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Fiscal Policy and the Long Shadows of History

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Abstract: This paper aims to track the persistent effects of Poland's partitions on fiscal policy outcomes, in the form of property tax rates. By using spatial regression discontinuity design, the paper demonstrates that rates of property taxes levied on residential buildings are roughly 12% larger in the municipalities located just to the west of the former Prussia-Russia border. After examining various transmission channels, based on the benefit and capital view of property taxation, the paper establishes that the diverse endowment of hard infrastructure and utility services, the quality of public administration, and the extent of property rights protection might constitute plausible, yet not definitive, mechanisms driving the observed differences in property taxation.

Keywords: Historical persistence, property taxes, spatial regression discontinuity

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Introduction

No one disputes the claim that history matters and that distant historically events shape social, political, institutional and economic outcomes of today. In some cases, historical events may be consequential inasmuch as they are able to determine the trajectory of economic development and the wealth of nations over the centuries (see, for instance, Acemoglu et al., 2001, Nunn, 2009, Comin et al., 2010, Dell & Olken, 2020, and Michalopoulos & Papaioannou, 2020). In other cases, the legacies of former institutions are reflected in long-lasting poverty and consumption patterns or even health outcomes (e.g., Dell, 2010). The long shadows of history were further studied in the context of entrepreneurship and trust (Grosfeld et al., 2013) and trust and corruption (Becker et al., 2014), civic capital (Guiso et al., 2016), anti-Semitism (Voigtländer & Voth, 2012), political outcomes or institutions (Grosfeld & Zhuravskaya, 2015, Charnysh, 2015, Vogler, 2019, Ochsner & Roesel, 2020, and Gingerich & Vogler, 2021), traditions (Giuliano & Nunn, 2021), education (Bukowski, 2019, Backhaus, 2019, Becker et al., 2020, and Spruk & Kovac, 2020), productivity (Hornung, 2014), economic inequalities (Galletta & Giommoni, 2021, and Guirkinger et al., 2021) and conflict (Besley & Reynal-Querol, 2014, Iyigun et al., 2017, and Campante & Yanagizawa-Drott, 2015). In this paper, I investigate yet another outcome, which potentially is shaped by the forces of history, namely fiscal policy.

In this vein, I advance an argument based mainly on the benefit view of property taxation (see, for instance, Hamilton, 1975). According to this view, property tax is akin to a user fee inasmuch as it is basically a payment for public services and goods provided by a local government. Holding all else constant, property tax rates are thus positively related to the quantity and quality of locally provided goods and services. Given that historical events have led to differences in the provision of these goods and services and that these differences have persisted until today, it is plausible to assume that they are now reflected in diverse property tax rates. To put it more illustratively, if, for example, disparities in the provision of railway and road infrastructure or other installations such as water, gas and sewerage systems were initiated in the past and are still visible today, localities providing more of these public goods due to historical legacies can impose higher property taxes.

To examine if indeed history is responsible for the variation in contemporary property tax rates, I use the case study of Poland and the historical events as related to the partitions of this country. In the aftermath of partitions, Poland and its institutions ceased to exist for a notorious period of 123 years, i.e., between 1795 and 1918. Prussia, Russia, and Austria – the three neighboring counties participating in the partitions – extended their own formal and informal institutions on the former territory of Poland, leading to some striking socio-economic and institutional differences across various parts of Poland. Upon regaining independence, Poland experienced varying

levels of economic development and endowment of hard infrastructure across regions, and its territory was ruled by the three different legal systems and, to some extent, also cultures. Notwithstanding the immense efforts to harmonize the law and improve the economic conditions of underdeveloped regions, many differences still persist even to this day and are likely to shape present political, social and economic outcomes. While the political and social outcomes of the partitions have been already investigated in the historical persistence literature, the economic policies in the form of fiscal policy choices have not been studied as of yet.

As such, this work builds upon the rigorous empirical literature studying historical persistence in the context of the partitions of Poland. Grosfeld and Zhuravskaya (2015) investigate if the partitions matter for political outcomes in contemporary Poland. They show that support for religious conservatives and liberals is greater in the former Austrian part, while the ex-communist parties perform better what was the Russian part. They also demonstrate that the railway infrastructure is denser in the former Prussian part of Poland. Wysokińska (2015), in turn, shows that the municipalities in the former Prussian part are somewhat more prosperous than those on the Russian side. Furthermore, Bukowski (2019) and Backhaus (2019) study the effects of partitions on education. While the former illustrates that pupils record higher grades at schools located in the former Austrian regions than pupils from the 'Russian' part of Poland, the latter show that initially large differences in literacy did not persist for long. Lastly, Vogler (2019) shows that there are sharp and lasting differences in the organization and efficiency of bureaucratic institutions at the former empires' borders. The 'Austrian' and 'Prussian' parts of Poland observe better performance of bureaucracies – in terms of their cost-effectiveness and competitive recruitment of staff – than the 'Russian' part.

In a similar way to these studies examining the historical legacies of partitions in Poland, I employ a spatial (geographic) regression discontinuity (RD) design, which enables the exploration of sharp differences in the outcomes at the (nearly) exogenously drawn borders between the former partitioning states – Prussia, Russia and Austria. The empirical analysis shows that property tax rates levied on residential buildings are greater by 12% in the municipalities located in the former Prussian territory than these situated in the former Russian partition. The plausible channels of transmission are the differing levels of transport infrastructure and provision of utility services, which still persist today, the quality of public administration and, lastly, the degree of property rights protection. Nonetheless, given the data limitation, the most uncertain is the latter mechanism. In contrast to the former Prussia-Russia border, I found no effects on the property tax rates at the historical boundary between Austria and Russia.

This paper is structured as follows. The next section provides a historical overview and guiding theoretical frameworks, which enable us to link historical legacies and today's fiscal outcomes, namely property tax rates. Then, the paper discusses the

institutional context of local governance in Poland, giving emphasis to issues in relation to property taxation. Subsequently, the paper presents the underlying research design and displays the main results, the robustness checks and the results on the channels of transmission. The conclusion section ends the paper.

History and theoretical expectations

A brief historical introduction

The economic and political decline of the Commonwealth of Poland and Lithuania (hereinafter Poland) throughout the 18th century triggered the partition of the country by the three neighboring states: Prussia (Germany since 1871), Russia and the Habsburg monarchy (hereinafter Austria). In 1795 they completed the third and last partition of the Polish state, after which the country ceased to formally exist for a notorious period of 123 years. Poland lost its independence not only for a very long period of time but, as stressed by Grosfeld and Zhuravskaya (2015), also at a very crucial moment in history. Europe in the 19th century experienced numerous events, which changed the fate of the old continent. This was the time of development of national identities, modern states and their institutions such as legal systems and constitutions. Moreover, the economic and social foundations were rapidly changed by the Industrial Revolution and the abolishment of serfdom (Markevich & Zhuravskaya, 2018).

Historians generally agree that the three partitioning states transplanted very different formal institutions and they varied significantly in terms of their policies towards Polish territories (Davies, 2001, Zamoyski, 2015, Skibiński, 2018). For more than a century, the former Polish territories were therefore governed by considerably diverse political and legal institutions, customs and norms. Yet, differences could also be observed in the level of industrialization and endowment of hard infrastructure.

The underlying question is whether the economic and institutional differences triggered by the partitions persist over time and shape the policy outcomes in today's Poland. More specifically, I investigate if the history of partitions can explain the variation in contemporaneous property tax rates set at the municipality level. To this end, one needs a guiding theory on determinants of property tax rates and an account of historical differences, which, if persisted, might affect property taxation.

