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State Formation and Frontier Society: An Empirical Examination*

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Abstract

How is state capacity consolidated? While there is a growing literature on state formation and the long-term rise of state capacity, this literature typically deals with differences between countries, neglecting the fact that state formation also occurs differentially *within* a country over time. This article examines legacies of state formation spatially, by looking at variation within “frontier” states – countries which in recent centuries have extended rule over new territories adjacent to their core regions. Frontier zones within such countries are found to have ongoing lower levels of public order and deficient public goods provision. Several theories are examined to explain this discrepancy, including internal resettlement, costs of monitoring and enforcement, and the relationship between settlers and the indigenous population. It is argued that the formation of strong social institutions among settlers leads to resistance to attempts to impose governance over frontier regions, and to ‘select for’ lower fiscal capacity and lower provision of public goods.

JEL Z13, N90, R23, H41.

Keywords. State formation, settlement patterns, historical institutionalism, frontier thesis, public goods, rule of law, governance.

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I Introduction

A growing literature examines the relationship between state formation and contemporary state capacity. Longitudinally, Gurr (1981) and Eisner (2004) show how homicide rates fell in European states during their processes of state formation, while at the cross-country level Gennaoli and Rainer (2007) and Putterman et al. (2002) show how differences in historical state centralization can explain variation in public goods provision and economic growth across countries in the twentieth century. Meanwhile, comparative historical studies such as Ertman (1997) and Fukuyama (2011) have shown how different regime trajectories lead to higher or lower levels of state capacity in the present time. However, while studies typically deal with processes across countries or within one single country longitudinally, this neglects the fact that state formation also occurs *between* regions of a single state. Yet relatively few studies have considered differences in state capacity at the subnational level (Boone 2003, Naseemullah 2012).

This paper corrects this deficit by examining variation in subnational state capacity amongst a particular subset of countries – which we call ‘frontier states’. These are polities that have an internal hinterland, over which they have gradually settled and extended their rule over time, which thereby allows us to test certain hypotheses generated regarding state formation and governance at the cross-country level. If it is correct, as Gurr (1981) and Eisner (2004) show, that levels of public order vary over time with the length of state formation, and cross-country analyses show this same correlation cross-sectionally, then logically areas of a country with a longer legacy of centralised rule ought to exhibit higher levels of public order than those in which central government has had a relatively short existence. We show this

to be so. Second, it can be hypothesised that variation in institutional quality between regions, as reflected in the provision of public goods, similarly reflects legacies of establishing central state authority over these areas.

Accordingly, the rest of this paper proceeds as follows. Section II summarises the literature on the concept of the frontier, and section III delimits instances of frontier states. Section IV examines indicators of governance among frontier regions, including public order and public goods provision, and shows that frontier regions are deficient relative to the core areas of frontier states. Section V examines reasons why frontier regions may be relatively ‘under-governed’ in comparison to core areas of states. Finally, Section VI concludes.

II The Concept of the Frontier

Why should we expect to find an enduring legacy of frontier settlement upon rule of law or the provision of public goods? The literature on frontier settlement and its social and political effects can largely be traced to the ‘frontier thesis’ of American historian Frederick Jackson Turner, who argued that as settlers moved west, they abandoned hierarchical European institutions in favour of greater individualism and egalitarianism (Turner 1893). Though Turner generally emphasized the civic and democratic aspects of the frontier experiment, he also noted its defects: that the frontier was ‘a region of personal feuds and frontier ideals of law’ where ‘the idea of the personality of law was often dominant over the organized machinery of justice’; and that frontier politics was subject to ‘a laxity in regard to governmental affairs which has rendered possible the spoils system [in which] the successful man to punish his enemies and reward his friends’ (Turner, 1920: 142). If Turner did not focus more extensively on the ‘lawless characteristics of the frontier,’

it was simply, he wrote, ‘because they are sufficiently well known’ (Turner 1920: 24).

Frontier society was traditionally ‘undergoverned’, or what O’Donnell has referred to as a ‘brown zone’: an area under nominal state authority, in which the state’s monopoly of legitimate use of force has not been fully established. Writing in the nineteenth century, Sarmiento (1868), for example, lamented how on the Argentinian frontier ‘since there is no collected society, no government is possible; there is neither municipal nor executive power, and civil justice has no means of reaching criminals’ (Sarmiento, 1868: 21). Experimental studies within the United States have suggested this dependence on second-party enforcement has left a deeper behavioral syndrome, by showing for example that individuals from frontier areas are more likely to respond aggressively to provocation, than individuals from the coastal northeast (Cohen et al. 1996). In historical Argentina, Sarmiento likewise observed how the frontiersman is ‘independent of every want, under no control, with no notion of government’ (Sarmiento, 1868: 14).

Thus, while following the ‘Turner thesis’ the frontier may have been a place in which the ascriptive hierarchies of the feudal estate were abolished, it was also a zone of anarchy; only very gradually did these wild ‘wests’, ‘easts’ and ‘souths’ come under the jurisdiction and administrative hierarchy of “the center”. By studying how frontiers are ‘tamed’, or indeed, remain ‘untamed,’ therefore, we can learn more about the process of state formation, as well as the persistence of limitations to the extension of state authority spatially. As the works of James Scott (2009) or Victor Liebermann (2009) serve to illustrate, all states begin with ‘frontiers’: not only the frontier states of the Americas or eastern Eurasia, but also, historically, of the padi states of

upland southeast Asia - and as Eugen Weber (1976) has shown, even for a western European state, such as France, the state's control over the provinces was consolidated at a relatively late point in time¹.

