RESEARCH PAPER SERIES 03/2017

May 16th 2017

Institutions or Culture? Lessons for development from two natural experiments of history *

Agnieszka Wysokinska†

16 May 2017

Abstract

This study uses two natural experiments from Polish history, municipal level data and regression discontinuity design to consider the relative role of institutions and culture for long-run development. The first experiment documents the persistent effects of institutions and culture on the development of the 19th century partition of Poland between the Prussian, Russian and Austrian empires. Evidence is presented that these borders are exogenous. The former Prussian partition significantly outperforms the Russian and Austrian based on tax and other data. We find that agrarian reforms in the 19th century sent the three parts on different trajectories to modern development. As a result, half of the households are still rural in the Russian and Austrian partitions compared to a fifth in the Prussian. The partitions differentiated the cultures between the three parts as well. To distinguish the role of institutions and culture we exploit the second experiment of history - Stalin's forced migration movements after World War II. This enables us to exclude culture as a channel of persistence and demonstrate the role of institutions in long - run development. Robustness tests indicate the distinct nature of the historic borders.

Keywords: Institutions, culture, historical persistence, development **JEL:** B52, 012, Z13

*Section 3.1 is based on my PhD thesis at the European University Institute Wysokinska (2011). I would like to thank my advisers Andrea Ichino and Luigi Guiso as well as Jerome Adda and Paolo Pinotti for all their suggestions and helpful comments. I would also like to thank: Daron Acemoglu, Philippe Aghion, Sacha O. Becker, Jan Fidrmuc, Steven Pischke, Tomasz Zarycki, as well as participants of seminars at IGA and CEP at London School of Economics, University College London, Brunel University, EUROREG University of Warsaw, as well as conferences and workshops: EEA, WINIR, INET, Economic Growth Summer Workshop at Warwick University, Economic Growth and Development Workshop at the Rimini Center for Economic Analysis, Culture and Long Term Economic Effects Workshop at University of Warsaw. I am grateful to the Institute of Global Affairs at the London School of Economics for providing a very conducive research environment.

†University of Warsaw and London School of Economics. E-mail: A.A.Wysokinska@lse.ac.uk

Introduction

Why are some countries so rich while others are so poor? While the role of capital accumulation and innovativeness for development is well understood, these standard proximate answers to the big question of economics fail to explain why some countries are more innovative and accumulate more capital (North and Thomas (1973)). Hence, the question what are the fundamental causes of development in the long run? The recent evidence points towards the role of incentives, for example to invest or innovate, provided by such institutions like property rights or patents.

There is good evidence that the roots of economic development are very deep (see Spolaore and Wacziarg (2013) and Nunn (2014) for a comprehensive literature review). The question arises what are the factors that could explain this persistence of economic fortunes? There are four candidates posited in the literature, which are potentially highly persistent. These are institutions, culture, geography and arguably human capital. The empirical challenge with establishing causal effects of the factors for development is that they are interrelated between each other and potentially endogenous to development.[1] One way of solving this problem in the literature is to look at natural experiments of history, when the organic process of co-evolution with development was cut by imposition of conditions as good as random. Ideally, such an experiment moves just one of the factors while keeping the others constant.

This paper focuses on the role of institutions and culture (including their interplay) and follows the natural experiments of history approach for identification.[2] In the two natural experiments considered, geography and human capital can be controlled for and ruled out.[3] The three seminal sets of papers in the literature consider the impact of institutions on long - run economic development. They are Engerman and Sokoloff (1997, 2002), La Porta et al. (1997, 1998), Acemoglu et al. (2001, 2002) as well as contributions building on these reviewed in Nunn (2014). They hypothesize that past institutions determine current institutions and in turn these determine the current level of development. A second strand of literature considers the role of cultural traits in long run development. The mechanism involves past institutions affecting past culture that was transmitted intergenerationally to the present and this affects the level of development today (see Nunn

[1]Even geography can be endogenous either directly defined as soil quality or landlocked or indirectly through its interplay with history.

[2]We define institutions in very general terms similarly to North (1990) as 'rules of the game' that provide incentives and think about them as determining decision making through costs and benefits comparison. For culture, we follow Nunn (2012) who defines culture as decision-making heuristics, which typically manifest themselves as values, beliefs, or social norms, transmitted intergenerationally.

[3]For discussions of the role of geography and human capital see Becker and Woessmann (2009), Nunn and Puga (2012), Glaeser et al. (2004), Dittmar (2011) and Bukowski (2014).

(2008), Wysokinska (2011), Peisakhin (2013),Grosfeld and Zhuravskaya (2015), Becker et al. (2016) and Lowes et al. (2017)).[4]

Nunn (2012) and Alesina and Giuliano (2015) have argued that the first strand does not properly take into account culture in the process of creating institutions. The second strand focusing on culture assumes that formal institutions did not survive the collapse of empires. This paper exploits two natural experiments from the history of Poland and their interaction to provide identification. Both institutions and culture are considered and we point out that there were institutions that survived the collapse of the empires.

There are three main results. First, there is a large robust difference in economic development across the Prussian - Russian border. Second, we identify that it is institutions rather than culture that is responsible. The third result is that the most likely mechanism through which history operates is the institution of farm size. The difference that the Prussian partition has a larger farm size than the Russian and Austrian partitions can be traced back to the 19th century agrarian reforms that transformed the economy from feudalism to capitalism. Initially, economies of scale provided larger incentives to invest and adopt innovations in the Prussian partition. More importantly, over the course of more than a century, farm size affected incentives to leave agriculture and work in industry or services. As a result, currently the share of rural households in the Prussian partition is one fifth while in the Russian and Austrian partitions half of the households are still rural. This is despite the fact that the overall share of agriculture in Polish GDP is around 3% (GUS (2015)).

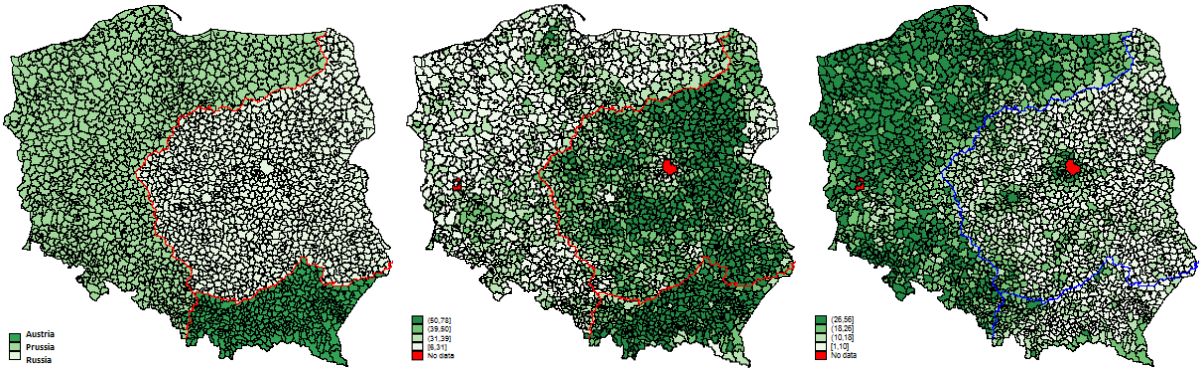
The first experiment happened in the 19th century in Poland. The country was divided into three partitions and incorporated into the socioeconomic structures of three neighboring empires, the Prussian, Austrian and Russian. Most importantly, the divisions were as good as random based on census data and historic accounts, which we discuss further below. All three partitions were 'treated' by empires and the treatment was intense. Interestingly enough, the division took place in the instrumental period for economic development, i.e. the initial stage of industrialization, which set in train an unprecedented period of increasing standards of living. What makes it also an interesting experiment is that many of the policies were forcibly implemented in the interests of the occupying empire rather than of the people inhabiting the lands, therefore breaking the organic process of development. After World War I, the three parts were united and incorporated into the reborn Second Republic of Poland. The Molotov-Ribbentrop Pact again divided Poland during World War II between the successors of the Prussian and

[4]There is also a strand considering genetic traits affecting development, see Ashraf and Galor (2013). Poland is an ethnically homogenous country and we consider a very limited 50km bandwidth which allows us to exclude this channel.

Russian states. However, this time the line of division lies hundreds of kilometers east from the 19th century one. After the war, a communist system was implemented in Soviet dependent Poland for half a century. The year 1989 marked the beginning of a new era when a set of political and economic reforms was successfully implemented to transform Poland to liberal democracy and an economic system based on free markets. Despite almost a hundred years from the unification of the lands, the historic borders continue to divide Poland. This phenomenon is perhaps best visible during general elections, like for example the 2015 presidential elections - see figure 1. The conservative party Law and Justice candidate, who became the president had larger support in the former Russian and Austrian partition than in the former Prussian partition.

Figure 1: 19th century partitions, share of votes for President Andrzej Duda (PiS) in 2015 presidential elections and 2015 parliamentary elections share of votes for incumbent Civic Platform (PO)

(a) 19th century borders (b) Andrzej Duda (PiS) 2015 (c) Civic Platform (PO) 2015



The second experiment exploits vast population movements - Stalin's forced migrations from the east to the Western and Northern Territories acquired by Poland after World War II. This 'experiment' essentially forcibly moves people from the Russian partition (with the culture of the Russian partition) to the Prussian partition with its agrarian land structure and better infrastructure 'inherited' from the German population forcibly removed to German territories after the war.

The question we start with in this article is 'what is the causal effect of partitions on current economic development?' To identify the effect we adopt regression discontinuity design (RDD) in the geographical context. Within a maximum of 50km from the historic borders, using detailed Geographical Information System (GIS) data we compare the municipalities around the historic borders in terms of measures of prosperity. We do find a robust difference (discontinuous) at the Prussian - Russian border, namely the municipalities collect up to 20% more revenues (mostly from various income and real estate taxes - note that rules are set nationally), in particular 28% more personal income

taxes. We do not find any robust difference on the Austrian - Russian border. The Prussian - Austrian border is too short to investigate. The results are robust to various robustness checks, model specifications and bandwidths up to 10km.

The next question is 'what is the channel of persistence?' As mentioned above, there are four in the literature: institutions, culture, geography and human capital. We are able to eliminate the effects of geography and human capital relatively easily. There are no natural barriers such as large rivers or mountains on the borders, and overall the surface is very flat. The communist era equalized human capital across the country. Hence, we are left with institutions and culture. Given the disruptions of the initial partitions, reunification in the interwar period, communism after World War II and the move to the market economy since 1989, the cultural explanation seems *a priori* more plausible.

Based on ethnographers' work, there is good evidence that cultures were affected during the 19th century partitions, in particular attitudes of people towards those from the other side of the border, intermarriages and language (Schmit (1997)). The only indicator of culture available at such a level of disaggregation and still representative of municipalities is turnout in national referenda.[5] We find that in the 2003 EU accession referendum, within 50km of the historic border, the former Prussian partition had 7.1 pp higher turnout than the former Russian partition (56% in Prussian compared to 49% in Russian). On the Austrian-Russian border there are also significant discontinuities in turnouts of around 7 pp. higher in the former Austrian partition.

Cultural explanations, even though *a priori* more plausible, are not the only ones. The urban, rural split of municipal own revenues reveals that urban municipalities are equally prosperous within 50km on both sides of the Prussian - Russian border, and also have similar turnouts. The whole difference both in prosperity and turnouts within 50km of the border comes from the population inhabiting rural areas and smaller towns surrounded by countryside. The share of rural and small town populations is quite substantial. In fact according to rural census data, around 50% of households in the Russian and Austrian partitions are rural, while in the Prussian partition the share is below 20%. This is in a country deriving around 3% of GDP from agriculture.[6] Within 50km, crossing the border from the Russian to Prussian partitions the discontinuity involves a change of 16 pp (from 39% to 23%). On the Austrian - Russian border, there is no robust discontinuity and the average share of rural households is higher, at almost 48% on both sides.

Why are households in the Russian and Austrian partitions more likely to be engaged

[5]Notice that survey data are representative at the regional level,but not at the county level, even then they often have the county indicator. For example, European Social Survey, wave 7, contains 1615 observations for Poland. There are 2478 municipalities in Poland and 380 counties. So it is inappropriate to use them at municipal or county levels as they are not representative at this level of aggregation.

[6]The overall share of rural population in Poland is around 40% and stable since 1980, see GUS (2015).

in agricultural activities than those in the former Prussian partition? It seems to be an outcome of a process that has been taking place for more than a century. During the partition period, if one was to point out a single instrumental change, it would be the agrarian reforms, which granted peasants property rights and transformed the economy from having feudal relations to agriculture largely based on markets. In other words, the seeds to modern economic growth were planted. At the eve of the partitions, it is estimated that around 80% of the population belonged to the peasantry (Ihnatowicz et al. (1979)). The peasants were granted property rights over the land in all three partitions during the course of the century, but the conditions differed across partitions. Each of the empires had their own motives to conduct the reforms and hence they resulted in different outcomes. In the Prussian partition, implementing the model of the Prussian road to capitalism, larger and more effective farms emerged, freeing large parts of the rural population to work in newly growing industries, while in the Russian and Austrian partitions smaller and less effective farms emerged, making subsistence possible and not providing enough push factors to leave agriculture and move to an unknown destiny in industry. The nature of compensation to the landlord differed substantially, in the Prussian partition the peasants had to cover it themselves directly, while in the Austrian and Russian the compensation was covered by the state (from taxes). Hence, verification by market forces in the Prussian partition was fiercer than in the other two.

The interesting part is that the basic structure of farm lands introduced in the 19th century persisted until present, although with some modifications from subsequent major agrarian reforms. The fact remains that there is a significant difference in the farm size on the two sides of the Prussian - Russian border, with 15 hectares on the Prussian side and only 9 hectares on the Russian side so the average difference is 66%. On the Austrian - Russian border, the average size of the farms is smaller on both sides. In the Austrian partition within 50km, it is 3.3 hectares and in the Russian 5.5 hectares. Hence, in this part the farms are much smaller compared to the current average for the EU of 15 hectares for individual farms.

So far, there are two channels that play a role: institutions and culture. It seems plausible that institutions play an important role in explaining the 28% difference in income tax revenues given the significant difference in farm sizes. However, the role of differences in culture as measured by voter turnout cannot be excluded. The second natural experiment is used to further clarify the role of the two channels. After World War II, Joseph Stalin decided to match borders of the states with ethnicity in order to prevent conflicts on ethnic grounds in the future (Applebaum (2015)). The Western and Northern territories (part of the Prussian partition, see figure 6) in what is today's Poland were previously part of Germany both before and during World War II. About 10.5 million

Germans from this area were expelled and replaced by 6.2 million Poles. About 1.4 million of these people were forced to resettle from the previous Eastern Borderlands of Poland (today's Ukraine and Belarus) and various parts of the USSR. Around 2.9 million were migrants from central Poland (Sienkiewicz and Hryciuk (2008) and Eberhardt (2011)). The important part of these movements is that a significant fraction of these replacements was forced and was directed into well defined areas.

The experiment allows us to observe the Prussian and Russian partitions' cultures within the same institutional environment. In particular, the land structure is similar throughout the Prussian partition. The results of the exercise show there is no difference in income taxes between the part of the Prussian partition consisting of the Western and Northern territories and the remaining part, and municipal own revenues are even higher. In the former, the majority of the population came from the territories that belonged to Russia during the 19th century while in the latter they were from the Prussian partition. In fact, the two populations are still culturally distinct, with voter turnouts significantly lower among the group from the East. These cultural differences do not translate into income differences between the two parts. In fact, municipalities in the Western Territories are at least as well off as the ones in the rest of the Prussian partition. This, combined with the results from the first experiment allows us to conclude that culture does not drive the differences in economic development between the Prussian and the Russian partitions. The fact that on the Austrian-Russian border there are cultural legacies that do not translate into income differences further suggests the primary role of institutions and not culture.

In addition to contributing to the debate on the role of institutions versus culture in long term development, this paper also contributes to the substantial literature on the legacies of the 19th century partitions of Poland. Zarycki's pioneering studies (Zarycki (1997, 2000, 2007)) on Polish electoral choices trace the cleavages on the liberal - conservative axes to the 19th century experience of partitions.[7]

Gorzelak and Tucholska (2008) and Jalowiecki (1996) suggest different economic and cultural legacies between the Polish and Ukrainian regions are the result of the 19th century partitions. Also Herbst (2007) points to the legacies of the past in formation of human and social capital and relates it to the differences in development between Polish regions. Sobczynski (1993) based on county level data finds evidence for persistent effects of partitions for land use on the Prussian - Russian border: arable land, pasture, orchard, forests, settlements as well as railways and roads but none on the Austrian - Russian

[7]This issue attracts considerable attention in the popular press after each election. They publish maps showing that Prussian partition votes for Civic Platform (PO) while the Austrian and Russian partitions are for Law and Justice (PiS) - see, e.g., `http://www.newsweek.pl/polska/wybory-prezydenckie-2015-wyniki-i-frekwencja-na-mapie,artykuly,363932,1.html`

border. He concluded that there is more evidence of persistence in rural than urban areas on the Prussian - Russian border. These differences in infrastructure between the partitions persisted for a long time.[8] However, according to a recent study by geographer Komusinski (2010) the differences in infrastructure do not translate into differences in use of railways. Based on the running of at least one train a day, there is no longer a difference in the role played by railways in the former Prussian and Austrian partitions.[9] Padło (2014) documents persistence of historical borders supplementing it with photographic evidence.[10]

On the other hand, the results in the study by Grosfeld and Zhuravskaya (2015) stand in contrast with the findings in the rest of the literature. The authors suggest no persistent effects in political choices between Prussian and Russian partitions. However, figure 1 provides visual evidence for the existence of a cleavage in political choices between the Prussian and Russian partitions exactly on the historic border. Using the strategy adopted in this paper, it is possible to confirm the findings in the rest of the literature and identify the robust and significant discontinuity in political choices between Prussian and Russian partitions.[11] They do find a difference in railway infrastructure but do not take into account the actual usage of railways that was pointed out by Komusinski (2010). There are several explanations for the differences between Grosfeld and Zhuravskaya (2015) and the existing literature on the Prussian-Russian border. These include the aggregation of data over the years when the political scene was transforming, and a number of econometric issues.

With regard to the economic legacies of the historic border, which are the main focus of this paper, our results are also significantly different from those of Grosfeld and Zhuravskaya (2015). In particular, we do find a significant difference within a 50km bandwidth in economic development on the Prussian Russian border. Our analysis is primarily based on the tax data identified in Wysokinska (2011), which they do not consider. Their analysis is based on aggregate luminosity data and they find no difference. In addition to the tax data, we also analyse luminosity data but with a finer grid and do find a difference on the border.

There is also a large literature on the Western and Northern Territories in various disciplines. Until 1989 the topic was politically sensitive and much effort was expended

[8]The Prussian partition had a denser railway network than the Russian partition.

[9]These maps went viral in the Polish press, when they first appeared in a blog dedicated to the persistence of the 19th century borders with the revealing comment 'Polish National Rail achieved what no government post - 1918 managed to achieved - unified the three partitions in terms of infrastructure.'

[10]The author also runs a blog: `http://bezgranica.blog.onet.pl` dedicated to the 19th century borders

[11]This difference is 5.2pp to 7.9pp in the share of votes for Civic Platform in 2015 parliamentary elections on the Prussian side, within 50km bandwidth.

to emphasize the Polish right to these lands, best summarized by the name given to them by the communist propaganda - 'Regained Territories'. The recent studies, free from this burden, shed more light on the problem of Polonization of these newly acquired territories especially in the initial period, e.g. distinct demographics and population composition, the problem of property rights, underinvestment and overall insecurity, political preferences and pro - European Union support as well as unproductive collective farms (see Osękowski and Strauchold (2015) and Sakson (2006) for the most recent summary of the multidisciplinary literature). A quantitative study based on European Social Survey data by Fidrmuc (2012) investigates social capital in regions that have experienced large population movements, including the Western and Northern Territories of Poland and finds little or no evidence of its persistence. We contribute to this literature by adding the quantitative dimension of economic progress and cultural differences based on detailed municipal data.

Section 1 provides the historical background and discussion of the randomness of the border. Section 2 describes identification strategy and data. In section 3 the results are presented and section 4 assesses their robustness. Section 5 concludes.

