

# Indirect Rule and Public Goods Provision: Evidence from Colonial India

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## Abstract

This paper contributes to the conflicting literature about indirect rule by delivering a new theoretical explanation for the persistent effects of indirect rule on contemporary provision of public goods. It looks at a single region of India which has areas that historically experienced both direct and indirect rule. The theoretical mechanism focuses on the principal-agent problem and the incentives that it produces for local leaders. Unlike local princes, colonizers were under stricter oversight and had to be more accountable to the top due to the obligations to extract resources. A spatial regression discontinuity design is used to compare directly and indirectly ruled territories. The empirical results show that indirect rule has long-term negative effects on the provision of public goods.

**Key Words:** colonial legacies, accountability, local incentives, public goods.

Supplementary material for this article is available in the online appendix.

**This paper is currently under review.**

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Literature provides a set of conflicting results about the effects of indirect rule on the local policy outcomes.<sup>1</sup> Some studies show negative effects of indirect rule on development because of the low capacity of the institutional system to provide public goods. Eventually, such inefficiency leads to despotic and autocratic regimes, like decentralized despotism (Mamdani, 1996). Others find that indirect rule allows better integration in the local environment (Lange, 2009) and can prevent rulers' despotic intentions and the exclusion of natives from civil freedoms (Fisher, 1998). This inclusiveness of natives could lead to better self-governance and prosperity, and, as a result, territories with indirect rule should have better socio-economic outcomes (Iyer, 2010). However both sets of literature do not consider the agency problem faced by the center and local leaders in directly and indirectly ruled territories. Exploring this agency problem more deeply provides a theoretical mechanism explaining long-term effects of indirect rule.

I offer an empirical test of the long-term effects of indirect rule at the micro-level in India. To do so, I use a single state of Karnataka, which is constituted by both former directly and indirectly ruled territories. Applying a spatial regression discontinuity design allows me to identify a causal effect of colonial indirect rule on the public goods provided today.

This paper contributes to the literature about colonial legacy by providing a theoretical explanation of indirect rule effects and by emphasizing the importance of exploring micro-level data. It introduces village-level Indian data and highlights that micro-level analysis can reveal more complicated causal relationships and heterogeneous effects of well-known institutions and processes.

## Indirect Rule and Incentives of Local Leaders

Delegation of power presents a particular type of relationship between the center and local officials. Exploring how these relationships impact the incentives of local officials shapes the theoretical argument of the current study.

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<sup>1</sup>See the full literature review in the Online Appendix A.

The interactions between local leaders and the center can be explained with a principal-agent model with the colonial government as a principal. Local leaders are the agents of this colonial government, and they are making decisions at the local territories on behalf of the center. A principal-agent problem occurs when the local leaders have a trade-off between being accountable to the central government or acting in their own private interests.<sup>2</sup> Following the logic of principal-agent models, this paper assumes that the central government aims to constrain local agents in their ability to invest resources in private consumption in order to avoid abusive rent-seeking and local instability. But the center's ability to constrain varies depending on whether there was either direct or indirect organization of power.

The trade-off between upward accountability and local leaders' private interests is reflected in the process of allocating resources. Accountable local leaders were investing in the infrastructure and goods that could have simultaneously improved resource extraction and kept the local population satisfied. Local leaders that were investing in their private interests did not care much about providing public goods, but rather increasing their own wealth. In practice, as the central government had different abilities to constrain local leaders in directly and indirectly ruled territories, these local leaders varied in how loyal of agents they were. As a result, the institutional structure (direct or indirect rule) led to two types of local leaders: ones with strong and ones with weak incentives to provide public goods rather than invest in private consumption.

In the Indian case, princes in the indirectly ruled territories had more autonomy from the center and more legitimized authoritarian power over the local population. The delegated authority that was given to native princes was hard to remove without additional costs for the center, whereas the British local leaders and their bureaucrats could have been easily punished. Being natives helped princes to establish a proto-autocratic administration

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<sup>2</sup>A similar principal-agent problem existed not only in India. For instance, Spanish *encomienda* system had an analogous problem of abused rent-seeking from the side of the local agents, who were given a monopoly on the labor of particular groups of indigenous people.

without formalized institutions of control and accountability ([Handa, 1968](#)). In turn, the local population was suppressed by their authority, decreasing the risks of potential revolt. The apathy of the suppressed people and their involuntary belief in the princes' authority decreased the risk of protests ([Ramaswamy and Patagundi, 2007](#)) and eventually provided both local princes and the central government with more stability. That resulted in *weak incentives* of the princes to provide any type of public goods ([Mukherjee, 2018](#)).

The British representatives in the directly ruled territories were subject to more control from the colonial government than the local princes. Since their salary and promotion was in the central government's jurisdiction, disloyalty could have negatively affected their incomes or the trajectories of their career paths. ([Lee, 1899](#)). While being natives allowed princes to keep lower levels of violence with almost no cost, the British bureaucrats had to secure the colonizer's position through other means. British representatives were complete foreigners for the local population, which made establishing and legitimizing their authority challenging. The colonizer was a common enemy, which potentially produced higher mobilization of the local population against British representatives. The fear of violence and the risks of losing the territories, and associated resource extraction, led British representatives to have *strong incentives* to provide public goods in their local territories. Simultaneously, this approach could have benefited the extraction and territory expansion goals of the colonizer (for instance, building roads or water infrastructure).

