Portuguese Colonial Land Grants in Brazil: Long-term Effects on Inequality and Economic Development

Vinicius Okada da Silva [5th Year]

Committee: **Richard Akresh (Chair), Marieke Kleemans, Felipe Valencia Caicedo (UBC), Mary Arends-Kuenning (ACE)**

Feedback

Motivation

- Inequality in access to land has been .
  - "**Brazil has one of the highest levels of inequality of land distribution in the world** [...] **An estimated 1% of the population owns 45% of all land in Brazil**." (USAID, 2016)
- "The agrarian problem is one of the most serious [Brazil] has, because of the great concentration of land ownership and the low level of utilization by the large and medium property owners" (Oliveira Andrade, 1980, p. 1)

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- How much of economic development and inequality can be traced to colonial institutions?
  - Goal of this research would analyze the effects of colonial Portuguese land grants (*sesmarias*) on long-term development and inequality in Brazil.

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- Proposed Identification:
  - Exploit a 1701 law that banned livestock grazing within 80km of the coast of Brazil.

Possible Channels

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Diagram with History of Land Concessions in Brazil

Diagram with Proposed Channels

Contribution

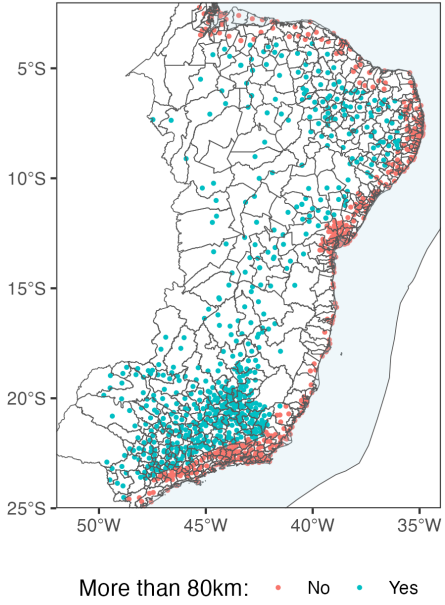
- Role of colonization, institutions, and land tenure in present outcomes:
  - Institutional and Natural Endowments: Acemoglu et al., 2001 (AER), Sokoloff et al., 2000 (JEP).
  - Americas: Naritomi et al., 2012 (JEH), Musacchio et al., 2014 (JEH), Wigton-Jones, 2020 (JEG), Laudares et al., 2022 (WP), Sellars et al., 2018 (JDE), Smith, 2023 (WP)
  - India and Africa: Banerjee et al., 2005 (AER)

Data

- Land Grant Locations:
  - Information on the land grants from the Sesmarias of the Luso-Brazilian Empire Database
- Establish that they had an effect in the past:
  - 1872 Brazilian Census [**Novel Data for 1872 at a Fine Geographical Level**]
- Present-Day Effects on Land Tenure
  - 1995 Brazilian Agricultural Census

1872 Parish Level Information

[New Data]



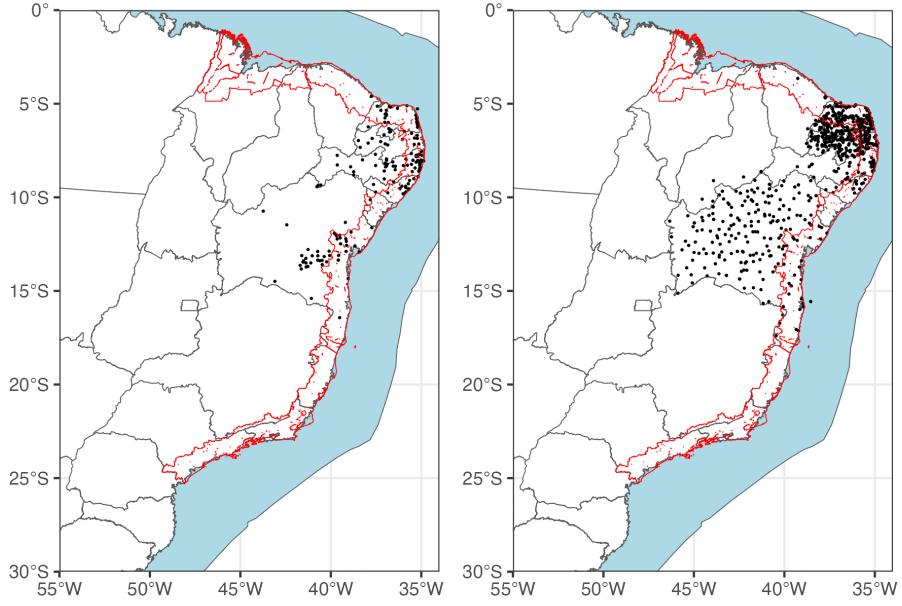
Identification Strategy

Coastal Ban on Livestock

- In 1701, the Portuguese Crown enacted a ban on cattle ranching from 80km of the coast (10 leagues) (Fausto et al., 2014, p .40; Simonsen, 2005, p .198; Bethell, 1984, p .460).
- "Landholding in the [interior] was truly extensive [...] The sesmarias on which cattle ranches were established sometimes exceeded hundreds of thousands of acres" (Bethell, 1984)
- "Extensive cattle raising, with open grazing, did not require much attention or labor. For that reason, the number of slaves in the region was small" (Oliveira Andrade, 1980, p. 113)
- Regression Discontinuity design exploiting this 80km cutoff.

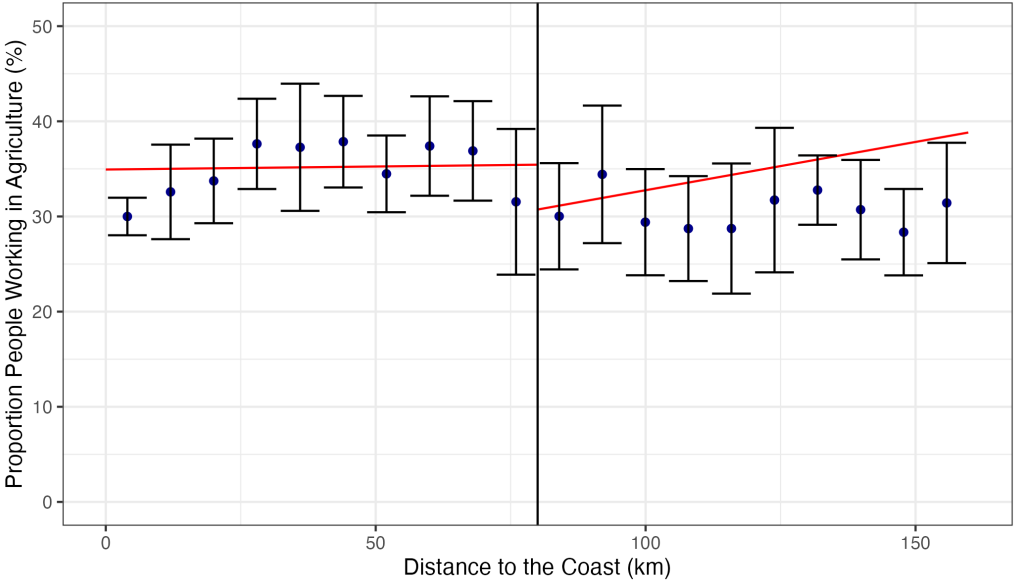
$$Y_{m,s} = \beta \cdot CoastDist_{m,s} + f(D_{m,s}) + \mu_s + X_{m,s} + \epsilon_{m,s} \quad (1)$$