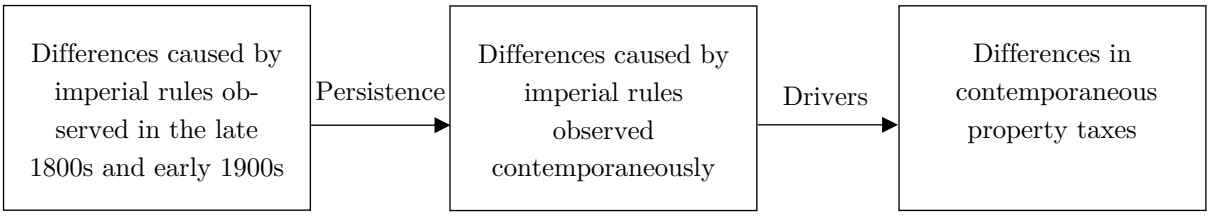
Theoretical insights

One of the main theoretical frameworks on the (incidence and determinants of) property tax, the so-called benefit view, assumes that this tax is an equivalent to a benefit tax. This view takes as its starting point the Tiebout model, in which people choose their place of residence to match their preferences in terms of local tax and spending

combinations (Tiebout, 1956). The property tax was explicitly introduced into this model in subsequent developments by Hamilton (1975) and Fischel (1985, 1995) (see also Zodrow, (2011) and Oates & Fischel (2016) for a comprehensive overview of the various perspectives on property taxation). The underlying conclusion from these models is that property taxes are paid in exchange for the benefits of local public goods and services and these taxes are capitalized in the value of the property. Thus, higher taxes are justified on the basis that local governments can provide more public goods and services or of higher quality. Given the context of this study, the question is if the historical legacies can explain the differing levels of local public goods and services and consequently give a reason for diverse property tax rates charged at the local level.

Although the benefit view on property taxation appears to be the most suitable analytical framework for the question at hand, an alternative - capital view – logic might also have some explanatory merits (see Mieszkowski (1972) for an early contribution discussing this view). In line with the capital view, the property taxes have a distorting nature inasmuch as they discourage the improvements of land, for instance, in the form of building or extension of the structures (houses) located on land (see, for instance, Zodrow (2001) and Kitchen, 2013, for a great overview of capital view on the incidence of property taxes). This logic may have some explanatory power in the context of this study if there is a varying degree in land utilization, which in turn can be explained by historical legacies. If such underutilization exists, the municipalities might be interested in setting lower tax rates to incentivize investments. The next section provides an account of various historical legacies of partitions, which may matter for the level of local public goods, provision of services, and degree of land utilization. Figure 1 presents the overarching causal pathway, which is presumed and investigated in this paper.

Figure 1. Causal channel of transmission



Historical legacies of the partitions

Hard infrastructure

One of the main accounts of differences between the former empires pertain to the diverse intensity in developing hard infrastructure, most notably railway and road networks. In the 1930s the greatest railway and road network density was observed in

the former Prussian partition with some 10 km and 30 km per 100 km^2 of railway and road network, respectively. This contrasts with 4-6 km of railway and 11-29 km of roads per 100 km^2 in the former Kingdom of Poland (part of the Russian partition) and Austrian partition (Koryś, 2018, p. 234, after Główny Urząd Statystyczny). Historical narratives also suggest that in Prussia, the utility supplies, such as water, gas, sewerage, were the most extensive, i.e., the share of population using these utilities was the largest (Jezierski and Leszczyńska, 2003, p. 164; Tarnowska, 2013). Prussia had the highest number of cities with access to sewerage. For instance, Gdańsk (Prussian partition) was the first city with sewerage already established in 1869. In Warsaw (Russian partition), sewerage began being constructed in 1881 and until 1890 only 4% of all housings had access to sewerage. In terms of gas supply, in the early 20th century one gasworks was covering approximately 40 thousand inhabitants in the Prussian partition, 700 thousand inhabitants in the Austrian partition and 1.7 million inhabitants in the Russian partition. The most wide-spread water supply was in the cities from the Austrian and Prussian partition and the most limited water infrastructure was observed in the Russian partition. Additionally, the phone network differed greatly across partitions. In the Prussian partition 9.3 households per one thousand were equipped with a phone, in Russia 3.4 and in the Austrian partition 0.9.

Should these differences in hard infrastructure and amenities (utility supplies) persist until today, they could explain a varying degree of contemporaneous access to public goods and services at the former borders between partitioning countries, which in turn could give a reason for the varying levels of property taxation. In line with the benefit view of property taxation, one would also expect the highest property tax rates in the former Prussian partition and the lowest in the former Russian part.

Cadaster and property rights

Before the partition of Poland, the property tax was known under the name 'chimney' tax (podymne) and it was imposed centrally on dwellings possessing a chimney (Owsiak, 2000). The chimney tax was abolished and replaced by the various institutional arrangements of the conquerors after the partitioning of Poland. The most modern property tax system was established in the "Prussian Poland", where this tax together with the income tax generated the largest share of government income. In other parts, i.e., Russian and Austrian partitions, the indirect taxes prevailed, particularly those concerning consumption such as excise (Jaśkiewiczowa and Jaśkiewicz, 1969, p. 81). In Prussian partition, the property tax system was also more formalized and had a more local character as compared to the property tax regimes in the Russian and Austrian parts. The local character of the Prussian system relied on the fact that property taxes were set and levied by the local governments and the income from these taxes constituted local income (Rembikowska, 2009, p. 31; Stankiewicz, 2013, pp. 199-

200; Tarnowska, 2013). A higher degree of formalization of the property taxes in Prussia stemmed from the fact that tax rates were set based on the cadaster (both land and building cadaster[1]) (Mika, 2010). The cadaster facilitated acquisition of the land and buildings as property rights were clearly defined, increasing the legal certainty of the transactions. The existence of the cadaster also improved the procurement of credits and loans as the cadaster eased the estimation of the value of the property which could be used as collateral. (CSPIM, 1933). In terms of quality the Prussian cadaster was ahead of other systems by a few decades and, notwithstanding the fact that contemporarily there is a new cadaster in Poland, many former Prussian districts still use the old Prussian cadaster for surveying works crucial in determining the exact boundaries of the properties, not least for legal purposes (Przewięźlikowska & Skotnicki, 2001). In contrast to the Prussian partition, in Russia the cadaster recorded only the largest properties and in general was of a much lower quality, to the extent that it is not extensively used by surveyors; in Austria, on the other hand, only the land cadaster was established, and it was largely outdated in 1918 (CSPIM, 1933; Mika, 2010; Chrostek, 2011, p. 125).

Another difference between the partitions was the approach towards legalizing the transfer of property rights in the land register (Chrostek, 2011, p. 124). These differences are related to the ones with cadasters as land registers largely rely on the cadasters. In Prussia it was obligatory to amend the land register upon the transfer of property rights and this rule was largely respected and enforced. Although the same rule existed in Austria, the Polish peasants did not respect it and the transfer of property rights was based mainly on verbal contracts. In Russia, as the land register was largely missing, the transfer of property rights was in large parts based on notary acts. For those lands, for which the register existed, the formal changes to the register upon a transfer of property were required. Yet, due to savings, no alignment agreements were entered into them.

Based on this discussion, it is plausible to state that because of the detailed and modern cadaster and the enforced obligation of the registration of any transfer of property rights, the property rights in the former Prussian territories were much better defined and protected than in other parts. Again, if these differences persisted over time, they could be reflected in the varying tax rates. In line with the benefit view of property taxes, the higher tax rates should be observed in the localities where the property right is better defined and protected as compared to localities where there is less certainty over these rights. For this to hold, one needs to assume that a greater protection of property rights (through a more reliable land registry) is considered as a benefit provided by a local government.