III Specifying the Frontier

Empirically, frontier zones may be defined by several attributes, including administrative remoteness (distance from the central government), population sparsity, or the relatively recent arrival of its transitory population. For the purpose of this project we understand frontier zones as newly-settled tracts populated by historically recent migration, in which the institutions of public order, from the police and judiciary to local government and administration, are recently formed. It is the newness of administrative structures, we argue, which constitutes the essence of the frontier, to which other attributes are contributors. Areas with low population density may or may not be frontier zones, for example, though many frontier zones have low population density by virtue of the recent origin of the inhabitants; the arrival of a populus into a formerly blank geography, in new townships, and thus new mayoralties, new electoral districts, is a typical characteristic of the frontier.

Among the potential sites of study for this project, we considered a number of frontier 'zones' within contemporary polities in the world today. These were assessed based on the extent to which they meet several of the frontier criteria, namely distance from government, recency of population flows, and population sparsity. A summary is provided in Table 3.1.

¹ In this regard Weber opens with a very revealing quote from a character in Balzac, as he strolls through the Burgundy countryside: "You don't need to go to America to see savages... Here are the Redskins of Fenimore Cooper".

Table 3.1: Attributes of Territories Considered for Frontier States

	Distance from Political Authority	Population Sparsity	Net Migration, 1950-
Brazilian Interior			
North (Amazonas)	2860km*	3.8/km2	Medium
Centre-West	930km*	8.1/km2	Medium
<i>national av.</i>		22/km2	
Canadian West			
Alberta	2874km	5.9/km2	High
British Coloumbia	3551km	4.76/km2	Medium
Saskatchewan	2213km	1.75/km2	Medium
<i>national av.</i>		3.41/km2	
United States Frontier			
Southwest	1905km	28.5/km2	High
California	3700km	93.3/km2	Medium
Northwest	3746km	25.41/km2	Medium
Rocky Mountains	3189km	25.55/km2	High
Alaska	5422km	0.49/km2	High
Upper Midwest	1502km	15.0/km2	Low
<i>national av.</i>		32/km2	
Russian Federation			
Siberia	2821km	3.76/km2	High
Far East	6434km	1.0/km2	High
Urals	1159km	6.8/km2	Low
Northern Province	995km		Low
<i>national av.</i>		8.3/km2	
Argentina			
Cordoba	625km	Low	Low
Mendoza	958km	Medium	Low
<i>national av.</i>		14/km2	
Chinese Western Provinces			
Xinjiang	2414km	13/km2	Low*
<i>national av.</i>		140/km2	

* distance from historical capital (Rio de Janeiro); capital moved to Brasilia in 1960

This article takes the four largest countries with the greatest extent of frontier settlement over the period from the 16th century to the present day: the United States, Canada, Brazil, and Russia. Taking migration flows as a measure of the frontier, Robinson and Garcia-Jimeno (2009) have computed the share of total land area in North America with population density below 0.7725 people per square kilometre (2 per square mile), in 1850 for the United States and in 1851 for Canada, using data from the United States Census (1898) and the Dominion Bureau of Statistics (1957), and this enables us to separate 'frontier' from 'non-frontier' provinces for Canada, the US, and Brazil. For Russia, we take the 1897 census data, and similarly define as frontier areas those in which the population density was below the same threshold. A summary of frontier regions, with maps, is provided in the Appendix.

IV Wild 'Wests', 'East' and 'Norths'

This section presents descriptive evidence of weak state capacity across the areas that were historically frontier zones, before proceeding to more systemic econometric analysis in the next section. Perhaps one of the best indicators of the extent to which public order is preserved is the homicide rate. When we examine the four largest frontier countries, frontier zones fare worse, on average, than non-frontier zones, albeit often with substantial internal variation. These patterns can be seen in figures A.2 in the Appendix.

In Canada, 'frontier' regions have significantly higher homicide rates than the earlier settled regions of the Atlantic littoral: Nunavut, in the north, has a homicide rate of 18.64 per 100,000, compared to just 1.36 in Ontario, 1.12 in Quebec, and precisely no homicides on Prince Edward Island, dur-

ing 2009, the year of reference. In Russia, ‘frontier’ regions to the east of the country also have notably higher homicide rates than in the European parts of the country. Moreover, the murder rate appears to increase the further one penetrates to the East, with rising elevation around the Urals, yet greater criminality in Krasnoyarsk, and maximal levels of homicide around the region from Lake Baikal to Madagan on the Pacific seaboard: while rates in European Russia can be as low as 5.5 per 100,000, in Siberia rates range as high as 26 per 100,000 in Buryatia, 22 per 100,000 in Irkutsk, and 35 per 100,000 in Zabaikalsky Krai, on the border with Mongolia.