Distribution of Land Grants pre- and post- 1701



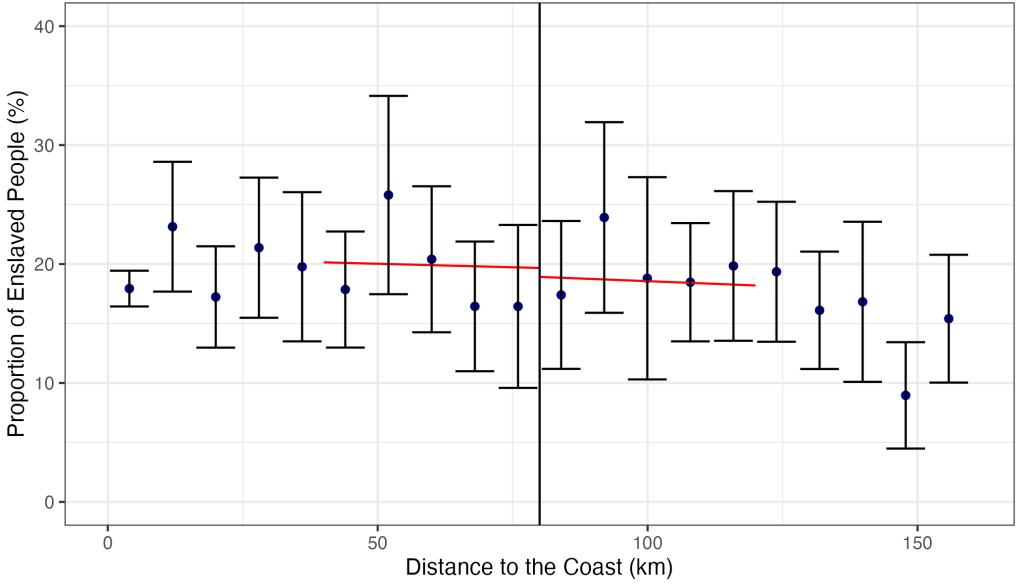
1872 Results

Agriculture



1872 Results

Slavery



1872 Results

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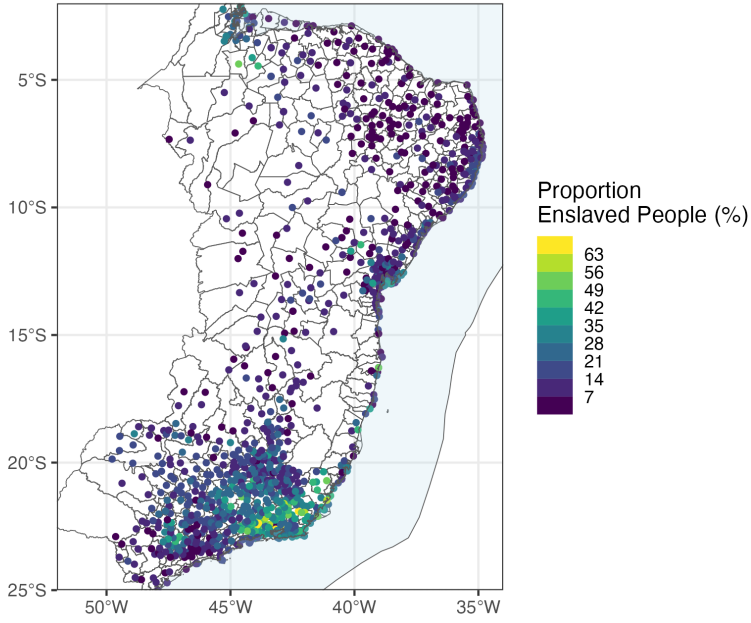

1872 RD vs. OLS

Demographics

	(1)	(2)	(3)	(4)	(5)
Panel A (RDD)					
Past 80 km	-8.049	-0.095	-0.363	1.796	-0.335*
	(6.601)	(0.613)	(0.306)	(1.487)	(0.192)
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	[35.6,35.6]	[31.6,31.6]	[35.9,35.9]	[29.9,29.9]	[31,31]
N	[114,83]	[99,73]	[114,83]	[91,70]	[97,71]
Panel B (OLS)					
Past 80 km	1.937	1.182***	-0.614***	0.207	-0.407***
	(1.440)	(0.277)	(0.136)	(0.469)	(0.095)
N	1115	1115	1115	1115	1115
R^2	0.16	0.27	0.18	0.28	0.09

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

1985 LandSat RD vs. OLS

Land Usage

1872 RD vs. OLS

Descriptive OLS - Labor

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A (RDD)						
Past 80 km	-8.049	-0.095	-0.363	1.796	-0.335*	13.490***
	(6.601)	(0.613)	(0.306)	(1.487)	(0.192)	(4.471)
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	[35.6,35.6]	[31.6,31.6]	[35.9,35.9]	[29.9,29.9]	[31,31]	[21.6,21.6]
N	[114,83]	[99,73]	[114,83]	[91,70]	[97,71]	[64,44]
Panel B (OLS)						
Past 80 km	1.937	1.182***	-0.614***	0.207	-0.407***	-1.755*
	(1.440)	(0.277)	(0.136)	(0.469)	(0.095)	(1.041)
N	1115	1115	1115	1115	1115	1115
R^2	0.16	0.27	0.18	0.28	0.09	0.20