1 Historical Background

The division of Poland between Prussia, Russia and Austria was decided during the Congress of Vienna in 1815, the aim of which was to restore peace after the Napoleonic Wars. Which parts of Poland were to be taken by each of the empires, was decided by geographic location since each of them could enlarge its territories with newly acquired lands. Prussia was interested in Western neighboring parts, while Russia in Eastern and Austria in Southern. The decision to be made was about the location of the borders rather then which parts to take. This process was long and complicated because of the lack of geographical barriers. Finally, it resulted in a division as good as random, which is documented below.

The division of Polish Lands was considered by all three empires as stable and leading to full incorporation into the Prussian, Russian and Austrian states. Initially the Prussian and Russian parts enjoyed some autonomy but in the course of the century it vanished. In the Austrian partition, the situation was different with less harsh policies and more autonomy especially in the second half of the century. There were many differences between the lives of Poles in the three partitions, dictated by differences in the functioning of the Prussian, Russian and Austrian empires. Interestingly these differences occurred during the major political and economic changes taking place in Europe during the 19th century. The foundations for capitalism and the modern nation state were laid during

the time Poland was divided and could not decide for itself, which is crucial for the causal interpretation of the results.

In 1918 when Poland gained independence, and the lands were reunited in the Second Republic of Poland, the scale of the differences was fully realized. Setting aside practicalities like: reintroducing state currency, merging post systems and translating names of geographical locations back into Polish, more challenging tasks awaited due to the vast differences between different parts in development. In the former Prussian partition there was a relatively dense railway network. Also the illiteracy rate was below 5% while in some parts of the former Russian partition, the illiteracy rate was as high as 80%. Overall, the economy in all three former partitions was still based on agriculture with 75% of Poles inhabiting rural areas. However, there were vast differences with Poles in the former Prussian partition cultivating relatively modern and larger farms while in the rest of the country most farms were small and ineffective.

World War II started on 1st September 1939 with the German attack on Poland. It brought massive physical destruction and loss of life. After the war, Poland reemerged in new borders essentially moved toward the west. Poland lost territories in the east and instead was compensated by the Western and Northern territories formerly inhabited by German people. As a Soviet dependent state, it also moved away from capitalism to socialism with a centrally planned economy and a communist one party system. Some degree of private property was kept, including ownership of farms. Only in the newly acquired Western and Northern territories, where German owners were forced to leave and hence no owners could claim the farms, were some elements of collective farming introduced in the Soviet style. In 1989 Poland regained its independence and began a successful process of transition to a free market economy. After a quarter of a century of this reversion to capitalism, the paper analyzes the experiment and verifies if the 19th century division continues to affect the economic fortunes of Poles in the three parts.

1.1 Exogeneity of the border - borders' delineation

A crucial assumption for the causal interpretation of the effects of 19th century partitions is exogeneity of the borders i.e. the fact that empires did not divide Polish lands exactly along pre-existing divisions. Here, we discuss the plausibility of this assumption evoking historical facts as well as pre-treatment data from censuses in 1808 and 1810. All the evidence is highly suggestive of the arbitrary nature of the line dividing Prussia from Russia, but some doubts could arise on the Austrian-Russian border.

The borders were decided during the Congress of Vienna in 1815 and emerged from a long process of negotiations. At the eve of the Congress, Polish lands existed under

the name of the Duchy of Warsaw - a Napoleonic construct, which served as a point of reference for negotiation between the main powers during the Congress. After Napoleon's defeat, Russia physically occupied the Duchy and this was a decisive factor for the negotiations. On the other hand, Prussia's position was to claim the Duchy of Warsaw, constructed from the 1793 and 1795 Prussian partitions, which was based on the notion of restoring borders. Nevertheless, Russia militarily occupying the Duchy was in a stronger position. The final agreement, after a lengthy process of negotiations was for Russia to keep the Duchy, with the exception of roughly two Western departments which would be incorporated into Prussia.

Figure 1 in the online appendix depicts the area of the Duchy (the dotted area) as well as the location of the subsequent 1815 border (the red line). The Western part of the Duchy was given to the Prussians and the rest to the Russians. Notice, that the Western-Eastern divide of Polish lands was not dictated by economic factors but by the geographical location of Prussia being in the West and Russia in the East. The relevant factor is the lack of pre - existing differences on the border. There are several arguments and also data which point in this direction on the Prussian - Russian border. First of all, the line divided a historically homogenous region of Greater Poland (Wielkopolska). Secondly, it is worth noticing that this part of Europe where Polish lands are located is flat and geographical barriers are scarce to enforce political borders (see figure 2 panel (b)). For example, Applebaum (2015) describes how an army would not have encountered any major obstacles on its way from a Baltic Castle to a fortress on the Black Sea. This meant that, in general, the borders between regions, countries and ethnicities in this part of the world were not set in stone. They were often left as notions rather than explicit lines of division. However, the line had to be drawn and later enforced. How difficult it was in the case of the Prussian - Russian border - a length of several hundred kilometers is best described by the long description from the Final Act of Congress of Vienna 1815

in the footnote below.[12,13]

1.2 Exogeneity of the border - historical data

The final argument for exogeneity of the border comes from historical data. Prior to 1815, there were two population censuses conducted in 1808 and 1810 on the lands subsequently divided between Prussia and Russia, but the data is unavailable for the Austrian partition. The reason for the 1810 census was to include additional territories that had not been included in the initial 1808 census. The overall results are aggregated at the department level, which is too large a unit to use in the regression discontinuity design (RDD). However, additional data for townships is included, which are used here to infer the preexisting differences in urbanization between the two regions within the 50km bandwidth. We geocode this data and the illustrations are available in the online appendix (see figure 1). Overall, no clear patterns emerge from the figures.

Table 1 focuses on the 50km around the subsequently delineated border. There do not seem to be any significant differences between the towns' urbanization either. Also, when comparing the religious composition - a potential difference in culture - no patterns emerge. Overall, the arguments presented above point in the same direction, that the border from 1815 between Prussia and Russia is as good as random.

[12] *The part of the Duchy of Warsaw which his Majesty the King of Prussia is to possess, in full sovereignty and property, for himself and his successors, under the title of Grand Duchy of Posen, shall be comprised within the following line of demarcation: Commencing from the frontier of Eastern Prussia, at the village of Neuhoff, the new limit shall follow the frontier of Western Prussia, as it has existed from 1772 to the Peace of Tilsit, as far as the village of Leibitsch, which shall belong to the Duchy of Warsaw [Russian part]; from thence a line shall be drawn, which, leaving Kompania, Grabowiec, and Szczytno, to Prussia, passes the Vistula near the latter place, on the other side of the river, which falls, opposite Szczytno, into the Vistula, as far as the ancient limit of the district of the Netze, near Gros-Opoczko, in such a manner that Sluzewo shall belong to the duchy, and Przybranowa, Hollander, and Maciejewo, to Prussia. From Gros-Opoczko it shall pass through Chlewiska, which shall remain to Prussia, to the village of Przybyslaw, and from thence by the villages of Piaski, Chelnice, Witowickski, Kobylinka, Woyczyr, Orchowo, as far as the town of Powidz. From Powidz it shall continue through the town of Slupse, to the point at which the rivers Wartha and Prosna join. From this point it ascends the river Prosna as far as the village of Koscielna wies, a league from the town of Kalisch. Thence, leaving to this town, (on the left bank of the Prosna) a territory describing a semi-circle, measured according to the distance between Koscielna wies and Kalisch, it rejoins the course of the Prosna, and continues to follow it, ascending by the cities Grabow, Wieruszow, Boleslawiec, and ending near the village of Gola, at the frontier of Silesia, opposite Pitachin.* Note that the river Prosna is a minor river and the border only follows it for a short distance.

[13] In contrast, the process of the formation of the Austrian - Russian border after 1815 was not so clearly exogenous because in substantial part it coincides with the major river in Poland, the Vistula, although still in its upper, narrower part. Additionally, the Austrian partition - referred to often as Galicia, already had some distinct features before the partitions. In the literature it is often described as the poor part of Poland. Also, on the geographical side, it is a relatively small, hilly and overall a distinct region in Poland between the Tatra mountains and the Vistula River. Furthermore, the data from the two censuses of 1808 and 1810 presented below are unavailable for the Austrian partition. For this reason, we focus mainly on the comparison between the Prussian and Russian partitions.

Table 1: Differences prior to 1815 between Prussia and Russia within 50 km

	(1) Population 1808	(2) Population 1810	(3) Jews 1808	(4) Christians 1808	(5) HH 1810
	Prussian versus Russian				
Prussia	137.5	112.4	-128.1	287.6	42.3
	(202.84)	(185.44)	(76.78)	(163.97)	(23.23)
(Longitude)	10.4	102.2	-154.4	183.3	43.2
	(230.79)	(211.94)	(87.58)	(186.54)	(26.55)
(Lat, long)	183.9	285.4	-166.7	358.8	63.8*
	(267.41)	(246.55)	(100.88)	(215.38)	(30.93)
Constant	1058.4***	1054***	340.6***	726.5***	140.0***
	(155.16)	(141.33)	(57.69)	(125.43)	(17.70)
Observations	135	136	124	135	136

Note: The differences in population (total and number of households) and religious composition in 1808 and 1810 for townships located within 50km from the 1815 border. Based on the 1808 and 1810 census data. The first row contains simple differences in means, the second controls for longitude, and the third controls for latitude and longitude.

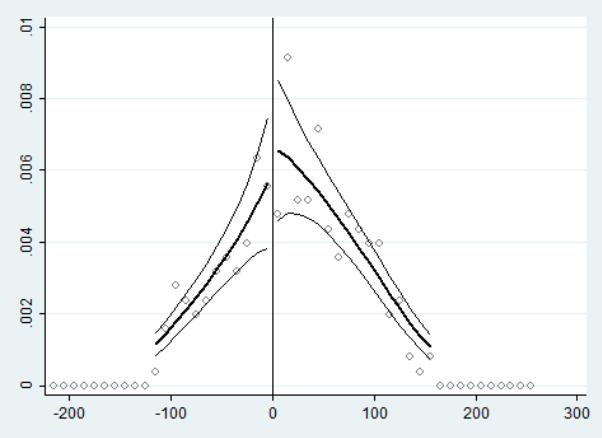
We can also verify if there is anything particular about the location of the towns with the McCrary test (McCrary (2008)), originally developed to test for sorting around the threshold. Here we think of it as a useful tool to detect if the location of the border was selective, i.e. separating the more urbanized from less urbanized areas. Figure 2 shows the McCrary plot, which further suggests that there was nothing distinct about the location of the Prussian - Russian border in the subsequent years.

2 Identification Strategy and Data

To identify the effects of the 19th century partitions, we rely on regression discontinuity design applied in a geographic context. Geographic RDD comes with some interesting features distinct from uses in other contexts, which we discuss below. However, the gain in precision from narrowing the bandwidth to 50km comes at the cost of availability of data, since a very high level of disaggregation is needed for the estimation to be meaningful. These data have to be geographically located, hence the reliance on good Geographic Information System (GIS) data, the use of which we explain in the subsection on data below. All data come from publicly available official statistics, except for GIS data on the 19th century borders. The data description, their source as well as associated optimal

Figure 2: McCrary plot for town location 1808, 1810 in panel a). Panel b) elevation map based on European Digital Elevation Model (EU-DEM), version 1.1 Panel (c) main rivers

(a) Towns 1808, 1810



(b) Average yearly temperature

(c) Physical map and main rivers

(d) Elevation based on EU-DEM

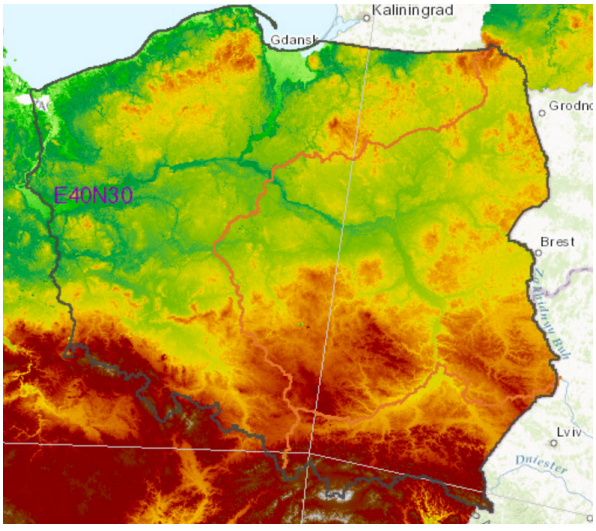
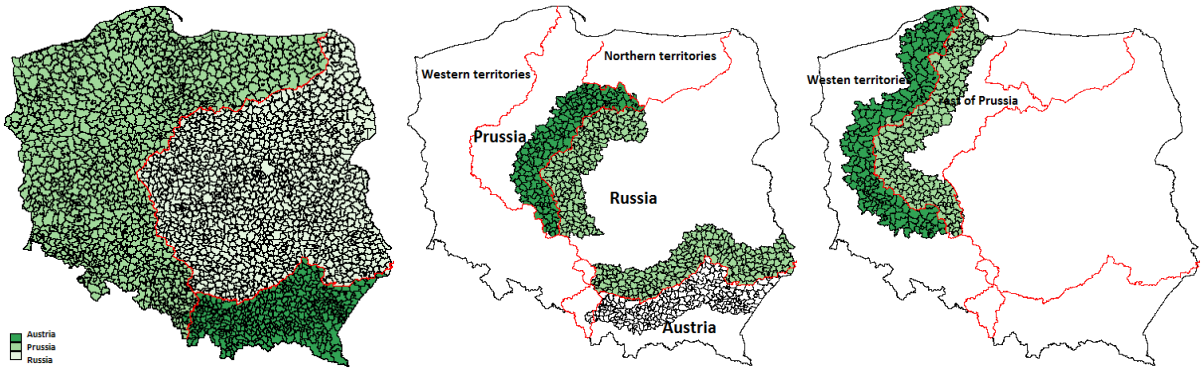


Figure 3: Samples within 50km adopted in the study

(a) 19th century borders (b) Prussian - Russian sample (c) Western Territories sample



bandwidths are displayed in table 4.

While it is relatively straightforward to identify the 19th century persistent effects for prosperity, institutions and culture in this way, it is a challenge to shed more light on the actual channel through which history operates. To distinguish between the channels, we will exploit information from another natural experiment of history, namely Stalin's forced migration movements into the Western and Northern Territories of Poland post World War II, which provides an exogenous shock to culture.

2.1 Identification strategy

Given the turbulent history of Poland and its frequently changing borders the first step is to identify the 1815-1914 division, i.e. how much of the observed differences between economic development of regions in Poland today can be traced back precisely to the 19th century experience of partition. This is accomplished by use of geographical regression discontinuity design, that is spatial RDD. Taking the borders as exogenous as discussed above in section 1.1, the discontinuity observed at present can be attributed to the 19th century division between Prussia, Russia and Austria.

This RDD approach has additional advantages. Although the 19th century partitions can be viewed as a quasi-natural experiment, the fact remains that the Polish lands in the Prussian, Russian and Austrian partitions differ in a number of important ways, these are proximity to the Western European markets that were important for grain exports, proximity to the Baltic Sea, and exposure to new ideas facilitating the process of technological diffusion. In order to 'control' for these factors, we limit the area of study to a maximum of 50 km (which we narrow to 10km when data allow) of the 19th century borders. The visualization of the 50 km bandwidth areas can be seen in figure 3. The idea is that within the maximum of 50 km bandwidth it is unlikely that the people

living in the former Prussian sector benefit from closer proximity to the sea or Western European markets. We will rely on the same identification strategy for the second natural experiment.

Regression discontinuity designs in geographic contexts come with their own particularities coming among other things from the spatial distribution of the units of observation. The application of the concept is not obvious as evidenced by the multiplicity of specifications used in the literature. For a recent summary of geographic regression discontinuity design see Keele and Titiunik (2015) and Keele and Titiunik (2016).

We provide three different specifications of the model. All the specifications estimate the differences in outcomes between the two sides of the border, with the differences coming from the weighting of the observations. First a crude specification, where outcome variables are regressed on a dummy indicating the side of the border on which the centroid of the municipality is located. This approach is equivalent to the local randomization approach to RDD (Skovron and Titiunik (2015)) where one assumes that the assignment into Prussian and Russian treatment is as good as random.

$$y_i = \alpha_1 + \beta_1 Prussia_i + \epsilon_i \tag{1}$$

$$y_i = \alpha_2 + \beta_2 West_i + \xi_i \tag{2}$$

where the unit of observation is municipality (commune) and y_i will be the outcome variable (we will use different measures of development, cultural and institutional outcomes). Prussia is a dummy variable taking on value 1 for a municipality formerly in Prussia and 0 for a municipality formerly in Russia. Similarly, West is a dummy variable taking on 1 for the Western part of the Western border and 0 for the Eastern. The interpretation of the β coefficients is therefore straightforward. They are the average difference in outcome variable between municipalities located in the former Prussian and Russian partitions in the case of β_1 or the Western and Eastern parts of the Western border in the case of β_2. The constants from these models are interpreted as averages of outcome variables for baseline categories, Russia in the first equation and the rest of Prussia for the second equation. Throughout this paper, we include the constant from this specification in the last row of the tables to facilitate interpretation.

The main worry with this crude specification is that it does not control for the gradient of changes. In this setting it is definitely a problem as a gradient of changes from West to East exists in much of Eastern Europe. One way to deal with this problem is to narrow the bandwidth where it is more reasonable to assume that local randomization is plausible, which we perform in the robustness check section. Another way is to control

for the longitude, which we do in the second specification.

The third and preferred specification follows the standard approach in the literature proposed by Dell (2010) exploiting the discontinuities based on the borders when the observations are clustered around the centroids of administrative units. We do abstain from naive distance, which is the direct implementation from one dimensional RDD with distance being the forcing variable, for reasons mentioned in Keele and Titiunik (2015). Notice, that the distance is calculated from centroids of municipalities so the distance - which would be the forcing variable - is not continuous in this case.

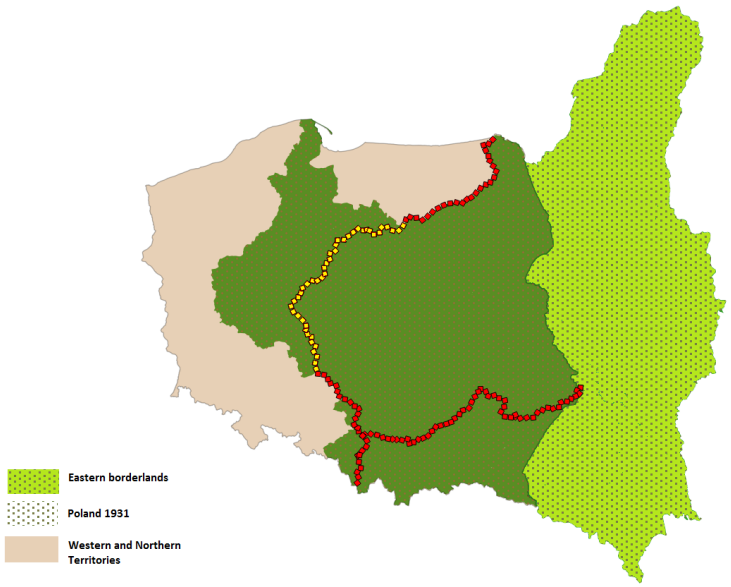
Based on the more recent understanding in the literature (see Lee and Lemieux (2010), Gelman and Imbens (2014)) we abstain from using high order polynomials in all specifications and rely on local linear regressions.[14]

The causal interpretation of the results rests on the assumption that there were no differences in relevant characteristics prior to the experiment. This assumption has been tested to some degree with the help of the 1808 and 1810 data on urban population in townships in section 1.2, which revealed no significant differences in terms of population and religious composition on the two sides of the border. We exclude from the sample the parts which belong to the Western and Northern Territories, which had population replaced after World War II, figure 6 panel a). While in the present political borders these sample restrictions are not immediately apparent, they are better understood when imposed on the borders of interwar Poland from 1931, see figure 4. The parts of the border which are excluded from the sample are the ones which were political borders in the interwar period, and historically were part of Prussia.