## Historical Background and Data

India presents a unique setting to compare direct and indirect rule consequences. Colonial India was divided into separate territories – provinces – the combination of which formed British India. Provinces were ruled by British representatives - Governor-Generals, *directly* appointed by the Crown. The rest of the territory consisted of *indirectly ruled* princely states. Princely states were subordinated to the British, but ruled by the local princes, who

were delegated to govern these territories.<sup>3</sup>

Although indirectly ruled territories existed throughout the whole country, this paper examines a single contemporary state of Karnataka that includes regions that were both under direct and indirect rule. Karnataka state was formed by the States Reorganization Act in 1956.<sup>4</sup> It was shaped from the districts of the former princely states (indirect rule) - Mysore and Hyderabad, and the former British provinces (direct rule) - Bombay and Madras. Since state reorganization was based on the homogeneity of the linguistic groups, regardless of their colonial past, these institutionally heterogeneous territories were combined into one ethno-linguistically homogenous state - Karnataka. This homogeneity allows me to eliminate the persistence of ethno-linguistic cleavages as an alternative theoretical explanation of the differences between directly and indirectly ruled territories.

Methodologically, I use a spatial regression discontinuity design to estimate the effects of indirect rule ([Dell, 2010](#)). The former borders between directly and indirectly ruled territories in Karnataka serve as a two-dimensional running variable. I consider borders between direct and indirect rule as exogenous to the British capabilities and the willingness to annex.<sup>5</sup> I do not claim that the borders were random, since they clearly were the result of wars and treaties during the annexation process ([Handa, 1968](#), 13), but that they might be counted as if random, because of the uncertainty in the process of conflict and during conflict resolution ([Sun and Tyson, 2018](#)).

I use village-level data for 2011 (the last Indian census) that is available from the Village Directory of the electronic census library of India.<sup>6</sup> The pool of observations includes villages

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<sup>3</sup>Figure B.1 in the Online Appendix shows the geographical division between princely states and British provinces in the middle of the 19th century.

<sup>4</sup>In 1956 it was called Mysore state, but was renamed into Karnataka state in 1973.

<sup>5</sup>In the case of Mysore, it was also known that the annexation was driven by the necessity of the British to protect themselves against the alliance between Mysore's leader - Tipu Sultan - and Napoleon during the Napoleonic Wars ([Mukherjee, 2017](#)). Hence the decision to annex was exogenous to the socio-economic status of Mysore.

<sup>6</sup>Official Website of the Office of the Registrar General and Census Commissioner of India (URL Source:

located in the districts alongside the former Mysore-Bombay and Hyderabad-Bombay borders (Figure B.2-B.3 in the Online Appendix).<sup>7</sup>

The main independent (*treatment*) variable is whether a village is located in the former princely state or the province territory. Although some of the districts and villages changed their shapes and names, the district division alongside the former borders between directly and indirectly ruled territories was preserved since 1872 (of the Registrar General et al., 2004), which allows me to assign the treatment variable values using contemporary geographic information system (GIS) district-level data.

Dependent variables capture public goods provision through the availability of paved roads (*pucca roads*) and medical facilities (*health centers*) (summary statistics are provided in the tables C.1-C.2 in the Online Appendix). The chosen public goods present examples of two sets of public goods — infrastructural and social, that are usually provided by local leaders. First, these public goods respond to the needs of the local population. Roads are necessary for food distribution or for access to schools and hospitals; they also have an economic value of expanding the market. Medical facilities are important for maintaining the social needs of the locals. Second, these are the goods that exhibit physical persistence. For example, it is easier and cheaper to pave a road that existed in the village rather than construct a new road, and it is easier to build a hospital in places with previously existing medical facilities and medical personnel. Moreover, the Crown was likely to invest only in the provision of such public goods that could be useful for her main goal - resource extraction. All the dependent variables are binary, where 1 indicates the availability of public goods and 0 indicates its absence.

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<http://censusindia.gov.in/>)

<sup>7</sup>The list of districts is the following: Bagalkot, Bijapur, Chitradurga, Davangere, Dharwad, Gadag, Gulbarga, Haveri, Koppal, Raichur, Shimoga, Uttara Kannada, Yadgir.

## Results

Whether a village is located on the side of the border that was formerly under indirect rule is a deterministic and discontinuous function of known covariates: longitude and latitude. All relevant factors, except the treatment, should be continuous at the boundary ([Angrist and Pischke, 2008](#)).

There are potential counterfactuals that could explain heterogeneity across the borders. One of them is different land revenue systems. However, the entire geographical region analyzed in this study had the same scheme of land revenue during colonial times ([Banerjee and Iyer, 2005](#))<sup>8</sup>, which allows me to eliminate it as a possible explanation. Another factor is internal migration; it is possible that people were moving to places with a better administrative system. However, historians establish that migration was uncommon in these territories during colonial times ([Fisher, 1998](#)). People were not only attached to their families and the communities where they grew up, but it was also quite hard to move without a proper transportation system. Moreover, in colonial times people did not have enough information about the other side of the border, which could have prevented them from moving across the border for a better life. This argument allows me to eliminate migration as a potential counterfactual.

Controlling for certain factors that may impact the interaction between direct and indirect rule and public goods availability (eg., contemporary economic indicators) cannot be possible because of post-treatment bias. Thus, for control variables I use a set of geographic factors that are not changeable over time and population characteristics such as total population, scheduled castes and scheduled tribes population. I use scheduled castes and tribes population given that the caste system existed at these territories many years before the colonizers came to India, and since it was hard to move to new territories (especially for people from the lower castes), the social hierarchy of the population persisted through the colonial times until today. Sections D and E in the Online Appendix present a set of balance

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<sup>8</sup>It can be observed in Figure 1 of [Banerjee and Iyer \(2005\)](#) paper.

tests and explain the choice of pre-treatment covariates in the estimated regression models.