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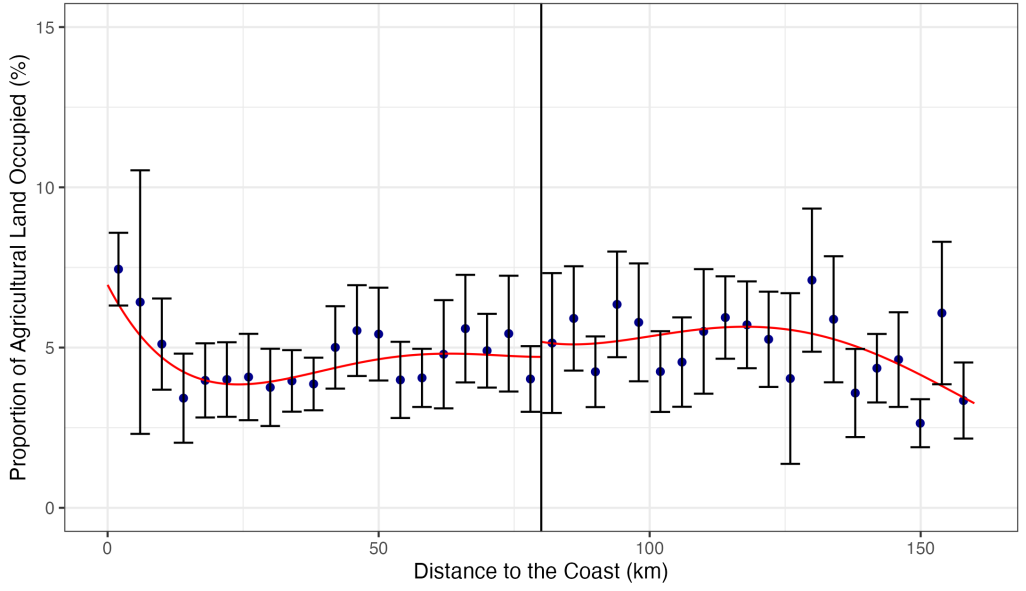
1995 Agricultural Census Results

Occupied Land



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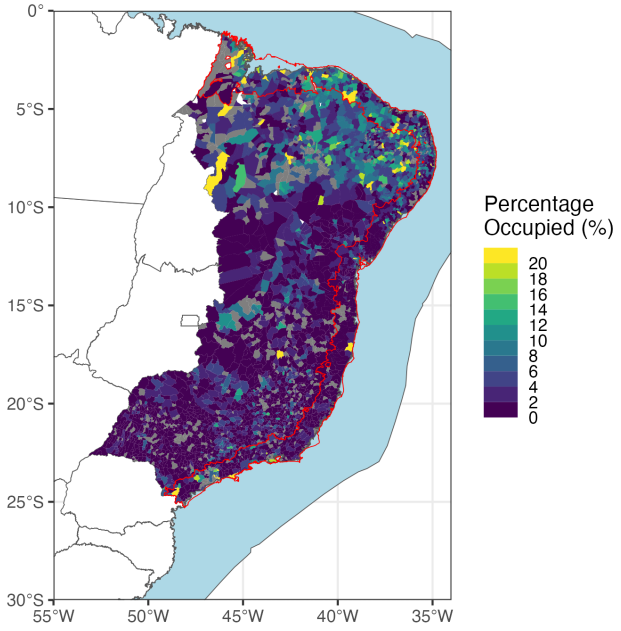
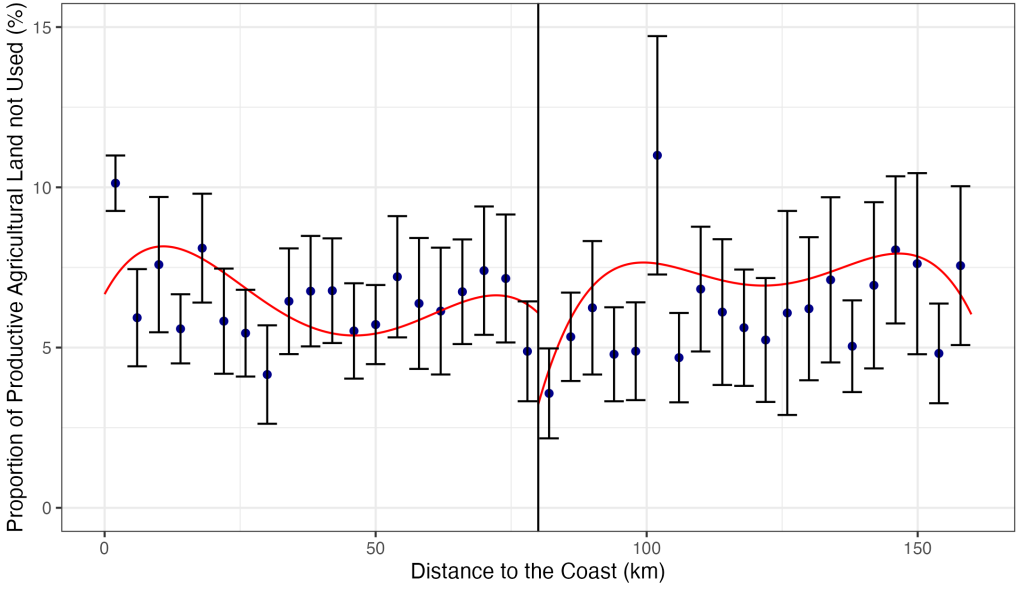


