Long-Run Effects of Colonial Land Redistribution: Evidence from India

Kartikeya Batra

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Motivation

- Historically, **global dominance of agrarian sector** made land an important asset
- Across countries, land ownership was concentrated in the hands of a **few elite**
  - **Significant overlap** between traditional social elite status and land ownership
- **As a result,** in recent decades, several countries have implemented land redistribution policies

Motivation

- **Land redistribution** benefits direct beneficiaries of land, but may also benefit non-beneficiaries
  - **Literature** finds positive socio-economic effects of redistribution on beneficiaries (Finan et al., 2005)
  - **However,** evidence on non-beneficiaries (indirect effects) is mixed (Faguet et al., 2020)
- **Ambiguity** in indirect effects consistent with ambiguous effects of land concentration among elite
  - Higher provision of public goods (Dell, 2010), Obstruction of redistribution (Anderson et al., 2015)
- **Missing Piece in the Puzzle:** Why this ambiguity?

This Paper

- What is the long-run socio-economic impact of **land redistribution**?
  - Estimate impact of **colonial land redistribution** on wealth, human capital, economic activity in India
  - **Estimate** treatment effects by beneficiary/non-beneficiary status
  - What is the role of norms related to **traditional social hierarchies** behind persistence?
- **Empirical Challenges:**
  - **Cross-country/state reforms**: Exploit intra-state variation in colonial land redistribution (1820s)
  - **Microdata?:** Village-level data for >100K villages; novel historical data at sub-district level
  - **Identification of beneficiaries/non-beneficiaries?:** Proxied for by household caste group
  - **Data on hierarchies and norms?:** Field survey in 189 villages; N=2,038 HHs

Contribution to Literature

- Impact of **land redistribution** (Finan et al., 2005; Mendola & Simtowe, 2015; Faguet et al., 2020)
  - **This Paper:** Long-run effects of redistribution on beneficiaries (direct) and non-beneficiaries (indirect)
  - Long time horizon allows estimation of effects on social norms as channel of persistence
- **Long-run** effects of land concentration (Engerman & Sokoloff, 1994; Dell, 2010; Banerjee & Iyer, 2005)
  - **This Paper:** Micro-evidence to identify long-run effects of (dilution of) land concentration (in India)
  - **Novel Microdata:** Decomposition of overall effects by level of historical social status
  - **Field Survey Data:** Exploration of adherence to social norms as potential channel of persistence

State of Uttar Pradesh: Setting for Natural Experiment

- **India's most populous state**, ∼200 million people (2011)
- **Social fragmentation** along caste lines; amongst poorest states ◂ Caste System

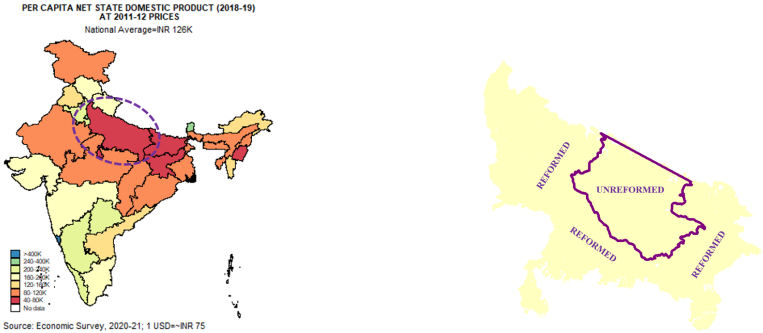
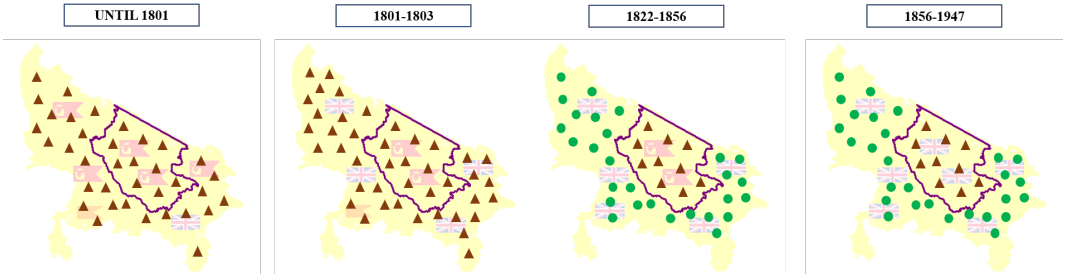


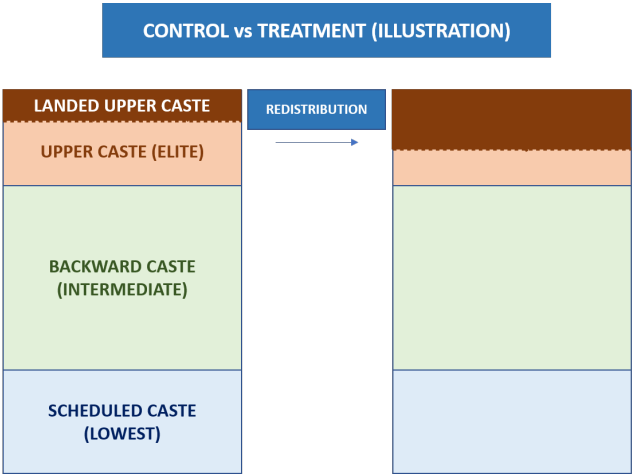
Figure: State of Uttar Pradesh and Intra-State Variation