[1] Historically, a rationale for the establishment of cadaster was to properly define the borders/limitations of the property rights. For instance, in ancient Rome, only this property was respected in a legal sense which was measured.

Public administration

Another crucial legacy of partitions was observed in public administration. In Prussia, Poles were subject to public administration (including judiciary) that was efficient, well-organized, predictable and based on neutral and impersonal procedures, hence adhering to the rule of law standards (Davies, 2001; Grosfeld and Zhuravskaya, 2015). A similar type of administration was present in the Austrian partition. The bureaucracy in the Russian part, on the other hand, was largely inefficient, corrupt and did not comply with the rule-of-law procedures (Grosfeld and Zhuravskaya, 2015). The employees of public administration were characterized by a high degree of conformism and loyalty toward the Russian regime and the administration was strictly controlled by the state by means of police and army (Davies, 2001; Wysokińska, 2011). For an extensive account of the differences in the bureaucratic quality across the emperies, see further Vogler (2019).

If these differences in the efficiency and rule of law standards of public administration persist over time (which is shown to be the case by Vogler 2019) and given that a higher quality of public services constitutes a benefit to local population, one could hypothesize a positive relationship between the quality of public administration and property tax rates. Hence, the localities with higher quality of administration would experience greater property tax levies.

Urbanization

The different levels of industrialization between former empires (consult Koryś, 2013, p. 232-236 for the detailed description of differences of industrialization) triggered different degree of urbanization across the partitions. In 1910, the percent of population living in the cities (defined as localities of more than 5,000 inhabitants) was effectively the same in Prussian and Russian parts of Poland and it amounted to 29% (Koryś, 2013, p. 366). In this respect, the 19% urbanization level in the Austrian part was considerably lower (ibid).

The argument as to why the urbanization level may matter in respect of the capital view of property taxes. The higher degree of urbanization means a more extensive land utilization and greater productivity. If that logic holds and the differences in urbanization are still observable nowadays, one expects higher property taxes in parts where utilization of land is more extensive and, vice-versa, if the land is underutilized the lower property taxes might encourage further investment in those properties. Given this, one would expect to observe lower tax rates in the localities from the former Austrian part as compared to two other partitioning zones.

Based on the discussion presented in this section, the following expectations could be formed. The property-tax rates should be higher in the former Prussian part of Poland than in the Russian and Austrian parts. Regarding the comparison between

the Russian and Austrian parts, the expectation is more ambiguous as there are arguments suggesting both negative and positive effects. It is crucial to note that even though this study presumes certain channels of transmission, it does not give a definitive answer over the mechanisms driving potential differences in the property taxation. For instance, one could assume that a greater prevalence of property taxes in Prussia made Poles living in these areas more accustomed (and less averse) towards property taxation. If this lower aversion is transmitted through intergenerational channels, today it could lead to acceptance of higher property taxes. Nonetheless, it is very difficult to (empirically) capture such a channel. By itself, this study encourages further examination of the mediating variables.

Property taxes in today's Poland

By international standards, Polish municipalities – the units of observation in this study - enjoy relatively high local autonomy (e.g., Ladner et al., 2019, p. 237). On the expenditure side, they are responsible for, among others, the provision of primary education, health care, police services and local public infrastructure. On the revenue side, in turn, the Polish municipalities are free to set rates of selected taxes, of which the property tax is one of the most important.[2] The property tax revenue constitutes roughly 10% of total municipal revenue in Poland – the largest share of all taxes imposed by the municipalities and similar to the revenue from personal income tax (municipalities are eligible to a share of income taxes levied on their territories). The property taxes can be imposed on land and building properties up to the ceiling set by the Minister of Finance, who amends the rates on a yearly basis.[3] To determine the exact property tax rate, the distinction is further made whether the land and buildings are used for commercial or residential purposes. Given this, one can distinguish four main categories of property taxes, which along with their 2017 maximum statutory ceilings are as follows: (1) taxes on residential land (0.47 PLN per m^2)[4], (2) taxes on commercial land (0.89 PLN per m^2), (3) taxes on residential buildings (0.75 PLN per m^2), and (4) taxes on commercial buildings (22.66 PLN per m^2)[5]. Figure 2 displays the

[2] For more information about the political governance in Polish municipalities, see, for instance, Gendźwiłł & Żółtak (2014), Kantorowicz (2017), and Kantorowicz & Köppl–Turyna (2019). The local tax competition was more specifically studied by Swianiewicz & Łukomska (2016) and Łukomska & Swianiewicz (2020).

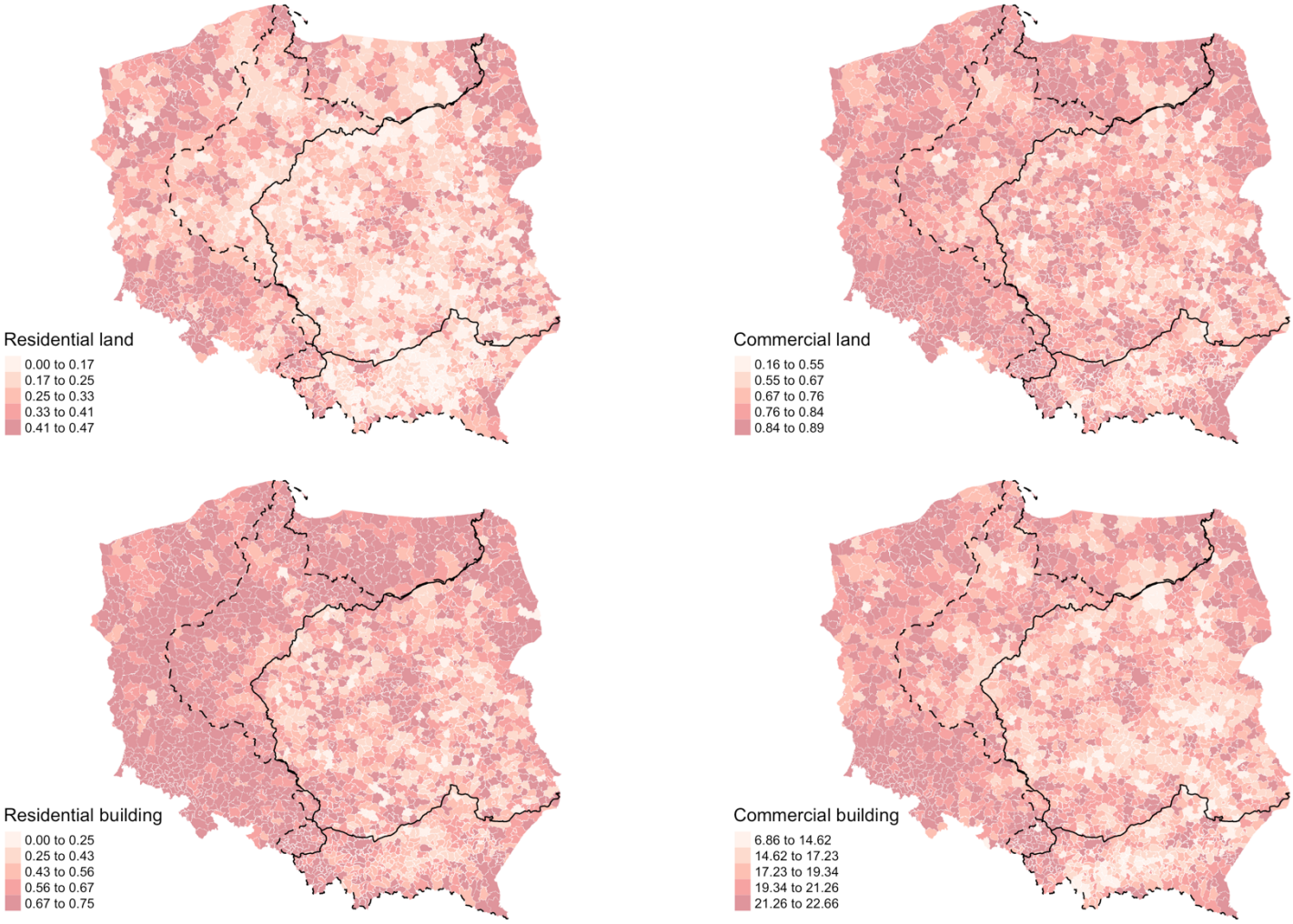
[3] Article 5 § 1 of the Act on Local Taxes and Fees 1991.