1995 Agricultural Census Results

Productive Land Not Used



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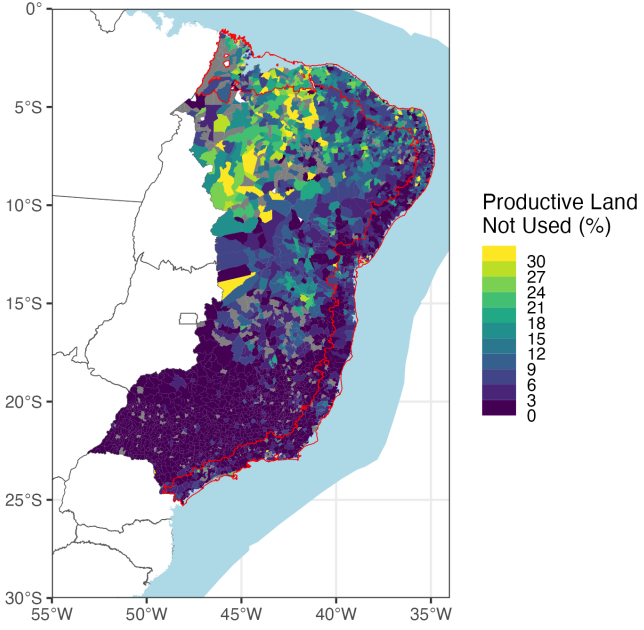
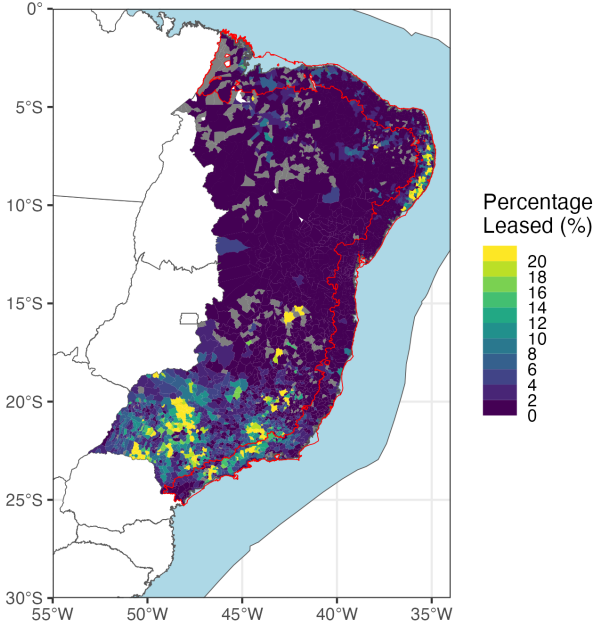


1995 Agricultural Census

Leased Land



1995 RD vs. OLS

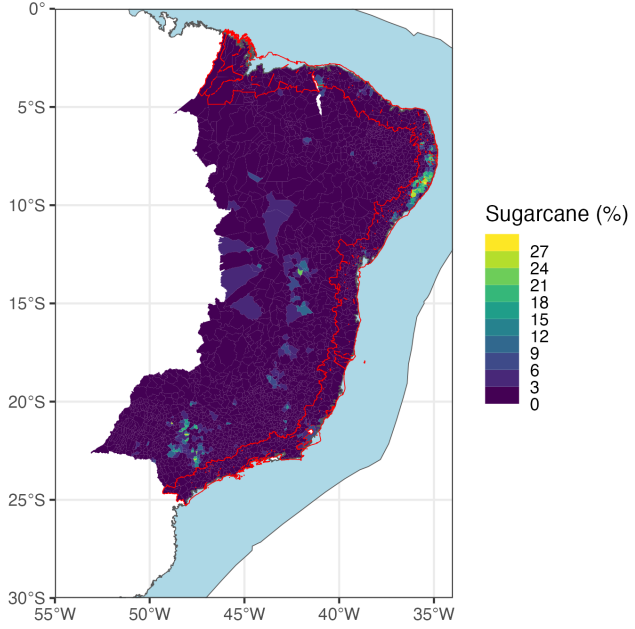
Agricultural Land Usage

	(1)	(2)	(3)	(4)	(5)
Panel A (RDD)					
Past 80 km	0.154	-0.618	0.004	-2.528**	-2.174
	(5.723)	(1.234)	(1.063)	(0.998)	(3.586)
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	[26.4,26.4]	[29.1,29.1]	[25.8,25.8]	[21.7,21.7]	[27.9,27.9]
N	[325,307]	[348,328]	[324,305]	[264,254]	[387,345]
Panel B (OLS)					
Past 80 km	9.671***	-1.230***	-1.091***	1.709***	6.781***
	(1.257)	(0.452)	(0.172)	(0.465)	(1.289)
N	4355	4101	4378	4328	4756
R^2	0.10	0.21	0.25	0.45	0.11

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

1970 Census

People Working in Sugarcane Production



Conclusion

References I

- Acemoglu, D, S Johnson, and J A Robinson (2001). "The colonial origins of comparative development: An empirical investigation". In: *Am. Econ. Rev.*
- Banerjee, Abhijit and Lakshmi Iyer (Sept. 2005). "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India". In: *Am. Econ. Rev.* 95.4, pp. 1190–1213.
- Bethell, Leslie (1984). *The Cambridge history of Latin America*. eng. Cambridge, England ; Cambridge University Press.
- Costa Porto, José da (1979). *O sistema sesmarial no Brasil*. pt-BR. Editora Universidade de Brasília.
- Fausto, Boris and Sergio Fausto (Aug. 2014). *A Concise History of Brazil*. en. Cambridge University Press.
- Laudares, Humberto and Felipe Valencia Caicedo (2022). *Tordesillas, slavery and the origins of Brazilian inequality*. https://conference.nber.org/conf_papers/f164242.pdf. Accessed: 2022-10-3.

References II

- Musacchio, Aldo, André Martínez Fritscher, and Martina Viarengo (Sept. 2014). "Colonial Institutions, Trade Shocks, and the Diffusion of Elementary Education in Brazil, 1889–1930". In: *J. Econ. Hist.* 74.3, pp. 730–766.
- Naritomi, Joana, Rodrigo R Soares, and Juliano J Assunção (May 2012). "Institutional Development and Colonial Heritage within Brazil". en. In: *J. Econ. Hist.* 72.2, pp. 393–422.
- Oliveira Andrade, Manuel Correia de (1980). *The Land and People of Northeast Brazil*. en. University of New Mexico Press.
- Sellars, Emily A and Jennifer Alix-Garcia (Nov. 2018). "Labor scarcity, land tenure, and historical legacy: Evidence from Mexico". In: *J. Dev. Econ.* 135, pp. 504–516.
- Simonsen, Roberto Cochrane (2005). *História econômica do Brasil : 1500-1820*. Edições do Senado Federal ; v. 34. Brasília : Senado Federal, Conselho Editorial.
- Smith, Cory (2023). "Land concentration and Long-run development in the frontier United States". In.

References III

- Sokoloff, Kenneth L and Stanley L Engerman (Sept. 2000). "Institutions, Factor Endowments, and Paths of Development in the New World". In: *J. Econ. Perspect.* 14.3, pp. 217–232.
- USAID (2016). *USAID COUNTRY PROFILE: PROPERTY RIGHTS AND RESOURCE GOVERNANCE - Brazil*. Tech. rep. USAID.
- Wigton-Jones, Evan (Dec. 2020). "Legacies of inequality: the case of Brazil". In: *J. Econ. Growth* 25.4, pp. 455–501.

History/Background

Request Process

- Petitioner submits a letter for an unoccupied land detailing their qualifications (captain, governor, etc.)

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- Five years to develop the land
- If successful, upon an inspection, land was transferred to the *sesmeiro*.