Table 1 presents the results for the OLS models with the linear polynomial of latitude and longitude with twenty kilometers bandwidths around the borders. These results show a mostly dominant negative effect of indirect rule. I do not observe a separation between different types of goods. Roads have a negative significant effect from indirect rule for the Mysore case, and health centers have a significant negative effect from indirect rule for the Hyderabad case; the rest of the coefficients are non-significant for the OLS estimation. However, the results for the alternative estimation using a non-parametric approach (Section G in Online Appendix) shows significant negative effects of indirect rule on roads and health centers across both borders. The results for the alternative specification with the cubic polynomial (Section F in Online Appendix), tests of alternative bandwidths (Section H in Online Appendix) and placebo tests with the fake borders between former direct and indirect rule territories (Section I in Online Appendix) support the baseline findings.

**Table 1: OLS Estimation of Indirect Rule Effect on Public Goods Outcomes (20 km bandwidth)**

	<i>Dependent variable:</i>			
	Health Centers		Paved Roads	
	(1)	(2)	(3)	(4)
Indirect Rule (Mysore)	−0.016 (0.026)	−0.115*** (0.035)		
Indirect Rule (Hyderabad)			−0.079*** (0.016)	0.008 (0.063)
Constant	−8.060** (3.199)	0.135 (5.072)	6.609 (6.761)	5.368 (6.828)
Controls	✓	✓	✓	✓
Observations	1,158	1,158	940	940

*Note:* \* $p<0.1$ ; \*\* $p<0.05$ ; \*\*\* $p<0.01$ . Robust standard errors clustered on districts are in the parentheses. Models 1 and 2 show the results for the effect of indirect rule on the Mysore-Bombay border, and models 3 and 4 present results for the effect of indirect rule on Hyderabad-Bombay border. All models are controlled for latitude, longitude, slope, terrain ruggedness, total population, scheduled castes and scheduled tribes population.

Even if historically there were differences between direct and indirect rule, whether they

persist is another matter. Institutional differences between directly and indirectly ruled territories created differences in the starting points of development after independence and the reorganization of states. Although in the next forty years the Indian Government tried to implement special economic programs to balance the development of Karnataka, these programs did not reach the expected results; even by the mid-1990s an imbalance between districts of Karnataka still existed ([Ramaswamy and Patagundi, 2007](#), 375). Due to historical differences, the southern part of Karnataka had better institutions and better infrastructure, which required less planned maintenance and less investment in the provision of new infrastructure (such as building new roads). As a result, new governmental programs that aimed to improve the economic status of certain districts continued to contribute to the skewed development between different parts of the state ([Karnataka Human Development Report, 2005](#); [Banerjee and Iyer, 2005](#)). This explanation supports a mechanism of physical persistence. For local governments it was easier to maintain public goods provided during the colonial times rather than creating new ones. Cultural persistence is a potential alternative mechanism of these results, but I test and rule this out in Section J of the Online Appendix.

## Conclusion

Directly and indirectly ruled territories had distinguished institutional systems which shaped different incentives for the local leaders. Empirical tests show the long-term negative effects of indirect rule on public goods availability at the local level. Specifically, indirectly ruled territories were worse at providing paved roads and health facilities. These results are consistent with the argument that native princes did not have enough incentives to provide public goods, possibly as a result of gaining a certain amount of autonomy which helped them build a stable autocratic regime. Being natives and the heirs of monarchic families that were present in those territories before colonization may have facilitated their legitimized authority, dampening their fear of losing power. The long-term consequences of such insti-

tutional differences on public goods provision can be explained by physical and not cultural persistence.

This paper accentuates three important points. First, it provides new evidence about indirectly ruled territories and suggests that historical differences, and more specifically colonial past, can have an important influence on contemporary economic outcomes. This cannot be neglected in discussing the topic of political and economic development at the local level. Second, the persistent effect of historical institutions has been an object of considerable interest and discussion. When it comes to the impact of direct and indirect rule, there is no scholarly consensus. Here, to bring greater clarity to this discussion, the paper addresses a principal-agent problem which helps to understand local officials' incentives as a primary mechanism of indirect rule effects. And third, the paper examines the effect of indirect rule on public goods provision in one relatively homogeneous territory - the contemporary Indian state of Karnataka. It emphasizes the importance of micro-level studies that can provide new fine-grained evidence for processes that have been already explored in the literature.

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**URL:** <https://ssrn.com/abstract=3258725>

# Indirect Rule and Public Goods Provision: Evidence from Colonial India

## Online Appendix

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## A Literature Overview

The existing literature provides conflicting findings about both direct and indirect rule (Mamdani, 1996; Fisher, 1998; Lange, 2004; Iyer, 2010; Baldwin, 2016; Naseemullah and Staniland, 2016; Mukherjee, 2017). Some scholars claim that direct rule allows for better use of colonizer's institutional capacity in terms of proper provision of developmental goods (Lange, 2009); however it is not inclusive to the local population. Indirect rule, on the other hand, is more integrated into the local environment (Lange, 2009). It can prevent rulers' despotic intentions and the exclusion of natives from civil freedoms (Fisher, 1998). This inclusiveness of natives could lead to better self-governance and prosperity, and, as a result, territories with indirect rule should have better socio-economic outcomes (Iyer, 2010). Additionally, such engagement and local connections of the native rulers may decrease colonial resistance and reduce dissatisfaction and potential violence from natives towards colonizers (Ferwerda and Miller, 2014). At the same time, the effects of indirect rule vary across territories. Some studies show negative effects of indirect rule on development (Lange, 2004) because of the

low capacity of the institutional system to provide public goods. Eventually, such inefficiency leads to despotic and autocratic regimes, like decentralized despotism ([Mamdani, 1996](#)).

Following the growing literature that exploits colonial-era borders ([Dell, 2010](#); [Bubb, 2013](#); [Michalopoulos and Papaioannou, 2016](#); [Lechler and McNamee, 2018](#); [Ali et al., 2018](#)), methodologically, this paper uses a spatial regression discontinuity design to estimate the effects of indirect rule.

