2nd Order Polynomial	Yes	Yes

*Notes:* The dependent variable is the literacy rate of the 40-49 years old and the 14 years old respectively. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table 12: Educational attainment at partition borders 1921

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable:						
Educational Attainment in 1921	Self-taught	Basic	Medium	Professional	Higher	Unknown
<b>Panel A: Prussian-Russian Border</b>						
Prussian Side = 1	-0.244*** (0.024)	0.360*** (0.021)	-0.006 (0.009)	-0.000 (0.001)	0.000 (0.001)	-0.110*** (0.026)
Observations	54	54	54	54	54	54
R-squared	0.940	0.958	0.896	0.833	0.866	0.404
Mean on Russian Side	0.303	0.496	0.0332	0.00509	0.00341	0.160
<b>Panel B: Austrian-Russian Border</b>						
Austrian Side = 1	-0.274*** (0.067)	0.353*** (0.061)	-0.011 (0.007)	-0.003 (0.003)	-0.002 (0.002)	-0.062** (0.023)
Observations	44	44	44	44	44	44
R-squared	0.887	0.921	0.866	0.832	0.846	0.745
Mean on Russian Side	0.344	0.487	0.0323	0.00584	0.00421	0.127
2nd order polynomial	Yes	Yes	Yes	Yes	Yes	Yes
City, Geo Controls	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* The dependent variable is the share of the population older than ten years that has attained the respective level of education. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 13: Educational attainment at partition borders 1961

	(1)	(2)	(3)	(4)	(5)
Dep. Variable:					
Educational Attainment in 1961	Self-taught	Primary	Medium	Higher	Unknown
<b>Panel A: Prussian-Russian Border</b>					
Prussian Side = 1	-0.007 (0.010)	-0.009 (0.019)	0.014 (0.018)	-0.000 (0.004)	0.002 (0.001)
Observations	52	52	52	52	52
R-squared	0.800	0.916	0.934	0.771	0.247
Mean on Russian Side	0.0540	0.831	0.103	0.00919	0.00293
<b>Panel B: Austrian-Russian Border</b>					
Austrian Side = 1	-0.038*** (0.008)	0.012 (0.028)	0.029 (0.022)	-0.002 (0.005)	-0.001 (0.001)
Observations	55	55	55	55	55
R-squared	0.844	0.869	0.888	0.759	0.242
Mean on Russian Side	0.0528	0.804	0.127	0.0129	0.00338
2nd order polynomial	Yes	Yes	Yes	Yes	Yes
City, Geo Controls	Yes	Yes	Yes	Yes	Yes

*Notes:* The dependent variable is the share of the population out of education that has attained the respective level of education. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 14: Robustness of enrollment to border segments and bandwidth

	(1)	(2)	(3)
<b>Panel A: Prussian-Russian Border</b>			
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911	Primary Enrollment 1911
Prussian Side = 1	0.832*** (0.015)	0.882*** (0.021)	0.825*** (0.020)
Observations	54	54	42
R-squared	0.997	0.997	0.997
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921	Primary Enrollment 1921
Prussian Side = 1	0.378*** (0.044)	0.332*** (0.074)	0.355*** (0.054)
Observations	54	54	42
R-squared	0.902	0.906	0.912
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931	Primary Enrollment 1931
Prussian Side = 1	0.098*** (0.026)	0.086** (0.037)	0.073** (0.033)
Observations	54	54	42
R-squared	0.550	0.552	0.6316
Dep. Variable	Primary Enrollment 1961	Primary Enrollment 1961	Primary Enrollment 1961
Prussian Side = 1	-0.031 (0.037)	0.029 (0.057)	0.011 (0.025)
Observations	53	53	39
R-squared	0.215	0.269	0.442
<b>Panel B: Austrian-Russian Border</b>			
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911	Primary Enrollment 1911
Austrian Side = 1	0.412*** (0.043)	0.365*** (0.077)	0.401*** (0.048)
Observations	44	44	37
R-squared	0.930	0.933	0.945
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921	Primary Enrollment 1921
Austrian Side = 1	0.156*** (0.045)	0.102 (0.063)	0.178*** (0.056)
Observations	44	44	37
R-squared	0.870	0.888	0.860
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931	Primary Enrollment 1931
Austrian Side = 1	-0.009 (0.027)	-0.001 (0.026)	-0.001 (0.033)
Observations	44	44	37
R-squared	0.662	0.742	0.618
Dep. Variable	Primary Enrollment 1961	Primary Enrollment 1961	Primary Enrollment 1961
Austrian Side = 1	-0.002 (0.014)	0.013 (0.018)	0.019 (0.021)
Observations	59	59	47
R-squared	0.192	0.213	0.238
2nd order polynomial	Yes	Yes	Yes
City, Geo Controls	Yes	Yes	Yes
Border Segment Dummies	No	Yes	No
Bandwidth (km)	65	65	50

Notes: The dependent variable is the gross public primary enrollment rate. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 15: Robustness of enrollment at Prussian-Russian border to population controls

	(1)	(2)	(3)
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911	Primary Enrollment 1911
Prussian Side = 1	0.832*** (0.015)	0.847*** (0.027)	0.839*** (0.027)
Share Jewish		0.368 (0.260)	0.374 (0.266)
Share Protestant		0.042* (0.022)	0.022 (0.042)
Share Born Outside Partition 1921			0.083 (0.114)
Observations	54	54	54
R-squared	0.997	0.997	0.997
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921	Primary Enrollment 1921
Prussian Side = 1	0.378*** (0.044)	0.346*** (0.076)	0.454*** (0.097)
Share Jewish		-0.458 (0.784)	-0.429 (0.766)
Share Protestant		0.076 (0.157)	0.307* (0.175)
Share Born Outside Partition 1921			-0.851*** (0.309)
Observations	54	54	54
R-squared	0.902	0.904	0.916
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931	Primary Enrollment 1931
Prussian Side = 1	0.098*** (0.026)	0.092*** (0.030)	0.069 (0.045)
Share Jewish		-0.108 (0.407)	-0.134 (0.429)
Share Protestant		0.029 (0.183)	-0.032 (0.218)
Share Born Outside Partition 1921			0.158 (0.191)
Observations	54	54	54
R-squared	0.550	0.550	0.555
Geo, City Controls	Yes	Yes	Yes
2nd Order Polynomial	Yes	Yes	Yes

Notes: The dependent variable is the gross primary enrollment rate. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 16: Robustness of enrollment at Austrian-Russian border to population controls

	(1)	(2)	(3)
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911	Primary Enrollment 1911
Austrian Side = 1	0.412*** (0.043)	0.427*** (0.049)	0.423*** (0.049)
Share Jewish		0.391 (0.374)	0.422 (0.299)
Share Protestant		3.903 (2.351)	3.748 (2.404)
Share Born Outside Partition 1921			-1.9 (1.289)
Observations	44	44	44
R-squared	0.930	0.939	0.944
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921	Primary Enrollment 1921
Austrian Side = 1	0.156*** (0.045)	0.123*** (0.044)	0.117** (0.043)
Share Jewish		-1.058*** (0.315)	-1.291*** (0.298)
Share Protestant		-0.550 (4.774)	0.148 (4.481)
Share Born Outside Partition 1921			1.805* (0.967)
Observations	44	44	44
R-squared	0.870	0.898	0.907
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931	Primary Enrollment 1931
Austrian Side = 1	-0.009 (0.027)	-0.004 (0.028)	-0.004 (0.028)
Share Jewish		0.094 (0.264)	0.061 (0.277)
Share Protestant		-1.525 (3.007)	-1.592 (3.028)
Share Born Outside Partition 1921			0.230 (0.459)
Observations	44	44	44
R-squared	0.662	0.668	0.670
Geo, City Controls	Yes	Yes	Yes
2nd Order Polynomial	Yes	Yes	Yes

Notes: The dependent variable is the gross primary enrollment rate. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 17: Enrollment at Prussian placebo border 1911-1961

	(1)	(2)
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911
Placebo Prussian = 1	-0.047*	-0.036
	(0.027)	(0.029)
Observations	41	41
R-squared	0.328	0.529
Mean on Placebo Russian Side	0.212	0.212
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921
Placebo Prussian = 1	0.049	0.096**
	(0.054)	(0.042)
Observations	41	41
R-squared	0.343	0.711
Mean on Placebo Russian Side	0.508	0.508
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931
Placebo Prussian = 1	-0.000	-0.006
	(0.025)	(0.031)
Observations	41	41
R-squared	0.265	0.323
Mean on Placebo Russian Side	0.967	0.967
Dep. Variable	Primary Enrollment 1961	Primary Enrollment 1961
Placebo Prussian = 1	0.004	0.002
	(0.033)	(0.053)
Observations	44	44
R-squared	0.066	0.090
Mean on Placebo Russian Side	1.06	1.06
2nd Order Polynomial	Yes	Yes
City, Geographic Controls	No	Yes

*Notes:* The dependent variable is the gross public primary enrollment rate. *Placebo Prussian Side* is an indicator that equals one if an observation is located in the Placebo Prussian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 18: Enrollment at Austrian placebo border 1911-1961