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- Five years to develop the land
- If successful, upon an inspection, land was transferred to the *sesmeiro*.
- Able to sell, pass down as inheritance, etc.

Selection

- Agglomeration: Effects on Neighboring Grids

Identification

Exploring the Content of the Letters

- Focus on the letters and their contents.
- Make the unit of observation a state by year.
- **Example Research Question:** How would a change in state governorship affect the contents of the letter:
  - **Channel:** New governor, not enough information on how strict he would be enforcing the land grants $\Rightarrow$ the letters are longer and more specific.

Other Relevant (?) Information to Add

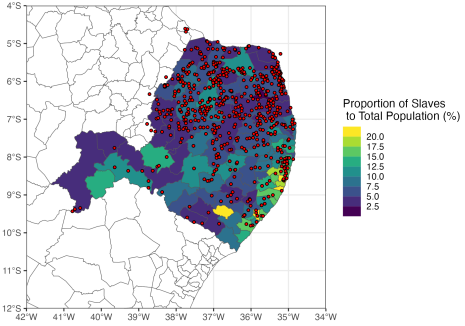
- *Sesmarias* caused economic uncertainty in colonial times as often poor people would settle, develop land, and then lose the right of the land because a richer person would claim it (Costa Porto, 1979, p. 142).

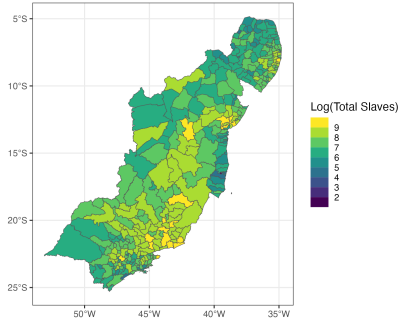
Manueline Ordinances 1511-1512

"Na petição por uma carta de sesmaria, o requerente devia justificar seu pedido, e quando recebesse a carta de concessão havia uma serie de obrigações entre as quais estava a necessidade do cultivo"

1872 Census - Slavery Distribution

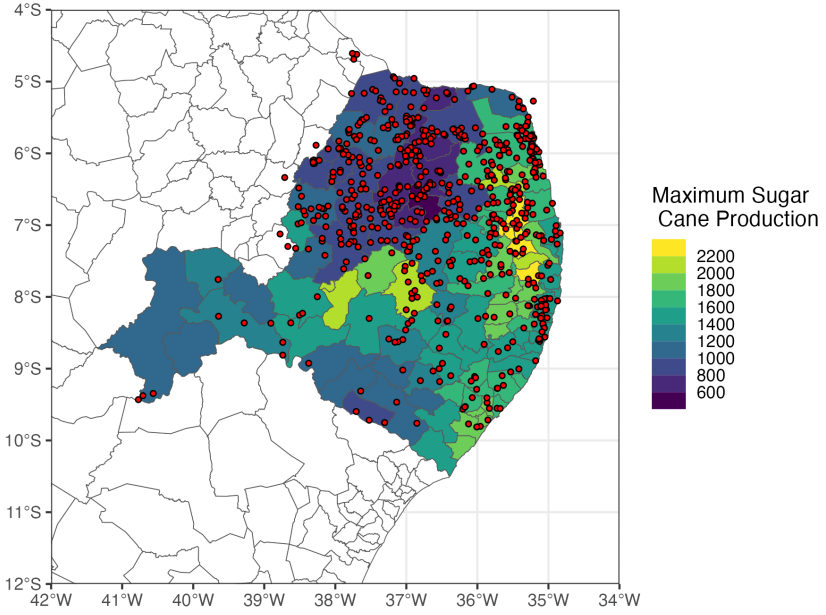
Back





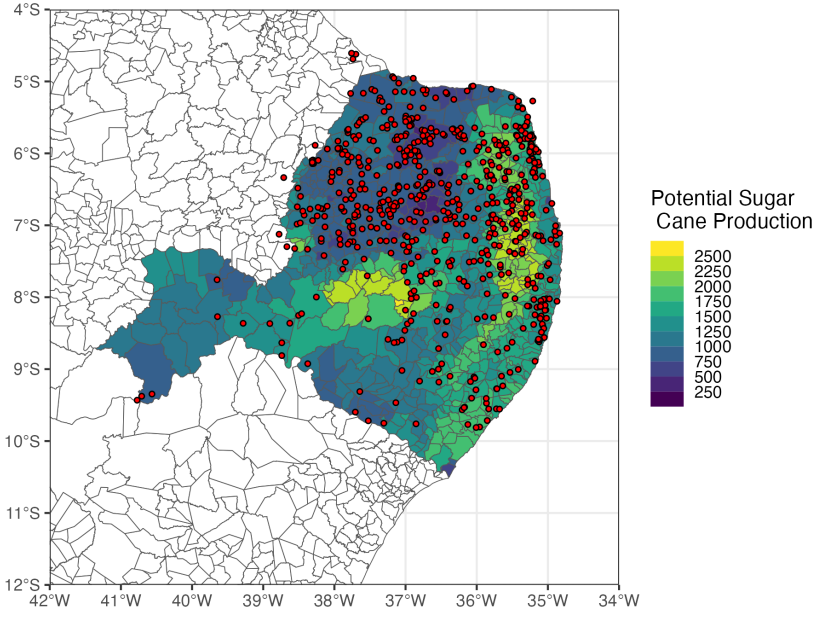
1872 Census - Potential Sugarcane Output

Back



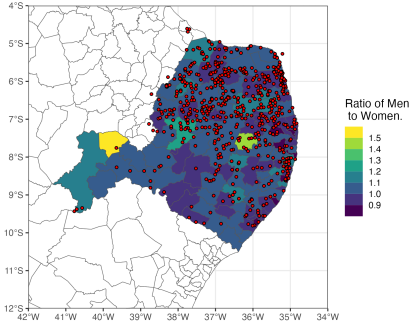
2010 Census - Potential Sugarcane Output