[4] I call this tax rate as being levied on "residential land" although formally speaking it is the tax levied on land used for other, non-commercial purposes.

[5] The maximum taxes rates for 2017 were set by the Statement of the Minister of Finance dated 28.07.2016 on the upper limits of rates of local taxes and fees in 2017 (Obwieszczenie Ministra Finansów z dnia 28 lipca 2016 r. w sprawie górnych stawek kwotowych podatków I opłat lokalnych w 2017 r.).

distribution of property tax rates across Polish municipalities and two overlaid borders: (1) the borders as established after the Congress of Vienna (1815), which depict the most stable borders between the partitioning countries (solid line), and (2) the borders of the inter-war Poland (dashed line). Some patterns are easily identifiable such as declining rates for all types of property taxes as one moves eastward. One may also build some first tentative observations about a discrete variation (sharp difference) in tax rates imposed on residential building at the Prussia-Russia border. This tentative observation needs to be subjected to a robust empirical investigation.

Figure 2. The level of property tax rates in the Polish municipalities in 2017



Note: The solid line marks the borders as established after the Congress of Vienna in 1815. The dashed line depicts the contour of the inter-war Poland within the contemporaneous Polish territory.

Data and empirical strategy

The dataset constructed for the purpose of this paper originates from various sources. The data on the dependent variable – the property tax rates in municipalities – were

extracted from the municipal resolutions on tax rates in 2017, which are available through the Voivodeship Law Journal.[6] The shortest (Euclidean) paths (in km) from the centroids of municipalities to the closest point on the borders between partitioning states (as established after the Congress of Vienna in 1815) were calculated in QGIS. The remaining data was extracted mainly from the Bank of Local Data run by the Central Statistical Office, the Moja Polis portal, and Grosfeld & Zhuravskaya (2015). Table A1 in the online appendix lists all variables used in this study along with their original sources. Subsequently, Table A2 provides descriptive statistics.

In order to identify the impact of partitions on property tax rates, I employ a spatial (geographic) regression discontinuity (RD), which was used in the previous empirical contributions on the historical persistence of empires in Poland (Grosfeld & Zhuravskaya, 2015, Wysokińska (2015), Bukowski, 2019, and Backhaus, 2019). The main logic behind the RD identification strategy is that in the case of the presence of a causal influence of partitions a sharp discontinuity in the outcomes should be detected exactly at the previous partition borders. Consequently, one could consider all variables that display a significant jump at the borders as an outcome of the partitions' influence. An important assumption for the spatial RD is that the borders of interest are not associated with any pre-existing discontinuous changes (and in particular other historical borders which could lead to compound treatment (Keele & Titiunik, 2015)), so that they can provide for as-if random split into treatment and control areas.[7] This assumption is difficult to test as historical data to support it is practically unavailable. A notable exception is provided by Backhaus (2019, p. 17) who demonstrates the lack of a sharp discontinuity in the pre-treatment distribution of population. Otherwise, the historical narrative provided by Grosfeld & Zhuravskaya (2015, p. 59) and Bukowski (2019, p. 147-148) also supports the claim that the boundaries were set rather arbitrarily by the partitioning empires.

Panel A in Figure 3 shows which borders and municipalities (here are marked only those municipalities which are not further than 50 km from the border) are under investigation to provide the baseline results. They are similar to those considered by Grosfeld & Zhuravskaya (2015). The Prussia-Russia border considered by Bukowski (2019) and Backhaus (2019) depicted in Panel B in Figure 3 serves as a robustness check as it excludes the Upper Silesia region. In addition to this border, for the robustness checks, I will also measure the effects at the Prussia-Russia border, which only takes into account those municipalities located in the Recovered Territories. These are territories, which did not belong to Poland before the partitions, nor during the inter-war period. The reason why at these borders one should also be able to

[6] The Voivodeship Law Journal can be accessed via http://www.dziennikiurzedowe.gov.pl/dzienniki-wojewodztw.html (accessed on August 20, 2021).

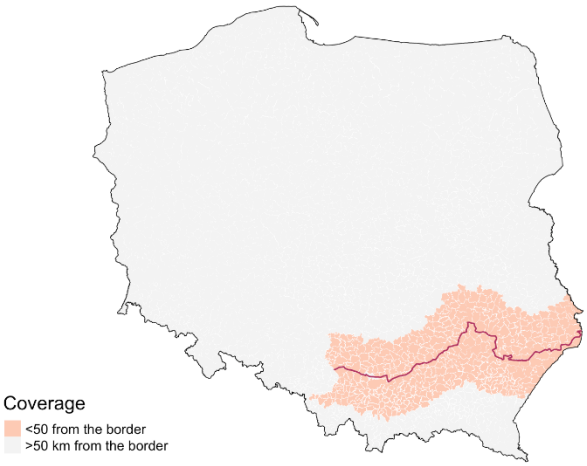
[7] In this context, see further Becker et al. (2020) on an often unjustified claim of the exogeneity of borders in the context of East Germany.

observe a discrete change in property tax rates is that the channels of transmissions stipulated in this paper are mostly related to issues such as hard infrastructure and other service utilities, and not to intergenerational transmission. Of course, by considering the Recovered Territories border one does not inspect the effect of partitions alone, but rather the effect of the long-time presence of Prussia. Lastly, it is of note that in the empirical analysis, I will consider only two borders, the Prussia-Russia and Austria-Russia borders, respectively. The Prussia-Austria border is too short to perform a meaningful analysis due to the issues of statistical power (too few observations close to the border).