The analysis and results of this study also have broader implications. They bridge the extensive literature on political and administrative decentralization ([Prud'Homme, 1995](#); [Grindle, 2007](#); [Treisman, 2007](#); [Brancati, 2008](#); [Chhibber and Kollman, 2009](#)) with that on the long-term consequences of colonial presence in developing countries ([Sokoloff and Engerman, 2000](#); [Acemoglu, Johnson and Robinson, 2001](#); [Nunn, 2008](#); [Dell, 2010](#); [Gerring et al., 2011](#); [Lee and Schultz, 2012](#)).

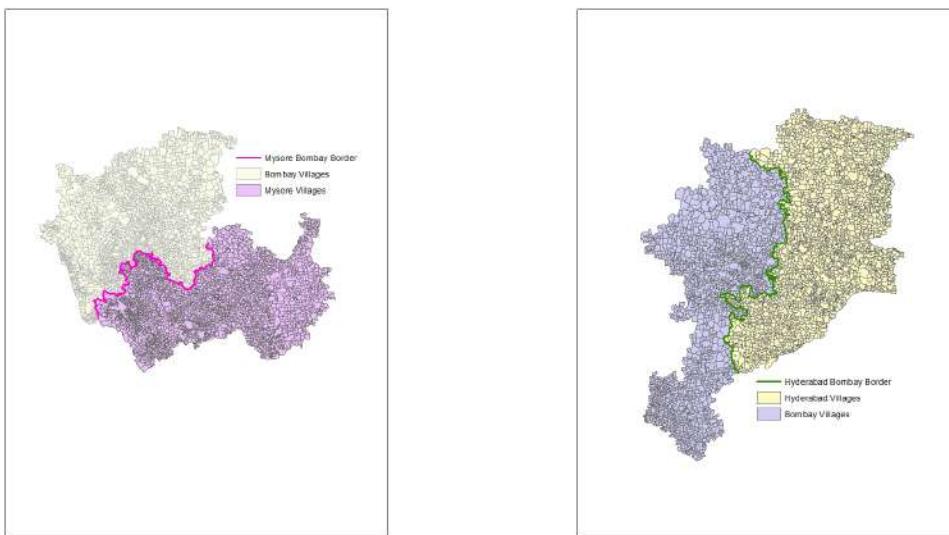
## B Graphic Appendix

Figure B.1: Map of Princely States and British Provinces (pre-1947)



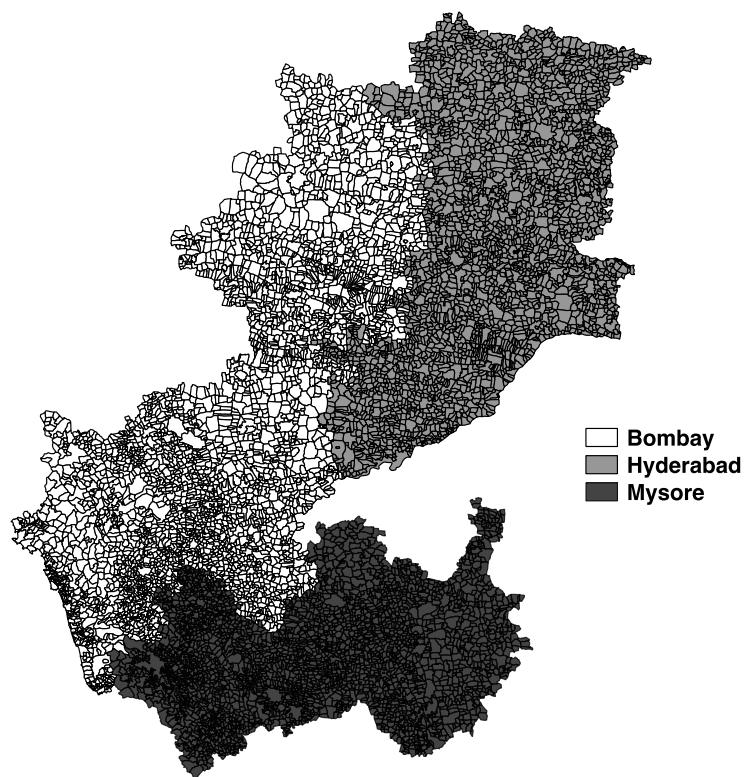
*Source of the map:* British Indian Empire 1909 Imperial Gazetteer of India  
(URL Source: <https://goo.gl/8t1iQq>).

Figure B.2: Village polygons: Mysore-Bombay and Hyderabad-Bombay



*Note:* Maps illustrate the village polygons of around Mysore-Bombay and Hyderabad-Bombay borders.

**Figure B.3: Village polygons Mysore-Bombay-Hyderabad**



*Note:* The map is constructed using GIS village polygons of the 2001 Indian Census.

## C Summary Statistics of the Dependent Variables

Table C.1: Summary Statistics for the Dependent Variables. Bandwidth=20km around Mysore-Bombay Border

Statistic	N	Mean	St. Dev.	Min	Max
Health Centers	1,158	0.231	0.422	0	1
Paved Roads	1,158	0.845	0.362	0	1

Table C.2: Summary Statistics for the Dependent Variables. Bandwidth=20km around Hyderabad-Bombay Border