Context: Land Redistribution in India's Most Populous State (1820s)

- **Pre-colonial state:** An aristocratic agrarian society; land controlled by elite revenue farmers
- **State annexed** by the British in two major phases beginning 1800s
- **1820s:** In ∼**77%** area, land redistribution (treatment)→Bigger landed community
- **1850s:** Existing **revenue farmers** declared as landowners (control) in remaining areas Timeline



Context: In Both Areas, Social Elite Remained Primary Landowners



Context: Plausibly Exogenous Variation Across Boundary

- **British** planned to implement redistribution in control areas; plan rescinded due to political reasons
- **Exploit boundary** to conduct spatial RD within narrow bandwidth around border (Pandey, 2010)
- **Boundary's History:** Pre 18th Century | Treaty of Oudh (1801) | Rohillas on the Western Boundary

Empirical Strategy

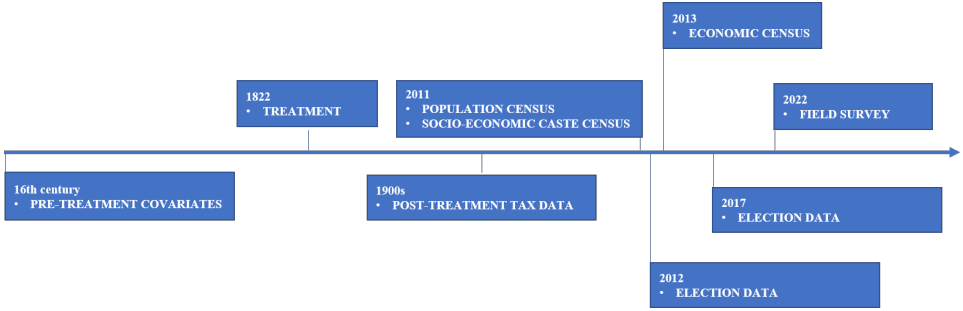
- Spatial RD with **local linear polynomial** in dist. to border (Cattaneo et al., 2019)
- Divide border into **25 segments**; control for segment fixed effects (Dell at al., 2018)
- **Specification:**

$$y_{v,z,s} = \alpha + \beta ReformedArea_{v,z,s} + f(Location_{v,z,s}) + \gamma \sum_{i=1}^{4} DistHistCities^{i}_{v,z,s} + \eta_s + \theta_z + \Psi X_{v,z,s} + \epsilon_{v,z,s} \quad (1)$$

  - $y_{v,z,s}$ are outcomes for village v in agro-climatic zone z along segment s
  - $ReformedArea_{v,z,s}$ equals 1 if village within reformed area, 0 otherwise
  - $f(Location_{v,z,s})$ is local linear polynomial in distance to border
  - $\sum_{i=1}^{4} DistHistCities^{i}_{v,z,s}$ are the distances of village v from four historically important cities
  - η_s and θ_z are segment and agro-climatic FE respectively
  - $X_{v,z,s}$ are village-level controls (geographic, location, climate)
  - Standard errors clustered at the district-segment level in main specification

Data

- **Main Outcomes:** HH assets (PC 2011), Schooling (SECC 2011), Econ. Establishments (EC 2013)
- **Social Norms:** Election data (2012-17), Field survey data (2022)
- **Historical Data:** Ain-i-Akbari ($16^{th}c.$), Colonial Gazettes (19^{th} c.)
- **Bioclimatic and Geographical Variables (raster files):** Fick & Hijmans (2017), ISRIC (2015), NRLP



Main Results

- **Redistribution** led to better socio-economic outcomes; unreformed areas lagged behind ◂ Asset Index
  - **Treatment effects** in the range of 6-75% of control mean
  - ◂ Balance Checks ◂ Migration Concerns ◂ Robustness to 16^{th} c. Covariates and Other Checks

Table: Village Level Socio-Economic Indicators (2011)

	(1) Average Asset Ownership Index	(2) Economic Establishments Per 100 People	(3) Log Avg Years of Schooling
Reformed Area=1	0.307***	1.067***	0.063*
	(0.116)	(0.161)	(0.035)
Anderson p-Value	[0.011]**	[0.001]***	[0.026]**
Control Mean	4.94	1.41	4.28
Bandwidth	10 km	10 km	10 km
N	10412	10384	9862

Robust standard errors in parentheses

*p<0.10, **p<0.05, ***p<0.01

Local linear regression coefficient estimated using triangular kernels. Winsorized outcomes (1 per cent on both sides, if not in log terms) used. Specifications control for geographic covariates, segment and agro-climatic zone fixed effects. Standard errors clustered at the district-segment level.