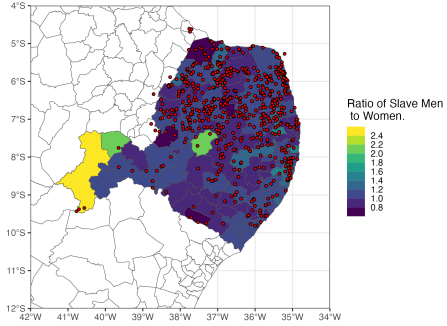
Back



1872 Census - Gender Distribution

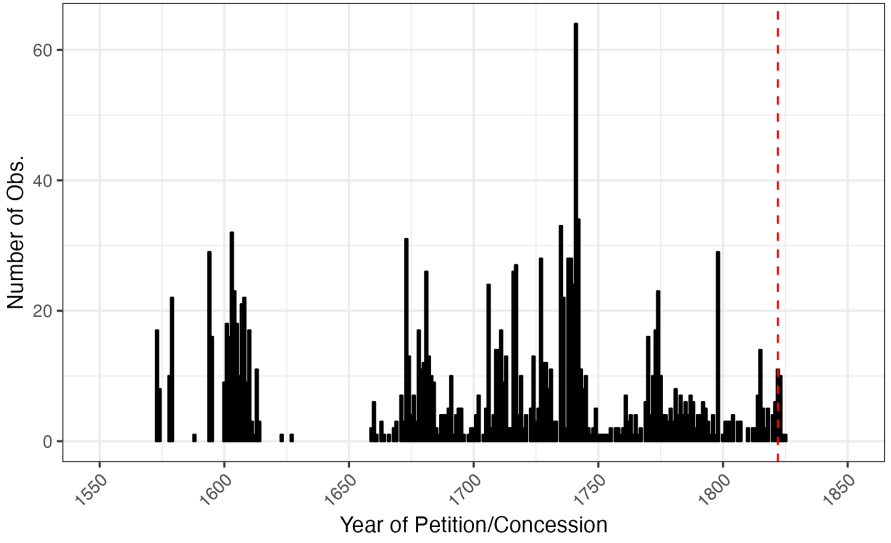
Back





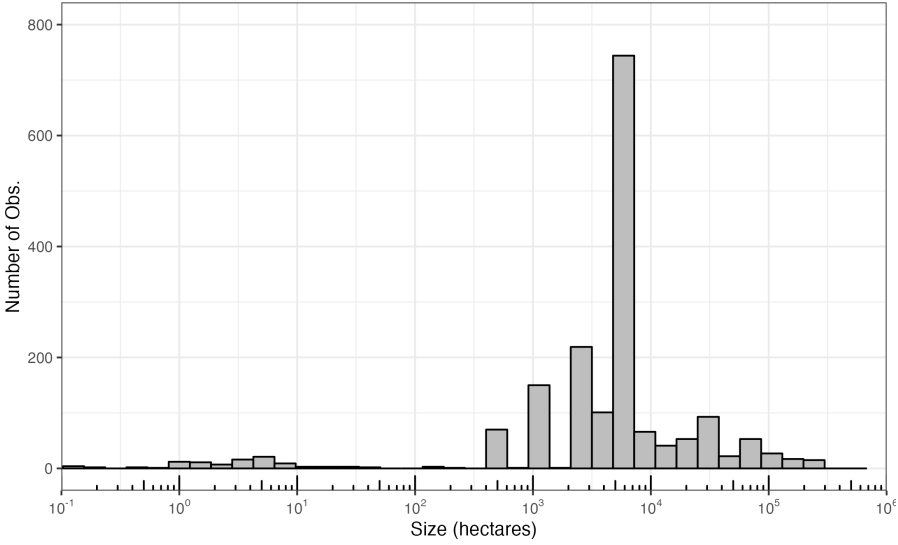
Basic Descriptive Statistics

Year Dist. Back



Basic Descriptive Statistics (1 hec = 2.5 Football Fields)

Size Dist. Back



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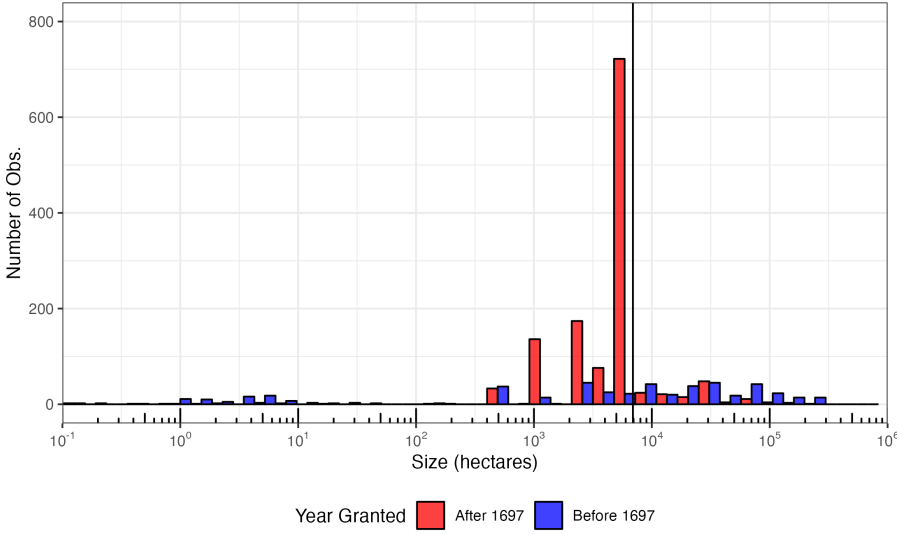
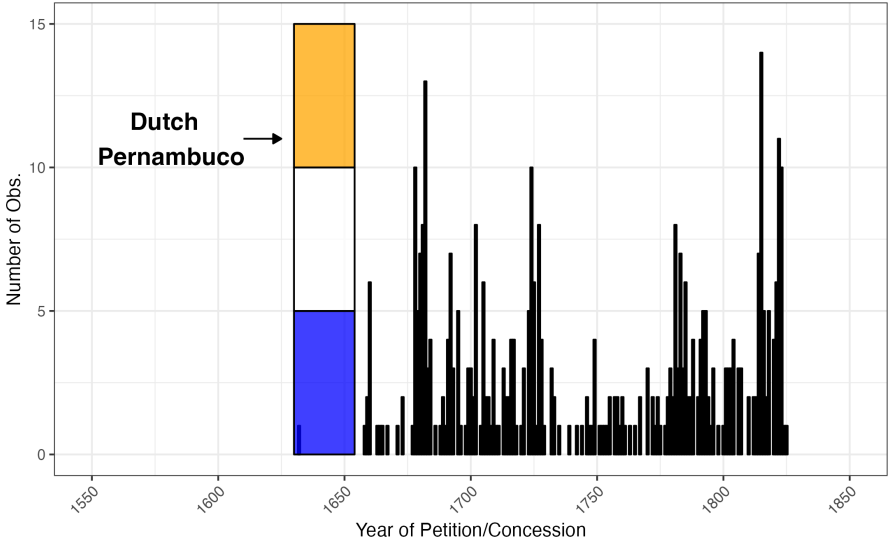


Smallest Land Grant

- The smallest land grant we have in the dataset is from 1603, in Rio de Janeiro (RJ0118). The petitioner asked for some land to build a house in the city of São Sebastião, which explains why in hectares it is so small.