In Brazil, while pockets of very extreme criminality exist along the coastal states and in particular in the Northeast, in the frontier regions the homicide rate is consistently elevated. With the exception of the border province of Acre, all of the frontier regions have homicide rates superior to 24 per 100,000. By contrast, seven of the non-frontier regions have murder rates below this level, for example such as Sao Paulo (14.9 per 100,000) or Santa Catarina (13 per 100,000). Finally, in the United States homicide rates are slightly higher in frontier areas (4.86 per 100,000) than non-frontier areas (4.7 per 100,000), though as with Brazil, it is the inclusion of areas with a legacy of slavery that account for much of the homicide in the non-frontier zone; excluding the deep south, the homicide rate in the early-settled areas of the United States is just 3.7 per 100,000. Thus a contrast can be drawn between the early-settled states of the Northeast, in which homicide rates are generally very low, and the ‘wild west’ frontier states of Arizona, New Mexico, and Nevada, in which homicide rates are among the highest in the Union.

Public Goods Provision

A second aspect of governance sometimes considered deficient in frontier zones is the provision of public goods. Frontier areas, noted Turner, may be more democratic; yet this may have accentuated their tendency towards clientelism, or the provision of private benefits to political constituents, rather than universal public goods. Meanwhile, the inability of frontier zones to effectively collect taxes, whether due to the weak development of bureaucratic infrastructure or differential preferences, is another attribute that vitiates effectiveness in public service delivery.

An illustration of the pattern of public goods provision from one of the cases in our study, the Russian Federation, is provided in the Appendix Figure A.4. Taken are four indicators from Russian National Statistics (2010), the percentage of slum housing as a proportion of total, the number of inhabitants per doctor, the ratio of children to educational places, and the number of hospital beds per capita. While there is substantial variation, a consistent pattern emerges of under-provision in frontier zones, relative to the areas west of the Ural mountains.

Further illustration of the pattern of public goods provision between frontier and non-frontier areas can be seen from the Republic of Brazil, shown in Appendix Figure A.3. We take two indicators from the OECD Economic Survey on Brazil (2005), the number of doctors per 10,000 population, and the immunisation rate of children under the age of one.

Again, frontier regions perform significantly worse in public goods provision than non-frontier areas. In general, therefore, frontier regions may perform worse at the provision of public goods by the state, reflecting the relatively dysfunctional nature of formal institutions in frontier societies. This does not mean they are worse at private provision of such goods – at this, indeed, they

may outperform non-frontier zones – but simply that the formal institutions of frontier areas are indeed relatively more dysfunctional.

Regression Analysis

We can analyze these differences more systematically by estimating basic OLS models to confirm a hypothesized association between frontier status and low levels of public order and public goods provision. As indicators of public order and public goods, we take respectively the homicide rate (per 100,000), and the infant mortality rate (per 1,000). Infant mortality is widely considered a useful proxy for the universality of healthcare provision, welfare benefits, and public sanitation, as it disproportionately affects poorer households unable to provide these privately, and is available for all of the subregions under consideration (Ross 2006; Lipton and Ravallion 1995; Victoria et al. 2003). Data on each of these are taken from national statistics of the respective countries. We control for the level of GDP per capita, by region. In addition, a substantial body of literature has attributed underinvestment in public goods to ethnic fractionalization, on the basis that in ethnically diverse societies it is more difficult to achieve agreement on desired public goals, intergroup trust, and solidarity for poorer members of society (Alesina et al. 2004, Keefer and Khemani 2004). A control for ethnic fractionalization, by subregion, is also included in the model. Finally, country fixed effects are also included.

In accordance with the frontier thesis, frontier zones have significantly higher rates of homicide and of infant mortality. All else equal, in frontier zones the homicide rate is higher by 3.59 per 100,000: a difference comparable to the gap between Sweden (1 per 100,000) and the United States (4.8 per 100,000),

Table 4.1: OLS Regression, Homicide per 100,000 and (Log) Infant Mortality

	<i>homicide</i>	<i>log infant mortality</i>
Frontier Region (0/1)	3.592*** (1.005)	0.112* (0.046)
GDP per capita (\$k, 2007-8)	-0.004 (0.044)	-0.002 (0.002)
Ethnic Fractionalization	5.778* (2.807)	0.017 (0.129)
<i>Country</i>		
Canada	-24.45*** (2.863)	-1.123*** (0.132)
Russia	-14.56*** (1.522)	-0.801*** (0.07)
USA	-23.19*** (1.979)	-0.979*** (0.091)
Constant	23.83*** (1.873)	2.854*** (0.086)
n	173	173
Adj. R-squared	0.64	0.61

or in turn between the United States, and Pakistan (7.8 per 100,000). Ethnic fractionalization is significantly and positively associated with the homicide rate, though not, as the fractionalization literature would suggest, with infant mortality. An examination of the homicide maps presented in the Appendix would indicate that this result may be specifically a result of ethnic exclusion rather than fractionalization per se: more precisely, the legacy of slavery in the southern United States and coastal northeastern Brazil, which are high on both ethnic fractionalization and the homicide rate, yet neither frontier zones. Though the coefficients for country fixed effects appear large, this

is mainly due to the reference case (Brazil), which has substantially greater average homicide and infant mortality rates than Canada, Russia, or the United States. The effect of frontier status is robust to the inclusion controls for country effects and also for GDP per capita, which is significantly associated with regional-level variation in neither homicide rates or infant mortality.