	(1)	(2)
Dep. Variable	Primary Enrollment 1911	Primary Enrollment 1911
Placebo Austrian = 1	0.043 (0.048)	-0.021 (0.035)
Observations	34	34
R-squared	0.459	0.645
Mean on Placebo Russian Side	0.163	0.163
Dep. Variable	Primary Enrollment 1921	Primary Enrollment 1921
Placebo Austrian = 1	-0.021 (0.058)	-0.045 (0.054)
Observations	34	34
R-squared	0.089	0.322
Mean on Placebo Russian Side	0.536	0.536
Dep. Variable	Primary Enrollment 1931	Primary Enrollment 1931
Placebo Austrian = 1	-0.028 (0.030)	-0.016 (0.022)
Observations	34	34
R-squared	0.234	0.544
Mean on Placebo Russian Side	0.984	0.984
Dep. Variable	Primary Enrollment 1961	Primary Enrollment 1961
Placebo Austrian = 1	-0.018 (0.015)	0.007 (0.017)
Observations	53	53
R-squared	0.094	0.236
Mean on Placebo Russian Side	1.061	1.061
2nd Order Polynomial	Yes	Yes
City, Geographic Controls	No	Yes

*Notes:* The dependent variable is the gross public primary enrollment rate. *Placebo Austrian* is an indicator that equals one if an observation is located in the Placebo Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 19: Robustness of literacy to border segments and bandwidth

	(1)	(2)	(3)
<b>Panel A: Prussian-Russian Border</b>			
Dep. Variable	Literacy 1921	Literacy 1921	Literacy 1921
Prussian Side = 1	0.261*** (0.013)	0.256*** (0.027)	0.252*** (0.017)
Observations	54	54	42
R-squared	0.966	0.966	0.973
Dep. Variable	Literacy 1931	Literacy 1931	Literacy 1931
Prussian Side = 1	0.182*** (0.011)	0.177*** (0.017)	0.175*** (0.012)
Observations	54	54	42
R-squared	0.971	0.972	0.977
Dep. Variable	Literacy 1960	Literacy 1960	Literacy 1960
Prussian Side = 1	0.014 (0.009)	0.010 (0.022)	0.016 (0.012)
Observations	52	52	39
R-squared	0.867	0.873	0.862
<b>Panel B: Austrian-Russian Border</b>			
Dep. Variable	Literacy 1921	Literacy 1921	Literacy 1921
Austrian Side = 1	0.163*** (0.049)	0.194*** (0.037)	0.164*** (0.055)
Observations	44	44	37
R-squared	0.885	0.897	0.897
Dep. Variable	Literacy 1931	Literacy 1931	Literacy 1931
Austrian Side = 1	0.088*** (0.029)	0.124*** (0.027)	0.092*** (0.032)
Observations	44	44	37
R-squared	0.848	0.868	0.882
Dep. Variable	Literacy 1960	Literacy 1960	Literacy 1960
Austrian Side = 1	0.037*** (0.008)	0.018* (0.010)	0.039*** (0.011)
Observations	55	55	47
R-squared	0.766	0.790	0.765
2nd order polynomial	Yes	Yes	Yes
City, Geo Controls	Yes	Yes	Yes
Border Segment Dummies	No	Yes	No
Bandwidth (km)	65	65	50

*Notes:* The dependent variable is the literacy rate. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table 20: Robustness of literacy at Prussian-Russian border to population controls

	(1)	(2)	(3)
Dep. Variable	Share of Literates 1921	Share of Literates 1921	Share of Literates 1921
Prussian Side = 1	0.261*** (0.013)	0.276*** (0.023)	0.282*** (0.028)
Share Jewish		0.311 (0.286)	0.312 (0.289)
Share Protestant		0.055 (0.057)	0.067 (0.070)
Share Born Outside Partition 1921			-0.044 (0.134)
Observations	54	54	54
R-squared	0.966	0.967	0.967
Mean on Russian Side	0.632	0.632	0.632
Dep. Variable	Share of Literates 1931	Share of Literates 1931	Share of Literates 1931
Prussian Side = 1	0.182*** (0.011)	0.194*** (0.016)	0.212*** (0.023)
Share Jewish		0.260 (0.191)	0.280 (0.200)
Share Protestant		0.100 (0.104)	0.146* (0.081)
Share Born Outside Partition 1921			-0.119* (0.085)
Observations	54	54	54
R-squared	0.971	0.974	0.975
Mean on Russian Side	0.768	0.768	0.768
Geo, City Controls	Yes	Yes	Yes
2nd Order Polynomial	Yes	Yes	Yes

Notes: The dependent variable is the literacy rate. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 21: Robustness of literacy at Austrian-Russian border to population controls

	(1)	(2)	(3)
Dep. Variable	Share of Literates 1921	Share of Literates 1921	Share of Literates 1921
Austrian Side = 1	0.163*** (0.049)	0.164*** (0.055)	0.166*** (0.058)
Share Jewish		0.278 (0.299)	0.356 (0.280)
Share Protestant		1.973 (1.362)	1.735 (1.373)
Share Born Outside Partition 1921			-0.613 (0.872)
Observations	44	44	44
R-squared	0.885	0.890	0.892
Mean on Russian Side	0.572	0.572	0.572
Dep. Variable	Share of Literates 1931	Share of Literates 1931	Share of Literates 1931
Austrian Side = 1	0.088*** (0.029)	0.098*** (0.031)	0.098*** (0.034)
Share Jewish		0.328 (0.301)	0.449 (0.321)
Share Protestant		-1.797 (2.107)	-1.549 (1.764)
Share Born Outside Partition 1921			-0.850 (0.568)
Observations	44	44	44
R-squared	0.849	0.858	0.867
Mean on Russian Side	0.732	0.732	0.732
Geo, City Controls	Yes	Yes	Yes
2nd Order Polynomial	Yes	Yes	Yes

Notes: The dependent variable is the literacy rate. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 22: Literacy at Prussian placebo border 1921-1961

	(1)	(2)
Dep. Variable	Share of Literates 1921	Share of Literates 1921
Placebo Prussian = 1	0.011 (0.026)	0.007 (0.024)
Observations	41	41
R-squared	0.138	0.571
Mean on Placebo Russian Side	0.645	0.645
Dep. Variable	Share of Literates 1931	Share of Literates 1931
Placebo Prussian = 1	0.005 (0.016)	-0.003 (0.018)
Observations	41	41
R-squared	0.188	0.601
Mean on Placebo Russian Side	0.782	0.782
Dep. Variable	Share of Literates 1961	Share of Literates 1961
Placebo Prussian = 1	-0.001 (0.006)	-0.001 (0.005)
Observations	44	44
R-squared	0.483	0.761
Mean on Placebo Russian Side	0.946	0.946
2nd Order Polynomial	Yes	Yes
City, Geographic Controls	No	Yes

*Notes:* The dependent variable is the literacy rate. *Placebo Prussian Side* is an indicator that equals one if an observation is located in the Placebo Prussian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 23: Literacy at Austrian placebo border 1921-1961

	(1)	(2)
Dep. Variable	Share of Literates 1921	Share of Literates 1921
Placebo Austrian = 1	0.069*	0.007
	(0.036)	(0.030)
Observations	34	34
R-squared	0.441	0.608
Mean on Placebo Russian Side	0.586	0.586
Dep. Variable	Share of Literates 1931	Share of Literates 1931
Placebo Austrian = 1	0.030	-0.010
	(0.029)	(0.032)
Observations	34	34
R-squared	0.326	0.479
Mean on Placebo Russian Side	0.74	0.74
Dep. Variable	Share of Literates 1961	Share of Literates 1961
Placebo Austrian = 1	0.005	-0.007
	(0.013)	(0.008)
Observations	53	53
R-squared	0.178	0.665
Mean on Placebo Russian Side	0.933	0.933
2nd Order Polynomial	Yes	Yes
City, Geographic Controls	No	Yes

*Notes:* The dependent variable is the literacy rate. *Placebo Austrian* is an indicator that equals one if an observation is located in the Placebo Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 24: Gender parity index at partition borders 1911-1921

	(1)	(2)
<b>Panel A: Prussian-Russian Border</b>		
Dep. Variable	Gender Parity Index 1911	Gender Parity Index 1911
Prussian Side = 1	0.295*** (0.026)	0.298*** (0.028)
Observations	54	54
R-squared	0.935	0.945
Mean on Russian Side	0.679	0.679
Dep. Variable	Gender Parity Index 1921	Gender Parity Index 1921
Prussian Side = 1	0.046 (0.032)	0.052 (0.033)
Observations	54	54
R-squared	0.163	0.302
Mean on Russian Side	0.928	0.928
<b>Panel B: Austrian-Russian Border</b>		
Dep. Variable	Gender Parity Index 1911	Gender Parity Index 1911
Austrian Side = 1	omitted (.)	omitted (.)
Observations	18	18
R-squared	.	.
Mean on Russian Side	0.541	0.541
Dep. Variable	Gender Parity Index 1921	Gender Parity Index 1921
Austrian Side = 1	0.124*** (0.028)	0.104** (0.040)
Observations	41	41
R-squared	0.472	0.642
Mean on Russian Side	0.872	0.872
City, Geo Controls	No	Yes
2nd Order Polynomial	Yes	Yes