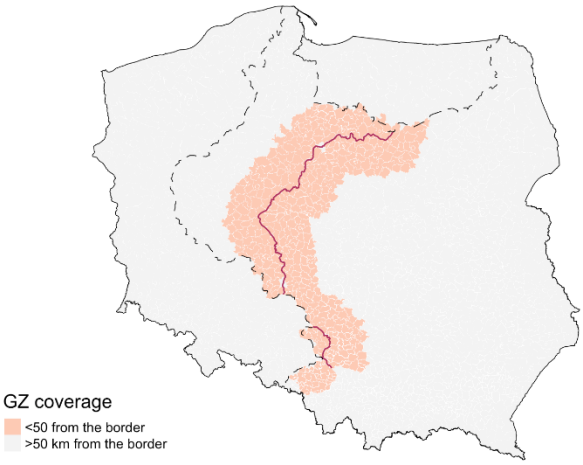
Figure 3. Borders under investigation

Panel A

The Austria-Russia border

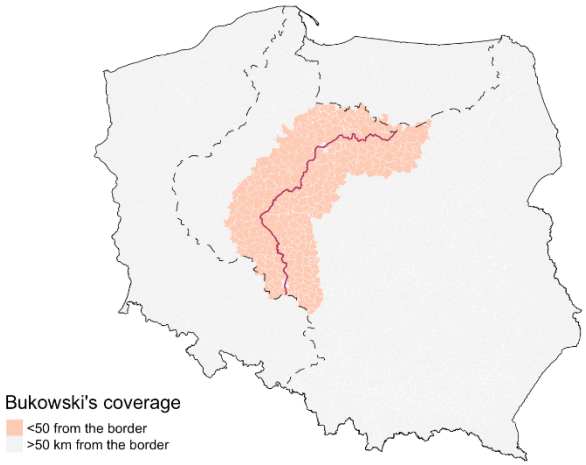


The Prussia-Russia border (main)

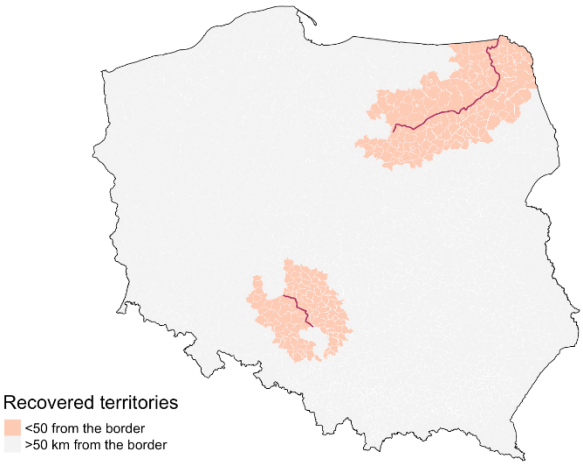


Panel B

The Prussia-Russia border (alternative)



Recovered territories



Similar to Grosfeld and Zhuravskaya (2015), Bukowski (2019) and Backhaus (2019), two types of RD models are applied, i.e., one-dimensional and two-dimensional spatial RD models. The one-dimensional model employs Euclidean distances to the empires' boundaries as the forcing variable. The cross-sectional one-dimensional RD specification is as follows:

$$y_i = \alpha + \delta_1 Treat_i + \beta_2 Dist_i + \beta_3 Treat_i \times Dist_i + \beta_4 X_i + \varepsilon_i$$

where i stands for municipality, y_i is one of the four types of property tax rates in 2017 (rates on residential land and buildings as well as commercial land and buildings). $Treat_i$ is a dummy taking a value of 1 if the municipality is located in the former Prussian or Austrian part of Poland depending on whether the Prussia-Russia or Austria-Russia border is considered (the Russian part is always a counterfactual). $Dist_i$ captures the shortest aerial (Euclidean) distance from each municipality to the partition boundary and allows controlling for a continuous relationship between distance and outcome variable y_i. The interaction term $Russia_i \times Dist_i$ allows specifying different slopes of the regression function at both sides of the partition border. Vector X_i contains a set of control variables such as longitude, latitude, altitude, average precipitation and temperature and dummy capturing large cities above 100,000 inhabitants. ε_i is the standard error, which in some specification is robust to unknown heteroscedasticity. The most crucial is the estimation of δ_1 as it captures the discontinuous jump in the outcome variable at the partition border. Consistent with Calonico et al. (2014), I report conventional and bias-corrected RD estimates.

The two-dimensional RD model, on the other hand, enables flexible control for the geographical location, instead of employing Euclidean distance to the frontier as a forcing variable (Dell, 2010; Grosfeld and Zhuravskaya, 2015). The model is of the following form:

$$y_i = \alpha + \delta_1 Treat_i + f(w_i, z_i) + \beta_4 X_i + \varepsilon_i$$

where $f(w_i, z_i)$ is a third-order polynomial of geographic coordinates (latitude, longitude) such as $f(w_i, z_i) = w_i + z_i + w_i^2 + z_i^2 + w_i^3 + z_i^3 + w_i z_i + w_i z_i^2 + w_i^2 z_i$.

In order to estimate a discontinuity at the borders of empires, one also has to select the bandwidth. In one-dimensional RD, I employ the procedure of selecting an optimal (and common on both sides) bandwidth in line with Calonico et al. (2020). In the two-dimensional RD, I follow the strategy of Grosfeld & Zhuravskaya (2015) and restrain observations to 60 km from the borders. As robustness checks to the one-dimensional RD, I further (1) increase the degree of polynomial to 2 and 3, respectively, (2) allow for different bandwidths on both sides of the border, (3) change the kernel from the default triangular to the Epanechnikov kernel, (4) cluster standard errors at the

district level (districts – powiaty – are regional governments above the municipality level), and (5) consider the property tax from 2013, instead of 2017.

Results

Main results

I start with the visual inspection of the discontinuity at the Prussia-Russia border (Figure 4) and the Austria-Russia border (Figure 5), respectively. Regarding the former, it can be observed that all types of property taxes increase sharply on the Prussian side of the border. The most pronounced is the jump recorded for the tax levied on residential buildings, which corroborates a tentative observation derived from Figure 1. Shifting to the Austria-Russia border, three out of four tax rates record the decline on the Austrian part. The only clear "no effect" is observed for the tax levied on residential buildings. It has to be noted, however, that the discontinuous shifts for the remaining three taxes at the Austria-Russia border are less pronounced when compared to the sharp changes recorded at the Prussia-Russia border. In what follows is the precise estimation of the border effects on property tax rates.

Figure 4. Visual RD discontinuity in property tax rates at the Prussia-Russia border