Basic Descriptive Statistics

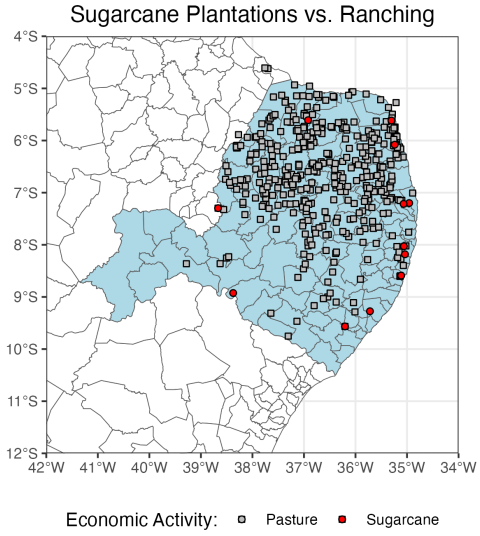
No Obs. in Pernambuco



Georeferenced Land Grants

Back

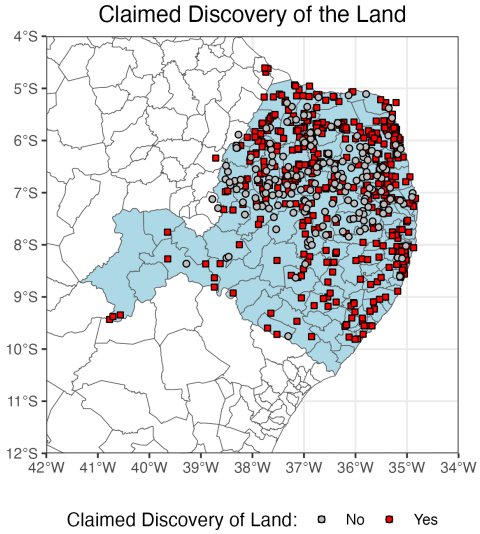
Sugarcane vs. Ranching



Georeferenced Land Grants

Back

Alleged Discovery of the Land



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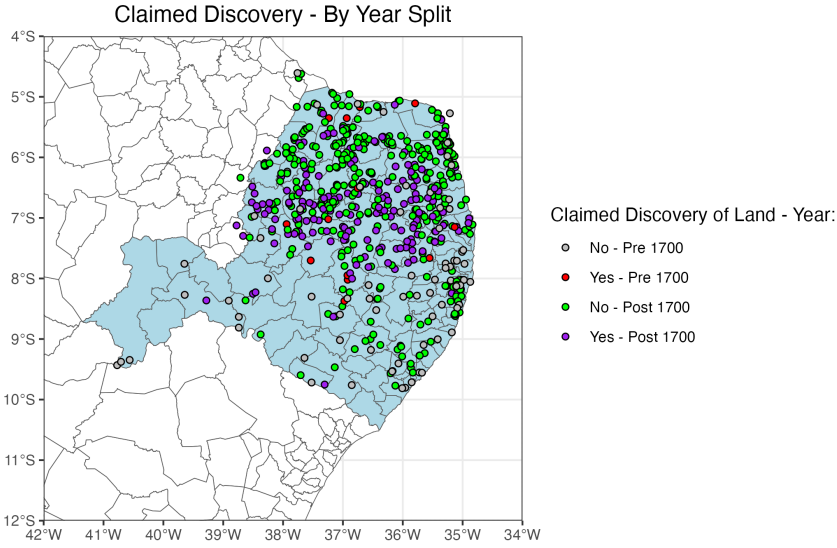

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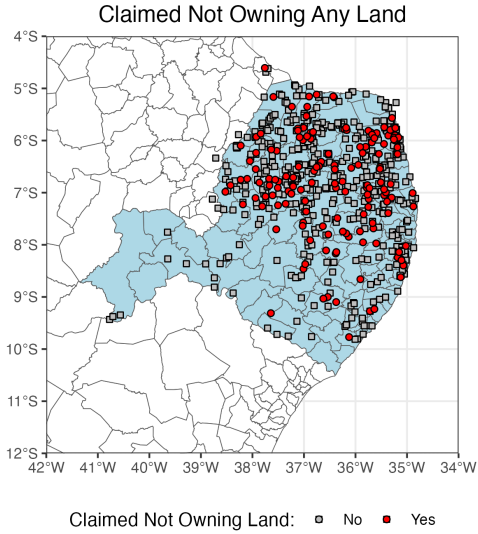
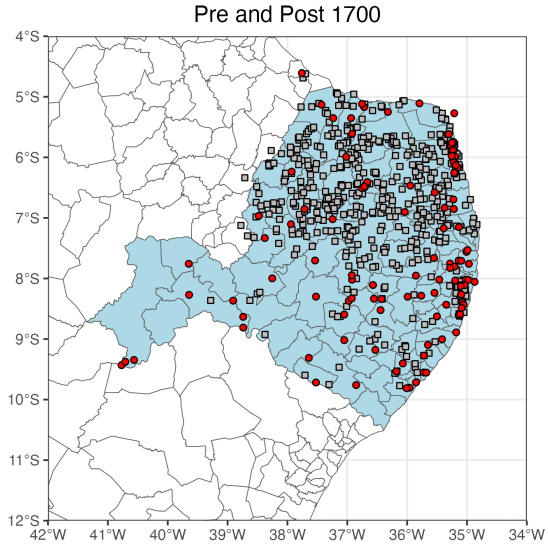


Georeferenced Land Grants

Back

Year of the Land Grant



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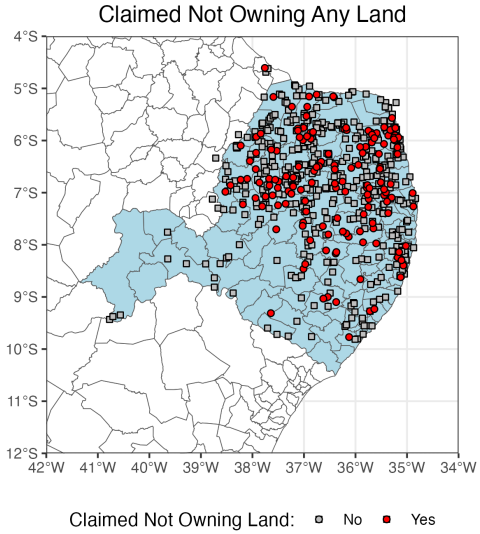