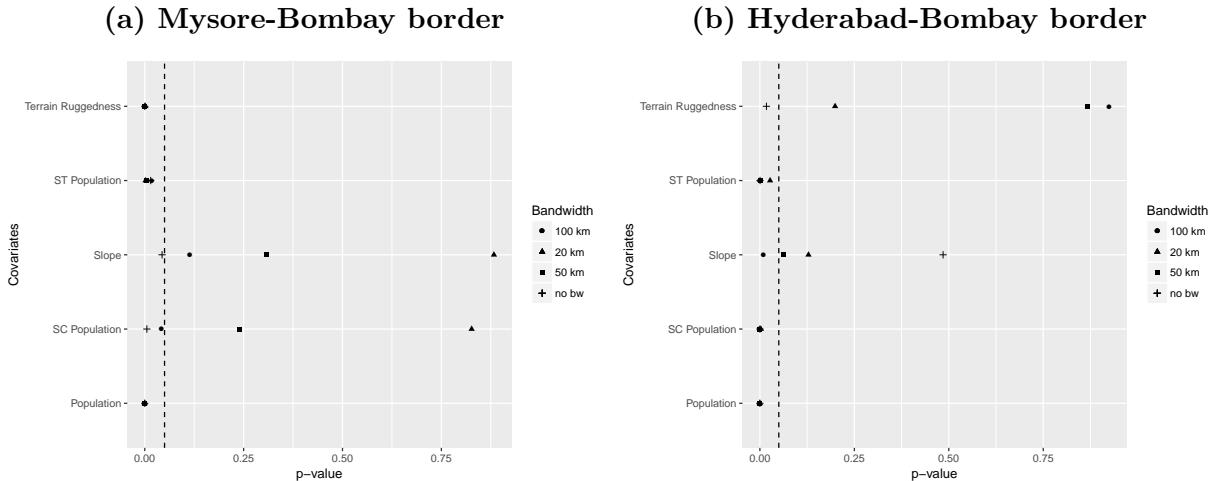
Statistic	N	Mean	St. Dev.	Min	Max
Health Centers	940	0.280	0.449	0	1
Paved Roads	940	0.878	0.328	0	1

## D Balance Tests

Figure D.1 shows balance tests for the chosen covariates. The imbalance in terrain ruggedness can be explained by the differences in elevation. To adjust for potential geographic heterogeneity, I control for the slope which is balanced across the border.

Additionally, I observe some imbalance in the population characteristics, particularly in scheduled castes and scheduled tribes population. These are generally the economically poor population groups. Figure D.1 indicates that scheduled castes population is balanced only for Mysore-Bombay border at twenty kilometers and fifty kilometers bandwidths; the rest of the variables are not balanced. This demonstrates the existence of a population variability across the border. However, I argue that the creation of the borders is exogenous to the socio-economic status of the territories, and is defined by exogeneity in the conflict and in the annexation process. Moreover, tables D.1 and D.2 provide evidence that the indirectly ruled territories on average have less scheduled castes and scheduled tribes population. That helps to rule out a mechanism that the negative effect on the provision of public goods in the indirectly ruled areas can be explained by the economic poverty of these territories.

**Figure D.1: Balance Tests of pre-treatment covariates around the borders**



*Note:* Figures present p-values. P-values are calculated for the null hypotheses about the absence of statistical differences between the covariates' means. Different symbols correspond to different bandwidths around the border. The dashed line shows a cutoff of p-value = 0.05.

**Table D.1: Balance Tests for Mysore-Bombay border (Bandwidth=20km)**

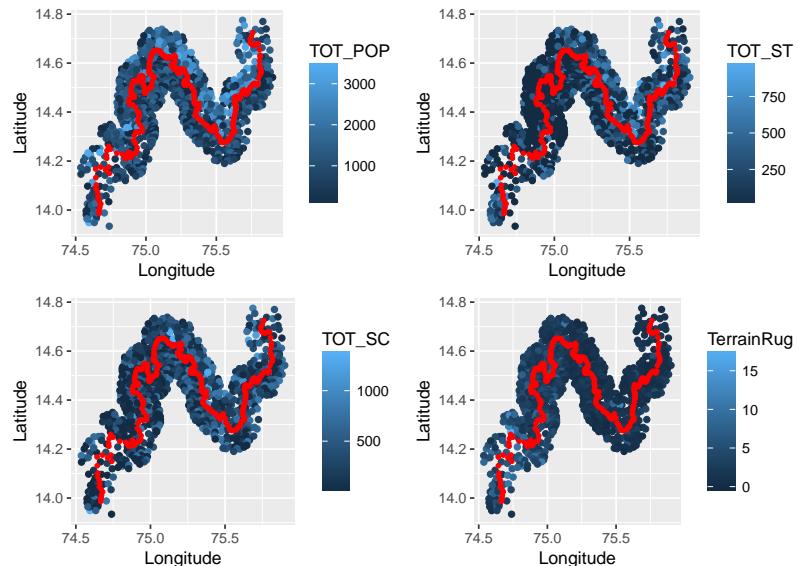
	Mean Tr	Mean Cont	T-Test P.Value
Total Population	844.766	1,445.905	0
Total Scheduled Castes Pop	278.085	282.091	0.827
Total Scheduled Tribes Pop	160.096	206.048	0.002
Slope	88.837	88.740	0.883
Terrain Rugness	2.312	2.755	0.002