As the descriptive statistics in Appendix A.1 show, frontier regions are not consistently poorer or richer than non-frontier zones. In Canada and Brazil frontier areas are wealthier on average, but in Russia and the United States they are less so. The descriptive statistics in A.1 do show however that the frontier/non-frontier gap in public order and public goods is consistent across all cases: in Russia, Canada, and Brazil the homicide rate in frontier areas is higher than non-frontier provinces, while the US case is an exception due to the classification of the South by historical population density (in section 2 above) as 'non-frontier' – whereas US regional studies of homicide would typically consider the South and Southwest together as frontier zones, in comparison to the coastal northeast (cf. Roth 2009). Meanwhile, in all cases infant mortality rates are higher on the frontier. Frontier regions are generally higher on ethnic fractionalization than non-frontier zones, the only exception here being the United States. And yet the variable for frontier status is robust to the inclusion of the ethnic fractionalization variable, suggesting that the mechanism for the observed difference is not simply reducible to differences in ethnic heterogeneity.

V Mechanisms

The provision of rule of law and public goods are typically considered the basic responsibilities of government. Why, therefore, do frontier regions remain 'undergoverned'? As stated, the frontier is defined by several attributes – that settlers arrive in advance of the government, and therefore set up their own social institutions ahead of formal political integration; the distance from the frontier to the capital, which leaves the latter only imperfectly able to police and control its frontier territories; and the relationship between settlers and the indigenous population, an attribute common to each of the four cases in this study (Russia, Canada, Brazil and the United States). Each of these should be considered in turn.

The strength of social institutions

Because settlers arrived in advance of the state, social institutions were established in order to deal with problems such as schooling, health, and the administration of justice. This density of local organisational capacity among settler societies was one of the most salient observations of both Tocqueville (1835) and Frederick Jackson Turner (1921). While much of the political science literature following Putnam (1993) has stressed the positive interaction between social institutions and democratic accountability for delivering public goods and services, this is not a necessary relationship. Even where civil society organizations take the role of service providers, if this 'crowds out' state provision then the consequence may be negative in the long run; informal service providers do not have the state's universal provision mandate, nor the same impartial and bureaucratic mechanisms for recruitment and delivery, nor the state's substantial financial resources, nor are they subject

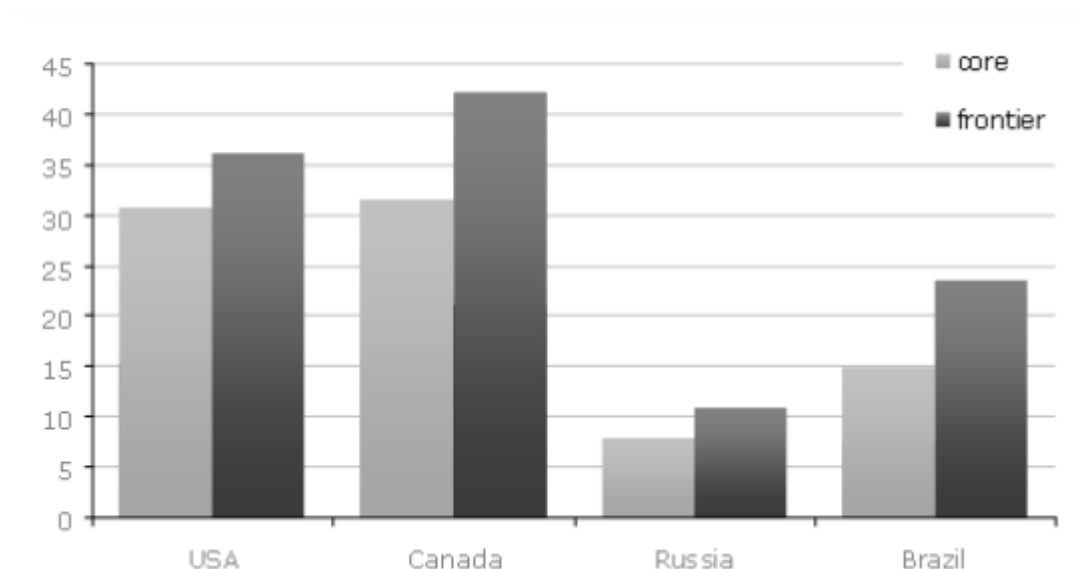
to the same accountability mechanisms that exist in a democracy (Rothstein 2011). The strength of local voluntary organisation vitiated the need for public interventions, and may even have created a vested lobby against state encroachment on private institutions; on the other, the strength of pernicious social networks may have weakened the ability of the state to govern effectively and impartially (Migdal 1988). Finally, another important attribute of frontier zones was that the absence of state authority made them a magnet for many forms of so-called 'negative' social capital, such as criminal networks, smugglers, and outlaw groups, with a strong incentive to resist the extension of centralized state control.

Whatever the ultimate effect of social institutions on the functioning of government, it is an established observation that frontier regions are far richer in voluntary activity than the non-frontier areas of their respective states. This can be seen in Figure 4.1, which shows the average membership of a range of voluntary associations from the World Values Survey battery (e.g. membership of religious, sports, political, environmental, youth or women's groups) for each of the four countries of this study. In historically recent settler societies, there is a universal tendency to greater informal association.