*Notes:* The dependent variable is the gender parity index. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

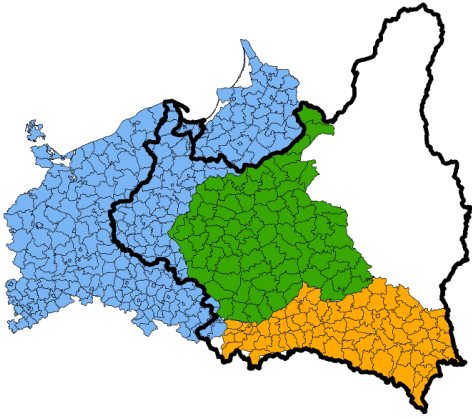
Table 25: Gender literacy gap by age groups at partition borders 1921

	(1)	(2)
<b>Panel A: Prussian-Russian Border</b>		
Dep. Variable	Literacy Gap 40-49 y/o 1921	Literacy Gap 40-49 y/o 1921
Prussian Side = 1	-0.057*** (0.012)	-0.054*** (0.010)
Observations	54	54
R-squared	0.551	0.632
Mean on Russian Side	0.0958	0.0958
Dep. Variable	Literacy Gap 14 y/o 1921	Literacy Gap 14 y/o 1921
Prussian Side = 1	0.021** (0.010)	0.017 (0.010)
Observations	54	54
R-squared	0.595	0.690
Mean on Russian Side	-0.0428	-0.0428
<b>Panel B: Austrian-Russian Border</b>		
Dep. Variable	Literacy Gap 40-49 y/o 1921	Literacy Gap 40-49 y/o 1921
Austrian Side = 1	-0.084*** (0.020)	-0.080*** (0.026)
Observations	44	44
R-squared	0.761	0.796
Mean on Russian Side	0.152	0.152
Dep. Variable	Literacy Gap 14 y/o 1921	Literacy Gap 14 y/o 1921
Austrian Side = 1	-0.033*** (0.009)	-0.044*** (0.011)
Observations	44	44
R-squared	0.654	0.784
Mean on Russian Side	0.00317	0.00317
City, Geo Controls	No	Yes
2nd Order Polynomial	Yes	Yes

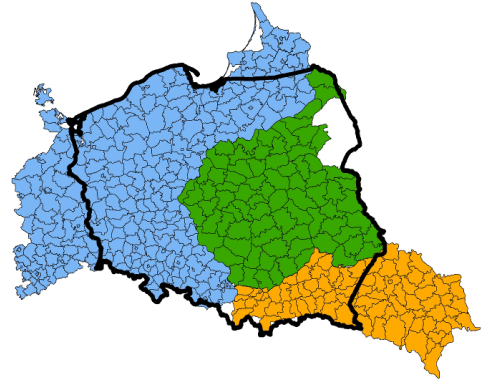
*Notes:* The dependent variable is the difference between the male and the female literacy rate of 40-49 y/o and 14 y/o in 1921 respectively. *Prussian Side* is an indicator that equals one if an observation is located in the Prussian partition. *Austrian Side* is an indicator that equals one if an observation is located in the Austrian partition. Two-dimensional RDD, 65km bandwidth, robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Figures

Figure 1: Partition territories in national boundaries of Poland



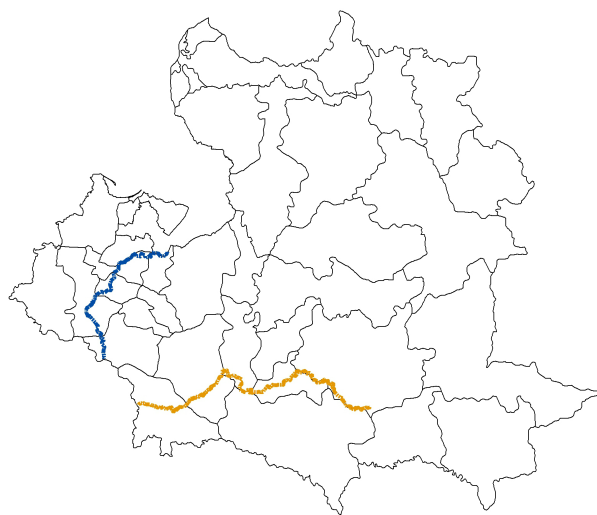
(a) Partition counties in interwar Poland



(b) Partition counties in Poland since 1944

Panel (a) shows counties in the Prussian Empire (blue), the Russian Empire (green) and the Austrian Empire (orange), enframed by the national boundaries of the Second Polish Republic (1918-1939). Panel (b) shows the same counties enframed by the national boundaries of the Polish People's Republic (1944-1989) and its successor state, the Third Polish Republic (1989-).

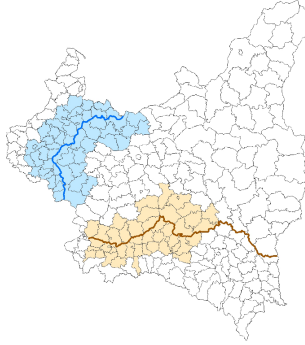
Figure 2: Borders of the Polish-Lithuanian Commonwealth and partition borders



The figure shows both the external and the regional boundaries of the Polish-Lithuanian Commonwealth (1569-1795). They are overlaid with the Prussian-Russian partition border (blue) and the Austrian-Russian partition border (orange).

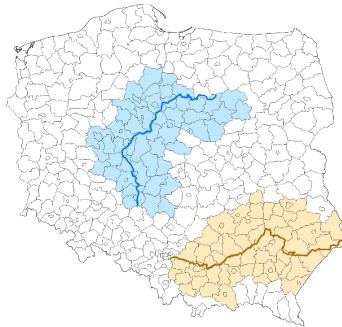


Figure 3: Partition borders and sample counties within interwar Poland



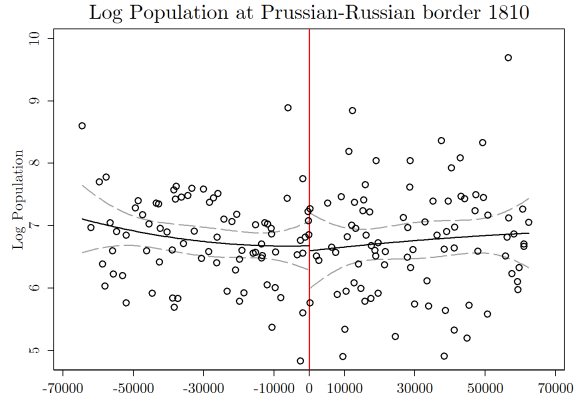
The figure shows the sample counties within the Second Polish Republic (1918-1939) at the Prussian-Russian partition border (blue) and at the Austrian-Russian partition border (orange).

Figure 4: Partition borders and sample counties within Poland since 1944



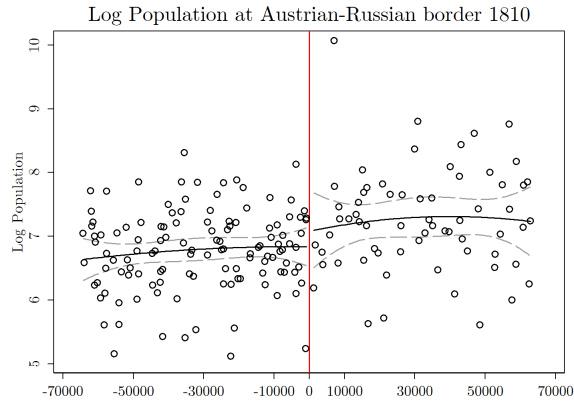
The figure shows the sample counties within the Polish People's Republic (1944-1989) at the Prussian-Russian partition border (blue) and at the Austrian-Russian partition border (orange).