Distribution of Treatment Effects: By Beneficiary Status

- **Ideally, decomposition** of treatment effects requires data on beneficiary status of households
- **No data** on who received land parcels (beneficiaries)
- **Potential Solution:** Use **HH caste** as proxy for beneficiary status
  - **Upper/Elite Caste:** Primary Beneficiaries
  - **Lowest Castes:** Non-Beneficiaries

Distribution of Treatment Effects: By Beneficiary Status

- **Upper/Elite Caste:** Beneficiaries (positive effects, although uncertainty due to data constraints)
- **Lowest Castes:** Non-Beneficiaries (unambiguous positive effects)

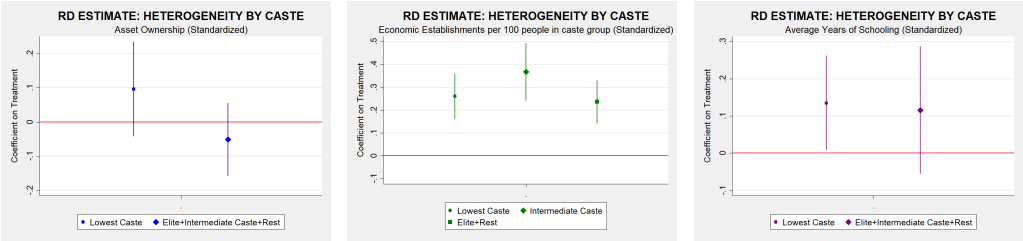


Figure: Heterogeneity by Beneficiary Status

Research Questions: Summary

- What is the long-run socio-economic impact of **land redistribution**?
  - Estimate impact of **colonial land redistribution** on wealth, human capital, economic activity in India
    - Overall positive average effects on all outcomes
  - **Estimate** treatment effects by beneficiary/non-beneficiary status
    - Unambiguous positive average effects on non-beneficiaries

Dilution of Pro-Elite Norms as Potential Mechanism?

- In **both** areas, majority land was held among upper caste HHs ◂ Historical Land Ownership by Social Group
  - **Caste system** prescribes lower education and low-quality jobs for non-elite
- **Stokes (1983):** Landlords in treatment areas less hegemonic (smaller landholdings, land divisions)
- **Lower Elite Hegemony→Dilution of Pro-Elite Caste-based Norms?**
- **Did colonial land reforms** change non-elite's attitude towards caste-based norms?
  - **Field survey** across 189 villages (2,038 HHs) ◂ Representativeness (C) ◂ Representativeness (T)
  - **Respondents** asked about caste-based economic belief systems ◂ Survey Design ◂ Survey Questions
  - **Spatial RD** estimation using baseline specification, with respondent controls and appropriate weights

Dilution of Pro-Elite Norms as Potential Mechanism?

- **Reforms** led to lower adherence to caste-based belief systems among non-elite (∼12%)
- **Also led** to higher aspirations among non-elite; 28.6% less likely to aspire for low-quality job
  - Optimal aspirations lead to higher investments (Genicot & Ray, 2017) Causal Chain

Table: RD Estimates: Socio-Economic Aspirations (Binary Variables, unless specified otherwise)

			Should Caste system be changed?		
	(1) Index of Caste-Based Stereotypes (Scale 1-5)	(2) Low Quality Job Aspiration for Son (Binary)	(3) Desire for Any Change (Scale 1-3)	(4) Desire for Any Change	(5) Desire for Radical Change
Reformed Area=1	-0.290*	-0.149*	0.171**	0.078*	0.093*
	(0.161)	(0.086)	(0.078)	(0.042)	(0.051)
Sample	Non-Elite	Non-Elite	Non-Elite	Non-Elite	Non-Elite
Control Mean	2.47	.52	2	.87	.13
Bandwidth	10 km	10 km	10 km	10 km	10 km
N	1801	1492	1792	1792	1792

Robust standard errors in parentheses

*$p<0.10$, **$p<0.05$, ***$p<0.01$

Theoretical Framework: Role of Elites

- **Theoretical guidance** on dilution of norms among non-elite
- **Forward looking dynamic PE model** by Acemoglu & Robinson (2006)
  - **Elites'** attitude towards socio-economic change governed by trade-off between loss of power and probability of replacement
  - **Elites** accommodate change to status quo if political rents are low, competition is high
- **In treated areas,** higher competition among landlords, lower political rents
  - **Model**→Elites in treatment areas more likely to accept dilution of norms; those in control areas more likely to make efforts to block dilution
- **Empirical Evidence**→Upper caste elite in control areas more accommodating of non-elite
  - ◂ Water Sharing ◂ Ultimatum Game ◂ Election Candidate Selection
  - Cooperative tactics as means to control non-elite (Acemoglu et al., 2014; Anderson et al., 2015))

Other Channels of Persistence

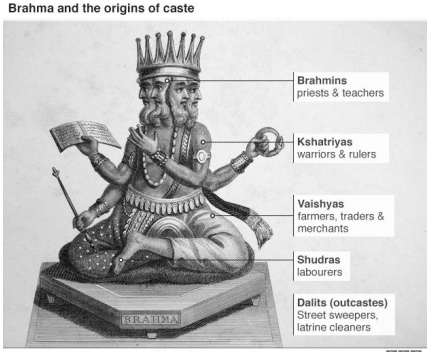
- **Divergent** policy priorities? (Banerjee & Iyer, 2005)
  - **Ruled out:** Intra-state analysis rules out differences in policy legislation
- **Persistence** due to continued legal hegemony of elite? (Acemoglu et al., 2014)
  - **Ruled out:** No such provisions in India
- **Differential** quality of post-independence governance?
  - **Not ruled out:** Positive treatment effects on quality of public goods in this area (Pandey, 2010)
- **Differential treatment** by colonial government?
  - **Plausible?:** Coefficients stable after inclusion of newly compiled data on colonial tax, school infrastructure and attendance, market activity, although significance affected ◂ Robustness