Distance

While constraints of distance are unlikely to directly explain variation in contemporary state capacity today, they may have done so indirectly as a result of their influence in the past, resulting in an institutional equilibrium in which local agents were unable to build the state's 'extractive capacity', invest in infrastructure, or root out clientelistic practices in local government. According to this argument, for example, the fact that in the nineteenth

Figure 4.1: Higher Voluntary Association in Frontier Regions



century governors of Siberia and the Russian Far East were *de facto* (if not *de jure*) independent of the Russian government in St Petersburg, resulted in a tendency for greater autonomy (including, potentially, greater resource malappropriation or corruption) which has persisted even through the centralizing efforts of the Soviet state. While this effect would be expected to decline asymptotically to zero over time, if we assume a high degree of institutional persistence, such regions could still exhibit such a legacy today.

The relationship of settlers to the indigenous population

Though a simple explanation in terms of ethnic fractionalization is not consistent with the estimated regression coefficients, it may be that particular legacies of ethnic diversity do explain frontier/non-frontier differences. For example, one such argument that would explain 'undergovernance' in frontier zones concerns the relationship between settlers and the indigenous popu-

lation: in most frontier regions, from Buryatia in Russia, to New Mexico in the United States, to the Northwest frontier in Canada or the Amazon region of Brazil, a dual society was formed from the coexistence – and often, conflict - of settlers with indigenous peoples. Legacies of colonialism and are often cited as an explanation for the link from fractionalization to the underprovision of public goods, clientelism, and maladministration (Alesina et al. 2004; Acemoglu and Robinson 2002).

‘Selection’ for Reduced Fiscal Capacity and Public Goods

Next, an intriguing hypothesis is that frontier regions ‘select for’ lower fiscal capacity and lower provision of public goods, either due to the strength of existing social institutions, a weaker sense of collective identity arising from ethnic diversity, or a sense of the state’s weak capacity and therefore ineffectiveness in policy implementation. Among the most striking features of frontier zones, for example, is their universal tendency towards economic libertarianism. Figures 4.2 show frontier and non-frontier areas compared on two items from the World Values Survey: one asking the respondent their extent of agreement as to whether the ‘government’ should take more responsibility for people, or whether people should ‘take more responsibility for themselves’; and a second item asking whether competition is good as it ‘stimulates people to work harder’ or whether competition is harmful as it ‘brings out the worst in people’. In both cases frontier zones are clearly more ‘libertarian’; respondents in frontier zones indicate a greater preference for having individuals and not government take responsibility, and a greater preference for competition in individual relations.

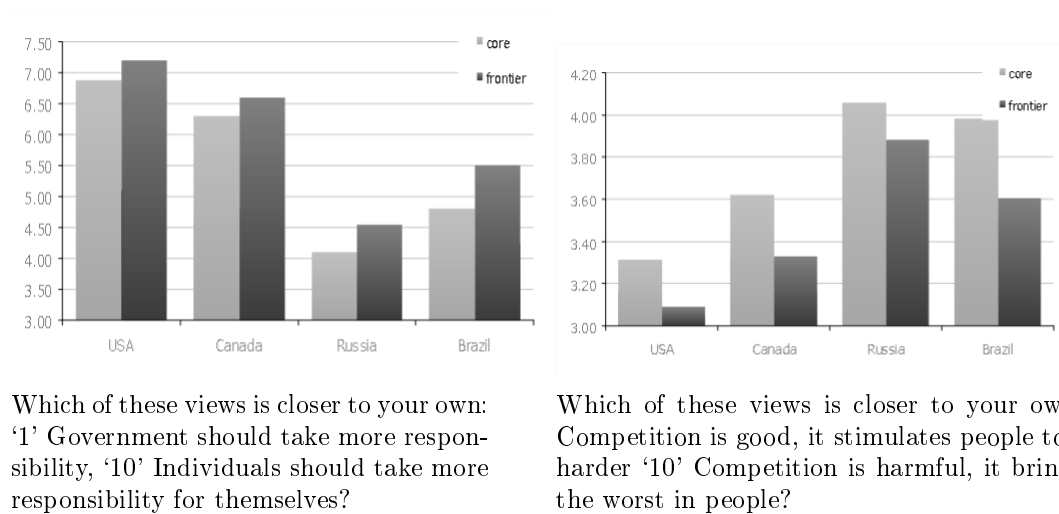


Figure 4.2: Greater Libertarianism in Frontier Regions

Conservative Populism and the Frontier

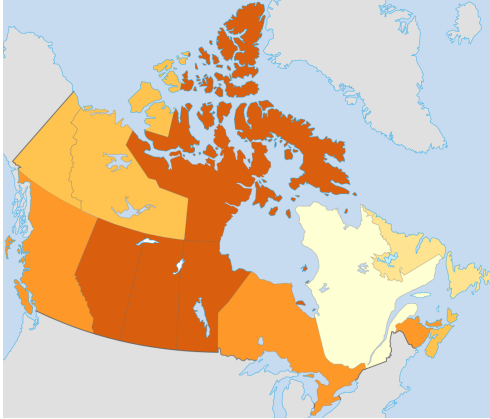
Do the differences in values highlighted in the previous section have any political salience? The term ‘political cleavage’ has been defined by Almond as national, ethnic, linguistic, and religious divisions that affect political allegiances and policies (Almond 2004). Spatial cleavages, such as the metropolitan-provincial distinction, or the divide between regional groups, are a frequently described feature of empirical political science. However as a specific subtype of spatial cleavage, the ‘frontier’ has not been featured; most likely because, unlike ethnic or linguistic boundaries, the frontier is continuous, there are areas which are more or less recently settled, but no ‘final frontier’ so to speak. In this section we show that the ‘frontier’ is indeed a useful heuristic for understanding party competition in those countries which have them.