The more challenging aspect of this research agenda lies in uncovering the channel through which 'history' operates. One possibility is that agrarian reforms in the 19th century differentiated farm sizes in the Prussian and Russian partitions and these differences persist until the present. These affect incentives to leave agriculture, both historically and currently, freezing people in unproductive activities and hence leading to differences in economic development. On the side of the border with smaller farms, more people are able to make a living from agriculture and are unwilling to take the risk to move out of agriculture to industry or services. On the side with larger farms, there are more people without land who are forced to move. Consistent with this channel of persistence are the

[14]Notice that the implementation of RDD in this paper is different from the one in Grosfeld and Zhuravskaya (2015). The authors use two main specifications, one based on distance, which they name one-dimension (although they do additionally include a first order polynomial in latitude and longitude that provides two additional running variables). The second specification based on third order polynomial in latitude and longitude. They also control for altitude and a 'big city' dummy - but this last variable is not defined. The clustering of the standard errors at county level is problematic too. It is not clear why the economic and political outcomes should be correlated within the county level in the Polish context. This is because very few decisions are made at this level in Poland.

Figure 4: The dotted line is the 19th century partition border. The part of the border considered in this study is in yellow. The green area shows location of the Second Republic of Poland in the interwar period superimposed on the current map of Poland.



discontinuities of the farm sizes and shares of the rural households at the border. The question is how much does this difference in farm size explain the difference in prosperity between the regions and how much is due to culture?

This second channel of culture, which has been emphasized in the literature by Becker et al. (2016), assumes that the institutional framework imposed by the partitioning powers, affected some attitudes and beliefs about how the world works. Once in place, these differences in attitudes and beliefs proved highly persistent even when the populations were united under the same institutional framework and despite switches to and from communism. The mechanism responsible for this persistence is hypothesized to be intergenerational transmission. We follow Guiso et al. (2004) and Guiso et al. (2016) and consider voter turnout in national referenda as a measure of culture and also include turnout in presidential elections for comparison. This is an interesting indicator of civic involvement of the society and is a measure of culture because it is fairly independent of institutions and the incentives they provide.

Most plausibly, both of these channels of institutions and culture are in operation and they are not independent of each other. There is a possibility that agrarian reforms from the 19th century continue to affect the present not only directly but also through their impact on culture. Notice that it is not possible to distinguish between channels by simply controlling for size of the farm or culture, because it would be introducing 'bad controls' (Angrist and Pischke (2008) and Imbens and Lemieux (2007)). It would

be controlling for the outcome variable and this would bias the effect of partitions.

Hence, to further narrow the channel, we exploit the second natural experiment: Stalin's forced migration movements to the Western and Northern territories. These parts of Poland belonged to Germany before World War II and had their population expelled as described in section 1. We focus on the Western territories because we can compare people from different 19th century cultures keeping institutions constant, which is not the case for the Northern territories. Given that at least part of this movement was forced and that the geographical location of the movements was well defined, this gives the possibility to observe how culturally distinct people inhabiting parts belonging to the Russian empire in the 19th century perform when moved to what were Prussian lands at this time. Hence comparison between the Western territories and the rest of the Prussian partition allows us to keep the land structure constant as well as potentially the overall infrastructure in terms of buildings, roads and railways.

2.2 Data

In this study we rely mostly on municipal level data, with a few exceptions mentioned below. This is the largest unit of observation which permits the use of regression discontinuity design in this setting. However, this improved empirical strategy comes at the cost of availability of data, especially regarding measures of development.

Development measures The standard measure of prosperity, GDP, is unavailable at the municipal level, hence the need for alternative indicators. We rely on three measures. First, the share of personal income taxes collected within municipality (PIT). Second, own revenue which includes taxes and charges collected within the municipality. Both are in *per capita* terms and the series starts with 2002 (i.e. after the administrative reforms). Third, luminosity data which we use both at the 0.5 by 0.5 km grid and municipal level.

Each of these indicators has its strengths and weaknesses which we discuss briefly below. *A priori* the share of Personal Income Tax seems to be capturing the incomes quite well. The positive is that each municipality keeps the same share of around 40% of Personal Income Tax (PIT).[15] What makes it particularly useful is that it is designed at national and collected at local level and it includes a large variety of incomes from employment, self-employment, real estates, and capital gains.

There are two potential problems with this measure. First, one could worry that this measure is overstating the differences in incomes because of the progressive nature of taxation. There are two bands one at 18% and the other at 32% in Poland, but as a

[15] Art. 89 ust. 1 i 2 ustawy o dochodach jednostek samorzadu terytorialnego.

practical matter only a few percent (e.g., 2.47% in 2013) of payers fall into the second category in Poland so the bias is small.[16] This is largely due to the fact that it is relatively easy for many categories of tax payers to escape the 32% rate by switching to the linear 19% system, meant for entrepreneurs but widely used as an escape from high taxation by the self-employed.

Second, a more problematic feature of this measure is the exemption of farmers from PIT, who are entitled to pay rural taxes instead. These are related to the size of the farm and its potential product and income. This factor could lead to an overstatement of the difference in incomes if there were more farmers on the Russian side. In the extreme case, the difference in PIT could just be an *artefact* of the difference in the structure of the work force. As we will show further below using data on rural taxes, this is not the case (see table 5). Nevertheless this tax does not capture the economic activity of a large part of population.

To extend the measure of economic activity we also exploit the own revenue per capita. Overall, the own revenues of municipalities include: taxes and charges (above described PIT, real estate tax, Corporate Income Tax, stamp duties, rural tax, tax on means of transport, forest tax and inheritance tax, the revenue from property and other very small categories including revenues from local charges and services). The largest two categories are share of PIT and real estate tax. There is much variation between the municipalities in own revenues and some enjoy extraordinary revenues from high Corporate Income Tax shares raised especially from natural resource firms located within their borders.

The third measure employed in the study are the night lights or luminosity. We exploit the information both at 0.5km by 0.5km grids as well as aggregated to municipal level. The luminosity has been shown to correlate well with the *GDP per capita* (Chen and Nordhaus (2010)). The problem with using it in RDD is that the lights tends to travel to other pixels, which is particularly problematic in uncovering discontinuities.

To try and assess the performance of these three measures of development, we aggregate the data to the sub-regional level, where we have official GDP statistics. The cross correlation tables are included in table 3. It seems that, at least at this level of aggregation, the GDP *per capita* is better captured by the share of PIT and Own Revenue *per capita*, which are both highly correlated with GDP at around 0.94. Luminosity seems to be picking up the density of population rather than GDP as the correlation with GDP is 0.63 and with population density 0.88. Admittedly, this is a very crude assessment and conducted at a sub-regional level, nevertheless it provides some information about the performance of the indicators used. In the case of the Prussian-Russian border this is not going to be relevant as all the indicators point in the same direction. However, on

[16]Ministry of Finance report for 2013 http://www.finanse.mf.gov.pl/documents/766655/9671763/Informacja.

the Western - rest of Prussian border we will come back to this discussion.

Cultural and institutional measures As discussed above, the indicator of culture used below is referenda turnout. This data on political behavior comes from the National Election Commission.[17] There were four national referenda in Poland after the end of communism. The first in 1996 concerned property transfers and privatization, the second in 1997 concerned the constitution, the third in 2003 concerned EU accession and the fourth in 2015 concerned single-member districts. The 1996 and 2015 referenda did not reach the quorum. In 2015 the turnout was only 7.8% and was the lowest by far so we do not use this data. We supplement this data with turnouts in presidential elections from the years 2000-2015.

The institutional indicators are chosen to capture any differences in the provision of incentives at the municipal level. The first is the size of farms. The differences between the regions resulting from the different 19th century agrarian reforms persisted with some modifications until the present. They provided in the past and continue to provide different incentives for economic development. Related to this are shares of rural households, a measure of how many households are related to any kind of agricultural activity.Both measures are from the Rural Censuses of 2010 and 2002. Notice that the share of rural households as well as indicators that follow are outcome based and could incorporate cultural component as well. Given the empirical strategy adopted in this paper, it will be possible to identify *ex post* which culture or institutions drive some of the outcomes.

We also collect data on the efficiency of the legal system and educational attainment to see whether there are any differences between the partitions that drive our results. First, we check if the legal system provides diverse incentives in the three regions in terms of its efficiency. This is achieved with the use of data on average length of the trial in criminal course and percentage of cases lasting over 5 years (Mojapolis.pl from the Ministry of Justice). For these measures the courts' areas do not always correspond to municipal administrative units. Second, we collect data on differences in educational attainments as measured in standardized tests (Mojapolis.pl from the Regional Examination Commission) since the educational differences have been linked in the Polish literature to the experience of partitions. In fact, we find there are no differences in these indicators on the Prussian - Russian border.

Geographical Information System data on municipalities and other regional border are obtained from the Geodesic and Cartographic Documentation Center.[18,19]

[17] `http://pkw.gov.pl/`

[18] Centralny Osrodek Dokumentacji Geodezyjnej i Kartograficznej.

[19] The very detailed data on the border location have been provided by Paweł Struś and Tomasz Padło, Institute of Geography, Pedagogical University of Cracow. The author would like to express her gratitude

3 Results

In this section, we start by establishing the legacy of the 19th century division for current economic development using regression discontinuity design within the 50 km bandwidth described above. We concentrate on the Prussian - Russian border, since there is no robust discontinuity on the Austrian - Russian border in terms of development (see table 1 in the online appendix). We proceed by documenting discontinuities in culture and institutions observed when crossing the border from the Russian to Prussian partition. Since there is evidence that both incentives and internal cultural values have been affected to try and distinguish which channel is at play, we further investigate the relative importance for development of each of the channels by exploiting the second natural experiment of Stalin's forced migrations. The latter provides the exogenous variation in culture (within the part of migration that was forced) and keeps the incentives constant.

3.1 19th century partitions

3.1.1 Development

There are large differences in economic development between regions in Poland. In the literature and press, these large differences are coined as Poland A - the well developed Western part and Poland B - the less developed Eastern block (Kozak et al. (2001)). While the concept is well defined, where exactly the boundary between Poland A and B lies is less clear. The interesting question is how much of these differences can be attributed to the 19th century division of Poland. Table 2 shows the differences between partitions. In 2014 the municipalities that were located in the Prussian part collected approximately 1748 PLN own revenues *per capita* while in the Russian and Austrian parts the numbers were much lower, around 1369 and 1223, respectively. Hence, in the Prussian partition the revenues are 27-42% higher than in Russian and Austrian parts. Aggregated data for 2002-2014 shows a similar pattern (see table 2 first row). For the differences in PIT, the Prussian partition outperforms the Russian and Austrian by 16-20% in 2014. These data are visualized in panels (a) and (b) of figure 5, with the North Western part of Poland being more prosperous than the South Eastern.

As discussed in section 2.1, to uncover the causal effect of the 19th century partition, we limit the area around the border to 50km, 30km, and 10km as within such narrow areas, the only difference between the three parts can be attributed to the experience of partitions in the 19th century, provided the border is exogenous. This assumption has been discussed in section 1.1. Similarly, some of the factors like proximity to Western

for their generous help.

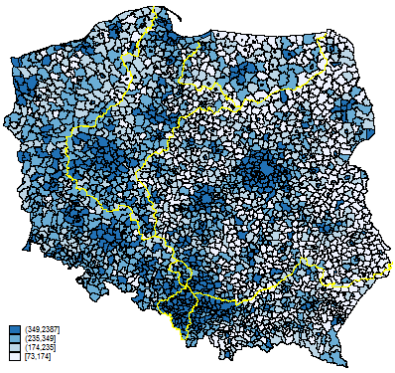
Table 2: Descriptive statistics, by partition and Western territories

	(1) Russian partition	(2) Prussian partition	(3) Austrian partition	(4) Western Territories
Panel A: Development				
Own Revenue 2002-2014	900	1188	804	1260
PIT 2003-2014	269	317	265	309
Real Estate Tax 2002-2014	262	374	214	414
Own Revenue2014	1369	1748	1223	1856
Own Revenue2002	520	666	459	697
PIT 2014	429	498	414	542
PIT 2002	110	137	116	132
Real Estate Tax 2014	367	514	297	583
Real Estate Tax 2002	198	254	175	271
Luminosity	61	76	71	68
Panel B: Institutions				
Farm size	7	13	3	14
Individual farm size	8	15	3	15
share of rural HH	48	22	56	21
Urbanization	58	66	48	67
Litigation time	4.5	4.1	3.8	4.2
Litigation overdue	0.3	0.3	0.4	0.4
Test 6th grade	75	74	78	73
Test 9th grade math	46	44	48	44
Panel C: Culture				
Turnout 2003	50	55	56	54
Turnout 1997	36	37	49	36
Turnout 1996	26	27	48	26
Turnout presidential	49	48	53	46
Population (mean)	13,473	17,207	16,944	15,720
Urban Population (total)	8,690,514	11,740,539	2,771,655	5,356,542
Rural Population (total)	6,273,603	5,996,755	2,981,510	2,645,005
Population (total)	14,964,117	17,737,294	5,753,165	8,001,547
Observations	1114	1026	340	504

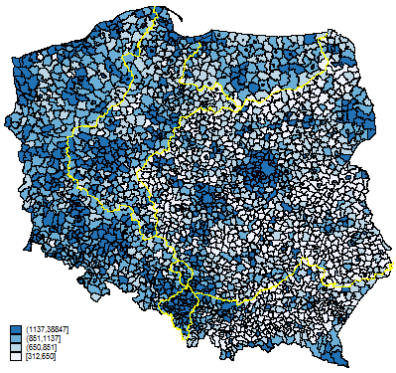
Note: Prussia includes Western and Northern territories, column "'Western Territories"' includes Western part of Territories only. Columns 1, 2 and 3 sum to total.

Figure 5: Chropleths maps. Shade proportional to the measurement of selected variables.

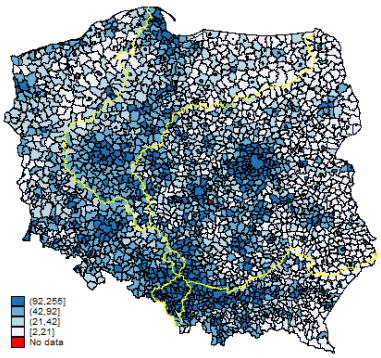
(a) PIT



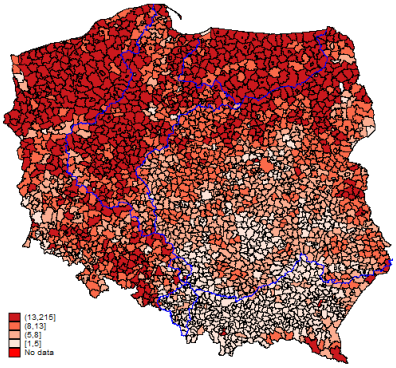
(b) Own revenue



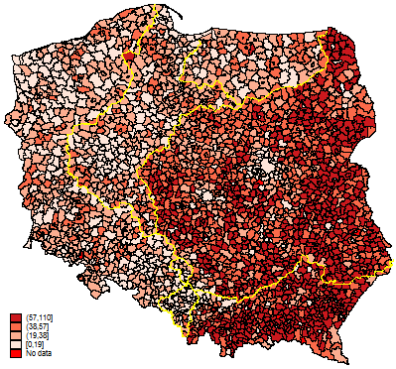
(c) Luminosity



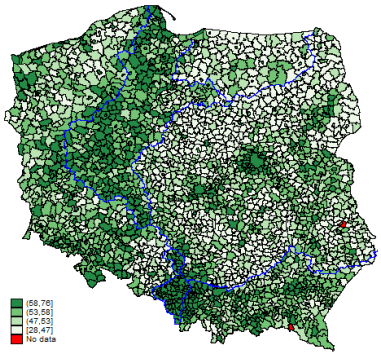
(d) Farm sizes



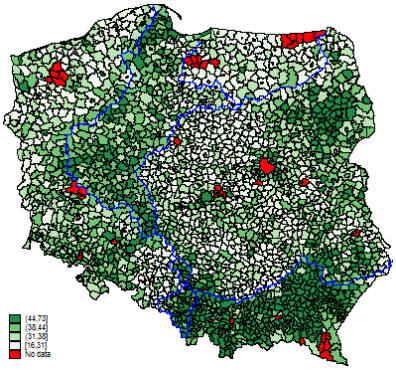
(e) Share of Rural hh



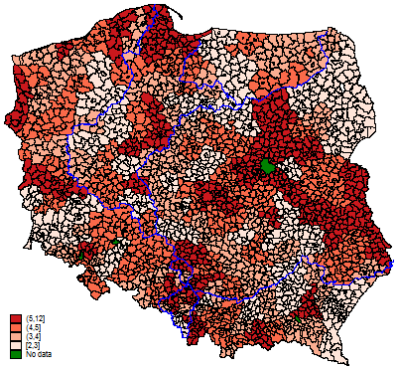
(f) Turnout 2003



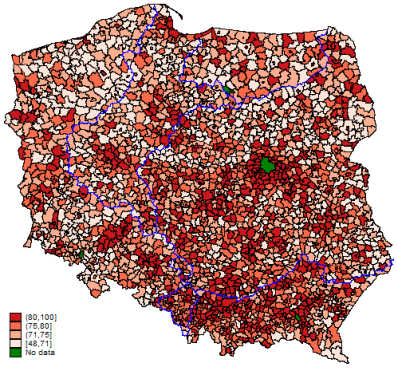
(g) Turnout 1997



(h) Litigation time



(i) Test 6th



European markets lose their importance within such narrowly defined bandwidths and the gradients are taken away by the geographical controls.

The results are organized in table 3, with Panel A containing the results for the Prussian-Russian border and Panel B for the Western Territories-rest of Prussia border (see figure 3). The first column contains the development indicators, while the rows are for the three model specifications for 50km, 30km, and 10km bandwidths. Row Prussia provides a difference in means in indicators crossing the Prussian-Russian border in panel A and row West the Western-rest of Prussian border in panel B. Row (Longitude) controls for distance to the border, while row (Lat, Lon) takes into account the spatial nature of the discontinuity. Row constant provides the mean of the variable in the Russian partition. The optimal bandwidths for own revenues, PIT and real estate tax, all in *per capita* terms are calculated using Imbens and Kalyanaraman (2012) selection criterion and are between 40-50km. Also based on this criterion, the luminosity's optimal bandwidth is 14 km for the 0.5km by 0.5 km grid.

Crossing the historic border from the Russian to Prussian partition own revenues *per capita* rise by 166 PLN or 20% compared to the 32% difference for the entire areas of Prussian and Russian partitions listed in the descriptive statistics table 2. When controlling for the geographic location of the municipality (row Lat, Longitude) the discontinuity is estimated at 80PLN *per capita*, i.e. around 10% higher.

A similar pattern emerges from the second indicator - the share of personal income taxes (third row PIT). In the optimal bandwidth the row discontinuity estimates are 58PLN i.e. 25%, which diminish to around 13% when controlling for location of the municipality. For comparison, the difference in means for entire areas of partitions is around 18% as can be seen in the descriptive stats table 2.

The last column contains the estimated discontinuities for luminosity data. Since the optimal bandwidth is 14km, we use the closest included i.e. 10km. Crossing the border from Russian to Prussian partition the luminosity increases by 12.1 (i.e. 24%) in simple difference and by 8 (i.e. 16%) when controlling for the location of the pixel. Notice that this stands in contrast to the findings of Grosfeld and Zhuravskaya (2015) where based on municipal level aggregates, rather than the finer grid level used here, they do not find any significant difference between the partitions. In fact when we use the municipal aggregates, the luminosity is higher on the Prussian side but the differences are insignificant.