Figure 5: Discontinuities in log population at Prussian-Russian border



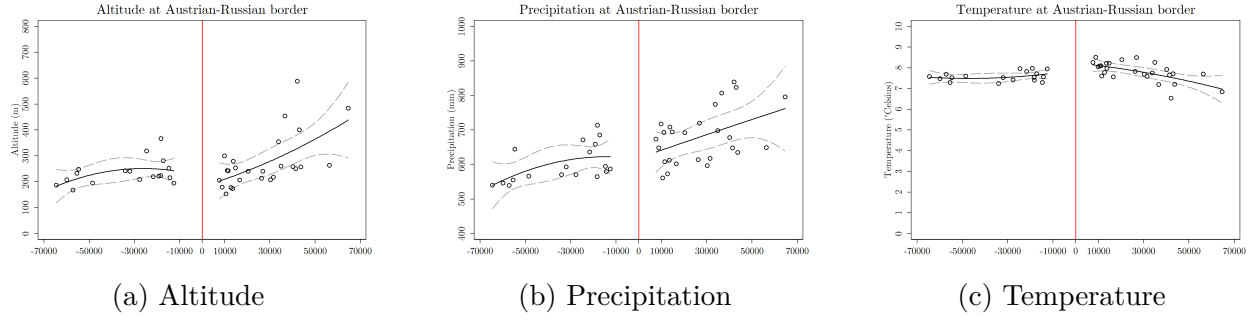
Y axis: Log population. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 6: Discontinuities in log population at Austrian-Russian border



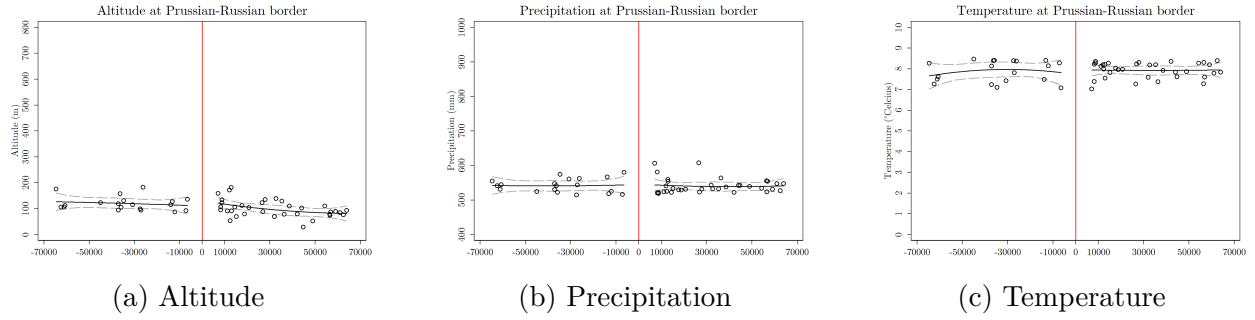
Y axis: Log population. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 7: Discontinuities in geographic characteristics at Austrian-Russian border



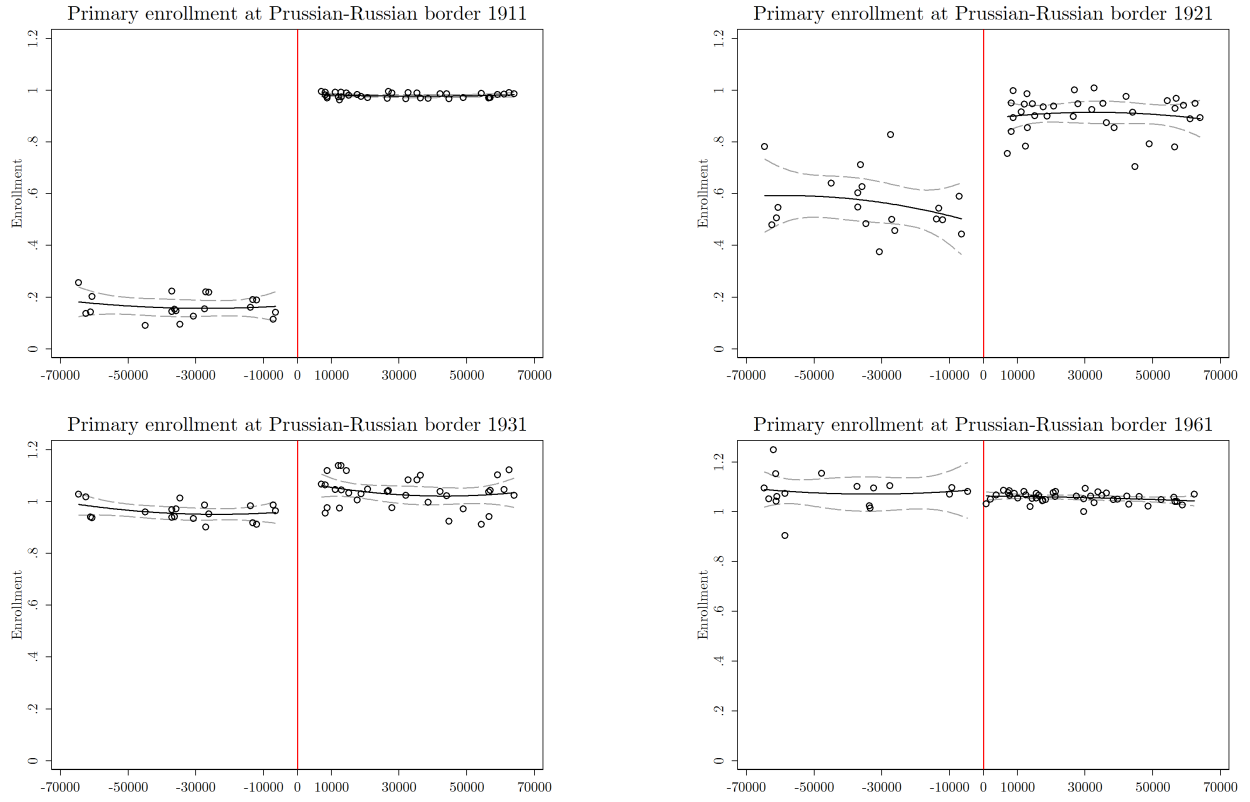
Y axis: Average altitude, precipitation, temperature. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 8: Discontinuities in geographic characteristics at Prussian-Russian border



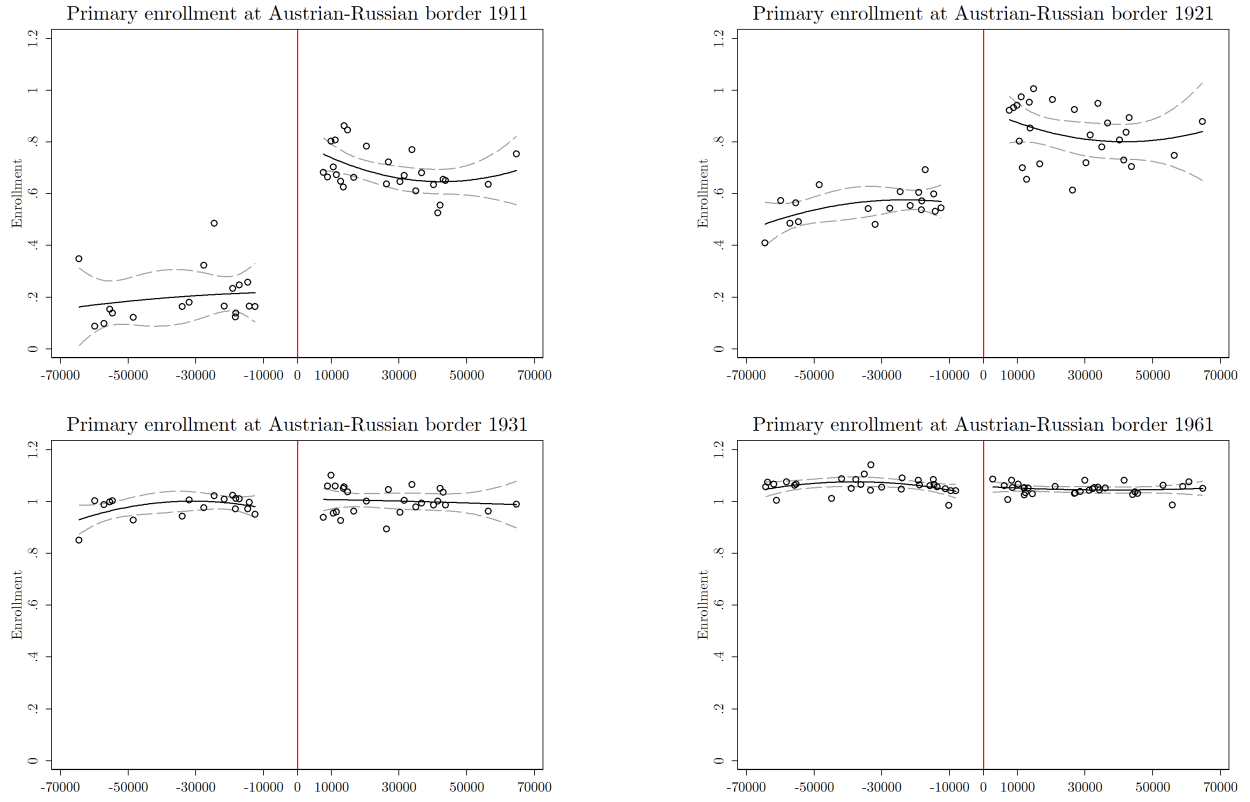
Y axis: Average altitude, precipitation, temperature. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 9: Discontinuities in primary enrollment at Prussian-Russian border