Conclusion

- **Exploiting** intra-state policy experiment from early 19^{th} century India, I estimate long-run causal effects of land redistribution
- **Spatial RD** estimates→Two centuries after policy, reformed areas witness better socio-economic outcomes
- **Treatment** impacted both direct beneficiaries and non-beneficiaries
  - **Unambiguous, positive** effects on non-beneficiaries **(indirect effects)**
- **Channel of Persistence (indirect effects):** Adherence to pro-elite norms among non-elite (survey data)
  - **Results**→Reforms led to lower adherence to traditional economic restrictions among non-elite
  - **Possibly** because redistribution led to bigger elite group, and lower political hegemony per elite

Appendix

India's Caste System



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Field Survey: Overview

- **Three-Stage Randomization Design** with final coverage of 189 villages (vs targeted 200 villages)
  - **Village→Hamlet→Household**



Figure: Field Survey: Uttar Pradesh (Summer 2022)

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Field Survey: Sampling Design

- **Within a bandwidth of 10 km around each segment,** 2 strata on either side
  - **0-5 km:** Four villages selected within this bandwidth (2 T+2 C)
  - **5-10 km:** Four villages selected within this bandwidth (2 T+2 C)

Choice of Hamlet | Representativeness: Unreformed Areas | Representativeness: Reformed Areas

- **Target:** 12 HHs per village (6 Lowest Caste+6 Elite/Intermediate)

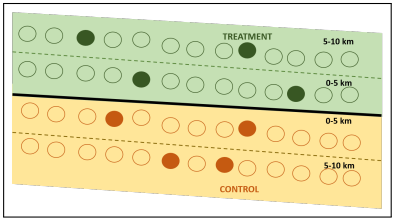

Figure: Randomization Design: First Stage (Zooming into One Segment)

Field Survey: Sampling Design

- **In single hamlet villages,** sampling done using right-hand rule in entire hamlet
- **In multi-hamlet villages,** following strategy used before using right-hand rule

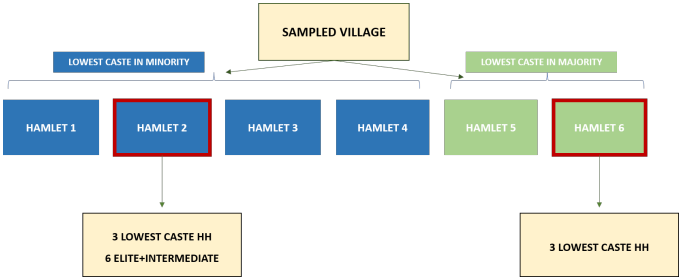

Figure: Randomization Design: Second and Third Stages

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Balance Checks

- **Validity of RD:** Should satisfy continuity assumption (nothing else changes discontinuously at c=0)

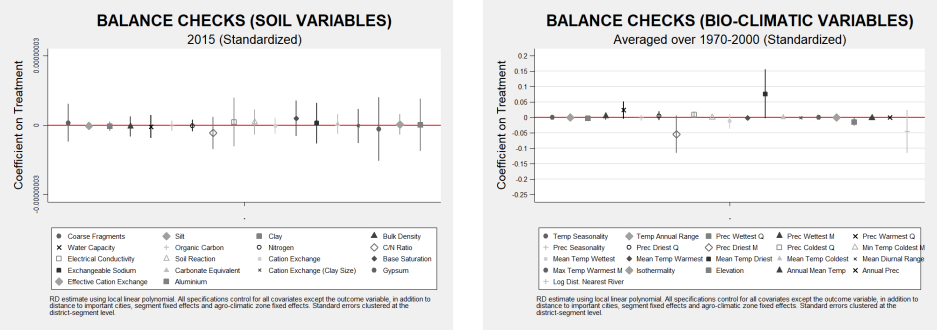

Figure: Balance Checks

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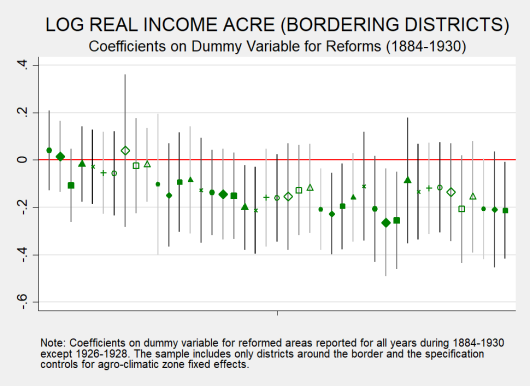
Higher Income led to Dilution of Norms?



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Hamlet Structure: Treatment Effects

- **Ahmed (1952), Baden-Powell (1894):** Higher caste-based residential segregation in unreformed areas
- **Persistent** causal effects of redistribution on village structures (lower segregation)

Table: RD Estimate: Village Level Structure (2018)

	(1) Log Village Area	(2) Log Population Density	(3) Log No. of All Habitations	(4) No. of Habitations with no SC/ST	(5) No. of SC/ST Dominated Habitations
Elite Dilution=1	-0.232***	0.005	-0.302***	-0.424*	-0.172**
	(0.053)	(0.052)	(0.086)	(0.232)	(0.074)
Control Mean	197.21	8.77	3.83	1.48	.76
Bandwidth	10 km	10 km	10 km	10 km	10 km
N	11024	10378	9539	9539	9539

Robust standard errors in parentheses

*p<0.10, **p<0.05, ***p<0.01

Local linear regression coefficient estimated using triangular kernels. Specifications control for geographic covariates, segment and agro-climatic zone fixed effects. Standard errors clustered at the district-segment level.