We also include for completeness the discontinuities for real estate tax (column 5), which together with the share of PIT are the two largest components of municipal own revenues. This provides an assessment of the relative importance of physical infrastructure (buildings), which will be relevant in the Western Territories. We will come back to

Table 3: Differences in development of Prussian and Russian partitions within 50km of the border

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Own revenue	s.e.	PIT	s.e.	Real estate	s.e.	Luminosity	s.e.
Panel A: Prussia vs Russia								
bandwidth 50								
Prussia	166***	(17)	57***	(5)	34***	(9)	23***	(0.4)
(Longitude)	130***	(19)	39***	(5)	21*	(10)	9***	(0.4)
(Lat, Long)	87***	(23)	30***	(6)	22	(12)	1	(0.5)
Constant	832***	(12)	229***	(3)	272***	(6)	47***	(0.3)
Observations	4017		4017		4017		140296	
bandwidth 30								
Prussia	200***	(20)	52***	(6)	69***	(8)	18***	(0.4)
(Longitude)	175***	(20)	43***	(6)	56***	(9)	10***	(0.4)
(Lat, long)	103***	(22)	41***	(7)	23*	(9)	5***	(0.5)
Constant	785***	(13)	224***	(4)	236***	(6)	46***	(0.3)
Observations	2678		2678		2678		91654	
bandwidth 10								
Prussia	178***	(38)	38***	(10)	64***	(17)	10***	(0.7)
(Longitude)	179***	(38)	39***	(10)	65***	(16)	9***	(0.7)
(Lat, long)	143***	(38)	39***	(10)	49**	(17)	8***	(0.7)
Constant	825***	(25)	239***	(7)	240***	(11)	50***	(0.5)
Observations	1053		1053		1053		33920	
Panel B: Western vs rest of Prussia								
bandwidth 50								
West	161***	(21)	-8	(6)	78***	(8)	-25***	(0.3)
(Longitude)	200***	(25)	-10	(7)	77***	(9)	-20***	(0.3)
(Lat, long)	193***	(26)	-6	(7)	79***	(9)	-14***	(0.3)
Constant	1044***	(14)	311***	(4)	310***	(5)	63***	(0.2)
Observations	4433		4433		4433		224858	
bandwidth 30								
West	132***	(19)	-14*	(6)	55***	(8)	-19***	(0.3)
(Longitude)	151***	(21)	-17*	(7)	61***	(8)	-16***	(0.4)
(Lat, long)	137***	(21)	-14*	(7)	56***	(9)	-13***	(0.4)
Constant	978***	(13)	295***	(4)	297***	(5)	56***	(0.2)
Observations	2938		2938		2938		146805	
bandwidth 10								
West	130***	(28)	-10	(9)	84***	(12)	-9***	(-17.07)
(Longitude)	120***	(29)	-17	(9)	82***	(13)	-8***	(-14.88)
(Lat, long)	113***	(29)	-14	(9)	77***	(13)	-7***	(-13.27)
Constant	963***	(18)	284***	(6)	292***	(8)	49***	(131.82)
Observations	1118		1118		1118		55485	

Note: all in *per capita* terms, at municipal level, for 2002-2014 and 50, 30 and 10km bandwidths. Prussia - dummy taking on 1 for municipality in former Prussian partition and 0 for former Russian. West is a dummy variable taking on 1 for municipality located in the Western Territories and 0 if located in the rest of Prussian partition. Row (Longitude) controls for longitude of the municipality and the (Lat, Long) controls both for latitude and longitude. Row Constant provides the baseline mean of a variable, in panel A for the Russian part and in Panel B for the rest of Prussia, see figure 3 for choice of samples.

Table 4: Rural vs urban differences in municipality incomes between Prussian and Russian partitions within 50km

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Own revenue			Personal Income Tax			Luminosity		
	urban	rural	mixed	urban	rural	mixed	urban	rural	mixed
Prussia	-22	151***	197***	-11	44***	75***	-3	16**	27**
	(52)	(22)	(34)	(20)	(5)	(10)	(18.2)	(5.0)	(8.1)
Cons.	1297***	758***	859***	462***	194***	239***	205***	42***	50***
	(35)	(14)	(27)	(14)	(3)	(8)	(12.5)	(3.1)	(6.4)
Obs.	416	2587	1014	416	2587	1014	32	199	78
% diff.	-2%	20%	23%	-2%	23%	31%	-1%	38%	54%

Note: Prussia - dummy variable taking on 1 for Prussian and 0 for Russian. Columns provide differences in means. Columns (1), (4) and (7) for urban, (2), (5) and (8) for rural and (3), (6) and (9) for rural-urban municipalities.

this in subsection 3.2.

Notice, that the above described general patterns are robust to 30 and 10 km bandwidths included further below in the same table 3. Overall, all of the included measures of prosperity point in the same direction - the municipalities in the former Prussian partition continue to outperform the ones in the former Russian partition, even when we limit the bandwidths to 10km and control for the geographic location and in particular take away the West-East gradient.

Rural versus urban areas. Prussian - Russian border An interesting picture of local development emerges by breaking the results into urban, rural and rural-urban municipalities (later called mixed for simplicity). The mixed category consists of smaller towns surrounded by rural areas. Table 4 shows differences in economic indicators according to the type of municipality. As the numbers in columns (1), (4) and (7) of table 4 demonstrate, there is no difference in prosperity in either own revenues, PIT or luminosity measures between larger towns on the Prussian - Russian border. The whole difference lies within rural and mixed municipalities. This is an interesting feature of the developmental difference between the former Prussian and Russian partitions suggesting on the one hand, deep roots of economic development within rural areas and on the other hand history has no destiny in the case of more urbanized areas. The urban areas are more prosperous than rural so that the discrepancies between rural and urban areas are very large on the Russian side of the border.

Because of the exemption from Personal Income Tax for farmers, the possibility arises

Table 5: Differences in rural tax between Prussia and Russia within 50km

	(1) All	(2) Mixed	(3) Rural	(4) Urban
Prussia	288763***	299766***	287816***	7423
	(11519)	(30263)	(11414)	(6486)
Constant	332421***	491831***	331434***	67399***
	(7864)	(23986)	(7237)	(4440)
Observations	4017	1014	2587	416
% difference	87%	61%	87%	11%

Note: Differences in means in rural tax collected in municipalities on the Prussian-Russian border within 50km. Numbers in total for municipalities

that the PIT difference reported in table 3 is an artifact of this regulation. Maybe there is no difference in incomes between the two parts, it is just the structure that is different. We show that this is not the case, as the rural taxes - an indirect measure of farmers' incomes - are several orders of magnitude higher on the Prussian side of the border. Table 5 contains the results within 50 km from the Prussian - Russian border. The difference in revenues from rural taxes is large - overall 89% as reported in column (4). Since both PIT taxes and rural taxes are higher on the Prussian side, the structural explanation can be ruled out. Nevertheless, the fact remains, that the incomes of farmers are generally unknown and therefore the picture remains incomplete.

To conclude this subsection, there is a large and robust difference in economic development between the Prussian and Russian partitions within the 50km bandwidth. No robust difference has been detected on the Austrian - Russian border (see table 1 in the online appendix). The differences on the Prussian - Russian border are mostly related to rural areas and urbanization is less in the Russian partition.

3.1.2 Institutions

In this subsection and the next, we investigate if there are legacies in institutional arrangements from the 19th century. In the big picture, most institutions did not survive and vanished with the collapse of the empires and this is the identification strategy of culture in Becker et al. (2016) and Peisakhin (2013). There were many differences between the empires. For example, there were 4 legal systems, unconnected railway systems, different monetary systems, some signs identifying town names in German and others in Russian, different mail systems, educational systems, and administration systems to name a few. The scale of the differences was only fully realized in the interwar period

when the first attempt to reunite Polish Lands from the three partitions was undertaken. The administrative reforms explicitly tried to eliminate the 19th century borders by combining different parts within the same administrative units. During World War II the Polish Lands that had been reunited in the interwar period suffered significant material losses both in physical and human terms. According to data from population censuses in 1946 there were 11 million less Poles compared to 1939. The physical destruction in the regions of the Western Territories reached in industry 73%, in housing 45%, in the rail network 77% (Osękowski and Strauchold (2015) p.46). After the war, these lands saw another, this time deeper shift in regimes - to communism. The incentive systems changed significantly, often orthogonally to what the free market would create and sometimes to the great benefit of people as, for example, in the case of education. From 1989 there was again another shift in both political and economic institutions with the transition being mostly considered a success.

Although the general picture is that there is very little persistence in institutional arrangements, there are three institutions that can be traced back to the experience of the 19th century that may have survived. These are education, efficiency of the judicial system and agrarian reforms. We consider each in turn.

Education An important difference between the three empires was the educational system implemented in each of them. Judging by the outcomes, the educational systems in the 19th century were vastly different. For example, in 1911 the illiteracy rate was below 5% in the Prussian partition, while in the Russian it was 59% and in the Austrian it was 41% (Romer and Weinfeld (1919)). Overall, the communist system after World War II equalized educational opportunities and therefore overall human capital is now comparable across partitions (Grosfeld and Zhuravskaya (2015)). One particularity mentioned in the Polish literature is the possible reversal of fortunes between the Prussian and Russian partitions in the outcomes of standardized tests in recent years compared to historical literacy rates, investigated by Bukowski (2014). Here we confirm his results in table 6 using the same RDD methodology as in this paper. The differences between total partitions found in the descriptive statistics in table 2 of around 2 points on a scale from 1-100 cannot be attributed to the experience of the 19th century partitions based on RDD. The results are robust to different model specifications and bandwidths included in row 6 of table 6.[20]

[20]Notice, that Bukowski (2014) documents a discontinuity on the Austrian - Russian border, which does not translate into higher incomes though, see table 1 in the online appendix of this paper.

Table 6: Differences in institutional indicators within 50 km

	(1) Farm size	(2) s.e.	(3) HH rural	(4) s.e.	(5) Litig time	(6) s.e.	(7) Litig share	(8) s.e.	(9) test 6th	(10) s.e.
Panel A: Prussia vs. Russia										
bandwidth 50										
Prussia	5.3***	(0.78)	-16.9***	(1.77)	0.5***	(0.08)	0.003	(0.02)	-0.2	(0.67)
(Longitude)	5.2***	(0.85)	-17.8***	(1.92)	0.4***	(0.09)	-0.03	(0.02)	-0.9	(0.72)
(Lat, Long)	3.1**	(1.00)	-9.8***	(2.17)	0.1	(0.10)	-0.1***	(0.03)	-0.2	(0.87)
Constant	9.4***	(0.53)	43.5***	(1.21)	3.4***	(0.06)	0.2***	(0.01)	74.7***	(0.46)
Observations	309		309		308		308		309	
bandwidth 30										
Prussia	5.1***	(0.84)	-15.8***	(2.19)	0.4***	(0.09)	-0.0005	(0.02)	-0.07	(0.83)
(Longitude)	5.2***	(0.87)	-16.6***	(2.24)	0.3**	(0.09)	-0.02	(0.02)	-0.4	(0.85)
(Lat, Long)	3.7***	(0.94)	-11.2***	(2.34)	0.2	(0.10)	-0.08**	(0.03)	0.2	(0.94)
Constant	9.0***	(0.57)	43.9***	(1.49)	3.4***	(0.06)	0.2***	(0.02)	75.0***	(0.56)
Observations	206		206		205		205		206	
bandwidth 10										
Prussia	5.4**	(1.70)	-13.2***	(3.76)	0.2	(0.15)	-0.02	(0.04)	0.3	(1.41)
(Longitude)	5.4**	(1.70)	-13.1***	(3.74)	0.2	(0.13)	-0.02	(0.04)	0.3	(1.42)
(Lat, Long)	4.7**	(1.70)	-11.1**	(3.66)	0.2	(0.14)	-0.04	(0.04)	0.4	(1.45)
Constant	8.7***	(1.13)	42.3***	(2.51)	3.4***	(0.10)	0.2***	(0.03)	75.5***	(0.94)
Observations	81		81		80		80		81	
Panel B: Western vs. rest of Prussia										
bandwidth 50										
West	1.0	(0.90)	-2.7	(1.53)	0.08	(0.14)	0.02	(0.03)	-1.4*	(0.68)
(Longitude)	0.2	(1.06)	-2.8	(1.81)	0.3*	(0.16)	0.06	(0.04)	-0.9	(0.81)
(Lat, Long)	-0.8	(1.05)	-1.6	(1.82)	0.2	(0.16)	0.04	(0.04)	-0.6	(0.82)
Constant	14.2***	(0.60)	26.2***	(1.03)	4.1***	(0.09)	0.3***	(0.02)	73.6***	(0.46)
Observations	340		340		341		341		341	
bandwidth 30										
West	1.0	(0.94)	-3.8*	(1.86)	0.2	(0.16)	0.08*	(0.03)	-1.5	(0.85)
(Longitude)	0.8	(1.03)	-4.1*	(2.04)	0.3	(0.18)	0.10**	(0.04)	-0.9	(0.93)
(Lat, Long)	0.2	(1.02)	-3.2	(2.03)	0.2	(0.18)	0.08*	(0.04)	-0.6	(0.94)
Constant	13.7***	(0.62)	27.6***	(1.24)	4.0***	(0.11)	0.3***	(0.02)	73.5***	(0.57)
Observations	226		226		226		226		226	
bandwidth 10										
West	1.2	(1.52)	-6.7*	(3.10)	0.04	(0.23)	0.08	(0.05)	1.3	(1.15)
(Longitude)	1.0	(1.56)	-6.2	(3.17)	0.08	(0.23)	0.09	(0.05)	1.1	(1.17)
(Lat, Long)	0.7	(1.55)	-5.8	(3.18)	0.05	(0.23)	0.08	(0.05)	1.3	(1.17)
Constant	13.8***	(1.00)	29.7***	(2.03)	4.0***	(0.15)	0.2***	(0.03)	72.1***	(0.75)
Observations	86		86		86		86		86	

Note: data at municipal level for 50, 30 and 10km bandwidths. Prussia - dummy taking on 1 for municipality in the former Prussian partition and 0 for the former Russian. West is a dummy variable taking on 1 for municipality located in the Western Territories and 0 if located in the rest of Prussian partition. Row (Longitude) controls for longitude of the municipality and the (Lat, Long) controls both for latitude and longitude. Row Constant provides the baseline mean of a variable, in panel A for the Russian part and in Panel B for the rest of Prussia, see figure 3 for choice of samples.

Efficiency of the judicial system Austrian and Prussian administration are often viewed as exemplary for efficiency. For example, Becker et al. (2016) finds some evidence that the institutional arrangements from the 19th century continue to matter through their impact on trust for these institutions. Here we are interested in the functioning of the judiciary system. The judiciary system went through major transformations, especially during communism and we find no robust differences in its functioning on the Prussian - Russian border.[21],[22]

Using data on average length of trial as well as percent of overdue cases in criminal procedure, we find no robust evidence to support the thesis of legacies in the judiciary system. On average in Poland in recent years, the trials last for 4.5 months in the former Russian part, 4.1 months in the former Prussian part and 3.8 months in the Austrian part. How much of this variation can be attributed to the 19th century experience? When focusing on the 50 km around the historic borders, table 6 shows that in the case of the Prussian - Russian border, the signs actually get reversed and the trials last two weeks longer (0.5 months) instead of shorter, which is often interpreted as a possible sign of inefficiency. Overall, we can exclude efficiency of the judiciary system as a channel explaining the difference in development around the border.

Agrarian reforms and the incentives to leave agriculture Agrarian reforms were of key importance in the transition from a feudal society to capitalism for the Polish Lands. The reforms granted property rights to peasants in all three partitions and freed them from serfdom. Among other things, this allowed them to farm their own land, be employed in agriculture or move to industry. What's important in all three partitions is that these reforms were conducted in different ways by the imperial powers and therefore resulted in different consequences. Generally, in the Prussian partition the reforms transformed the rural areas the most and had an economic motivation subscribing to the model of the Prussian road to capitalism. They led to the emergence of bigger farms where the more effective farmers ended up owning the land. The nature of the contract between the gentry and the peasant assumed compensation to the gentry for the reform be paid by peasant (in land, money or labor) (Bardach et al. (1993) p.423). The produce of these farms was mainly sold in the market. In contrast, in the Russian partition the reforms had a largely political motivation, namely to prevent the peasantry from supporting the gentry in their independence struggle against Russia. Hence, the result was the emergence of small farms, largely producing for the needs of their owners with

[21] Neither on the Austrian - Russian border, see table 1 of the online appendix and figure 5.

[22] Since the courts are not located in every municipality, the variation in the indicator is at the courts' administrative level, which sometimes is the municipality itself and sometimes larger.

relatively little sold to the market. Also, the nature of compensation to the gentry for the reform was different from the Prussian partition and was provided by the state (from taxes). This type of compensation did not provide the same incentives as in the Prussian partition to be positively verified by the market.

Clearly the incentives to invest and modernize farms in the Prussian partition were much higher. In addition, the proportion and composition of potential workers who could be freed to go to industry and become paid workers there was very different in the two partitions. The reforms in the Austrian partition were similar in effect to those in the Russian partition and also led to the emergence of small farms (Kalinski (2004) p.39). The structure in the Prussian partition was later conserved by the law forbidding the division of farms with inheritance. They were required to remain whole when passed from one generation to the next. No such restrictions were made in the Russian partition (Bardach et al. (1993) p.424). Overall, Bardach et al. (1993) p. 424 evaluates that the reforms in the Prussian partition seriously transformed economic and social relations in the countryside.

The results of the agrarian reforms are visible until the present in the average size of farms, see figure 5. The descriptive statistics in table 2 document large differences between the three regions of Poland in terms of average farm size. In the Prussian part this is around 15 hectares, while in the Russian part 8 hectares and in the Austrian 3.4 hectares. For comparison, the average for the European Union is around 15 hectares. Table 6 considers the 50km around the historic borders. On the Prussian - Russian border, crossing from the formerly Russian to Prussian part the average size of the individual farm grows by 5.3 hectares, from 9.4 hectares (row constant) in the Russian part to almost 15 hectares in the Prussian part, i.e. a 56% increase.

Consistent with the hypothesis that differences in farm size provided different incentives to leave agriculture and move to other economic activities throughout the past century or so, there are large differences in the shares of rural households observed at present.[23] Descriptive statistics in table 2 report that in the Russian partition it is 48% of households, in the Austrian 56% while in the Prussian it is much less at 22%. This is a vast difference between the Prussian partition and the other two partitions and particularly striking given that the share of agriculture in GDP in Poland was 2.9% in 2014 according to official statistics (GUS (2015)). Overall employment in agriculture was around 15-16% while in the EU, e.g. in 2013 it was only 1.9%.[24] Within the 50km bandwidth, crossing the border from the Russian to the Prussian partition, the share

[23]Rural household is defined as having a member owning a farm larger than 1 hectare or owner of cattle and animals.

[24]The data on employment in agriculture are not available at municipal level.

of rural households drops by 10-17% according to estimates included in table 6 row (3). Different model specifications and bandwidths included in the same table further below confirm the legacy of the 19th century land structure and its differentiating effect on leaving agriculture to move to other economic activities.

North (1990) points to two reasons institutions affect investments. One is security of property rights, the other economies of scale. In both partitions security of tenure was problematic. In the Prussian partition there was the colonization commission called the German Eastern Marches Society. The aim of this was to secure more lands for newly arriving Prussians. In the Russian partition confiscation of lands was commonly used as punishment for freedom movements (Davies (2005) p.97 vol. II). On the other hand, economies of scale, especially in the initial stage during the 19th century were likely important as in small farms investments in new agrarian technologies were uneconomic.

A third important factor concerns the incentives to leave agriculture. With smaller farms, more households obtain their livelihood from agriculture. With larger farms, fewer people are needed and the remainder must seek employment elsewhere. These incentives operated from the second half of the 19th century and continue to differentiate incentives in the three parts of Poland currently. They seem to have frozen a substantial part of the population in the Russian (and also in the Austrian) partition in agriculture. Today there are also other incentives to stay in agriculture: the previously mentioned exemption from the PIT scheme, smaller contributions to pensions within a separate system for farmers[25] and recently, the European Union direct payments to farmers. However, these are the same in all three partitions.

What is surprising is that the differences in farm sizes persisted until the present despite several subsequent agrarian reforms. The most important of these was the reform implemented in the mid and late 1940's by the communist administration, but it concerned mostly the large farms above 50 hectares and not the smaller peasant farms. Another important aspect of the persistence in land structure in Poland is that during communism agriculture stayed largely in private hands. To avoid creating too high a tension with the peasants in Poland and risk the project of communism, agriculture was not generally collectivized. The main exceptions were parts of the Western territories that were annexed from Germany after World War II where the German owners had been expelled.