Our initial analysis suggests the answer to this question is yes; frontier provinces in each country disproportionately provide an electoral base to

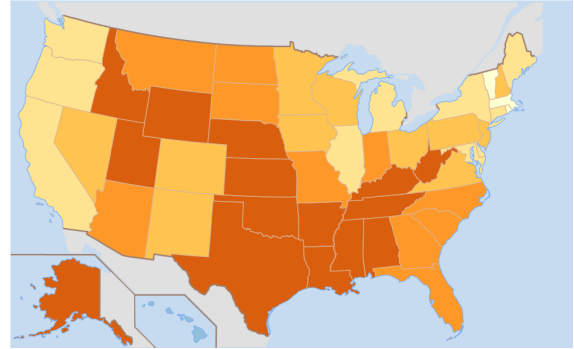
political parties whose economic platform combines some degree of nationalism, economic libertarianism, and social conservatism. This can be seen in Figures 4.3 below.

By country, there appears to be a clear cleavage between core and frontier zones in their preference for parties that might be described as representing a ‘popular right’ platform. In Canada, the electoral base for the new Conservatives is predominantly in the frontier provinces, in particular Alberta and Saskatchewan. In Russia, frontier provinces of the interior are disproportionately inclined to vote for the nationalist party of Zhirinovsky. And in the United States, it is a longstanding observation that both the Republican party, and more recently its ‘Tea Party’ wing, receive greater support from the interior states that were once part of the American frontier. This relationship is not a necessary one, however, as these regions were also the support base for an earlier generation of ‘progressives’. Yet populism, and in particular its rejection of coastal status elites, appears distinctive of the politics of the frontier, even if we cannot always isolate a specific left or right platform² .

² Though the political cleavage introduced by the frontier is not the specific focus of this study, it is notable that in each of the four cases in this study, the elites of their capitals and Atlantic littoral consider themselves, in varying degrees and quantities, as ‘European’, while their interior populations consider themselves as ‘true’ Canadians, Americans, Brazilians, and so forth. This is a distinctive pattern of a frontier society, in which the first wave of settlers establishes itself according to the tastes and hierarchies of the motherland, while subsequent waves, living in sheltered terrains distant from worldly affairs, identify instead with the great landmass which they have, with great difficulty, brought into mastery. It is also why each of these societies, at some point in its history, must wrestle with the tension between core and periphery - which politically is a struggle between the cosmopolitan, liberal, and deferential norms of the coast, and the isolationist, conservative, and economically libertarian values of the frontier.



Vote Shares for the New Conservative Party, Canada (2011 Election)



Vote Shares for Republican (McCain-Palin) Ticket, 2008 Presidential Election



Vote Shares for the Liberal Democrat (Nationalist) Party, Russia (2008 Election)

Figure 4.3: Vote Share for “Popular Right” Parties in Frontier Countries

VI Conclusion

This paper suggests that the frontier exists as an empirical phenomenon, and that the study of frontier zones can provide useful information in understanding processes of historical state formation. Frontier zones today appear to be characterised by a deficiency of state capacity, as reflected in poor delivery of public goods and lower rule of law. Second, because of the distinctive values of the settler population, notably their greater egalitarianism, individualism, and nationalism, frontier zones tend to be characterised by populist, anti-elitist, and nationalistic political movements, and electoral cleavages between the core and frontier zones are common in frontier nations.

We suggest that the study of frontier zones will shed light on broader processes of state formation: ultimately, all states have frontier zones at some point in their historical evolution. As the works of James Scott (2009) or Victor Liebermann (2009) serve to illustrate, this is true not only of the frontier states of the Americas or eastern Eurasia, but also, historically, of the padi states of upland southeast Asia; while Eugen Weber (1976) has shown that even in a western European state, such as France, the state's control over the provinces was consolidated at a relatively late point in time. While this study focuses on the largest and most recent cases of population settlement – the American and Canadian west, the Russian East, and the Brazilian interior – other cases would include the Chinese west and, in the Qing era, the southern frontier; India's settlement of its Northeastern territories; and processes of land-based settlement in Sub-Saharan Africa, including not only European settlement of South Africa, but also the internal movements of Bantu peoples.

Finally, we have suggested several hypotheses by which frontier zones may

end as having enduringly reduced state capacity. These include the path-dependency effect of early provision by social institutions, the selection effect of settlers towards greater libertarianism, the legacy of higher costs of monitoring and enforcement, and the relationship between settlers and the indigenous population. While not all frontiers exhibit each of these attributes, they are present in most cases, and this explains the tendency to find in most frontier zones today both stronger social institutions but also weaker formal mechanisms for sustaining public order and the delivery of public goods.