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Balance Checks: Other Unobservable Differences?

- **Check if the treatment region** was under any other kingdom/empire at any other time in history
- **Joppen (1914)** chronicles different Indian kingdoms/empires across centuries
- **Across most snapshots in time**, both control and treatment areas seem to be under the same ruler
  - **250 BC**
  - **2nd Century AD**
  - **350 AD**
  - **6th Century AD**
  - **7th Century AD**
  - **1022 AD**
  - **1236 AD**
  - **1318 AD**
  - **1525 AD**
  - **1605 AD**
  - **1700 AD**
  - **1751 AD**

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Balance Checks: Other Unobservable Differences?

- **However,** the 1398 snapshot suggests that southern boundary of land tenure system (right) matches boundary of the Jaunpur Kingdom (1394-1479, left)
- **As a robustness check,** I test main results by omitting this southern boundary; results are robust

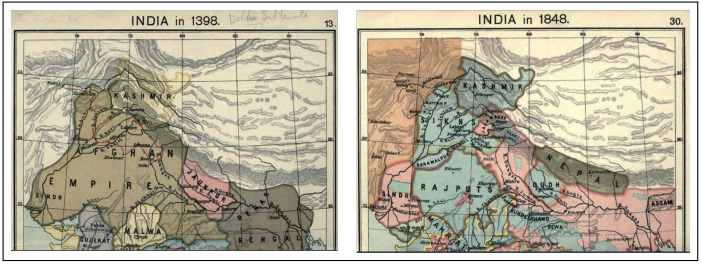

Figure: Jaunpur and Oudh Boundaries

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Migration Dynamics: 1881 Census

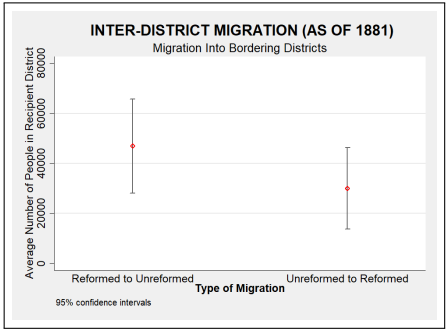

Figure: Inter-District Migration

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Weights Used for Survey Data (RD Estimates)

- **In each segment**, 2 villages were selected; from both villages, SC and non-SC respondents surveyed
- **Using census data** on SC and non-SC population, calculate average proportion of population of each category within that segment
  - **Example:** In segment A, 25% people are SC and 75% are non-SC
- **Each household's** in-segment weightage equals proportion of their household's category (SC vs non-SC) in the segment divided by number of households from that category in the segment
  - **Example:** In segment A, two villages A1 and A2 were sampled; in village A1, 6 SC and 6 non-SC HHs were surveyed; in village A2, 5 SC and 7 non-SC HHs were surveyed
  - **In-segment weightage:** For each SC HH: (25/11)%=2.2%; for each non-SC HH: (75/13)%=5.7%
- **For the purpose of RD,** the household's final weightage equals product of household's in-segment weightage and the weightage of their village calculated using triangular kernels

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Results Robust to Inclusion of Historical Tax Demands

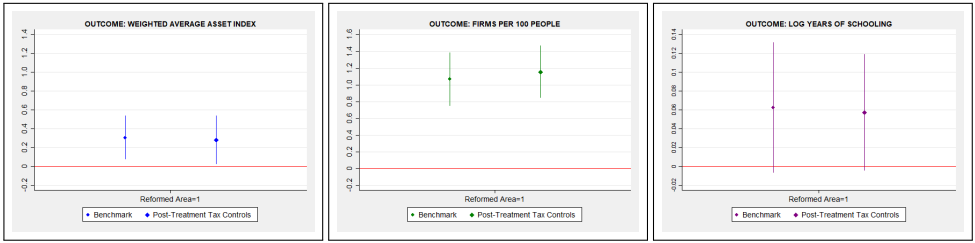

Figure: Main Results with Colonial Tax Demands as Controls

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Results Robust to Inclusion of Colonial Schools and Market Activity

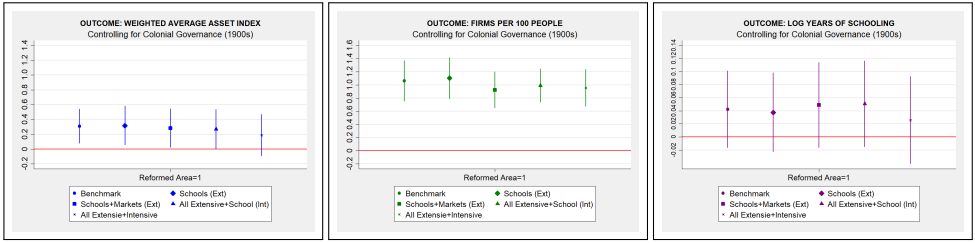

Figure: Main Results with Colonial Schooling and Market Acitivity as Controls

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Graphical Illustration Across Bandwidths (10-25 kilometers)