Summing up the findings in this subsection, consistent with the literature on persistence of empires, most institutions did not survive the collapse of empires. Even though there were vast differences in educational and administrative systems in the 19th century the subsequent years unified different parts of the country and we do not find any

[25] *KRUS*(in Polish)-Agricultural Social Insurance Fund.

evidence of persistence. However, farm size - an institution that was diversely affected during the 19th century - did persist and it continues to shape incentives in different parts of Poland.

3.1.3 Culture

In this part of the paper, we test for cultural legacies of the 19th century empires. There is good evidence of cultural legacies of the 19th century division. For example, an ethnographic study conducted in the neighborhood of the former Prussian - Russian border confirms the functioning of the stereotypes and reveals the presence of group identification across the historic borders. Poles on the former Prussian side are seen by their Eastern (Russian) neighbors as more economically advanced. Their success is attributed to hard work and saving, virtues they do not find among the members of the Russian group. On the other hand, the Eastern (Russian) neighbors are perceived as more hospitable and cooperative, as opposed to their Western (Prussian) neighbors who are regarded as egoistic and closed within the family circle (Schmit (1997)). These perceived between group differences translate into marriage choices of the people living around the border as they tend to marry within their group (Schmidt and Matykowski (2007)). Also Grosfeld and Zhuravskaya (2015) find evidence of cultural differences based on religiosity data.

The problem we are facing in this study is that it is difficult to find a good measure of culture, which would be representative at municipal level. While survey data on trust and also other attitudes are very helpful in a cross-country comparison, they are designed to be representative at most at regional level. For example, the European Social Survey has around 2000 observations in each wave while there are around 2500 municipalities. Many of the observations are clustered in big cities, which leaves most municipalities with zero or just one or a few observations. Clearly the data is not representative at the municipal level. The one measure which is detailed enough and representative of the municipality is voter turnout. We follow Guiso et al. (2016) and use the turnout in national referenda, but also supplement the results by turnouts in presidential elections. There have been four referenda since 1989, the most recent one in 2015 on single-member constituencies (8% turnout) did not reach quorum and we do not use it, in 2003 concerning European Union accession (59% turnout), the one in 1997 was a constitutional one (42% turnout) and 1996 concerned property transfers and privatization (32% turnout) also did not reach the quorum. The presidential elections take place every 5 years, we use the turnouts in the first rounds.

Overall, turnouts in Poland are very low, with around 50% of citizens participating in elections. The turnouts in referenda subscribe to this general trend, yet there are

Table 7: Differences in turnouts within 50km from the border

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Turnout 2003	s.e.	Turnout 1997	s.e.	Turnout 1996	s.e.	Turnout presidential	s.e.
Panel A: Prussia vs Russia								
bandwidth 50								
Prussia	7.1***	(0.63)	6.6***	(0.73)	1.2	(0.71)	3.2***	(0.47)
(Longitude)	5.4***	(0.64)	4.3***	(0.72)	-1.3	(0.68)	1.4**	(0.49)
(Lat, Long)	6.6***	(0.76)	6.1***	(0.85)	-0.5	(0.81)	3.1***	(0.59)
Cons.	48.5***	(0.43)	32.6***	(0.50)	25.3***	(0.48)	47.2***	(0.32)
Obs.	309		308		307		1236	
bandwidth 30								
Prussia	6.0***	(0.76)	5.7***	(0.91)	1.1	(0.87)	2.8***	(0.57)
(Longitude)	5.1***	(0.74)	4.5***	(0.85)	-0.3	(0.78)	1.9***	(0.57)
(Lat, Long)	6.3***	(0.80)	6.0***	(0.92)	0.4	(0.86)	3.0***	(0.63)
Cons.	49.2***	(0.52)	33.3***	(0.62)	25.5***	(0.60)	47.3***	(0.39)
Obs.	206		205		204		824	
bandwidth 10								
Prussia	4.3***	(1.22)	2.7	(1.51)	0.2	(1.33)	1.8	(0.92)
(Longitude)	4.3***	(1.20)	2.7	(1.39)	0.3	(1.19)	1.8*	(0.90)
(Lat, Long)	4.7***	(1.22)	3.6**	(1.34)	0.5	(1.22)	2.1*	(0.92)
Cons.	50.6***	(0.81)	35.7***	(1.00)	26.4***	(0.89)	48.3***	(0.61)
Obs.	81		81		81		324	
Panel B: Western vs rest of Prussia								
bandwidth 50								
West	-5.3***	(0.55)	-6.1***	(0.63)	-4.5***	(0.69)	-5.8***	(0.46)
(Longitude)	-5.1***	(0.64)	-5.7***	(0.74)	-1.9*	(0.77)	-5.4***	(0.87)
(Lat, Long)	-5.3***	(0.66)	-5.4***	(0.75)	-1.8*	(0.79)	-5.0***	(0.55)
Cons.	59.4***	(0.37)	42.6***	(0.42)	29.9***	(0.46)	53.4***	(0.31)
Obs.	341		338		338		1360	
bandwidth 30								
West	-4.7***	(0.65)	-5.5***	(0.75)	-4.2***	(0.87)	-5.6***	(0.57)
(Longitude)	-4.5***	(0.71)	-5.1***	(0.82)	-2.1*	(0.88)	-5.5***	(1.13)
(Lat, Long)	-4.8***	(0.71)	-5.1***	(0.83)	-2.1*	(0.89)	-5.0***	(0.62)
Cons.	59.5***	(0.43)	42.9***	(0.49)	30.2***	(0.57)	53.6***	(0.38)
Obs.	226		223		223		900	
bandwidth 10								
West	-3.3***	(0.91)	-4.2***	(1.21)	-4.6**	(1.41)	-4.9***	(0.90)
(Longitude)	-3.5***	(0.93)	-4.2***	(1.24)	-3.7**	(1.31)	-2.1	(2.41)
(Lat, Long)	-3.7***	(0.92)	-4.4***	(1.25)	-4.0**	(1.31)	-4.9***	(0.91)
Cons.	60.2***	(0.60)	43.4***	(0.78)	31.1***	(0.91)	54.2***	(0.59)
Obs.	86		84		84		342	

Note: Data at municipal level for 50, 30 and 10km bandwidths. Prussia - dummy taking on 1 for municipality in former Prussian partition and 0 for former Russian. West is a dummy variable taking on 1 for municipality located in the Western Territories and 0 if located in the rest of Prussian partition. Row (Longitude) controls for longitude of the municipality and the (Lat, Long) controls both for latitude and longitude. Row Constant provides the baseline mean of a variable, in panel A for the Russian part and in Panel B for the rest of Prussia, see figure 3 for choice of samples.

interesting regional differences. In table 2 in the three referenda (2003, 1997, 1996), the Austrian partition has the highest turnouts in Poland. Slightly lower turnouts are recorded in the former Prussian partition, and the lowest in the former Russian partition.

Focusing on the 50 km around the border, the results are presented in table 7 panel A. Crossing the border from the Russian to Prussian side the turnout increases by 7.1 pp in 2003 and 6.6 pp in 1997 in the baseline specification (row Prussia). There is no statistically significant difference in the 1996 referendum and the turnouts are very low on both sides at 25%. These differences are very stable across bandwidths and specifications. On the Austrian - Russian border, there is an even larger discontinuity with turnouts higher by 7% in 2003 and 12.6% in 1997 (see table 1 of the online appendix). The presidential elections turnouts follow a similar pattern but the discontinuities are smaller i.e. 3.1 pp within the 50km bandwidth, including coordinates controls. Interestingly, the historical regions are clearly visible on the maps of turnouts in Poland, see panels (i) and (f) in figure 5.

Rural - urban division An interesting exercise is to look at the turnouts through the rural-urban division presented in table 8, where a similar picture emerges to development patterns described above. Again, there are essentially no differences in voter turnouts among the inhabitants of urban municipalities, (these are larger towns). On both sides of the historic border in urban municipalities inhabitants have higher than average turnouts, around 60%, while the turnouts in rural and mixed municipalities were around 47% - 49% on the Russian side and 6 - 9 pp higher on the Prussian side in 2003. A similar pattern is visible in the 1997 referendum, with no significant differences in urban municipalities and the differences concentrated in rural and mixed municipalities.

Hence, the turnouts in urban municipalities are higher than in rural and mixed, and there is no difference across the Prussian - Russian border and the whole difference lies in rural and mixed areas. The gap between the rural and urban areas exist in both Prussian and Russian parts but it is much larger on the Russian side of the border. Notice, in section 3.1.1 the own revenues *per capita* as well as Personal Income Taxes *per capita* followed the same rural - urban pattern, where the whole difference was concentrated outside larger towns.

3.2 Identifying institutions versus culture: Stalin's forced migrations

Summarizing the results so far, we have found evidence of differentiating effects of partition on incomes on the Prussian - Russian border. These differences are concentrated

Table 8: Differences in cultural indicators between Prussian and Russian partitions within 50km. Rural *versus* urban division.

	(1)	(2)	(3)	(4)	(5)	(6)
	Turnout 2003			Turnout 1997		
	urban	rural	mixed	urban	rural	mixed
	Panel A: Prussia vs. Russia					
Prussia	2.2	6.5***	8.8***	-0.3	5.8***	9.0***
	(1.36)	(0.66)	(0.99)	(1.69)	(0.81)	(1.26)
Cons.	59.4***	46.9***	48.5***	43.7***	30.9***	32.9***
	(0.93)	(0.42)	(0.79)	(1.16)	(0.51)	(1.00)
Obs.	32	199	78	32	198	78
	Panel B: Western vs rest of Prussia					
West	-3.6***	-6.1***	-3.8***	-3.1*	-7.3***	-4.4***
	(0.88)	(0.64)	(0.74)	(1.46)	(0.84)	(0.82)
Cons.	66.9***	58.1***	58.8***	48.5***	41.6***	42.1***
	(0.55)	(0.44)	(0.49)	(0.91)	(0.58)	(0.54)
Obs.	36	178	127	36	178	124

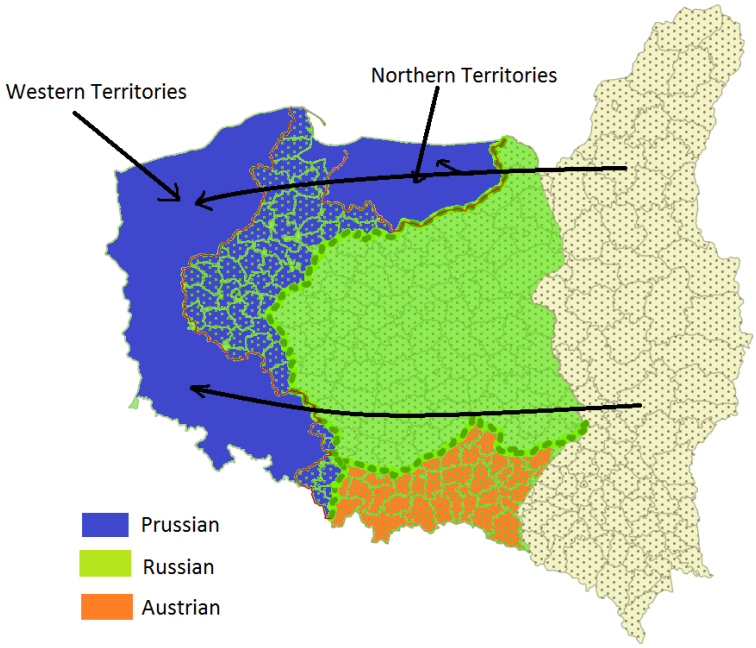
Note: Prussia - dummy variable taking on 1 for Prussian and 0 for Russia. West dummy variable staking on 1 for Western Territories 0 for the rest of Prussia. Columns provide differences in means. Columns (1) and (4) for urban, (2) and (5) for rural and (3) and (6) for rural-urban municipalities.

outside larger cities, in smaller towns and rural areas. On the Austrian - Russian border there are no robust differences in prosperity between inhabitants. In section 3.1.2 we have found evidence of institutional persistence proxied by size of the farm. The farms are much larger in the Prussian partition and smaller in the Russian and Austrian parts - a consequence of the agrarian reform conducted in the 19th century. Smaller farms are accompanied by higher shares of rural households. In terms of cultural differences proxied by turnouts in referenda, there are discontinuities on the Prussian - Russian and Austrian - Russian parts of the historical borders, with the Prussian and Russian partitions having higher turnouts. Coming back to the original question, what is the role of institutions versus culture in development, so far there seems to be stronger evidence to support the institutional channel, given the rural - urban divisions and the higher turnouts in the Austrian part not being accompanied by higher incomes. However, the role of culture cannot so far be eliminated, especially given the possible interactions between institutions and culture and challenges with identification on the Austrian-Russian border described in section 1.1. To narrow further the relative role of institutions and culture we now turn to our second natural experiment concerning Stalin's forced migrations.

Simplifying the historical process, the migratory movements we exploit here were the consequence of social engineering plans by Joseph Stalin to match the borders of states with ethnicity in order to prevent conflicts on ethnic grounds in the future (Applebaum (2015)). As a result of war and postwar migrations, it is estimated that 26.27% of Polish inhabitants changed their living place (Sienkiewicz and Hryciuk (2008)). After World War II the parts of the Western and Northern territories in what is today's Poland (see figure 6), which lie entirely within the Prussian partition, had its German population expelled and replaced by Poles. Part of this migration were Poles left behind the Eastern border - today's Ukraine and Belarus (the beige part in the East). It is estimated that around 10.5 million Germans left, were expelled or resettled. The incoming population was around 6.2 million Poles. Of these, 1.4 million constituted a forced resettlement from the USSR and the people left behind the Eastern border and around 2.9 million were migrants from central Poland (Sienkiewicz and Hryciuk (2008), Eberhardt (2011)). While we could claim that the forced migratory movements, provide exogenous variation to culture, this group constitutes a smaller proportion of the movements. There are good reasons to suspect that selection is still an important issue. Therefore the results in this section should be interpreted with caution. Nevertheless, because the results suggest a particular direction, combined with the first experiment, we believe they are informative.

We use this forced migration to assess the relative importance of institutions versus culture in shaping regional development. The identification involves considering people with two distinct cultures within the same institutional environment and checking how

Figure 6: Western Territories and Eastern Borderlands



they perform economically. To identify the effects of this quasi-experiment, we again adopt RDD methodology. First, we show that within the 50km bandwidth of the Western territories border - both sides of which lie entirely within the Prussian partition - the current inhabitants of the Western territories are culturally distinct from the inhabitants on the other side of the border in terms of voter turnout. Second, we verify that the institutional environment in terms of farm size and share of rural households is the same within the 50 km bandwidth on both sides of the border. Finally, we show that economic performance is comparable on both sides of the border. Hence, moving people from economically backward regions of the Russian partition to a more advanced setting with different incentives allows them to improve economically. This is despite the fact that that their culture as measured by voter turnout remains distinct. Combining this result with the first quasi-natural experiment, suggests that institutions play the primary role in determining economic performance.

Descriptive statistics in table 2 show the averages for the regions as a whole. The first thing to notice is that the Western part which belonged to Prussia in the 19th century and had the population replaced from the Russian occupied territories is comparable in terms of various measures of prosperity with the rest of the Prussian part, which did not have population replacements. Voter turnouts are slightly lower than in the Prussian partition

as a whole and the Austrian partition but the own revenues and personal income taxes are the highest. On the other hand, luminosity in this region is visibly lower than in the rest of the Prussian partition, but this seems to be reflecting low density of population rather than incomes, which we come back to below. Farm sizes and shares of rural households are very similar to the Prussian partition. Next we adopt the RDD approach employed in the 19th century partition experiment and narrow the area to 50km at most and use the different model specifications described in section 2.1. Figure 3 panel (b) shows the municipalities included in the sample.

3.2.1 Culture

We start by establishing the cultural legacy for this quasi-natural experiment. Given that the vast majority of people moved to the Western Territories from the territories previously ruled by the Russians, they should be culturally different and have lower turnouts than the incumbent inhabitants of the Prussian partition on the Eastern side of the border. We therefore verify the discontinuity in our cultural indicator, namely voter turnout, at the border within the 50km bandwidth. We are aware of the self - selection involved in part of these movements, but rely on the forcefully moved share to narrow down the effects for development. Using various model specifications described in section 2.1, the results are included in table 7 panel B and they are in line with the predictions. Again, the distinct nature of the inhabitants of Western Territories is visible on the maps of turnouts - see figure 5.

The main observations about the regions described above and included in table 2 are confirmed and strengthened when focusing on the 50km bandwidth. Crossing the border from the Western Territories to the rest of Prussia, voter turnout rises by 5.3 pp from around 54% to 59% within the 50km bandwidth. In the 1997 referendum the difference is slightly larger, the turnouts rose by 6.1 pp from around 37% to 43%. Hence, the voter turnouts are higher than in the Russian partition, but it is difficult to know if it is because of cultural adaptation or self selection of the newcomers. These results are quite stable across different model specifications and bandwidths up to 10km. The discontinuities in presidential election turnout are even more pronounced (of around 5.8 pp) rising from around 48% in Western Territories to 53% in the rest of Prussian partition. This is similar to the turnouts in 50km bandwidth in the Russian partition.

Summing up the argument, it is possible to culturally distinguish the inhabitants of the Western Territories from the rest of the Prussian partition.

3.2.2 Institutions

In this part of the paper, we verify the persistence of the 19th century institution of farm size in the Western Territories and associated share of rural households. The individual farms were largely 'inherited' from the German population together with the houses, equipment and tools. In this part of Poland, some larger farms were nationalized, but due to their inefficiencies these farms finally collapsed in 1993.

The results are included in table 6 panel B. The general structure of farm sizes has been preserved. The farms are generally slightly larger in Western territories even if we narrow the bandwidth to 10km, but the differences are statistically insignificant. The differences on the Western - rest of Prussia border reveal that farms on the Western part of the border are comparable to the rest of the Prussian partition (with an average of around 13-15 hectares). Larger farms are again accompanied by smaller shares of rural households. The differences in shares of rural households are statistically insignificant, or marginally significant. Overall, the basic structure implemented in the 19th century has been preserved. The Western Territories have large farms and these larger farms are always accompanied by lower shares of rural households - see maps in figure 5 for the whole of Poland.

3.2.3 Development

So far, the results suggest, in line with the initial hypothesis, that Stalin's forced migration movement created an experiment in which culturally distinct people from the former Russian occupied territories (or the descendants thereof) moved to the Prussian partition and 'inherited' the farm structure of the former German inhabitants. There have been some modifications to the structure of farm sizes in Poland, but basically the differences in size introduced in the 19th century are still visible (again see figure 5).

The interesting question within the lands that belonged to Prussia in the 19th century, is does the origin of people matter for their prosperity? In table 2, the overall Western Territories have comparable own revenues to the overall Prussian partition 1856PLN vs 1748PLN *per capita*, while in the Russian and Austrian partitions they are 1369PLN and 1223PLN *per capita*. The Personal Income Taxes and the real estate taxes are slightly higher than the whole of the Prussian partition, which could be reflecting the favorable infrastructure to population ratio. (The infrastructure for roughly 10 million Germans, replaced by the current 8 million inhabitants). On the other hand, the luminosity is lower in this part of Poland, possibly reflecting this lower population density rather than low incomes.

The results for the 50km around the border are included in table 3 in Panel B. The

results for own revenues of municipalities - the most generic indicator of prosperity - indicate that the Western Territories have significantly higher own revenues *per capita*. Crossing the border from the Western Territories to the rest of Prussia, the own revenues drop from around 1,200PLN to 1,044PLN. However, a closer look at the composition of the own revenues, namely personal income taxes and real estate taxes, reveals interesting features. In most specifications the shares of personal income taxes are comparable across the border while real estate taxes seem to be driving the differences in own revenues described above. This is not surprising, given that the infrastructure in this part of Poland was built for around 10 million people (Germans before World War II) while now inhabited by around 8 million Poles. The lower luminosity within the 10km bandwidth of -8.4 is probably also an artifact of lower population density. In section 2.2 we presented an evaluation of the indicators, which suggested luminosity was capturing population density better than capturing the GDP *per capita*. Notice, that this is different from the Prussian - Russian partition border in which all these indicators were going in the same direction of higher prosperity in the Prussian partition.