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Appendix

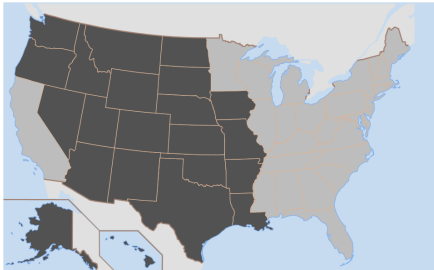
Table A.1: Descriptive Statistics: Homicide, Infant Mortality, GDP per capita

	Homicide rate		Infant Mortality		GDP per capita (nom. \$)		Ethnic Fractionalization	
	Frontier	Core	Frontier	Core	Frontier	Core	Frontier	Core
Russia	17.55	8.54	8.79	7.53	8836	9678	0.292	0.262
Canada	2.7	1.3	5.0	4.7	47401	36829	0.163	0.122
Brazil	29.25	28.11	19.88	15.79	10803	8694	0.515	0.489
United States	4.11	4.94	6.34	5.94	34014	46686	0.411	0.442

Note: Due to the small population size of some frontier territories, all figures have been population-weighted. This is to prevent outlier regions from leveraging the averages. Averages shown here are therefore for average for the frontier and non-frontier zone, as if each were treated as a single, unified entity.

Figure A.1: Frontier Regions of Four Countries

Frontier Regions of the United States



The West South Central region, which includes Texas, has been included in its entirety, despite that this also brings in Louisiana, Arkansas, and Missouri; this was considered acceptable on account of the low population density of the latter states in 1850, and the relatively greater weight of Texas in the analysis, on account of its larger population. California did not qualify as a frontier due to the already high population settlement in the year of calculation (1850).

Frontier Regions of Brazil



Frontier regions of Brazil. All the Amazonian regions of the Northwest are included, as well as the interior regions of the Centre-West. The coastal regions of Northeast, Southeast and the South are excluded. The coastal regions of the South are not considered frontier areas for the purpose of this project, as these were among the second wave of settlement in the late nineteenth century.

Frontier Regions of Canada



Frontier regions of Canada. Frontier regions are shown in dark, and include the provinces of Alberta, Saskatchewan, Manitoba, and British Columbia, and the territories of Nunavut, Yukon and the Northwest Territories.

Frontier Regions of Russia



The frontier regions of Russia include the Eastern regions of Siberia and the Far East, together with the Arctic regions of the North, all of which, in spite of scattered and tentative settlement in the Russian imperial period, only became settled *en masse* in the twentieth century.

Figure A.2: Homicide Rates across Frontier/non-Frontier Regions

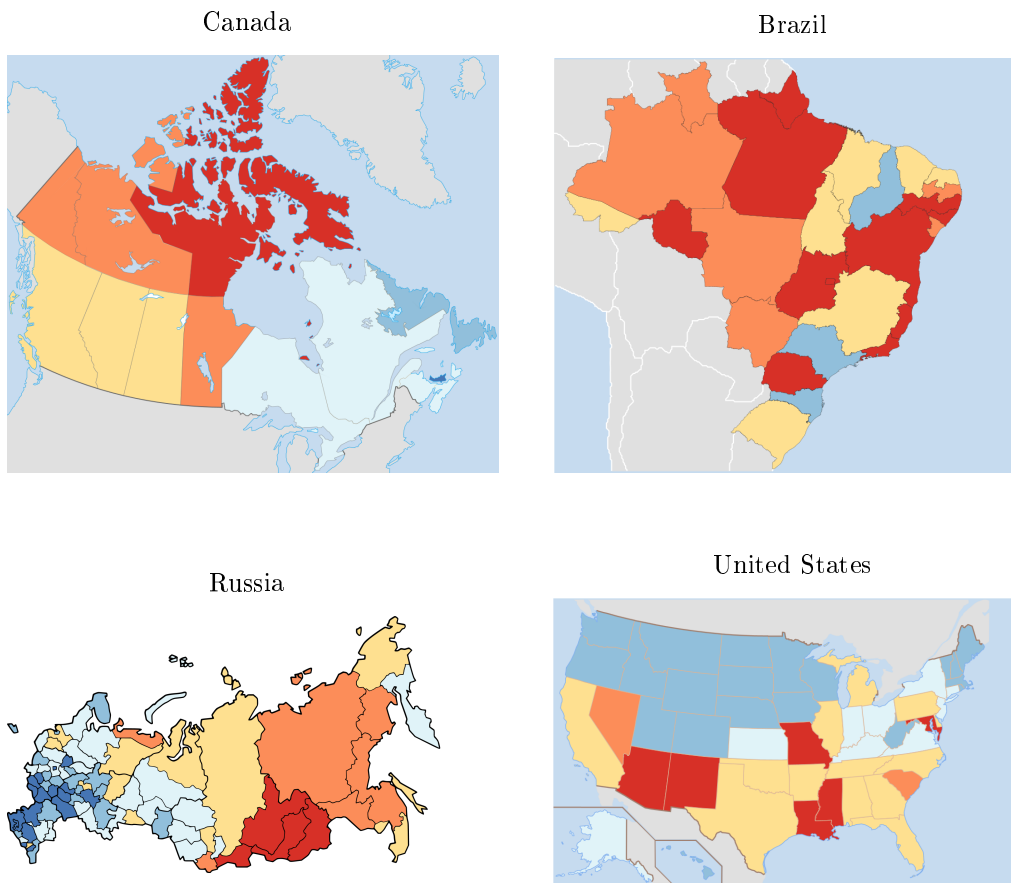
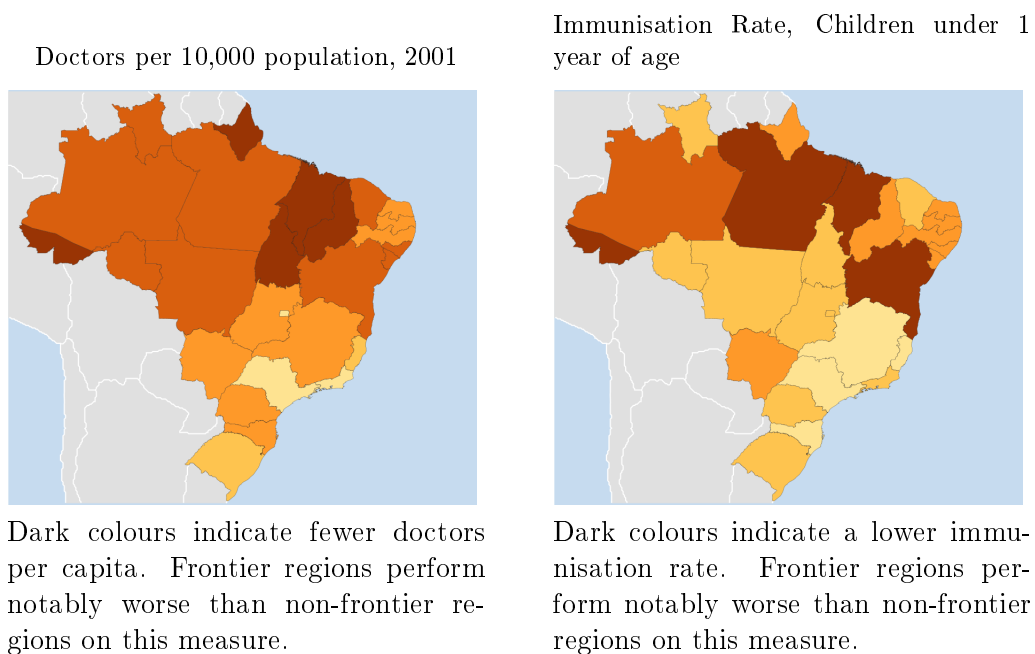