- **Results not sensitive** to choice of bandwidth

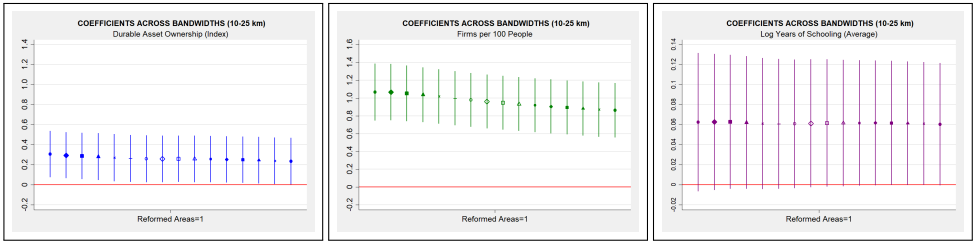

Figure: Main Results Across Bandwidths

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Robustness Checks: Different Kernels

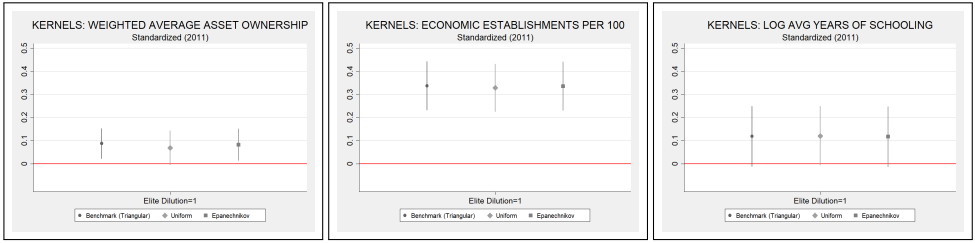

Figure: Robustness: Different Kernels

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Robustness Checks: Different Levels of Clustering

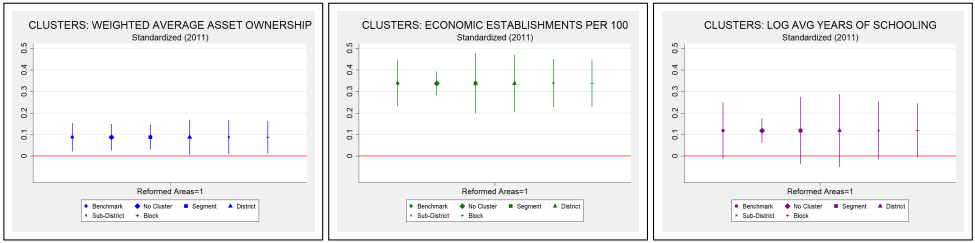

Figure: Robustness: Different Levels of Clustering

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Robustness Checks: Conley S.E. (Uniform Kernel, 10 km Cut-Off)

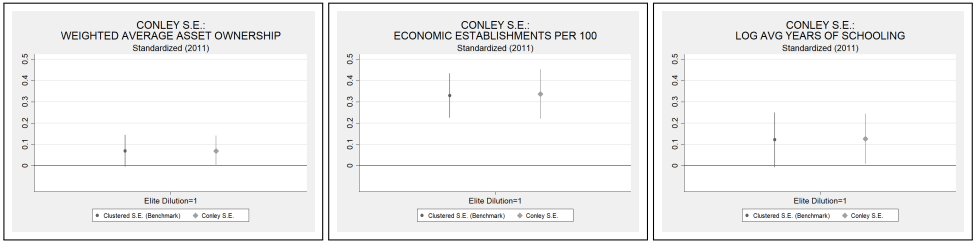

Figure: Robustness: Conley S.E.

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Results Robust to Inclusion of Pre-Treatment Covariates

- Results are **robust** to the inclusion of these controls

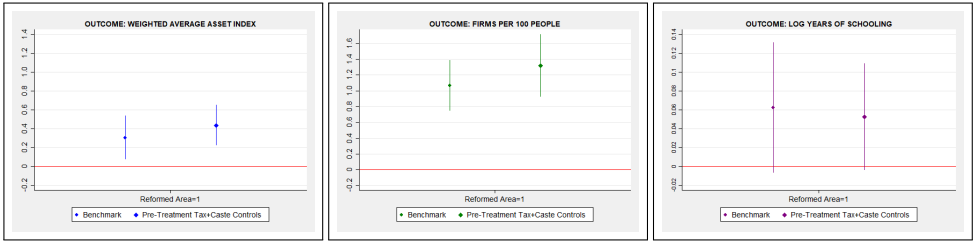

Figure: Main Results with Pre-Treatment Controls

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Robustness Checks: Removal of Southern Boundary/River

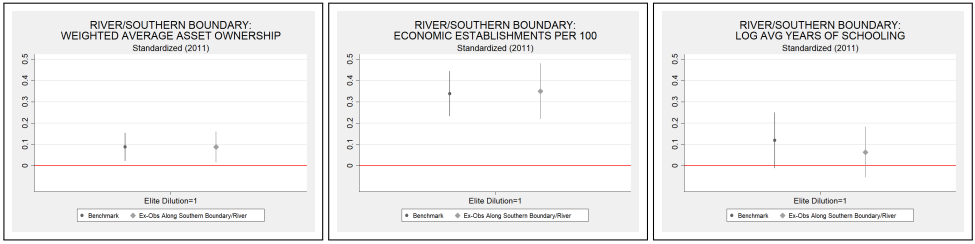

Figure: Robustness: Different Levels of Clustering

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Questions Related to Caste-Based Belief Systems

- **Q.1** On a scale of 1-5, how much do you agree with the following statement:
  1. On the whole, having political leaders from an upper caste is better for the voters.
  2. A university education is more important for a child from an upper caste family than other children in the village.
  3. When jobs (government or private) are scarce, employers should give priority to people of upper caste families.
  4. If Dalit (lowest caste) families earn more money than rest of the village, it's almost certain to cause problems.
  5. One's social status is determined by will of god and last life's deeds, and it should not be challenged.
  6. One's social status is determined by will of god and last life's deeds, but it can be changed.
  7. Families should ideally pursue professions that the varna/caste system dictates.
- **Q.2** What job would you like your son/grandson (<18 years) to take up when he grows up?