Overall, the Western - rest of Prussia border results would suggest, that the newly arrived from Russian lands population of the Western Territories is doing at least as well as those in the rest of the Prussian partition. They have enjoyed similar conditions in terms of agrarian land structure, infrastructure and location. They urbanized at similar levels to the rest of the Prussian partition, judging by the share of rural households discussed in section 3.2.2 above. This supports the importance of the agrarian land structure compared to the cultural component in the development of Polish regions. Yet, this natural experiment provides just partial exogeneity to culture, given that a substantial part of the movements was voluntary and only part was forced. Hence, we cannot exclude potential selection for instance on ability which would be responsible for at least part of the observed pattern of catching up in the Western Territories. At this point, it is also important to mention the fact, that inhabitants of the Western Territories lived with a fear of the German population reclaiming their property as West Germany did not validate the border until 1970. These unstable property rights could have resulted in underinvestment, especially in the initial stage of settlements. The situation in these lands have changed radically post 1989, when these territories attracted a large share of FDI in Poland.

On the other hand, evidence, from the admittedly very limited observables we have, seem to go against this hypothesis. Taking a very crude indicator of ability, the standardized test scores in this part of Poland are particularly low as shown in table 2. More importantly however, the lack of differences in the personal income taxes would require a very particular selection so that combined with the forced population movements it

leads to essentially no difference in the share of personal income tax between the Western Territories municipalities and the rest of the Prussian partition. What is more, the effects of the documented different culture from the Eastern parts of Poland, presumably less conducive for development, would have to exactly cancel out the benefits of more able migrants. Still, we do not have the full picture of movements to and from Western Territories so caution is advisable.

On balance, taking all the evidence into account, the results in this section suggest that it is institutions rather than culture drive the observed difference in regional economic development in Poland.

4 Robustness Checks

In this section, using various techniques, we assess the robustness of the results described in previous sections. We start by providing the picture of simple differences in averages when narrowing the bandwidth from 50km to 10km. We then consider border placebos, when we move the border 25km towards Prussia and Russia. Then we employ a strategy which takes into account all of the distances to the border and we test where the most likely structural break in the series of distances to the border is likely to occur using the Zivot-Andrews test. We also investigate further the cultural differences found on the Western-rest of Prussia border.

4.1 Differences in means for 50, 40, 30, 20, and 10 km

In table 9, we present the baseline results when the bandwidths are narrowed up to 10km. The rows with the names of the outcome variables present simple difference in means for given bandwidths displayed in columns. The constants provide the baseline mean, in this case for the Russian partition. This exercise is useful in demonstrating how stable these differences are. They also address the problem of the bias that could arise in the presence of the gradient of development from West to East. The 10km, apart from being quite a small sample, has a higher proportion of municipalities which the border cuts through and as a result the effects are somewhat diluted.

4.2 Segments of the border

In this section we cut the border into 5 segments with number 1 located at the South and number 5 referring to the North. We cut the border based on the number of points for the border we have, the result of which there are different number of observations associated

Table 9: Differences in means for 50, 40, 30, 20 and 10 km bandwidth

	(1)	(2)	(3)	(4)	(5)
	50km	40km	30km	20km	10km
PIT	57***	43***	52***	55***	38***
	(5)	(5)	(6)	(7)	(10)
Constant	229***	231***	224***	226***	239***
	(3)	(4)	(4)	(5)	(7)
Observations	4017	3367	2678	1911	1053
Own revenue	166***	185***	200***	194***	178***
	(17)	(17)	(20)	(24)	(38)
Constant	832***	791***	785***	793***	825***
	(12)	(12)	(13)	(16)	(25)
Observations	4017	3367	2678	1911	1053
Luminosity	23.1***	18.1***	18.3***	19.7***	10.3***
	(0.36)	(0.38)	(0.43)	(0.53)	(0.71)
Constant	47.0***	46.9***	46.3***	47.1***	50.3***
	(0.26)	(0.27)	(0.31)	(0.38)	(0.50)
Observations	140296	117250	91654	63669	33920
Farm size	5.3***	5.4***	5.1***	4.5***	5.4**
	(0.78)	(0.89)	(0.84)	(1.04)	(1.70)
Constant	9.4***	9.3***	9.0***	8.8***	8.7***
	(0.53)	(0.61)	(0.57)	(0.70)	(1.13)
Observations	309	259	206	147	81
Rural HH	-16.9***	-15.8***	-15.8***	-15.5***	-13.2***
	(1.77)	(1.96)	(2.19)	(2.59)	(3.76)
Constant	43.5***	43.6***	43.9***	43.3***	42.3***
	(1.21)	(1.34)	(1.49)	(1.75)	(2.51)
Observations	309	259	206	147	81
Turnout pres	3.2***	2.8***	2.8***	2.5***	1.8
	(0.47)	(0.51)	(0.57)	(0.68)	(0.92)
Constant	47.2***	47.4***	47.3***	47.6***	48.3***
	(0.32)	(0.35)	(0.39)	(0.46)	(0.61)
Observations	1236	1036	824	588	324
Turnout 2003	7.1***	6.3***	6.0***	5.4***	4.3***
	(0.63)	(0.69)	(0.76)	(0.90)	(1.22)
Constant	48.5***	48.9***	49.2***	49.7***	50.6***
	(0.43)	(0.47)	(0.52)	(0.61)	(0.81)
Observations	309	259	206	147	81

Note: The results present simple difference in means between municipalities located on the two sides of the Prussian - Russian border indicators of development, institutions and culture. Constant provides mean for Russian municipalities. Rows narrow the bandwidths form 50 to 10km.

with each part. Where the border is straighter more municipalities are associated with it, where it follows a more complicated line, less observations follow. It is a useful exercise to determine if the effects of partition are uniform and that they are not driven by some particular locations. The results are presented in table 10. Overall, in each segment the results are very similar and the signs always in line with the previous findings, although statistical significance is affected in small samples parts.

4.3 Border Placebo

Prussian - Russian border We next turn to evaluating the differences on the placebo border, when moving it 25 km towards the Prussian and the Russian partitions. This exercise compares the discontinuities on the historic border in terms of development, institutions and culture, with the ones randomly occurring on the line moved 25 km from the historic border. We start with development measures and the results are included in figure 7. The differences are within the 25km bandwidth and they exclude the urban municipalities where we do not find significant effects, see section 3.1.1. We use luminosity data at municipal level instead of 0.5 km grid to eliminate the immediate effect of larger towns or cities.

Generally, only on the historic border, the discontinuities are confirmed in all three measures of development. Nevertheless, we do pick up some significant differences in the share of personal income taxes on the Prussian placebo border and in the own revenues on the Russian placebo border. No differences are detected in the share of personal income tax on the Russian placebo and in own revenues in the Prussian placebo.

Before we draw any conclusion from this exercise we turn to evaluating the robustness of our cultural and institutional measures, the robustness of which we can also confirm visually, see panels (d), (e), (f), and (g) of figure 5. Here, most of the placebo tests show no significant differences, apart from the farm size on the Russian placebo. Also the results on the historic border for aggregated presidential elections come as insignificant, see panel (q) of figure 8.

Summing up, overall the results of this exercise seem to be confirming the distinct nature of the historic border when it comes to cultural and institutional measures but are more nuanced when it comes to measures of development. We will further investigate this matter in a larger spectrum of distances in the next subsection.

4.4 Zivot - Andrews Test

The placebo border exercise is useful in comparing the differences on the historic borders against the normally occurring, but does not consider the full variation in the sample,

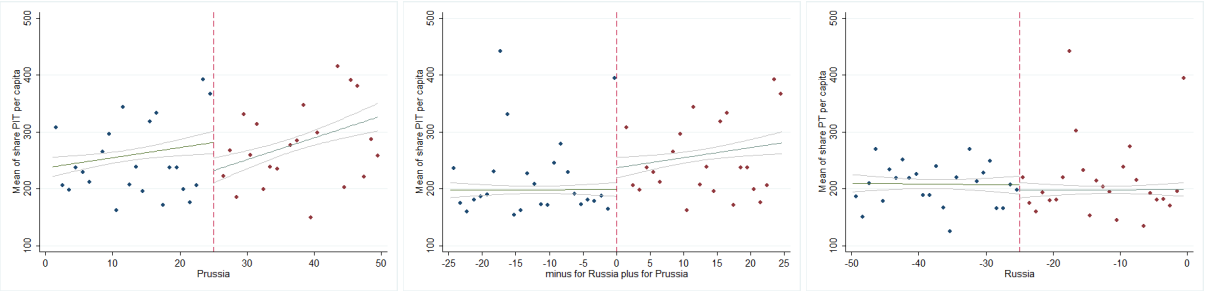
Table 10: Differences in means by segments of the border

	(1) Part 1	(2) Part 2	(3) Part 3	(4) Part 4	(5) Part 5
PIT	81***	68***	42***	69***	39***
	(15.5)	(11.1)	(10.0)	(15.7)	(9.0)
Constant	219***	240***	249***	234***	200***
	(9.6)	(8.4)	(6.4)	(12.0)	(6.3)
Observations	403	923	1092	494	910
Own revenue	236***	126**	222***	246***	114***
	(39.0)	(39.3)	(35.4)	(53.8)	(23.7)
Constant	704***	848***	909***	838***	738***
	(24.3)	(29.8)	(22.8)	(41.0)	(16.5)
Observations	403	923	1092	494	910
Luminosity	10.2***	35.8***	6.5***	43.5***	4.2***
	(0.91)	(0.77)	(0.69)	(1.23)	(0.57)
Constant	36.9***	55.9***	65.3***	43.0***	30.0***
	(0.48)	(0.62)	(0.50)	(0.97)	(0.39)
Observations	19503	34886	38573	15076	32195
Farm size	3**	8***	7***	4*	3
	(0.9)	(1.8)	(2.1)	(1.4)	(1.6)
Constant	8***	7***	11***	9***	11***
	(0.6)	(1.3)	(1.3)	(1.1)	(1.2)
Observations	35	72	84	38	53
Rural HH	-18***	-24***	-15***	-7	-14**
	(4.6)	(3.5)	(3.1)	(4.7)	(4.2)
Constant	52***	51***	38***	31***	43***
	(3.1)	(2.7)	(2.0)	(3.6)	(3.2)
Observations	35	72	84	38	53
Turnout pres	2.0	4.5***	4.0***	1.7	3.7***
	(1.40)	(0.98)	(0.93)	(1.26)	(0.87)
Constant	49.9***	48.9***	47.0***	45.9***	43.8***
	(0.87)	(0.75)	(0.60)	(0.96)	(0.61)
Observations	124	284	336	152	280
Turnout 2003	4**	8***	7***	4	6*
	(1.4)	(1.2)	(1.5)	(4.0)	(2.1)
Constant	53***	50***	48***	51***	47***
	(0.9)	(0.9)	(0.9)	(2.6)	(1.7)
Observations	35	57	52	17	14

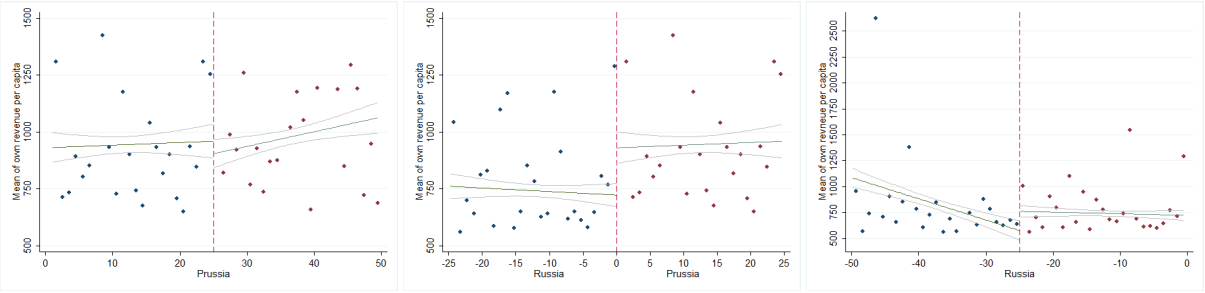
Note: The results present simple difference in means by segments of the border between municipalities located on the two sides of the Prussian - Russian border indicators of development, institutions and culture. Constant provides mean for Russian municipalities. Rows refer to 5 segments of the border from 1 in the South to 5 in the North.

Figure 7: Each point plots an average value within a one km bin. The solid line plots a local linear regression and dashed lines show 95% confidence intervals Placebo tests for 25 km moves of the border towards Prussia and Russia. Excludes urban municipalities.

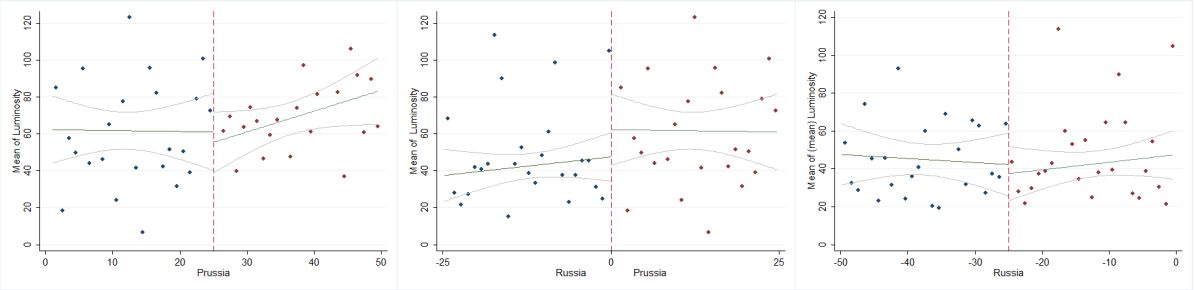
(a) PIT Prussia (b) PIT Prussia - Russia (c) PIT Russia



(d) Own revenue Prussia (e) Own revenue Prussia - Russia (f) Own revenue Russia



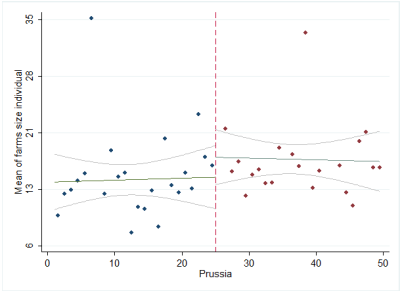
(g) Luminosity Prussia (h) Luminosity Prussia - Russia (i) Luminosity Russia



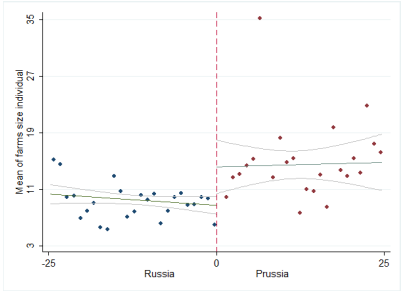
and also other possible placements of the placebo borders. To circumvent this issue, we adopt a test from time series econometrics of the most likely structural break point. Some variation in the data is natural and depends on the sample and possible outliers occurring at given distances to the border. How to distinguish between these naturally occurring differences from the causal effect of history? One way of doing it, is adopting the Zivot-Andrews test for the most likely structural break in the series of distances to the border within 50 km (Zivot and Andrews (1992, 2002)). The advantage is that unlike other structural break point tests we do not need to assume any particular distance (or time in the original setting of the test). The null hypothesis in the test is unit root with a drift that excludes any structural break. The alternative is stationary trend with the

Figure 8: Each point plots an average value within a one km bin. The solid line plots a local linear regression and dashed lines show 95% confidence intervals Placebo tests for 25 km moves of the border towards Prussia and Russia.

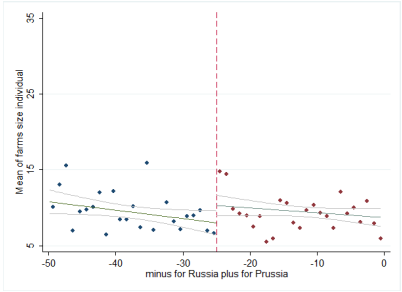
(a) Farm size Prussia



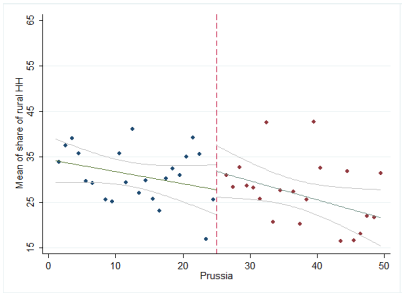
(b) Farm size Prussia - Russia



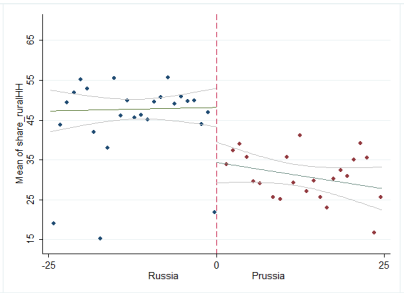
(c) Farm size Russia



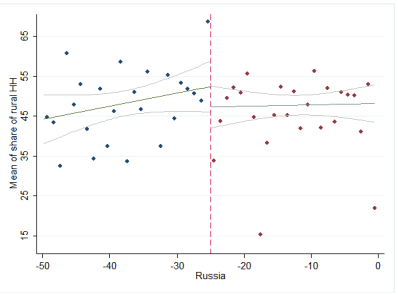
(d) Rural HH Prussia



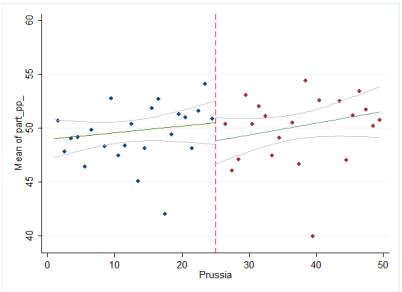
(e) Rural HH Prussia - Russia



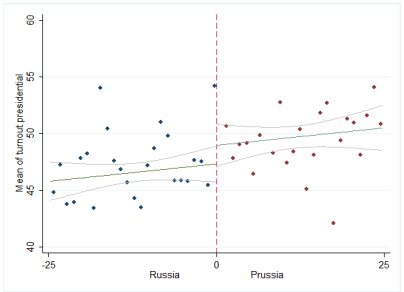
(f) Rural HH Russia



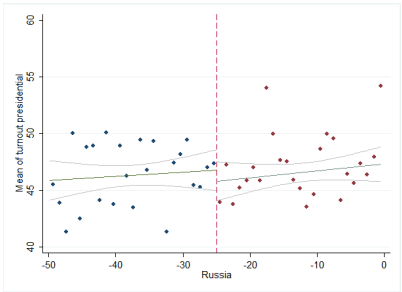
(g) Turnout presidential Prussia



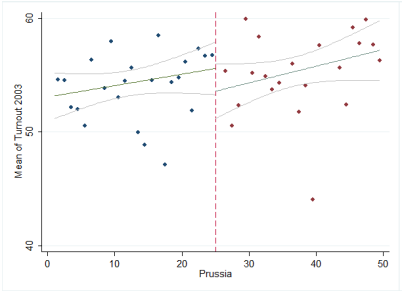
(h) Turnout presidential Prussia - Russia



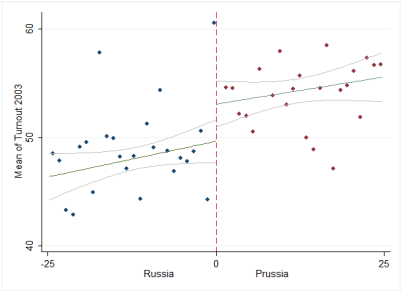
(i) Turnout presidential Russia



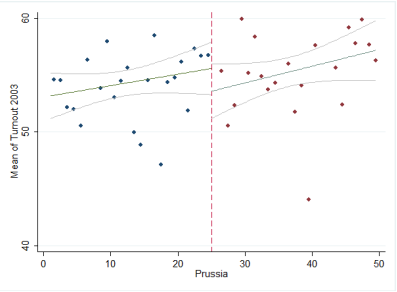
(j) Turnout 2003 Prussia



(k) Turnout 2003 Prussia - Russia



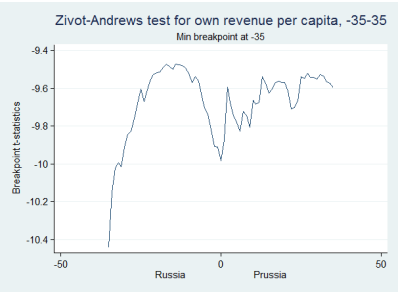
(l) Turnout 2003 Prussia



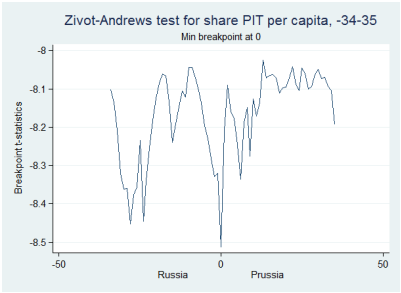
break in the intercept. Translating it into series of distances instead of dates, the null is no structural break in the series of distances to the border. The alternative used here allows

Figure 9: Zivot Andrews tests for structural break. Critical values: 1%: -5.34 5%: -4.80 10%: -4.58. Negative distance indicates place in Russia positive in Prussia.