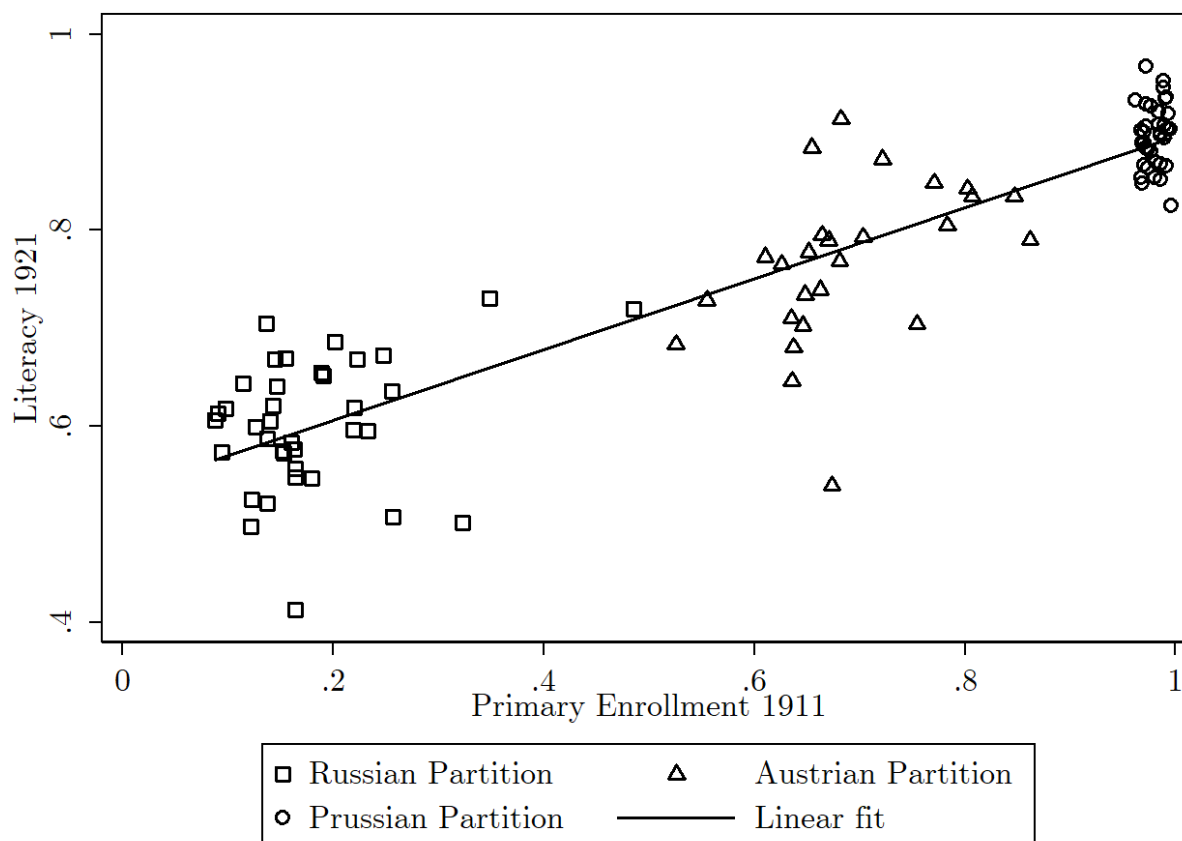
Y axis: Primary enrollment rate. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 10: Discontinuities in primary enrollment at Austrian-Russian border



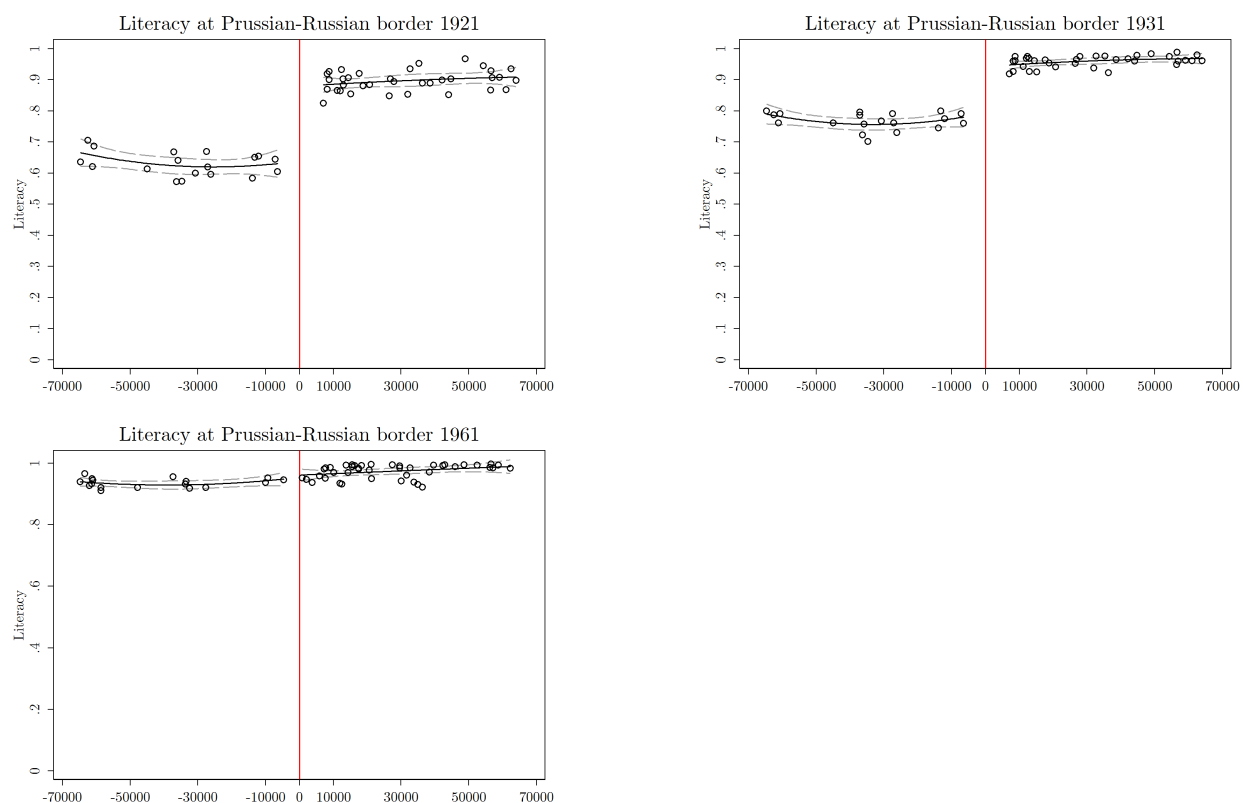
Y axis: Primary enrollment rate. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 11: Imperial school enrollment and Polish literacy



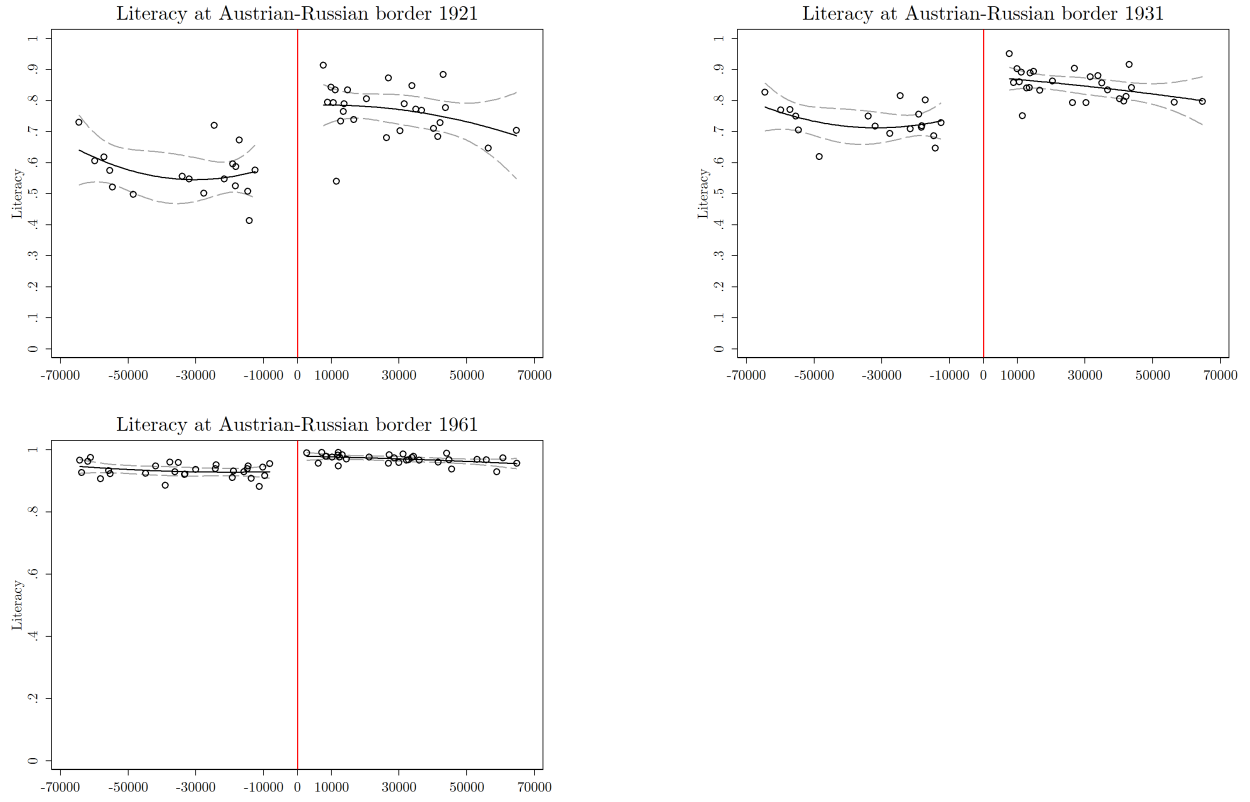
Y axis: Literacy rate in 1921. X axis: Public primary school enrollment in 1911.