**Table D.2: Balance Tests for Hyderabad-Bombay border (Bandwidth=20km)**

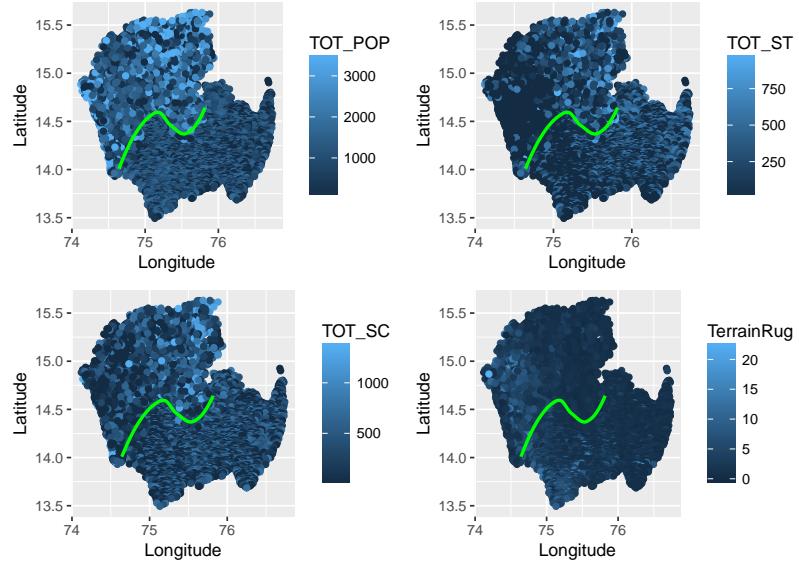
	Mean Tr	Mean Cont	T-Test P.Value
Total Population	1,385.179	1,669.790	0.00002
Total Scheduled Castes Pop	354.623	423.661	0.003
Total Scheduled Tribes Pop	248.146	210.045	0.027
Slope	88.702	87.302	0.129
Terrain Rugness	1.130	1.206	0.199

## E Additional Balancing

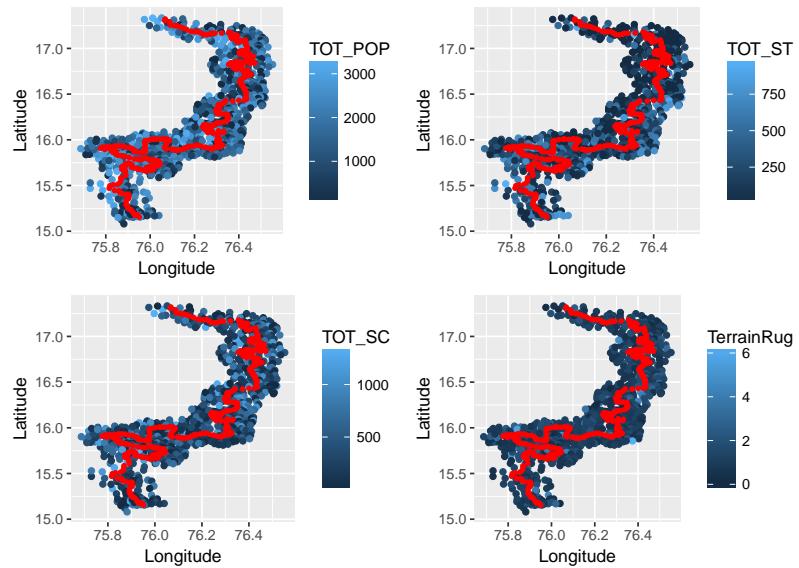
**Figure E.1: Covariates distribution across Mysore-Bombay Border (bw=20 km)**



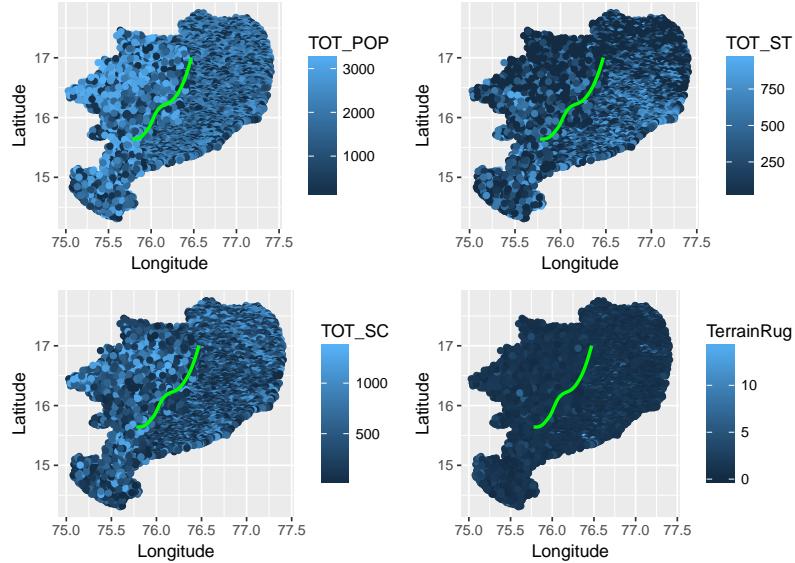
**Figure E.2: Covariates distribution across Mysore-Bombay Border (bw=200 km)**



**Figure E.3: Covariates distribution across Hyderabad-Bombay Border (bw=20 km)**



**Figure E.4: Covariates distribution across Hyderabad-Bombay Border (bw=200 km)**



## F Alternative Specification

**Table F.1: OLS Estimation of the Indirect Rule on the Public Goods Outcomes controlled for the Cubic Polynomial (bandwidth=20 kilometers)**

	<i>Dependent variable:</i>			
	Health Centers (1)	Paved Roads (2)	Health Centers (3)	Paved Roads (4)
Indirect Rule (Mysore)	-0.001 (0.011)	-0.126*** (0.035)		
Indirect Rule (Hyderabad)			-0.093*** (0.021)	-0.009 (0.073)
Constant	-46,305.380 (47,332.330)	-49,469.980 (40,972.960)	-96,428.040 (60,642.290)	-57,746.760 (53,923.800)
Controls	✓	✓	✓	✓
Observations	1,158	1,158	940	940

*Note:* \* $p<0.1$ ; \*\* $p<0.05$ ; \*\*\* $p<0.01$ . Robust standard errors clustered on districts are in the parentheses. Models 1 and 2 show the results for the effect of indirect rule on the Mysore-Bombay border, and models 3 and 4 present results for the effect of indirect rule on Hyderabad-Bombay border. All models are controlled for the cubic polynomial of the latitude and longitude, slope, terrain ruggedness, total population, scheduled castes and scheduled tribes population.