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Questions Related to Caste-Based Belief Systems

- **Another question** related to overall opinion towards caste system (World Values Survey, 2017-21)
  - In this question, we will give you three basic kinds of attitudes concerning the caste system. Please choose the one which best describes your own opinion?
    - The entire way our society is organized must be radically changed by revolutionary action
    - Our society must be gradually improved by reforms
    - Our present society must be valiantly defended against all subversive forces

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Result (Direct): Evidence points to Worse Relations in Reformed Areas

- **Redistribution**→ Lower probability of sharing water between elite, non-elite (53%)

Table: RD Estimates: Water Relations

	(1) Well Sharing with Elite (Modal)	(2) Well Sharing with Elite (Modal)
Reformed Area=1	-0.323***	-0.341***
	(0.106)	(0.112)
Level	Village-Caste	Village-Caste
Sample	All Castes	Non-Elite
Control Mean	.68	.64
Bandwidth	10 km	10 km
N	398	353

Robust standard errors in parentheses

*p<0.10, **p<0.05, ***p<0.01

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Result (Indirect): Lower trust between Elite, Non-Elite

- **Redistribution**→ Lower trust between non-elite and elite (∼15-17%) Robustness

Table: Ultimatum Game RD Estimates (Outcome: Weighted Rejection Rate)

	Offers From		
	(1)	(2)	(3)
	All Caste	All UC	Traditional Landowning UC
Reformed Area=1	0.059	0.079*	0.092*
	(0.043)	(0.047)	(0.049)
Sample	Non-Elite	Non-Elite	Non-Elite
Control Mean	.48	.52	.54
Bandwidth	10 km	10 km	10 km
N	1801	1794	1794

Robust standard errors in parentheses

*$p<0.10$, **$p<0.05$, ***$p<0.01$

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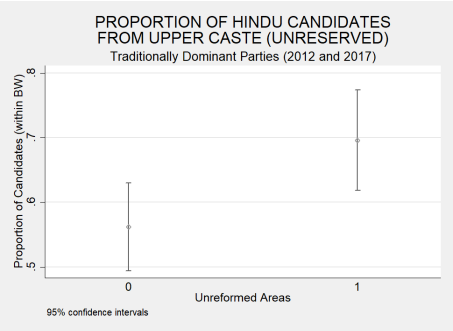
Further Evidence: Elites More Widely Accepted in Unreformed Areas

- **Elite** candidates less likely to be fielded by political parties in reformed areas
  - **Even** by parties set up on non-elite's agenda



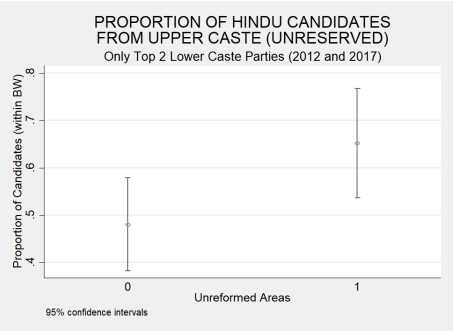


Figure: Candidate Selection (2012 and 2017)

Construction of the Durable Asset Index

- **Population Census of India (2011)** gives data on ratio of HH within village with following assets
  - Car
  - Mobile Phone
  - Fixed Line Phone
  - Two Wheeler (Scooter, Motorcycle)
  - Bicycle
  - Radio
  - Television
- **Asset Index** equals weighted average of these ratios; weight equals average regional price of asset as per National Sample Survey 2011-12
- **Final Weights (INR):** Car (339,944), Mobile (1,906), Fixed Line (1,646), Two Wheeler (49,300), Bicycle (2,674), Radio (1,053), TV (4,358)

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Sample Representativeness (Unreformed Areas)

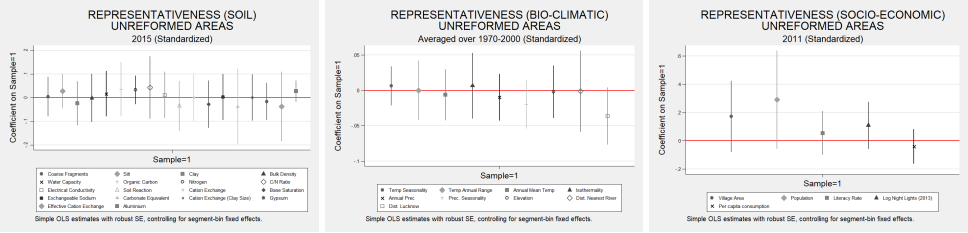

Figure: Sample Representativeness (Elite Dilution=0)

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Sample Representativeness (Reformed Areas)