Figure 12: Discontinuities in literacy at Prussian-Russian border



Y axis: Literacy rate. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

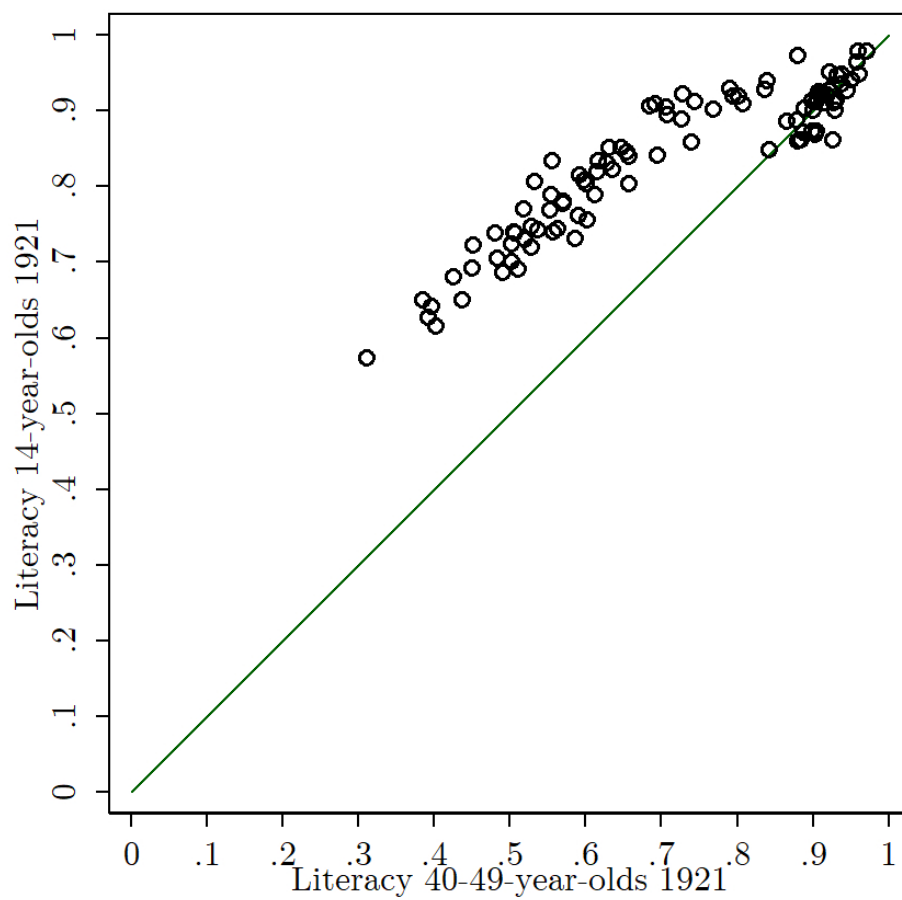
Figure 13: Discontinuities in literacy at Austrian-Russian border



Y axis: Literacy rate. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

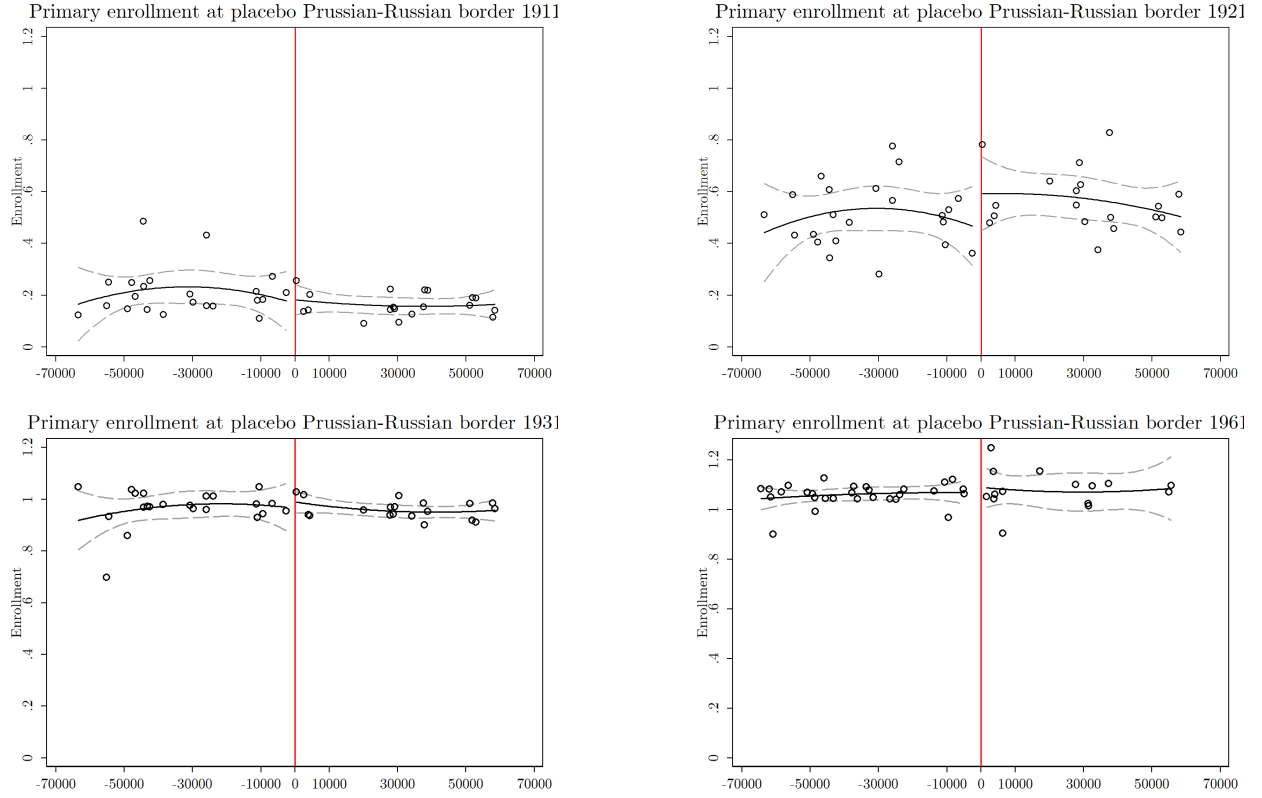


Figure 14: Intergenerational mobility in literacy 1921



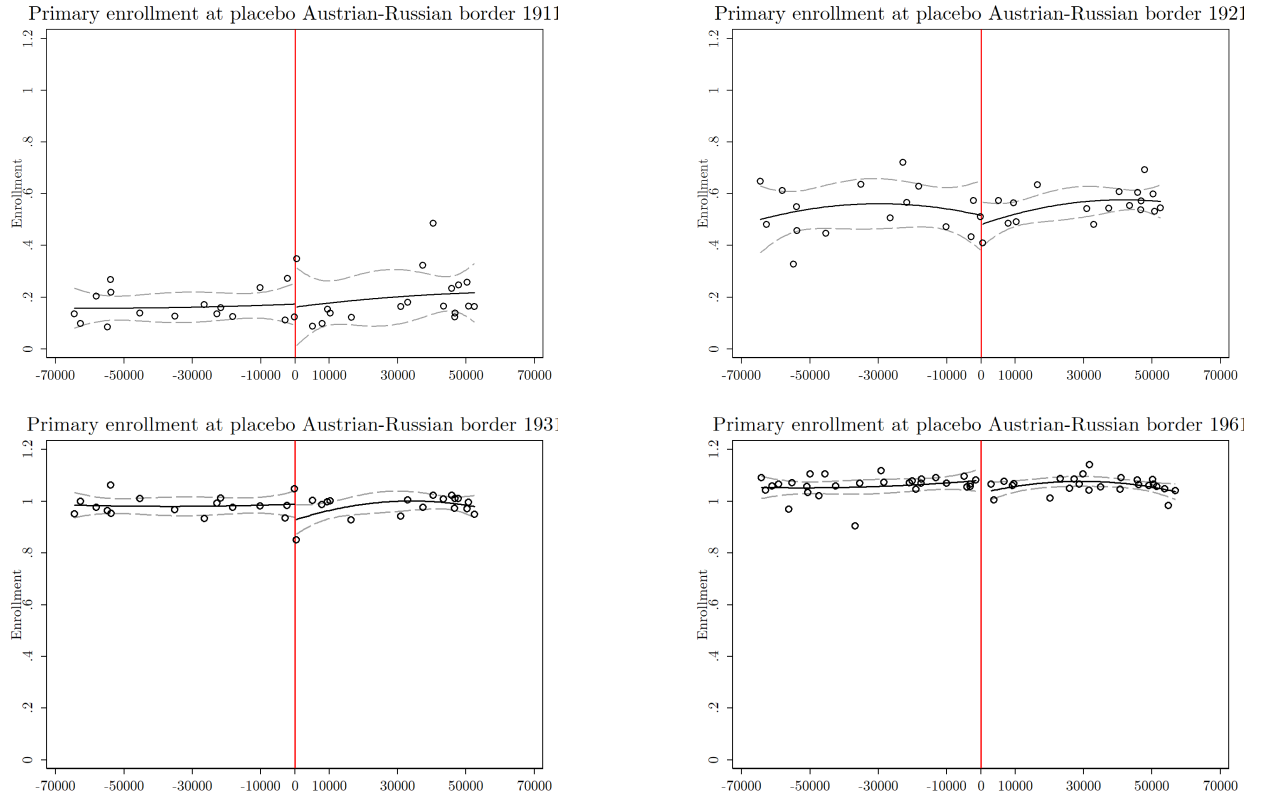
Y axis: Literacy rate of 14 y/o. X axis: Literacy rate of 40-49 y/o.