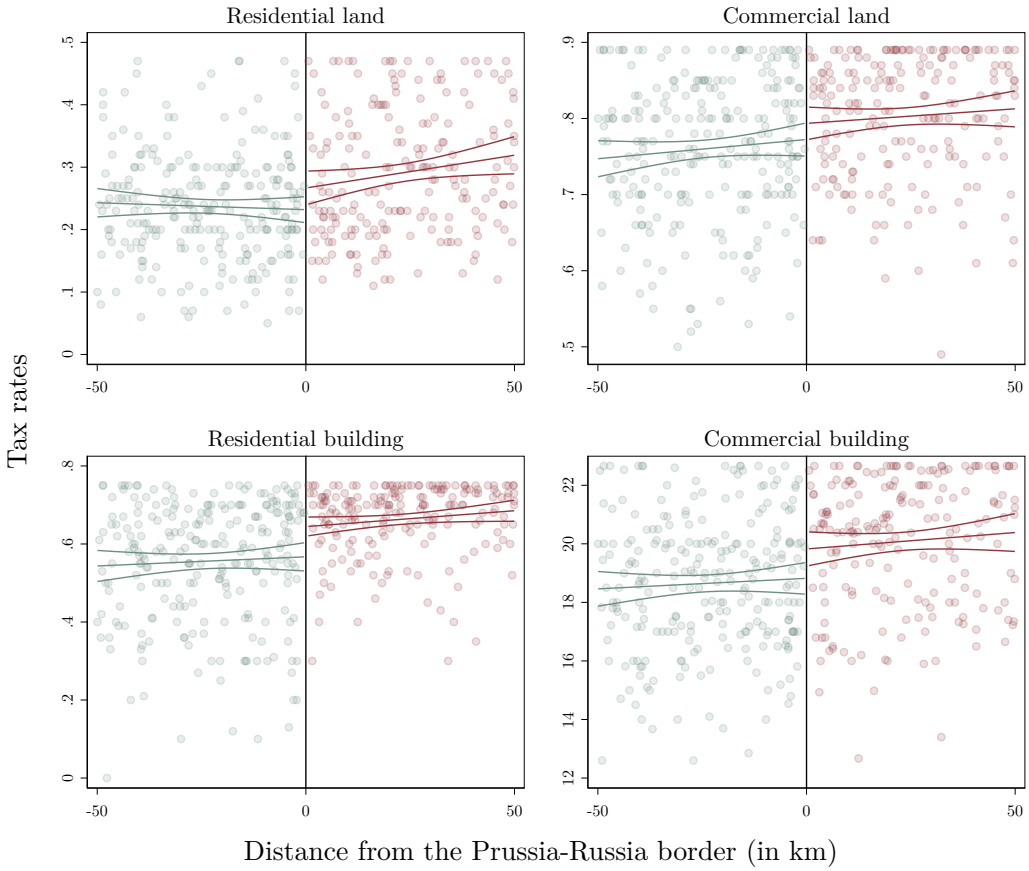


Figure 5. Visual RD discontinuity in property tax rates at the Austria-Russia border

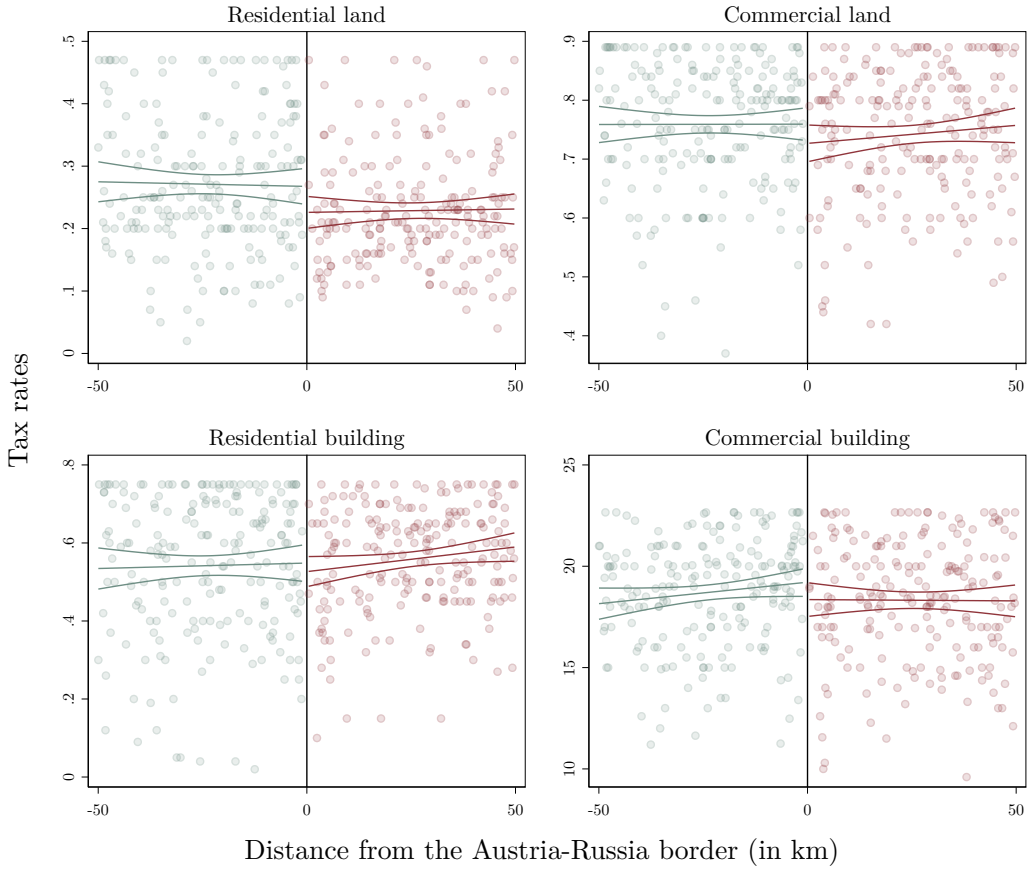


Table 1 contains the results for the baseline one- and two-dimensional RD capturing the effects of the former borders on property tax rates set by the Polish municipalities. For the Prussia-Russia border we observe a consistent effect of the border for the tax rates levied on residential buildings. Based on the results from the one-dimensional RD, which tend to be more conservative, one can conclude that the tax rate per 1 m^2 of a residential building goes up by some 0.07 PLN. It is an increase of approx. 12% (from approx. 0.58 PLN to roughly 0.65 PLN). The two-dimensional RD provides a somewhat higher estimate of nearly 0.14 PLN per m^2. The two-dimensional RD in fact shows the border effects for other types of taxes as well. Given that one-dimensional RD does not confirm this pattern, I consider these effects less robust. The results for the Austria-Russia border are less consistent. The one-dimensional RD suggests some weak (significant only at 10% level) negative effects for the tax levied on residential land and an even less precise effect for the commercial buildings. Although the two-dimensional RD suggests that the there are some effects on tax levied on residential land, by confronting it with estimates from one-dimensional RD, one needs to conclude that this effect is not robust. Thus, the only consistent and robust finding considers the tax on residential buildings at the former Prussia-Russia border.

Table 1. Main RD results on the effects of borders on property tax rates

Outcome variables	(1) Residential land	(2) Commercial land	(3) Residential buildings	(4) Commercial buildings
The Prussia-Russia border				
Panel A: *one-dimensional RD*				
Partition effect: Conventional	0.015	-0.001	0.072**	0.516
	(0.017)	(0.017)	(0.024)	(0.438)
Partition effect: Bias-corrected	0.010	-0.007	0.069**	0.409
	(0.017)	(0.017)	(0.024)	(0.438)
Partition effect: Robust	0.010	-0.007	0.069*	0.409
	(0.020)	(0.020)	(0.029)	(0.524)
Bandwidth	50.70	41.24	56.61	35.91
N below the threshold	247	211	278	181
N above the threshold	193	163	211	148
Order polynomial	1	1	1	1
Panel B: *two-dimensional RD*				
Partition effect: Conventional	0.044*	0.039*	0.138***	1.666***
	(0.018)	(0.017)	(0.025)	(0.428)
Observations	512	512	512	512
R-squared	0.223	0.153	0.242	0.187
The Austria-Russia border				
Panel C: *one-dimensional RD*				
Partition effect: Conventional	-0.050+	-0.042	-0.036	-1.383
	(0.030)	(0.037)	(0.051)	(0.888)
Partition effect: Bias-corrected	-0.055+	-0.041	-0.038	-1.462+
	(0.030)	(0.037)	(0.051)	(0.888)
Partition effect: Robust	-0.055	-0.041	-0.038	-1.462
	(0.037)	(0.046)	(0.063)	(1.081)
Bandwidth	23.59	26.73	25.76	25.61
N below the threshold	97	113	112	112
N above the threshold	82	95	92	90
Order polynomial	1	1	1	1
Panel D: *two-dimensional RD*				
Partition effect: Conventional	-0.041*	-0.032	0.006	-0.667
	(0.018)	(0.020)	(0.027)	(0.489)
Observations	473	473	473	473
R-squared	0.156	0.137	0.163	0.218

Note: Standard errors in parentheses. One-dimensional RD includes the following control variables: longitude, latitude, altitude, mean annual precipitation, mean annual temperature, large city dummy. Two-dimensional RD apart from a set of control variables specified above also include a set of higher polynomials in longitude and latitude.
Statistical significance: *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table 2 displays the results for two alternative codings of the Prussia-Russia border. The first alternative coding (Panel A) excludes the Upper Silesia region from the analysis, yet the results are largely in line with those presented in Table 1. The

effects, although slightly bigger, consider solely the property tax levied on residential buildings. In Panel B we further show the effects at the border, which on the Prussian side considers only those municipalities that are located in the Recovered Territories. Here as well I find the effect on the taxes levied on residential building along with the tax on residential land. The reason for the latter effect might be the fact that by looking at the recovered territories, one does not in fact examine the effects of partitions, but the effect of a much longer Prussian rule over these territories. This longer Prussian rule, as it turns out here, might lead to even more profound effects.