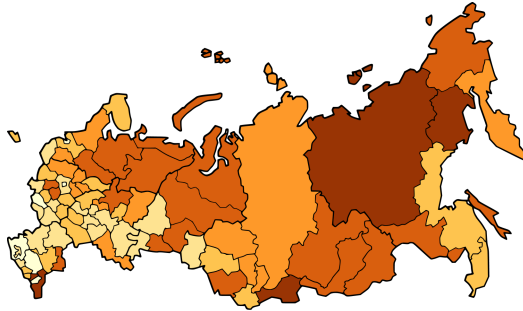
Figure A.3: Public Goods Provision Across Regions of Brazil



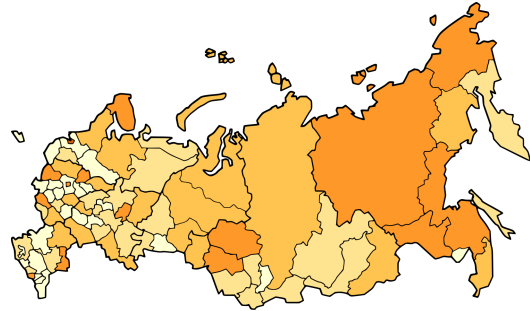
Source: OECD (2005) *Economic Survey of Brazil*

Figure A.4: Public Goods Provision Across Regions of Russia

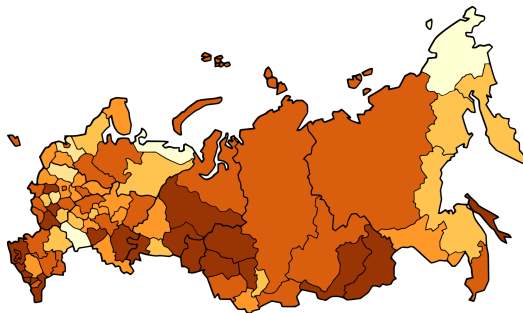
Slum Housing as a Percentage of Total



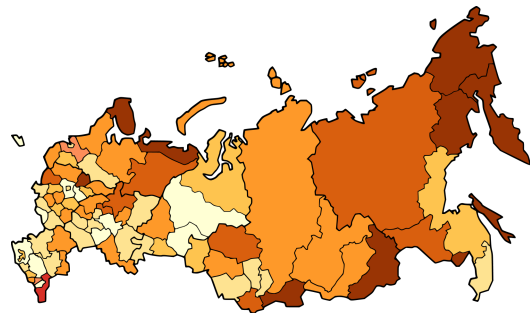
Inhabitants per Doctor



(a) Children per Educational Place (Ratio)



(b) Hospital Beds per Capita



Dark colours indicate lower public goods provision.

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