## G Alternative Estimation

The existing literature is skeptical about linear estimation of the spatial regression discontinuity models, because it evaluates the average effect alongside the border (Keele and Titiunik, 2015). Here I provide a non-parametric estimation, which helps to identify the potential heterogeneous effects and take them into account in the estimation of an average treatment effect. Table G.1 demonstrates the results of this estimation.<sup>1</sup> Here the border is presented as a set of points, and the estimated effect is the mean of the average treatment effects at each of these points. The results show a consistent negative effect of indirect rule without any heterogeneity between princely states and between different types of public good.

**Table G.1: Non-Parametric Estimation of the Indirect Rule Effect on Public Goods Outcomes**

Mysore-Bombay Border	Outcomes	Coefficient	Lower CI Bound	Upper CI Bound
	Health Centers	-0.046	-0.059	-0.034
	Paved Roads	-0.173	-0.187	-0.158
<hr/>				
Hyderabad-Bombay Border	Outcome	Coefficient	Lower CI Bound	Upper CI Bound
	Health Centers	-0.119	-0.129	-0.108
	Paved Roads	-0.019	-0.038	-0.0004

*Note:* Coefficients show the average effects of indirect rule on the availability of health centers and paved roads across the border points. They were calculated using the bootstrap technique from the coefficients estimated on the set of points alongside the border. CI stands for the 95% confidence intervals for the estimated average effects across the border points, also calculated using a bootstrap technique.

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<sup>1</sup>For the estimation of the treatment effects on each point of the border, I used the methodology offered by Keele and Titiunik (2015). Confidence intervals were constructed using a bootstrap method (Larget, 2014).

## H Alternative Bandwidths

**Table H.1: OLS Estimation of Indirect Rule Effect on Public Goods Outcomes (50 km bandwidth)**

	<i>Dependent variable:</i>			
	Health Centers		Paved Roads	
	(1)	(2)	(3)	(4)
Indirect Rule (Mysore)	-0.024 (0.028)	-0.119*** (0.036)		
Indirect Rule (Hyderabad)			-0.061*** (0.022)	0.008 (0.061)
Constant	-6.162** (2.876)	-2.865 (2.147)	7.196* (4.344)	7.311 (4.494)
Controls	✓	✓	✓	✓
Observations	2,525	2,525	1,849	1,849

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Robust standard errors clustered on districts are in the parentheses. Models 1 and 2 show the results for the effect of indirect rule on the Mysore-Bombay border, and models 3 and 4 present results for the effect of indirect rule on Hyderabad-Bombay border. All models are controlled for the latitude and longitude, slope, terrain ruggedness, total population, scheduled castes and scheduled tribes population.

**Table H.2: OLS Estimation of the Indirect Rule on the Public Goods Outcomes controlled for the Cubic Polynomial (bandwidth=50 kilometers)**

	<i>Dependent variable:</i>			
	Health Centers		Paved Roads	
	(1)	(2)	(3)	(4)
Indirect Rule (Mysore)	0.002 (0.007)	-0.119*** (0.013)		
Indirect Rule (Hyderabad)			-0.095*** (0.019)	0.0002 (0.074)
Constant	-2,796.069 (12,968.610)	28,425.830 (24,687.170)	-29,929.680* (18,083.590)	-7,973.379 (43,530.970)
Controls	✓	✓	✓	✓
Observations	2,525	2,525	1,849	1,849

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Robust standard errors clustered on districts are in the parentheses. Models 1 and 2 show the results for the effect of indirect rule on the Mysore-Bombay border, and models 3 and 4 present results for the effect of indirect rule on Hyderabad-Bombay border. All models are controlled for the cubic polynomial of the latitude and longitude, slope, terrain ruggedness, total population, scheduled castes and scheduled tribes population.

# I Placebo Tests

**Table I.1: Placebo Tests for Mysore-Bombay Border**

<i>Dependent variable:</i>				
	Health Centers -10 km	Paved Roads (1)	Health Centers (2)	Paved Roads +10 km
Placebo Indirect Rule	−0.051 (0.032)	0.001 (0.027)	0.006 (0.007)	0.033 (0.021)
Constant	−8.571*** (0.474)	−8.057*** (2.923)	−9.155 (5.599)	−0.148 (0.970)
Controls	✓	✓	✓	✓
Observations	1,014	1,014	1,110	1,110

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Robust standard errors clustered on districts are in the parentheses. Models 1 and 2 show the results for placebo border that is -10 kilometers (closer to the princely state) from the original Mysore-Bombay, and models 3 and 4 show the results for placebo border that is +10 kilometers (further to the princely state) from the original Mysore-Bombay. All models are controlled for latitude, longitude, slope, terrain ruggedness, total population, scheduled castes and scheduled tribes population.

**Table I.2: Placebo Tests for Hyderabad-Bombay Border**

<i>Dependent variable:</i>				
	Health Centers -10 km	Paved Roads (1)	Health Centers (2)	Paved Roads +10 km
Placebo Indirect Rule	−0.009 (0.041)	−0.013 (0.028)	−0.052*** (0.011)	0.010 (0.020)
Constant	−2.010 (3.585)	8.087*** (1.776)	23.063** (10.229)	1.711 (8.803)
Controls	✓	✓	✓	✓
Observations	740	740	819	819

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01. Robust standard errors clustered on districts are in the parentheses. Models 1 and 2 show the results for placebo border that is -10 kilometers (closer to the princely state) from the original Hyderabad-Bombay, and models 3 and 4 show the results for placebo border that is +10 kilometers (further to the princely state) from the original Hyderabad-Bombay. All models are controlled for latitude, longitude, slope, terrain ruggedness, total population, scheduled castes and scheduled tribes population.