Table 2. RD results on the effects of borders on property tax rates for alternative coding of borders

Outcome variables	(1) Residential land	(2) Commercial land	(3) Residential buildings	(4) Commercial buildings
Panel A				
The Prussia-Russia border (alternative)				
Partition effect: Conventional	0.007	-0.003	0.103***	0.777
	(0.020)	(0.022)	(0.030)	(0.576)
Partition effect: Bias-corrected	0.001	-0.011	0.101***	0.581
	(0.020)	(0.022)	(0.030)	(0.576)
Partition effect: Robust	0.001	-0.011	0.101**	0.581
	(0.023)	(0.026)	(0.036)	(0.699)
Bandwidth	46.67	38.47	49.59	33.80
N below the threshold	174	143	184	128
N above the threshold	133	116	140	101
Order polynomial	1	1	1	1
Panel B				
The Prussia-Russia border (recovered territories)				
Partition effect: Conventional	0.085***	0.035	0.086***	0.963
	(0.021)	(0.022)	(0.018)	(0.710)
Partition effect: Bias-corrected	0.087***	0.027	0.075***	1.057
	(0.021)	(0.022)	(0.018)	(0.710)
Partition effect: Robust	0.087***	0.027	0.075***	1.057
	(0.026)	(0.025)	(0.022)	(0.860)
Bandwidth	84.47	78.83	107.7	60.70
N below the threshold	338	302	468	218
N above the threshold	166	152	218	109
Order polynomial	1	1	1	1

Note: Standard errors in parentheses. RD models include the following control variables: longitude, latitude, altitude, mean annual precipitation, mean annual temperature, large city dummy. Statistical significance: *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

The results for the taxes levied on residential buildings at the former Prussia-Russia border are robust to the changes in the degree of polynomials (see the results

in online appendix A3), different bandwidth on both sides of the threshold (online appendix in A4), changes in the type of kernel applied (online appendix A5), clustering standard errors at the district level (online appendix A6) and considering the property tax rates from 2013, instead of 2017 (online appendix A7). Likewise, the lack of consistent results is confirmed for all types of taxes at the former Austria-Russia border.

After all, one can also pose the question as to whether the higher property tax rates lead after all to greater property tax revenues. As shown in Table A8 in the online appendix, at the Prussia-Russia border a discrete jump in the logarithm of per capita revenue from property tax is recorded, indicating that the former Prussian municipalities record higher incomes from this tax. The table further shows the absence of such discontinuity at the Austria-Russia border.

Transmission channels

The remaining question is however what plausible explanation is there for a discrete change in the tax levied on residential buildings at the former Prussia-Russia border? In other words, what are the potential transmission channels of the observed jump in property tax rates? This section aims to tackle this question by testing for the persistence of partition legacies such as the differences in (1) the provision of local public goods and services, (2) in the cadaster and property rights protection, (3) the quality of bureaucracy, and (4) the level of urbanization and other characteristics as related to land utilization. This investigation is only performed for the Prussia-Russia border (the main version of this border as in Table 1) as this is the border where the sharp discontinuity in tax rates was detected.

Table 3 provides the results for the discontinuous variation in the transportation infrastructure and utility services, respectively. Regarding the former, it is evident that municipalities on the Prussian side of the historical border have approx. 6 km more railways (column 1) and roughly 30 km more unpaved roads (column 7). Although this suggests that residents in the former Prussian municipalities have access to more infrastructure, the density measures (length of railways and roads per 1 km^2) of these transportation networks do not change discretely (see column 2 and 8) at the former border. When looking at the length of railway infrastructure accessible within the 15- and 10-km buffers from the centroids of the municipalities (see columns 3 and 4), it is apparent that the residents inhabiting the former Prussian municipalities have access to more railways. One should further notice that the share of all apartments connected to the sewerage system and the share of residents using this infrastructure are discretely higher on the Prussian side of the historical border (see columns 11 and 12). Overall, however, the difference in the availability of hard transport infrastructure,

namely railways and utility services, in particular connection to the sewerage system, constitutes a plausible transmission channel.

Assessing the quality of the cadaster and the degree of the property rights protection is rather difficult as no direct evidence on either is available. Instead, I will use two proxy variables which may shed light on these issues. The first proxy is the share of land plots owned by the public sector disclosed in the Land Registers (Księgi Wieczyste). Thus, it captures to what extent the public ownership of land is clear and indisputable. The fact that this proxy considers only land plots owned by the public sector is purely technical as it is the only available data, yet one may assume that the degree to which the problems with clearing the property rights of public and private properties in a given locality, is similar. Since the data on ownership disclosure in the Land Registers is available at the district level, it is no longer valid to perform the RD. Instead, I run a two-sample t-test to compare the share of disclosed property rights in the districts on the Prussian and Russian sides of the former border, whose centroids are no further than 50 km from the border. The average share of disclosed rights amounts to 89% in the former Prussian districts, and roughly 76% in the former Russian districts. This results in the 13 points difference, which is statistically significant at any conventional level ($t(68)=4.15$, $p>0.001$). This may indeed suggest that property rights are less ambiguous and thus better protected in the areas formally ruled by Prussia, which introduced very advanced and long-lasting cadaster preserved until today. The second proxy to shed some light on the overall management of land in the municipalities is the extent of zoning and land use planning. This data is available at the municipality level, although some local governments failed to provide this information. As can be seen in column 1 of Table 4, no discrete jump in the share of land covered with zoning and land use planning is detectable at the former Prussia-Russia border. Thus, the zoning and land use planning coverage is unlikely to explain the difference in the property tax rates, in contrast to the second proxy (the share of lands formally recorded in the Land Registers) which may have some explanatory power.

Another potential transmission channel, as discussed above, is the quality of public administration, which conceptually is difficult to measure. Vogler (2019) operationalizes the quality of bureaucratic performance (meritocracy) through three proxy variables: (1) the number of applicants relative to the number of job openings, (2) the number of applicants per position, and (3) the number of channels used to advertise job openings (p. 817). He shows that municipalities located in the former "Russian" part of Poland perform the worst on all three of those variables. To provide further evidence on the historical legacies of partitions for bureaucratic performance, I employ the data assembled by the "Klon/Jawor" non-government organization in collaboration with the Ministry of Labor and Social Policy for the project "Friendly municipality" (Przyjazny Samorząd). The goal of this project was to assess the intensity and scale of cooperation (rather than the quality of cooperation) between public

administration and non-governmental organizations. The data was extracted from the Moja Polis website. The three variables of interest available within this project are: (1) the number of strategic documents issued by a municipality, which detail the framework of collaboration between public entities and non-governmental organizations, (2) the proportion of these strategic documents for which the non-governmental organizations were consulted, and (3) the "Friendly Municipality" index, which varies from 0 to 5, whereby a higher score indicates a more friendly municipality. Apart from accounting for the presence of strategic documents and to what extent they were consulted with non-governmental actors, the "Friendly Municipality" index is further taking into account the extent of financial and non-financial forms of collaboration between the public and non-governmental entities and the overall partnership between them (for more information, see Stowarzyszenie Klon/Jawor (2010)). Columns 2-4 in Table 4 provide RD estimates capturing the effects of partitions on these three variables. It can be seen from these estimates that the municipalities located in the former Prussian partition, on average, observe a greater number of strategic documents issued annually and record a higher value of the "Friendly Municipality" index. This indicates that the quality of public administration legacy might have some merits in explaining the different levels of tax rates levied by local governments.