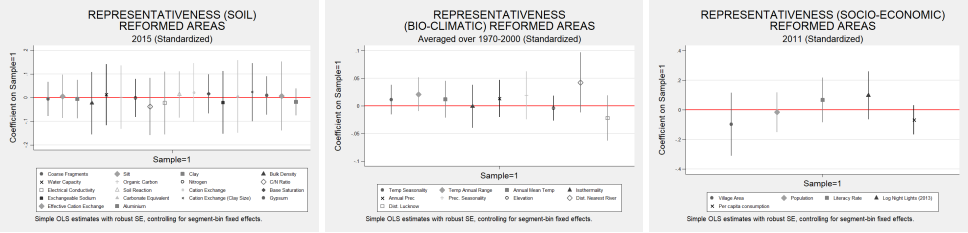

Figure: Sample Representativeness (Elite Dilution=1)

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Land Ownership by Social Groups in 1900s

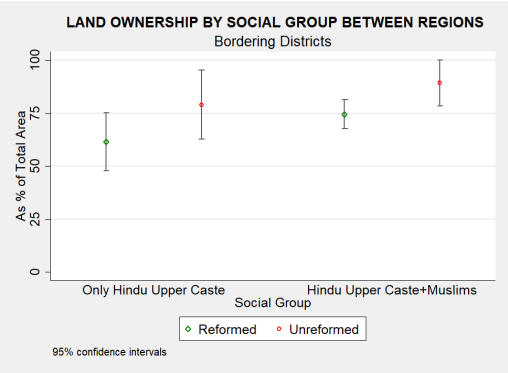

Figure: Land Ownership by Social Group (Source: Colonial Gazettes)

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Treaty of Oudh

Article 1.

His Excellency the Nabob Vizier hereby cedes to the Honourable the East India Company, in perpetual sovereignty, the undermentioned portions of his territorial possessions, amounting in the gross revenue to one crore and thirty-five lakhs of rupees, including expenses of collections, in commutation of the subsidy, of the expenses attendant on the additional troops, and of the Benares and Furruckabad pensions.

Statement of the Jumma.

Chuckla Korah, Kurrah, and Chuckla Etawah				55,48,877 11 9
Kehr and others				5,33,374 0 6
Furrackabad and others				4,50,001 0 0
Khairaghur and others				2,10,001 0 0
Azimghur and others, Azimghur, Mowzaut Bunjun				6,95,624 7 6
Goruckpore and others and Butwul	Goruckpore, etc.	5,09,853 8 0		
	Butwal	40,001 0 0		
				5,49,854 8 0
Soubah of Allahabad and others				9,34,963 1 3
Chuckla Bareilly, Asophabad, and Kelpoory				43,13,457 11 3
Nabob Gunge, Kehly, and others				1,19,242 12 0
Mohoul and others, with the exception of the Talook of Arwul				1,48,378 4 0
Total Jumma, Lucknow Sa. Rs.				1,35,23,474 8 3

Figure: Treaty of Oudh (1801)

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Rohillas on the Western Boundary

- **Despite** similar history until 1700s, on the western boundary separating treatment and control areas, Rohillas emerged after Mughal empire disintegrated
- **However,** in 1770s, that area was annexed by Oudh state
- **In the Treaty of Oudh (1801),** Habib and Habib (2014) suggest that Oudh surrendered Rohila tracts
  - Habib and Habib (2014) mention that some part of southern boundary was also not part of "Old Oudh"
- To address any empirical concerns, I **run robustness check** omitting these boundaries

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The Reform Timeline

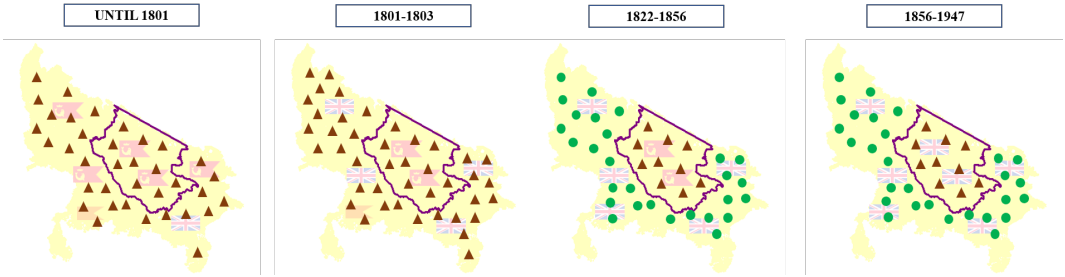

Figure: Reform Process (Triangles: Original System of high land concentration, Circles: Post-Redistribution)

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Land Distribution: Lowest Non-Elite

PERCENTAGE OF LOWEST NON-ELITE HOUSEHOLDS (<10km)				
LANDHOLDING QUINTILE	(1)	(2)	(2)-(1)	p-Value
	UNREFORMED	REFORMED	DIFFERENCE	
Q1 (0-1.32 acres)	85.3%	83.3%	-2.0%	0.00***
Q2 (1.32-2.30 acres)	7.5%	8.8%	1.3%	0.00***
Q3 (2.30-3.65 acres)	3.3%	3.8%	0.5%	0.004***
Q4 (3.65-6.10 acres)	2.6%	2.9%	0.3%	0.03**
Q5 (>6.10 acres)	1.3%	1.1%	-0.2%	0.19