Figure 15: Enrollment at placebo Prussian-Russian border



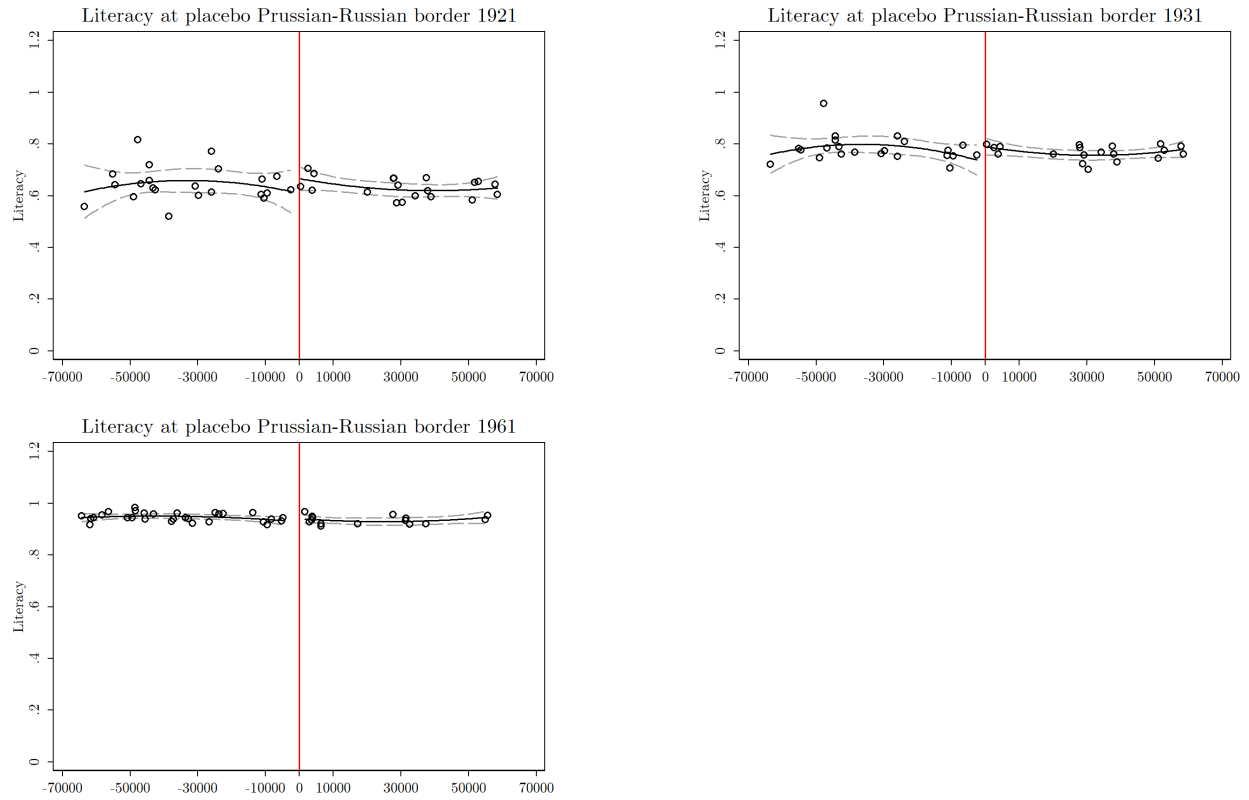
Y axis: Primary enrollment rate. X axis: Distance to the border in kilometers. Negative distance indicates placebo Russian partition. Bandwidth: 65km.

Figure 16: Enrollment at placebo Austrian-Russian border



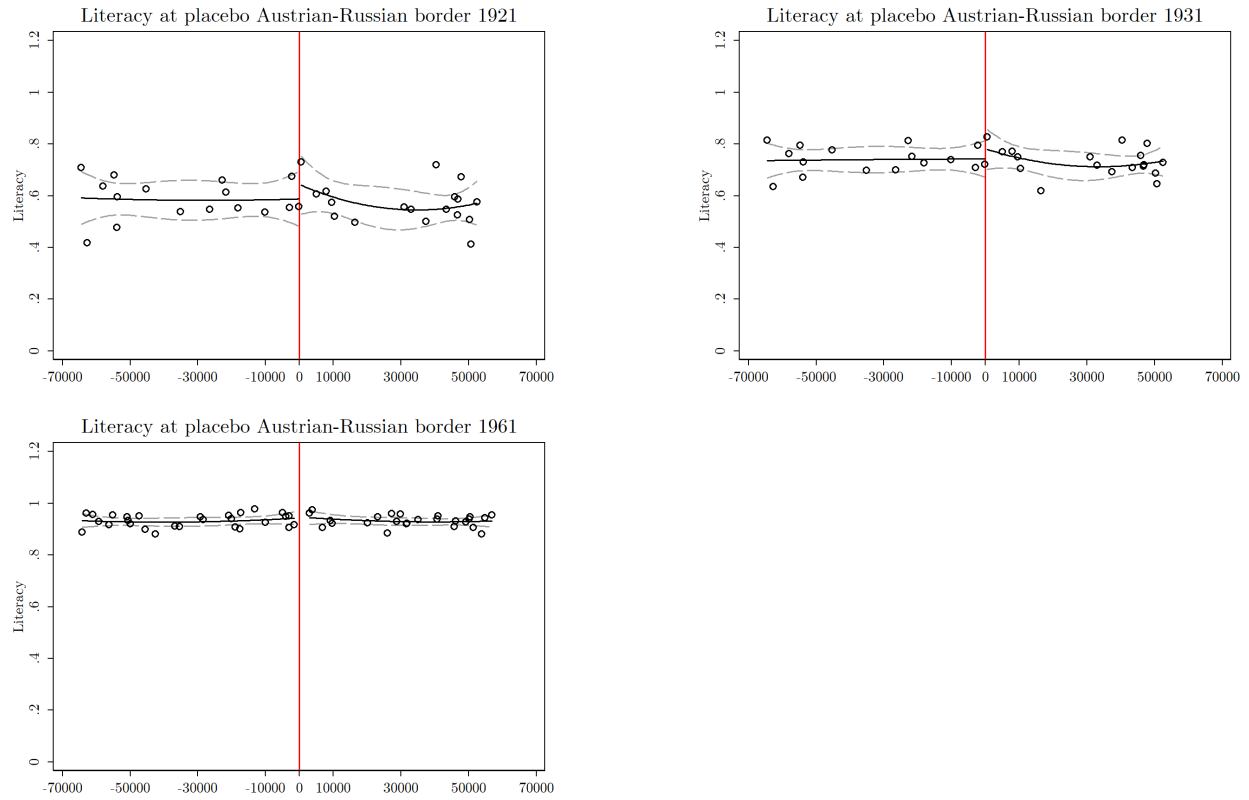
Y axis: Primary enrollment rate. X axis: Distance to the border in kilometers. Negative distance indicates placebo Russian partition. Bandwidth: 65km.