Likewise, I examine if there is a variation in the level of urbanization and various housing metrics to gauge the intensity of land utilization. Columns 5-11 in Table 4, which assemble the RD estimate for these variables, indicate a lack of historical persistence in that matter. The urbanization rate does not vary abruptly at the border, nor do other housing metrics such as the average usable area of an apartment per person and the average number of apartments per 1,000 population. Urbanization and the differences in housing metrics are therefore unlikely to explain the differences observed in the property tax rates.

Lastly, in light of a recent study by Banaszewska (2021), who shows that preferential tax treatment in local governments in Poland is associated with the political strength of the incumbent mayors, I run one more robustness check. The weak mayors, as the argument goes, are more prone to mingle with fiscal variables to increase their reelection prospects. The opposite applies to the strong mayors. To rule out the possibility the differences in property tax rates identified at the former Prussia-Russia border, I check for the presence of a sharp discontinuity in the "strength" of mayors at the said border. The political strength of mayors is measured as a margin of victory, i.e., a percentage difference in support between the winner and runner-up for the mayoral position in the first round of the 2014 local elections. Although the RD estimates in the baseline specifications (as in Table 3) show the difference of approx. 10 points, these estimates are not statistically significant at the conventional level of 5%. Thus, the strength and weakness of mayors is unlikely to explain the discontinuous difference in property tax rates levied on residential buildings.

Conclusions

This paper aimed to track the persistent effect of former partitioning borders on property tax rates in Poland. By using the spatial (geographic) RD, it demonstrated that this effect can be identified solely at the Prussia-Russia border, where the property tax rate levied on residential building is 12% greater in the municipalities located just to the west of the historical border, in other words, in those municipalities which have been ruled by Prussia. After examining various transmission channels, based on the benefit and capital view on property taxation, I established that the diverse endowment of hard infrastructure and utility services, the quality of public administration, and the extent of property rights protection might constitute plausible transmission channels driving the observed differences in property taxation. While plausible, these transmission channels are not definitive. Also, it should be noted that this study looked only at the property tax rates, leaving out the investigation of the property tax exemptions. Besides looking at the property taxes more comprehensively (i.e., by including tax base exemptions), future research should also investigate other local taxes, namely the agriculture and forest taxes.

This paper adds to the growing literature on the historical persistence of institutions and infrastructure, more generally, by investigating fiscal policy as an outcome variable impacted by the long shadows of history. More narrowly, it also adds to the handful of studies examining historical legacies in the context of Poland. The results presented in this paper are in line with the findings by Wysokińska (2015) who demonstrates that former Prussian municipalities have higher own revenues per capita as compared to the ones located in the former Russian partition. The higher property taxes in these municipalities can partially explain these differences.

Table 3. RD results on the effects of borders on hard infrastructure

Outcome variables	(1) Railway total (km)	(2) Railway total (km/km^2)	(3) Railway 15km buffer (km)	(4) Railway 10km buffer (km)	(5) Paved roads (km)	(6) Paved roads (km/km^2)	(7) Unpaved rods (km)	(8) Unpaved roads (km/km^2)	(9) Municipality water (% connected)	(10) Municipality water (% using)	(11) Sewerage system (% connected)	(12) Sewerage system (% using)	(13) Gas system (% using)
Partition effect: Conventional	5.600***	0.032	13.730**	10.083***	4.055	-0.002	30.491**	0.155	-0.847	1.256	15.847**	15.362**	2.720
	(1.357)	(0.020)	(5.051)	(2.721)	(5.899)	(0.110)	(9.519)	(0.099)	(1.285)	(0.977)	(4.875)	(5.034)	(4.598)
Partition effect: Bias-corrected	5.945***	0.033	13.008*	10.234***	2.250	-0.011	33.628***	0.173+	-0.383	1.758+	14.956**	14.229**	1.731
	(1.357)	(0.020)	(5.051)	(2.721)	(5.899)	(0.110)	(9.519)	(0.099)	(1.285)	(0.977)	(4.875)	(5.034)	(4.598)
Partition effect: Robust	5.945***	0.033	13.008*	10.234**	2.250	-0.011	33.628**	0.173	-0.383	1.758	14.956*	14.229*	1.731
	(1.567)	(0.025)	(6.073)	(3.285)	(7.048)	(0.134)	(11.215)	(0.121)	(1.488)	(1.143)	(5.959)	(6.132)	(5.646)
Bandwidth	56.41	47.07	44.21	53.54	49.82	45.49	44.48	50.83	53.75	33.60	41.64	41.60	39.36
N below the threshold	276	232	222	261	244	227	222	247	261	172	212	212	194
N above the threshold	208	176	167	199	189	173	168	193	201	137	164	164	157
Order polynomial	1	1	1	1	1	1	1	1	1	1	1	1	1

Note: Standard errors in parentheses. RD models include the following control variables: longitude, latitude, altitude, mean annual precipitation, mean annual temperature, large city dummy.

Statistical significance: *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table 4. RD results on the effects of borders on zoning and land use planning, quality of bureaucracy and housing metrics

VARIABLES	(1) Zoning and land use planning coverage	(2) Number of strategic documents	(3) Share of strategic documents consulted with local residents	(4) Friendly municipality index	(5) Urbanization	(6) Average usable area of an apartment	(7) Average usable area of an apartment per person	(8) Number of apartments per 1,000 persons	(9) Number of rooms per one apartment	(10) Number of persons per one apartment	(11) Number of persons per one room
Partition effect: Conventional	-2.115	0.780+	5.893	0.476*	8.332	-3.816	-1.368+	-2.774	-0.033	0.030	0.009
	(5.918)	(0.426)	(5.349)	(0.224)	(6.796)	(2.741)	(0.732)	(9.872)	(0.094)	(0.086)	(0.015)
Partition effect: Bias-corrected	-2.559	0.840*	5.446	0.458*	7.284	-3.449	-1.281+	-5.115	-0.002	0.052	0.006
	(5.918)	(0.426)	(5.349)	(0.224)	(6.796)	(2.741)	(0.732)	(9.872)	(0.094)	(0.086)	(0.015)
Partition effect: Robust	-2.559	0.840	5.446	0.458+	7.284	-3.449	-1.281	-5.115	-0.002	0.052	0.006
	(7.023)	(0.520)	(6.377)	(0.275)	(8.116)	(3.350)	(0.890)	(12.071)	(0.113)	(0.105)	(0.017)
Bandwidth	72.71	39.64	72.36	41.46	54.63	51.02	35.72	39.56	43.89	38.71	38.44
N below the threshold	322	129	209	203	270	250	178	199	221	190	189
N above the threshold	243	105	166	159	202	194	147	157	168	156	155
Order polynomial	1	1	1	1	1	1	1	1	1	1	1

Note: Standard errors in parentheses. RD models include the following control variables: longitude, latitude, altitude, mean annual precipitation, mean annual temperature, large city dummy.

Statistical significance: *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

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