## J Alternative Mechanisms

The long-term effects can be explained by physical or cultural persistence. Public goods that were provided during the colonial times can be used and expanded in a certain capacity today, which forms physical persistence. At the same time historical experience may result in a greater propensity to maintain and improve these goods, which would indicate cultural persistence. In the main part of the paper, I show that the driving mechanism of long-term effects of indirect rule was physical persistence. Here I provide some empirical evidence that allows me to rule out cultural persistence as a potential alternative mechanism.

Cultural persistence mechanism suggests that differences between the leaders in directly and indirectly ruled areas created differences in the local populations' mobilization activity and their propensity to carry out collective actions.<sup>2</sup> Poor incentives of the local leaders and population apathy in the princely states built a lack of interest in collective action, which led to the lack of mobilization. Direct rule, on the contrary, pushed the local population to unite in the face of a common enemy – colonizer's authority, and to mobilize against it. Historians show that people in the Bombay region had myriad grievances driven by the presence of colonizers and their extraction interests ([Ramaswamy and Patagundi, 2007](#)). Although there is evidence that certain norms, like collective action ability and local cooperation, or certain attitudes towards authorities were preserved even in post-colonial times ([Wucherpfennig, Hunziker and Cederman, 2016](#); [Lowes et al., 2017](#); [Dell, Lane and Querubin, 2018](#)), I argue that in this case cultural persistence is not the main mechanism that explains long-term effects on contemporary public goods heterogeneity.

People in the directly ruled territories had less trust of local leaders. That enhanced the collective action and more efficient mobilization capacity. Local population in the indirectly ruled areas, on the contrary, had more trust of local leaders, which led to a lack of mobiliza-

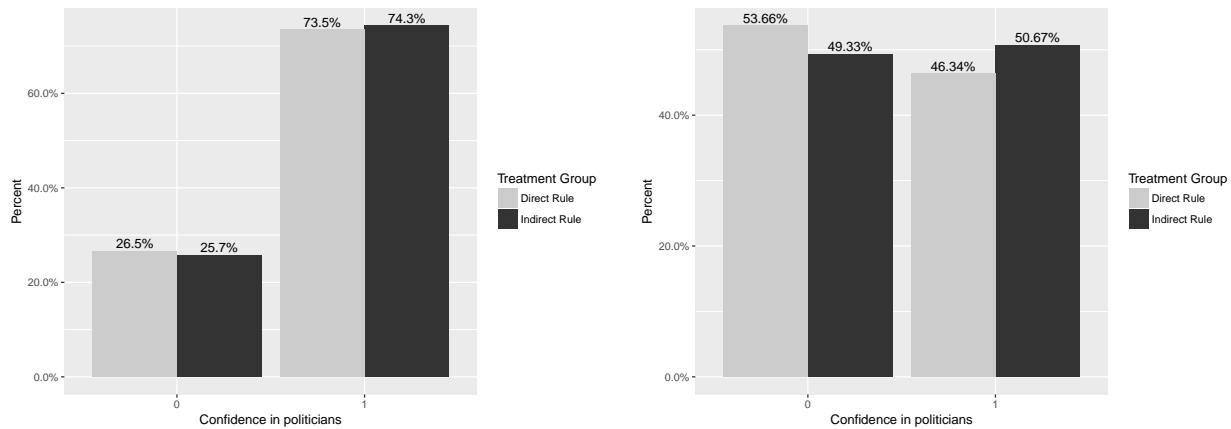
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<sup>2</sup>[Lawrence \(2013\)](#) cites [Hechter \(2000\)](#) and says that “direct rule prompts nationalist mobilization, but indirect rule thwarts nationalism because it reduces the demand for sovereignty and raises the costs of collective action”.

tion against these leaders and absence of any potential collective actions. Cultural persistence mechanism will argue that these trust attitudes on both sides of the former borders persist today and affect the ability of the local population to be vocal with their authorities and demand public goods provision. To see whether the persistence of trust holds through the

**Figure J.1: Indian Human Development Survey Results**

(a) First Wave of the Survey (2005)      (b) Second Wave of the Survey (2011-2012)



*Note:* The charts are based on the individual survey data and present the survey results only for the districts of Karnataka that were used in the baseline results. For confidence level, the category 1 was constructed with the aggregation of responses - "A great deal" and "Only some" for 2005 wave, and "A great deal of confidence" and "Only some confidence" for 2011-2012 wave. Category 0 means "Hardly any confidence". The first wave of the survey (2005) consisted such options for the respondents as "Don't know", "Valid blank", "Valid skip", and "-". Dropping of the "Don't know" category could have impacted the results of the first wave. The exact question in the survey was the following: "I am going to name some institutions in the country. As far as the people running these institutions are concerned, would you say you have confidence in politicians to fulfill their promises?".

time, I provide the results for the two waves of the Indian Human Development Survey: wave of 2005<sup>3</sup> and wave of 2011-2012<sup>4</sup>. Figure J.1 presents the summary of the responses about confidence in politicians to fulfill their promises.<sup>5</sup> I choose respondents from the districts of Karnataka that are used in the baseline models, identifying the districts of the former princely states as the treatment group and the districts of the British province as the control group. These figures show that, in both time periods, there is no significant differences

<sup>3</sup>Data is available at the ICPSR website: <https://www.icpsr.umich.edu/icpsrweb/DSDR/studies/22626>.

<sup>4</sup>Data is available at the ICPSR website: <https://www.icpsr.umich.edu/icpsrweb/DSDR/studies/36151>.

<sup>5</sup>Here I grouped the three-level scale of the responses to a binary measure.

between confidence in politicians in both former directly and indirectly ruled territories. It indicates that even if the variation in trust and confidence in authorities attitudes existed back during the colonial times, it does not hold today. This helps to eliminate a cultural persistence mechanism and point towards the original physical persistence explanation.

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