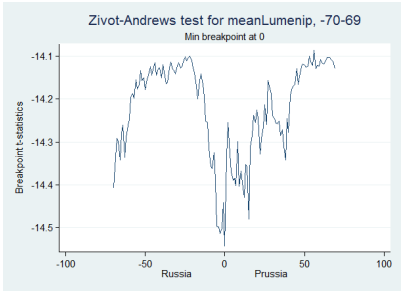
(a) Own revenue



(b) PIT

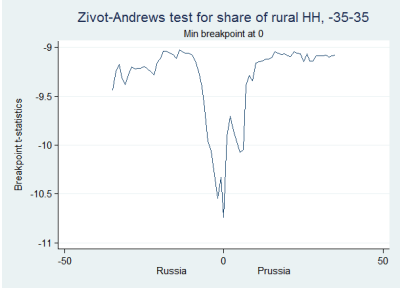


(c) Luminosity



(d) Farms size

(e) Rural hh



(f) Turnout 2003

(g) Turnout presidential

for one break in the intercept. The graphs below present the Augmented Dickey Fuller (ADF) t-statistics for each possible breakpoint (each km). The test provides t-statistics for each km from the border and the results are plotted in figure 9 for the Prussian - Russian partition border and in figure 10 the Western border. The online appendix also provides the results for the Austrian - Russian partition border - see figure 3.

Each figure graphs the breakpoint t-statistics for the outcome variable aggregated for each kilometer, for example for share of PIT in panel (b). Given the variation in the series within 50 km from the border, the test point to the minimum breakpoint at 0 km with the t-statistic below -8.5 hence significant at the 1% level. Similarly with luminosity, and other cultural and institutional measures. For farm size the test detects km 3 towards Prussia as the most likely structural break, hence reasonably close to the historic border.

The only indicator for which the most likely breakpoint is not the historic border is own revenue of the municipality. The test that larger differences in own revenues occur on the 35 km towards Russian than on the historic border.

Overall, the results of this robustness check confirm the distinct nature of the 19th century border in terms of institutions and culture and partly development.

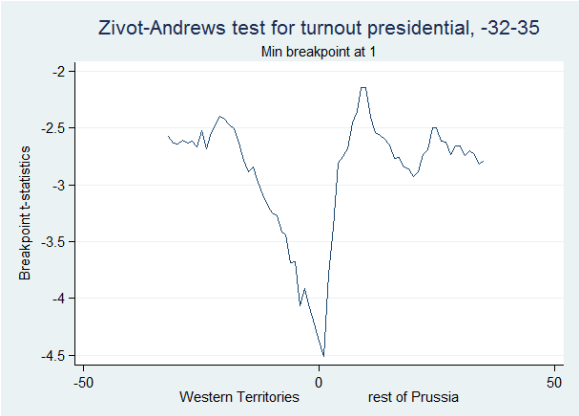
Western border In the previous section 3.2 we found that the recently arrived in the Western Territories are doing at least as well as their incumbent neighbors from the rest of the Prussian partition in terms of prosperity. The region remains more scarcely populated. We also documented that they face similar incentives provided by farm structure, which they 'inherited' from the former German inhabitants of these lands. Yet, they remain distinct from the incumbent neighbors in terms of their culture as proxied by voter turnout.

Here we verify if the Western Territories border is indeed distinct in terms of culture by running the Zivot-Andrews test. The t-statistics within the 50km variation from the border are plotted in figure 10. Panel (a) shows the results for turnout in 2003 referendum and panel (b) for presidential elections. They seem to suggest that the border could be distinct but definitely far less precisely than in the case of Prussian-Russian border. There, we found quite a sharp discontinuity at precisely 0km. Maybe without the institutional underpinning in the physical form of farm size, the cultural difference gets diluted?

Figure 10: Zivot-Andrews tests for structural break in the series of distances to the Western border. Critical values: 1%: -5.34; 5%: -4.80; 10%: -4.58.

(a) Turnout 2003

(b) Turnout presidential



5 Conclusions

What are the lessons from these experiments of history? The combination of the two shocks provided by the two natural experiments investigated in this paper offer interesting insights into the causes of economic development in the long run. The 19th century division came about at a crucial time for the development of Poland when economic and social relations were transforming from feudal ones to those based on capital and free markets. What makes Poland an interesting case, is that the conditions in each of the partitions were dictated from the outside by emperors, hence providing the exogenous variation necessary to evaluate the causal effects for institutional, cultural and economic persistence.

The first result is that 19th century partitions continue to shape economic development among the regions in Poland, with the Prussian partition outperforming both the Russian and Austrian. Using RDD we find that crossing the border from the Russian to the Prussian partition the own revenues rise by 10-20% and personal income taxes rise by 13-25% depending on the model specification. We do not find any robust difference in prosperity on the Austrian - Russian border.

To understand what is driving the persistence in economic development we investigate differences between partitions in terms of the deep causes of economic development: institutions, culture, geography and human capital. We concentrate on the first two, as we are able to eliminate the role of geography and human capital. We start with institutions and assess if any of the differences in incentives set up during the 19th century persisted until present. It is true that institutions in Poland have undergone major shifts. The first was the need after the collapse of the empires to unite the lands of the three partitions into one state. The second was when the institutions changed to incorporate the communist system after World War II. Finally, in 1989 there was yet another transformation into a market based system. However, the agrarian reforms from the 19th century imposed by empires, shaped the agrarian land structure which proved to be difficult to modify in the following years. In fact, the differences in farm size have persisted until present. Crossing the 19th century border from the Russian to Prussian partition, the average farm size rises from 9 hectares to around 15 hectares. These differences in farm sizes had at least two effects. In the initial stage, the larger farms in the Prussian partition faced different incentives to increase their productivity by exploiting economies of scale. What proved more important though in the long run is the incentives that individuals faced in terms of the decision to leave agriculture. We find that at present, crossing the border from the Russian to the Prussian partition the share of rural households drops by 10-18 pp. On the Austrian - Russian border, we find no robust discontinuities either in farm size or in

share of rural households. Overall, the farm sizes are very small in this part of Poland, namely 3-5 hectares within 50km of the border and the share of rural households is very high at around 47%.

Secondly, we concentrate on the second plausible channel of persistence of development, namely culture. Consistent with the literature on the cultural legacies of the empires, we find that the 19th century left significant differences between partitions in culture as measured by voter turnout in national referenda. Crossing the historic border from the Russian to the Prussian partition, the turnouts rise from 49% to around 55% within 50km in 2003, from 33% to 39% in 1997 hence a difference of around 6pp in both cases. We also find a robust and significant difference on the Austrian - Russian border. Crossing the border from the Russian to the Austrian part the turnouts rise from 49% to 56% in 2003 and from 36% to 49% in 1997. Notice, that on this border, there is no robust difference within 50km in own revenues or personal income taxes *per capita*. This suggests that culture does not play any role in determining incomes in this case.

To narrow down the relative importance institutions and culture play in shaping prosperity in the regions of Poland, we exploit the second natural experiment of history - Stalin's forced migration movements. It allows us to observe the economic performance of people from the Russian occupied territories who moved into the Prussian partition after World War II. We find that after around 70 years the newcomers are doing economically at least as well as the incumbent Poles from the rest of the Prussian partition, even though culturally they are still distinct. This underlines the importance of institutions.

Overall, combining the two natural experiments, the results provide strong support for the institutional channel driving the differences in economic fortunes of people living in different parts of Poland. Culture, although affected by the 19th century partitions does not seem to play a role (or not just on its own) in the development process. However, some caution is required in interpreting results from Stalin's forced migration, because a significant proportion of these movements was voluntary and selection likely occurred both in movements to and later possible from the Western Territories.

References

Acemoglu, D., S. Johnson, and J. Robinson (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review 91*(4), 1369–1401. [1]

Acemoglu, D., S. Johnson, and J. Robinson (2002). Reversal of fortune: geography and development in the making of the modern world income distribution. *Quarterly Journal of Economics 117*(4), 1231–1294. [1]

Alesina, A. and P. Giuliano (2015). Culture and institutions. *Journal of Economic Literature 53*(4), 898–944. [2]

Angrist, J. and J. Pischke (2008). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press. [17]

Applebaum, A. (2015). *Between east and west: Across the borderlands of Europe*. Penguin UK. [5, 10, 37]

Ashraf, Q. and O. Galor (2013, February). The 'out of africa' hypothesis, human genetic diversity, and comparative economic development. *American Economic Review 103*(1), 1–46. [2]

Bardach, J., B. Lesnodorski, and M. Pietrzak (1993). *Historia ustroju i prawa polskiego*. Panstwowe Wydawn. Nauk. [30, 31]

Becker, S. and L. Woessmann (2009). Was Weber Wrong? A Human Capital Theory of Protestant Economic History*. *Quarterly Journal of Economics 124*(2), 531–596. [1]

Becker, S. O., K. Boeckh, C. Hainz, and L. Woessmann (2016). The empire is dead, long live the empire! long-run persistence of trust and corruption in the bureaucracy. *The Economic Journal 126*(590), 40–74. [2, 17, 27, 30]

Bukowski, P. (2014, June). *Long-run persistence of the Empires. The impact of the Partition of Poland on Education*. Ph. D. thesis. [1, 28]

Chen, X. and W. D. Nordhaus (2010, August). The value of luminosity data as a proxy for economic statistics. Working Paper 16317, National Bureau of Economic Research. [19]

Davies, N. (2005). *God's Playground: 1795 to the present*. God's Playground: A History of Poland : in Two Volumes. Columbia University Press. [32]

Dell, M. (2010). The persistent effects of Peru's mining mita. *Econometrica 78*(6), 1863–1903. [16]

Dittmar, J. E. (2011). Information technology and economic change: The impact of the printing press. *Quarterly Journal of Economics 126*(3), 1133–1172. [1]

Eberhardt, P. (2011). Political migrations on Polish territories (1930-1950). Monographies 12, Polish Academy of Sciences Salinslaw Leszczynski Insitute of Geography and Spatial Organization. [6, 37]

Engerman, S. and K. Sokoloff (1997). Factor endowments, institutions, and differential growth paths among new world economies. *How Latin America Fell Behind*, 260–304. [1]

Engerman, S. L. and K. L. Sokoloff (2002). Factor endowments, inequality, and paths of development among new world economics. Technical report, National Bureau of Economic Research. [1]

Fidrmuc, J. (2012, August). How Persistent is Social Capital? CEDI Discussion Paper Series 12-04, Centre for Economic Development and Institutions(CEDI), Brunel University. [8]

Gelman, A. and G. Imbens (2014). Why high-order polynomials should not be used in regression discontinuity designs. Technical report, National Bureau of Economic Research. [16]

Glaeser, E., R. La Porta, F. Lopez-de Silanes, and A. Shleifer (2004). Do institutions cause growth? *Journal of Economic Growth 9*(3), 271–303. [1]

Gorzelak, G. and A. Tucholska (2008). *Historyczno-kulturowe uwarunkowania rozwoju: Polska i Ukraina*. Wydawnictwo Naukowe Scholar. [6]

Grosfeld, I. and E. Zhuravskaya (2015). Cultural vs. economic legacies of empires: Evidence from the partition of Poland. *Journal of Comparative Economics 43*(1), 55 – 75. [2, 7, 16, 24, 28, 33]

Guiso, L., P. Sapienza, and L. Zingales (2004). The role of social capital in financial development. *The American Economic Review 94*(3), 526–556. [17]

Guiso, L., P. Sapienza, and L. Zingales (2016). Long-term persistence. *Journal of the European Economic Association*. [17, 33]

GUS, C. S. O. (Ed.) (2015). *Statistical Yearbook of Agriculture*. Statistical Publishing Establishment. [2, 4, 31]

Herbst, M. (2007). Wpływ kapitału ludzkiego i społecznego na (krótkookresowy) wzrost gospodarczy w polskich podregionach. *w: M. Herbst (red.). Kapitał ludzki i kapitał społeczny a rozwój regionalny, Warszawa: Wydawnictwo Naukowe Scholar*. [6]

Ihnatowicz, I., A. Maczak, and B. Zientara (1979). *Społeczeństwo polskie od X do XX wieku*. Ksiażka i Wiedza. [5]

Imbens, G. and K. Kalyanaraman (2012). Optimal bandwidth choice for the regression discontinuity estimator. *The Review of Economic Studies 79*(3), 933. [24]

Imbens, G. and T. Lemieux (2007, April). Regression discontinuity designs: A guide to practice. Working Paper 337, National Bureau of Economic Research. [17]

Jalowiecki, B. (1996). Oblicza polskich regionow. [6]

Kalinski, H., J. (2004). *Historia Gospodarcza XIX i XX wieku*. PWE. [31]

Keele, L. and R. Titiunik (2016). Natural experiments based on geography. *Political Science Research and Methods 4*(1), 6595. [15]

Keele, L. J. and R. Titiunik (2015). Geographic boundaries as regression discontinuities. *Political Analysis 23*(1), 127155. [15, 16]

Komusinski, S. (2010). *Przeksztacenia przestrzenne sieci pasaerskiego transportu kolejowego w latach 1998-2008*. Phd thesis. [7]

Kozak, M., A. Pyszkowski, and R. Szewczyk (2001). *Słownik rozwoju regionalnego*. na zlec. PARR. [21]

La Porta, R., F. Lopez-de Silanes, A. Shleifer, and R. Vishny (1997). Legal determinants of external finance. *Journal of Finance 52*(3), 1131–1150. [1]

La Porta, R., F. Lopez-de Silanes, A. Shleifer, and R. W. Vishny (1998). Law and finance. *Journal of Political Economy 106*(6). [1]

Lee, D. S. and T. Lemieux (2010, June). Regression discontinuity designs in economics. *Journal of Economic Literature 48*(2), 281–355. [16]

Lowes, S., N. Nunn, J. A. Robinson, and J. Weigel (2017). The evolution of culture and institutions: Evidence from the kuba kingdom. *Econometrica*. [2]

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics 142*(2), 698–714. [12]

North, D. and R. Thomas (1973). *The Rise of the Western World: A New Economic History*. Cambridge University Press. [1]

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press. [1, 32]

Nunn, N. (2008). The long-term effects of Africa's slave trades. *Quarterly Journal of Economics 123*(1), 139–176. [1]

Nunn, N. (2012). Culture and the historical process. *Economic History of Developing Regions 27*(S1), 108–126. [1, 2]

Nunn, N. (2014). *Historical Development*, Volume 2, pp. 347–402. North-Holland. [1]

Nunn, N. and D. Puga (2012). Ruggedness: The blessing of bad geography in Africa. *Review of Economics and Statistics 94*(1), 20–36. [1]

Osękowski, C. and G. Strauchold (2015). *"Ziemie Odzyskane" po drugiej wojnie światowej*. Oficyna Wydawnicza Uniwersytetu Zielonogórskiego. [8, 28]

Padło, T. (2014). *Koniec Swiata*. Universitas. [7]

Peisakhin, L. V. (2013). In history's shadow: Do formal institutions leave a cultural legacy? In *EPSA 2013 Annual General Conference Paper*, Volume 286. [2, 27]

Romer, E. and I. Weinfeld (1919). *Rocznik Statystyczny.Tablice Statystyczne.* Gebethner Co. [28]

Sakson, A. (2006). *Ziemie Odzyskane 1945-2005.* Ziemie Zachodnie. Instytut Zachodni. [8]

Schmidt, J. and R. Matykowski (2007). *Granica symboliczna i jej pogranicza w czasach najnowszych.* AWEL. [33]

Schmit, J. (1997). *Stereotyp i granica. Pogranicze zaborw w mentalnoci wspczesnych Wielkopolan.* Midzychd: Eco. [4, 33]

Sienkiewicz, W. and G. Hryciuk (2008). *Wysiedlenia, wypdzenia i ucieczki 19301959. Atlas ziem Polski.* Demart. [6, 37]

Skovron, C. and R. Titiunik (2015). A practical guide to regression discontinuity designs in political science. *American Journal of Political Science*. [15]

Sobczynski, M. (1993). Stability of the old political boundaries in the cultural landscape of poland. *Zeszyty Instytutu Geografii i Przestrzennego Zagospodarowania PAN 14*, 1–111. [6]

Spolaore, E. and R. Wacziarg (2013, June). How deep are the roots of economic development? *Journal of Economic Literature 51*(2), 325–69. [1]

Wysokinska, A. (2011). Importance of history for economic development. Lessons from natural experiment of history. PhD thesis, European University Institute, Florence. [1, 2, 7]

Zarycki, T. (1997). *Nowa przestrzeń społeczno-polityczna Polski*, Volume 23. EUROREG UW. [6]

Zarycki, T. (2000). Politics in the periphery: Political cleavages in Poland interpreted in their historical and international context. *Europe-Asia Studies 52*(5), 851–873. [6]

Zarycki, T. (2007). History and regional development. a controversy over the rightinterpretation of the role of history in the development of the polish regions. *Geoforum 38*(3), 485–493. [6]

Zivot, E. and D. W. Andrews (1992). Oil-price shock, and the unit-root. *Journal of Business & Economic Statistics 10*(3). [46]

Zivot, E. and D. W. K. Andrews (2002). Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis. *Journal of Business & Economic Statistics 20*(1), 25–44. [46]

Online Appendix

Institutions or Culture?
Lessons for development from two natural experiments of history*

Agnieszka Wysokinska†

May 16, 2017

*

†University of Warsaw and London School of Economics. E-mail: A.A.Wysokinska@lse.ac.uk

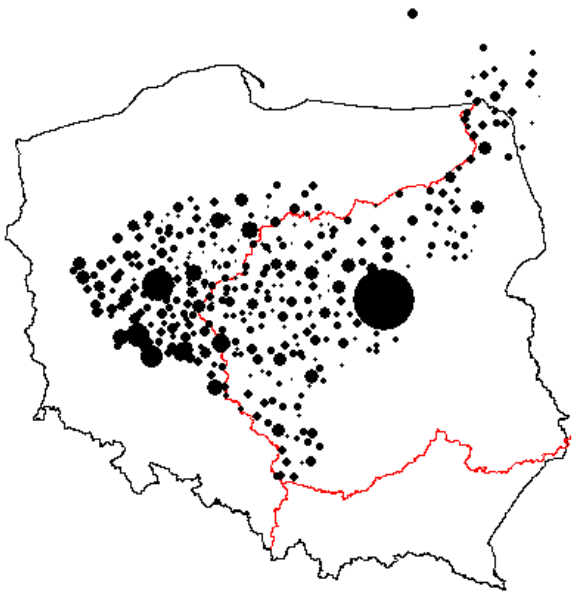
1 Historical background and data 1808, 1810

Figure 1: Census data 1808 and 1810. The dotted area corresponds to Duchy of Warsaw in 1808 and 1810 superimposed on the current political border of Poland. Red lines are the 19th century borders between the three partitions.