Figure 17: Literacy at placebo Prussian-Russian border



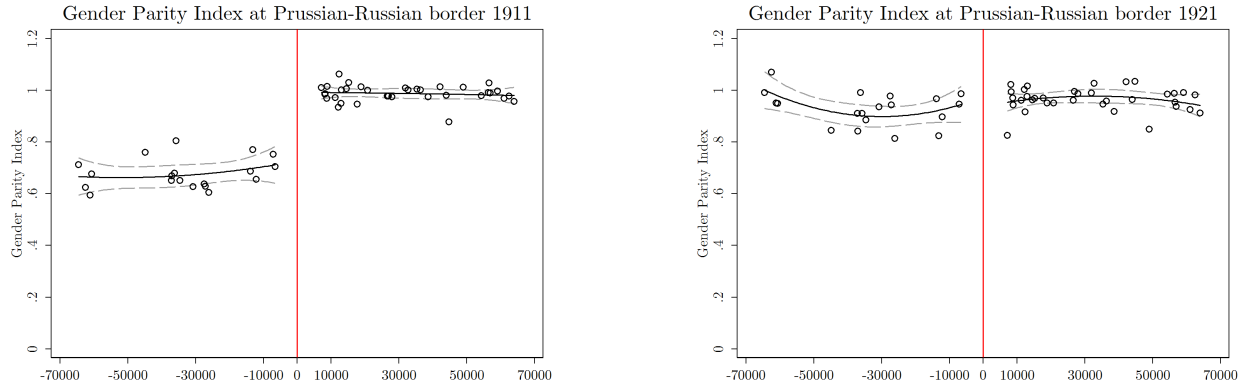
Y axis: Literacy rate. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 18: Literacy at placebo Austrian-Russian border



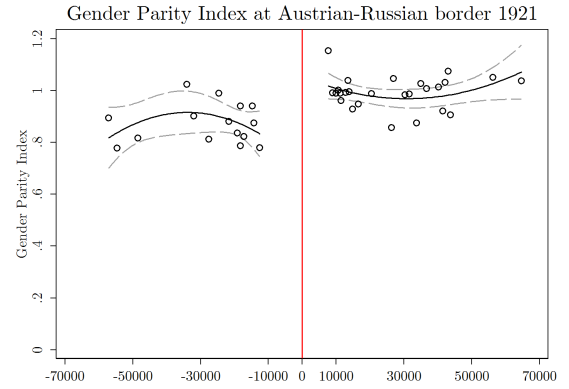
Y axis: Literacy rate. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 19: Discontinuities in gender parity index at Prussian-Russian border



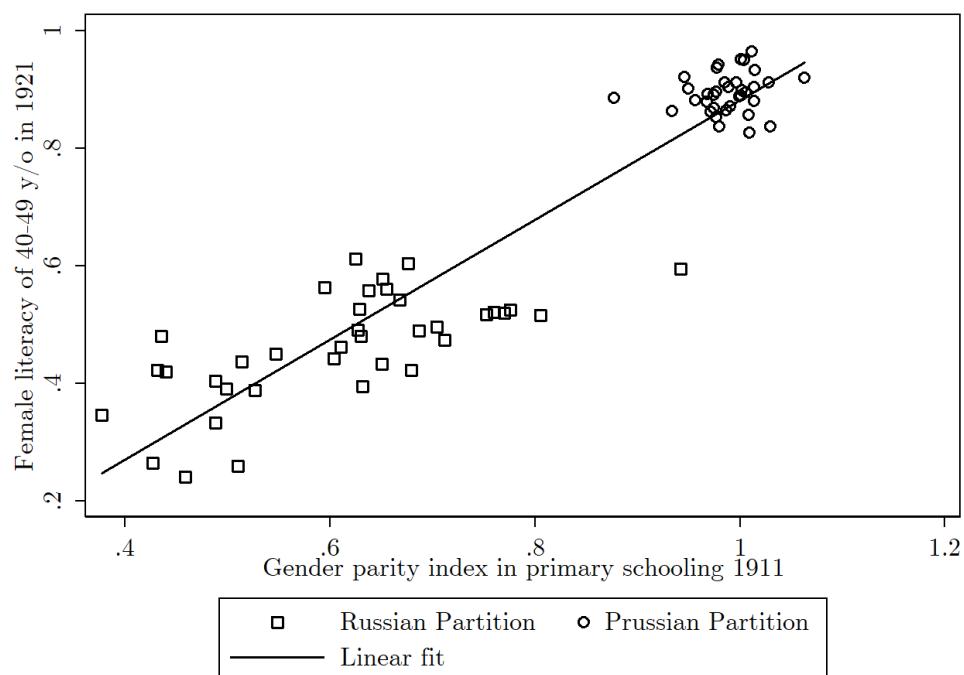
Y axis: Gender parity index. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 20: Discontinuities in gender parity index at Austrian-Russian border



Y axis: Gender parity index. X axis: Distance to the border in kilometers. Negative distance indicates Russian partition. Bandwidth: 65km.

Figure 21: Gender parity in 1911 and female literacy in 1921



Y axis: Literacy rate of 40-49 y/o females in 1921. X axis: Gender parity index in primary enrollment in 1911.

# Appendix

Table A1: Summary statistics at Prussian-Russian border

Variable	(1) N	(2) Mean	(3) SD	(4) Min	(5) Max
Population 1810	165	1236.71	1566.91	126	16114
Prussian-Russian Distance (m) 1911-1931	54	32,154	18,902	6,521	64,629
Prussian-Russian Distance (m) 1960	53	34,677	18,669	3,728	64,741
City Dummy 1911-1931	54	0.0741	0.264	0	1
City Dummy 1961	53	0.208	0.409	0	1
Average Altitude (m)	54	107.0	32.23	28.27	182.6
Average Temperature (Degree Celsius)	54	7.917	0.421	7.023	8.474
Average Precipitation (mm)	54	541.3	21.01	514.4	607.4
Average Caloric Yield	54	2,023	131.2	1,686	2,213
Optimal Caloric Yield	54	9,802	340.6	8,992	10,466
Share of Cropland 1800	54	0.631	0.0448	0.517	0.695
Share of Cropland 1900	54	0.834	0.0590	0.683	0.918
Primary Enrollment 1911	54	0.693	0.395	0.0906	0.996
Primary Enrollment 1921	54	0.785	0.188	0.376	1.008
Primary Enrollment 1931	54	1.010	0.0634	0.901	1.138
Primary Enrollment 1961	53	1.065	0.045	0.904	1.250
Share of Literates 1921	54	0.803	0.132	0.573	0.967
Share of Literates 1931	54	0.860	0.123	0.631	0.986
Share of Literates 1961	53	0.964	0.028	0.912	0.998
Schools Per 1,000 School-Aged 1911	54	5.299	3.053	0.795	11.43
Schools Per 1,000 School-Aged 1921	54	7.078	2.184	1.051	13.70
Schools Per 1,000 School-Aged 1931	54	7.242	2.454	1.181	12.42
Schools Per 1,000 School-Aged 1961	53	6.166	2.6	1.234	9.982
Classes Per 1,000 School-Aged 1911	54	12.68	7.887	1.192	24.19
Classes Per 1,000 School-Aged 1921	54	11.70	3.701	4.956	20.45
Teachers Per 1,000 School-Aged 1911	54	10.03	5.960	1.192	19.05
Teachers Per 1,000 School-Aged 1921	54	11.16	2.421	6.359	18.96
Gender Parity Index 1911	54	0.879	0.155	0.595	1.063
Gender Parity Index 1921	54	0.952	0.056	0.813	1.07



Table A2: Summary statistics at Austrian-Russian border

Variables	(1) N	(2) Mean	(3) SD	(4) Min	(5) Max
Population 1810	187	1413	1923.84	167	23612
Austrian-Russian Distance (m) 1911-1931	44	29,517	16,972	7,660	64,730
Austrian-Russian Distance (m) 1961	59	31,352	18,327	2,766	64,823
City Dummy 1911-1931	44	0.0455	0.211	0	1
City Dummy 1961	59	0.203	0.406	0	1
Average Altitude (m)	44	257.2	86.67	153.0	587.9
Average Temperature (Degree Celsius)	44	7.718	0.412	6.526	8.506
Average Precipitation (mm)	44	647.4	78.63	539.4	839.0
Average Caloric Yield	44	1,927	167.0	1,447	2,129
Optimal Caloric Yield	44	9,755	435.6	8,693	10,499
Share of Cropland 1800	44	0.501	0.110	0.293	0.679
Share of Cropland 1900	44	0.683	0.134	0.387	0.898
Primary Enrollment 1911	44	0.489	0.260	0.0880	0.862
Primary Enrollment 1921	44	0.720	0.168	0.409	1.006
Primary Enrollment 1931	44	0.994	0.0482	0.850	1.101
Primary Enrollment 1961	59	1.055	0.027	0.984	1.142
Share of Literates 1921	44	0.688	0.126	0.413	0.914
Share of Literates 1931	44	0.753	0.095	0.557	0.941
Share of Literates 1961	59	0.954	0.0265	0.881	0.991
Schools Per 1,000 School-Aged 1911	44	3.026	1.098	1.028	5.644
Schools Per 1,000 School-Aged 1921	44	5.124	1.408	1.819	7.953
Schools Per 1,000 School-Aged 1931	44	5.059	1.164	1.342	7.126
Schools Per 1,000 School-Aged 1961	59	5.71	2.38	1.137	12.01
Classes Per 1,000 School-Aged 1911	44	6.580	3.757	1.069	13.78
Classes Per 1,000 School-Aged 1921	44	9.175	2.352	5.872	15.62
Teachers Per 1,000 School-Aged 1911	44	7.152	4.137	1.028	16.55
Teachers Per 1,000 School-Aged 1921	44	12.09	3.795	6.387	25.36
Gender Parity Index 1921	41	0.948	0.089	0.778	1.154

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