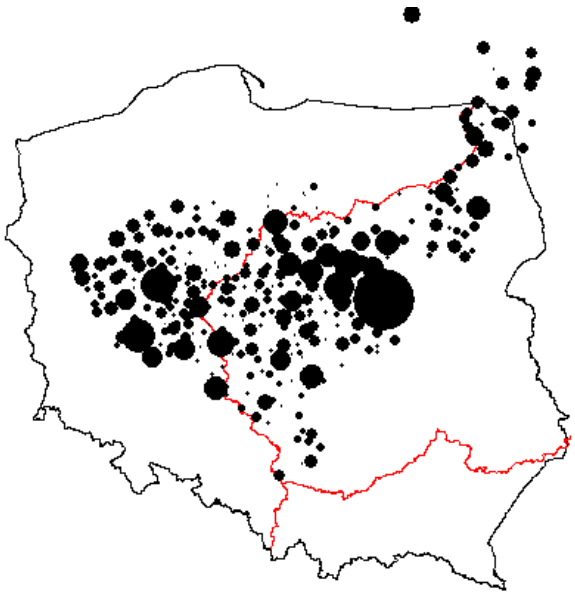
(a) Towns location 1810

(b) Population 1810

(c) Population 1808



(d) Jews 1808



A brief panorama of life under partitions At the eve of 1815, Poland was a pre-industrial country based on agriculture organized by the feudal system. 75% - 80 % of the population were peasants who worked on the land which belonged to the landlord - nobil-

ity or church (Ihnatowicz et al. (1979)).[1] The lives of the majority were organized within small communities and their fortunes largely depended on weather and the landlord. At the eve of the partitions, there was a long-lived conflict between peasantry and nobility. Effectively the forced labor of peasants was used to work in the fields to satisfy home production as well as profitable (for nobles) exports to the Western European markets. This conflict and its implications were important to the story of 19th century partitions. In the course of the 19th century the importance of nobility diminished mostly due to confiscations and the general attempt of emperors to weaken the role of this group.[2]

At the eve of the experiment in 1815 the feudal system regulated the social and economic aspects, but by the end of it in 1914 a new system shaping incentives emerged i.e. capitalism. The economy was still mostly based on agriculture, but the incentives in agriculture were radically different. The industrialization had already taken off as well. The first steam engine was installed in White Factory - a textile producer in the city of Lodz in 1839, although some time before, steam engines were brought to mines, e.g. 1788 in the silver mine in Tarnowskie Gory. The network of railways enabled transport and made trade less dependent on rivers and ports. Other inventions in communication technology like the telegraph sped up the information flow. Recently granted personal freedoms enabled peasants to move to towns to work in the newly constructed textile factories or heavy industry mostly mining and steelworks. The nobility lost its importance and a new social order was emerging.

It happened to be, that all of these major transformations took place in Polish Lands, during the time Poland lost it independence i.e. during the 'experiment'. Many of the solutions were imposed by empires, therefore cutting the organic development processes intrinsic to the society resulting in endogeneity. In all three parts of Poland similar processes were taking place granting lands and personal freedoms, construction of rails etc. But in all of them with a different twist depending on the interests of empires rather than people inhabiting the lands.

This new order, was a result of one of the most important reforms of the 19th century, which some researchers consider a founding stone of capitalism. These reforms transformed Polish Lands from feudalism to the system based on ownership of cultivated land by the farmers. In the eve of the partitions in 1815 Poland was still an estate society, with around 80% of the population belonging to peasantry. Peasants were tied to the land and had no right to move without the permission of the landowner. They also had the duty to cultivate the landowner's land in exchange for the the right to cultivate some land for their own use. It was a form of non monetary feudal payment. The system was

[1] see Davies (2001) for the comprehensive history of Poland in English.
[2] See Davies (2001)

time based so it is not surprising that agriculture was rather ineffective with yields much lower than in Western Europe.

In all three empires, the long conflict between the nobility and peasantry over the feudal system came to an end with the agrarian reforms, everywhere combining the two elements: freedom from serfdom and property rights over the land. However, in all three partitions these changes came with different twists depending on the interests of empires. In the Prussian partition, where the reforms had already started in 1815 and were part of a large series of reforms called the 'Prussian road to capitalism'. As a result of these policies, larger farms emerged with owners positively verified by the market because they had to make payments to landlords for the land. In the Russian and partly in the Austrian partitions, these reforms had largely a political motive, to keep the peasantry away from joining the Polish nobility in their freedom fighting movements.

In the Prussian and Austrian partitions, the schooling system developed while in the Russian its development was held back. This resulted in massive differences: in 1911 the illiteracy rates were below 5% in the Prussian partition, while in the Russian 59% and in Austrian 41% (Romer and Weinfeld (1919)). Similarly, in the development of railways. In the Prussian and Austrian partitions the network was much more developed while in the Russian partition much less dictated by the fear of Russian tzar to enable easy troops movements toward Russian interior. There were many other differences between the three partitions. It is important to mention differences in cultures between the three empires. Prussian rule of law is often evoked and seemed to have been transplanted to Polish people living in the Prussian partition, while Poles in the Russian part had to deal with a highly arbitrary and corrupted system. Life in the Austrian partition was probably more autonomous than in the other partitions, especially in the second half of the 19th century. Also in terms of religion, the Prussians were mostly protestants, Russians orthodox and Austrians Catholics.

The combination of the intensity of the treatment of these lands in their transformation to capitalism as well as the imposition of policies dictated by the interests of partitioning empires makes it an interesting experiment to shed more light on the development processes which took off during the 19th century and ever since has continued to raise the standard of living of inhabitants, despite the two world wars and communism.

2 Results Austrian - Russian border

In this section we include the results for the Austrian-Russian border in table 1.

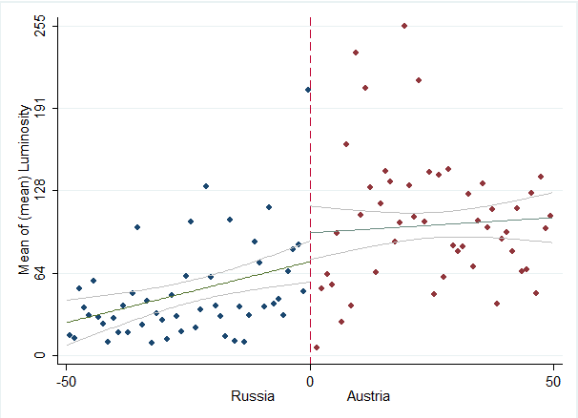
Table 1: Austrian-Russian border within 50km bandwidth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Development						Institutions				Culture					
	Own revenue	s.e.	PIT	s.e.	Lumi	s.e.	Farm size	s.e.	Rural HH	s.e.	Turnout 2003	s.e.	Turnout 1997	s.e.	Turnout 1996	s.e.
bandwidth 50																
Austria	72.6***	(13.64)	46.7***	(5.07)	29.4***	(0.37)	-2.0***	(0.22)	-3.9	(2.53)	7.1***	(0.65)	12.6***	(0.80)	19.7***	(1.03)
(Longitude)	30.7*	(13.15)	23.6***	(4.59)	22.1***	(0.33)	-1.7***	(0.19)	-1.2	(2.16)	6.7***	(0.64)	13.0***	(0.80)	20.9***	(0.94)
(Lat, long)	2.5	(20.71)	32.5***	(7.23)	19.0***	(0.52)	-0.8*	(0.36)	-2.6	(4.67)	4.0**	(1.23)	10.8***	(1.25)	15.0***	(1.44)
Constant	744.7***	(9.61)	232.1***	(3.57)	38.9***	(0.25)	4.7***	(0.15)	56.4***	(1.58)	48.7***	(0.46)	36.2***	(0.57)	27.7***	(0.72)
Observations	5265		5265		159214		405		405		405		402		401	
bandwidth 30																
Austria	18.6	(18.53)	25.0***	(6.83)	25.6***	(0.49)	-1.5***	(0.29)	-4.2	(3.01)	5.5***	(0.85)	9.7***	(1.04)	15.9***	(1.35)
(Longitude)	-5.1	(17.38)	12.8*	(5.96)	19.8***	(0.41)	-1.3***	(0.25)	-3.1	(2.79)	5.3***	(0.83)	10.0***	(1.03)	16.6***	(1.23)
(Lat, long)	-17.6	(23.52)	23.9**	(8.06)	11.9***	(0.55)	-1.6***	(0.34)	-4.1	(4.27)	5.8***	(1.13)	11.1***	(1.38)	14.8***	(1.65)
Constant	801.0***	(12.84)	250.2***	(4.73)	43.2***	(0.33)	4.4***	(0.20)	56.4***	(2.09)	49.5***	(0.59)	37.4***	(0.72)	29.5***	(0.94)
Observations	3276		3276		101318		252		252		252		251		250	
bandwidth 10																
Austria	-25.2	(37.88)	-4.7	(12.85)	17.4***	(0.83)	-0.3	(0.63)	-5.2	(4.90)	4.9**	(1.51)	9.0***	(1.64)	11.2***	(1.95)
(Longitude)	6.6	(35.66)	10.0	(11.37)	14.2***	(0.66)	-0.6	(0.52)	-6.4	(4.60)	5.2***	(1.46)	9.0***	(1.65)	11.0***	(1.93)
(Lat, long)	-4.3	(37.11)	15.7	(11.82)	10.7***	(0.70)	-1.0	(0.52)	-7.1	(4.81)	5.2***	(1.53)	9.6***	(1.71)	11.3***	(2.01)
Constant	864.2***	(25.08)	264.7***	(8.51)	47.0***	(0.58)	4.3***	(0.42)	58.1***	(3.25)	48.4***	(1.00)	35.6***	(1.09)	30.5***	(1.31)
Observations	1157		1157		37740		89		89		89		88		87	

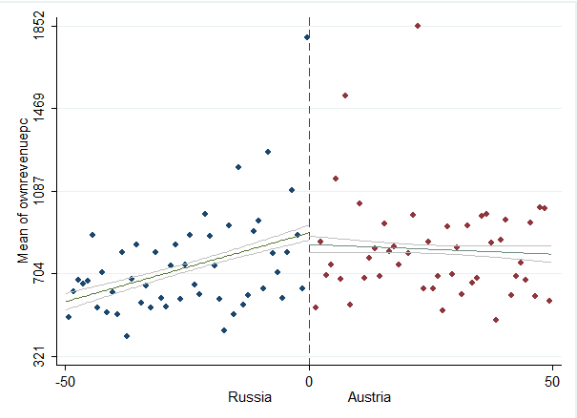
Note: Austria is a dummy taking on 1 for municipalities located in the former Austrian partition and 0 in Russian partition. Row Austria provides difference in means between Austrian and Russian partitions. Constant provides the means for the baseline average for Russia. Row (Longitude) controls for longitude while row (Lat, long) includes both latitude and longitude controls.

Figure 2: Differences on the Austrian-Russian border within 50km.

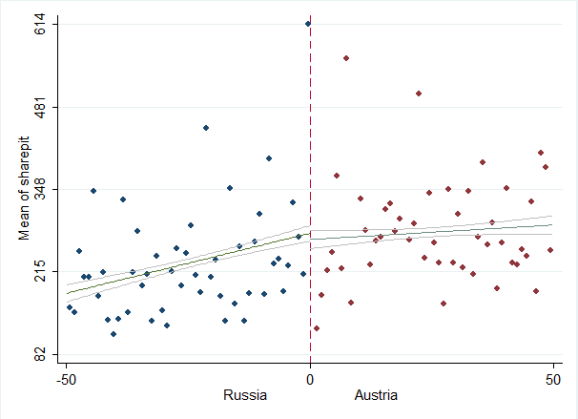
(a) Luminosity municipality



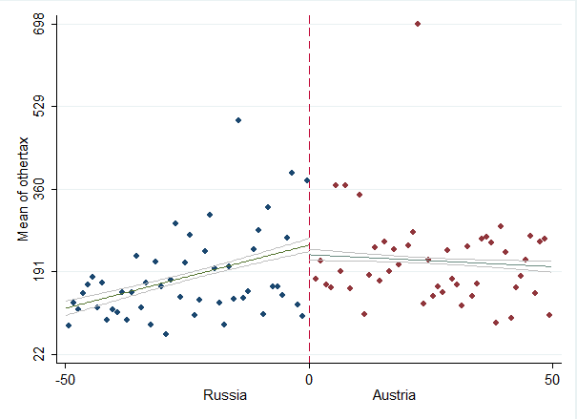
(b) Own revenue



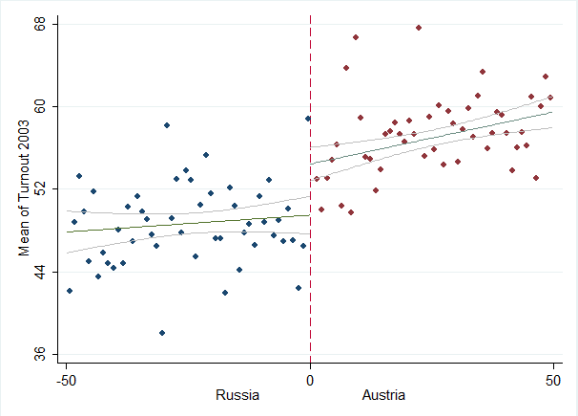
(c) PIT



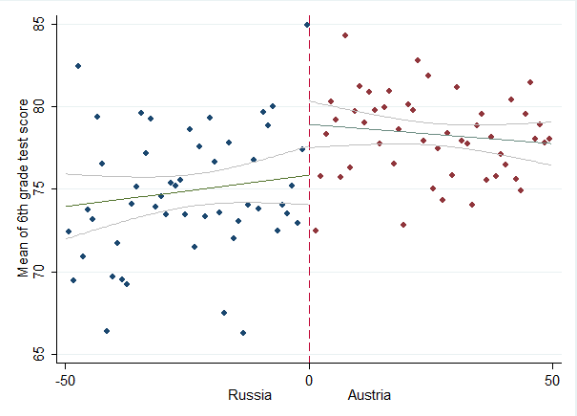
(d) Real estate tax



(e) Turnout 2003



(f) Test 6th

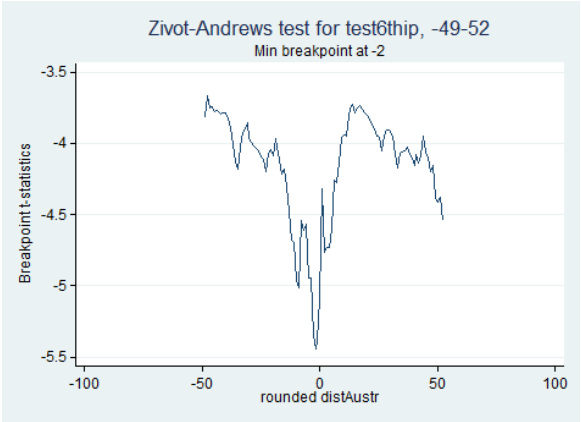


3 Robustness checks. Zivot-Andrews t-statistics.

Figure 3: Zivot Andrews tests for structural break. Critical values:1%: -5.34 5%: -4.80 10%: -4.58. Negative distance indicates place in Russia positive in Austria.

(a) Turnout 2003

(b) Test 6th



4 Additional tables and figures

Table 2: Share of urban and rural population within 50km

	(1)	(2)	(3)	(4)
	Prussia		Russia	
	50-100km	0-50km	0-50km	50-100km
urban	55%	60%	43%	53%
rural	45%	40%	67%	57%
Total	2,432,494	2,489,788	1,377,926	1,468,951

Note: the table presents number of population and its composition within 50km bandwidth and on 50km towards Prussia and Russia for comparison.

Table 3: Cross-correlation table

Variables	GDP	Lumen	PIT	Own rev	Pop density	Real est tax
GDP	1.000					
Lumen	0.628	1.000				
PIT	0.936	0.703	1.000			
Own rev	0.939	0.650	0.968	1.000		
Pop density	0.670	0.879	0.715	0.687	1.000	
Real est tax	0.738	0.384	0.671	0.744	0.271	1.000

Note: Cross correlation table for measures of development. Data at sub-regional level.

Table 4: Variable description

Name of variable	Description	Source	optimal bw (IK)
Own Revenue	2002-2014, mean per capita in Polish zloty. The own revenues include: taxes and charges (PIT, real estate tax, Corporate Income Tax, stamp duties, rural tax, tax on means of transport, forest tax and inheritance tax, the revenue from property and other very small categories including revenues from local charges and services)	Local Data Bank, Central Statistical Office	50km
PIT	2003-2014, mean of share of Personal Income Tax collected within the community, same share in each municipality of around 40%	Local Data Bank, Central Statistical Office	45km
Real Estate Tax	2002-2014, mean per capita. Taxes on real estates, centrally set ceiling	Local Data Bank, Central Statistical Office	40km
Rural tax	2002-2014, sum in municipality. The tax is on agricultural land and is a monetary equivalent to 2.5 quintal of rye per 1 conversion hectare	Local Data Bank, Central Statistical Office	57km

continued ...

... continued

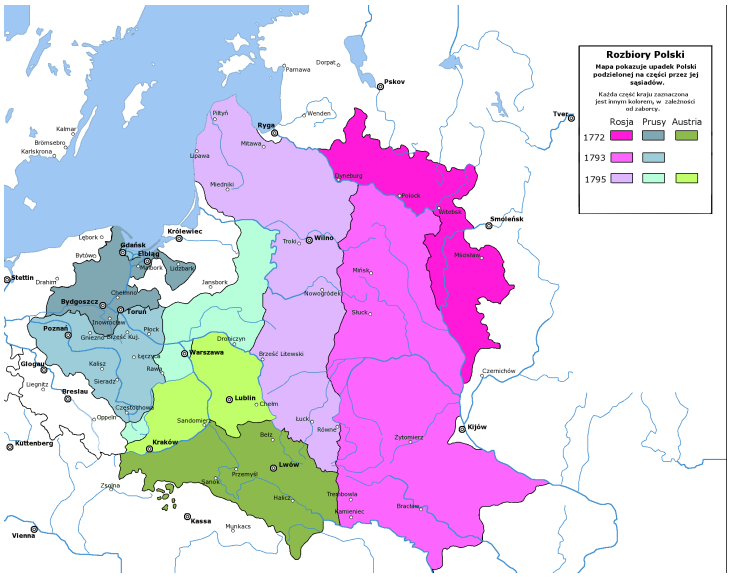
Name of variable	Description	Source	optimal bw (IK)
Luminosity	in 0.5km grid, year 2012	source: NASA Earth Observatory https://earthobservatory.nasa.gov/NaturalHazards/view.php?id=79765&src=ve	14km
Farm size	2010, average farm size within municipality: includes the individual farms	Rural Census 2010, Central Statistical Office	80km
Individual farm size	2002, average individual farm size	Rural Census 2002, Central Statistical Office	81km
share of rural HH	2002, share of households with rural activities, based on number of rural and total households	Rural Census 2002, Central Statistical Office	56km
Litigation time	2013, in months, the units of observation is region (in Polish okrag), does not enitrely correspond to administrative division. The average length of a trial in criminal procedure	www.mojapolis.pl after Ministry of Justice	47km
Litigation overdue	2013 in pp, the share of overdue cases in criminal procedure of more than 5 years	www.mojapolis.pl after Ministry of Justice	52km
Test 6th grade	% of the best score in Poland attained, in pp. 2013	www.mojapolis.pl after the Regional Examination Boards	50km
Turnout 2003	voter turnout in 2003 EU accession referendum, in pp	www.mojapolis.pl after the Regional Examination Boards	50km

continued ...

. . . continued

Name of variable	Description	Source	optimal bw (IK)
Turnout 1997	Voter turnout in the1997 Polish constitutional referendum	www.mojapolis.pl after Central Statisitical Office	120km
Turnout 1996	Voter turnout in the 1996 enfranchisement and privatisation referendum	www.mojapolis.pl after Central Statisitical Office	117km

Figure 4: The borders of Partitions in 1772 1793 and 1795



References

N. Davies. *Heart of Europe: The Past in Poland's Present*. Number pt. 385 in Heart of Europe: The Past in Poland's Present. OUP Oxford, 2001. ISBN 9780192801265. URL http://books.google.co.uk/books?id=ZrT71RC0ke4C. [2]

I. Ihnatowicz, A. Maczak, and B. Zientara. *Społeczeństwo polskie od X do XX wieku*. Książka i Wiedza, 1979. URL https://books.google.co.uk/books?id=PC1FAAAAIAAJ. [2]

Eugeniusz Romer and Ignacy Weinfeld. *Rocznik Statystyczny.Tablice Statystyczne*. Gebethner Co, 1919. URL https://archive.org/details/rocznikpolskitab00rome. [3]