Georeferenced Land Grants

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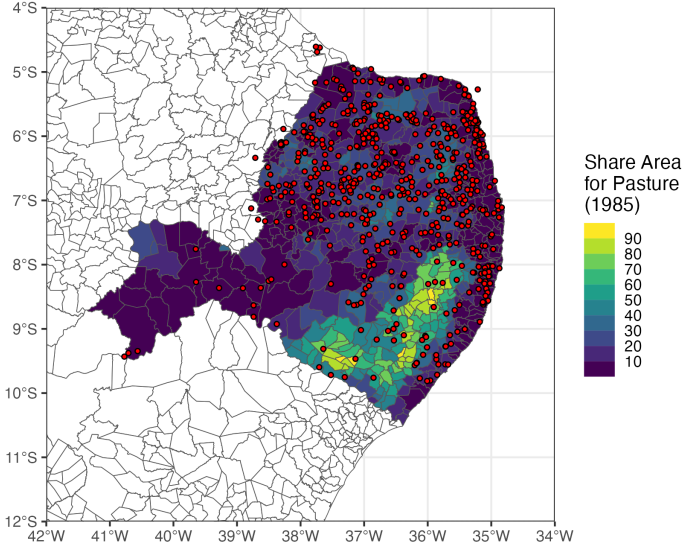

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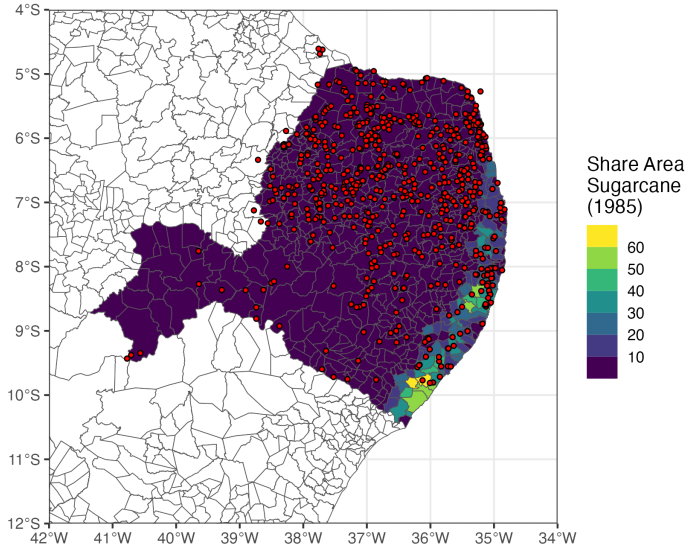

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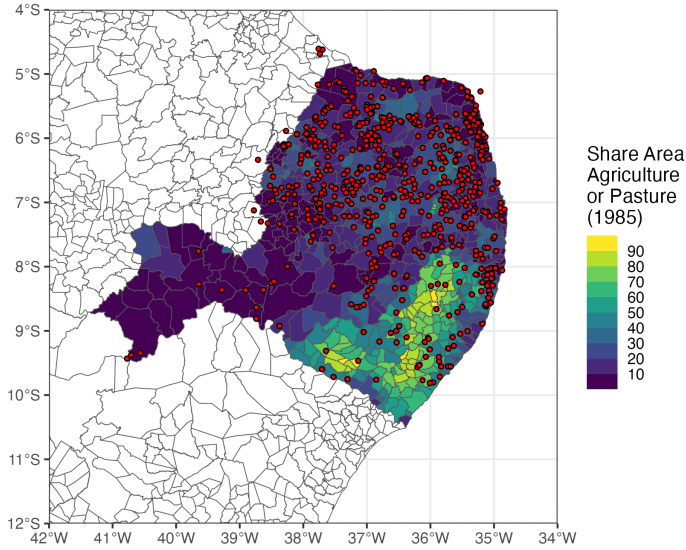

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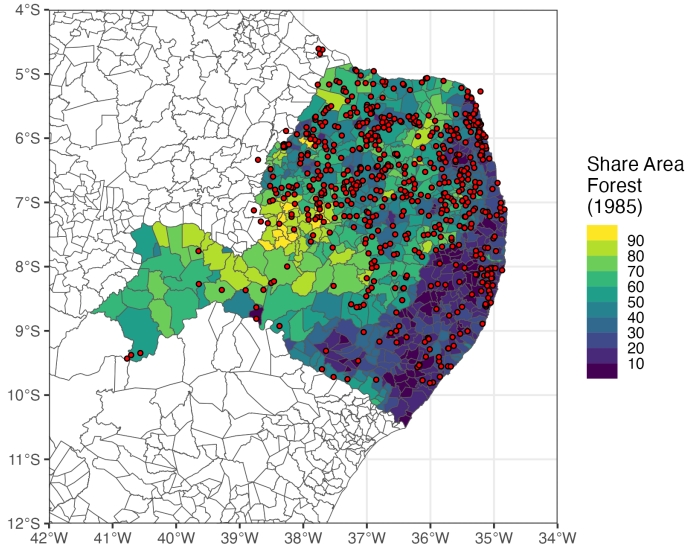
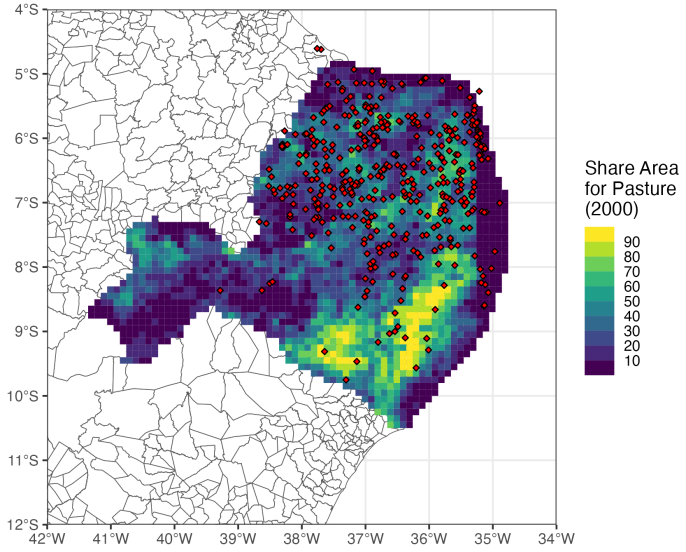


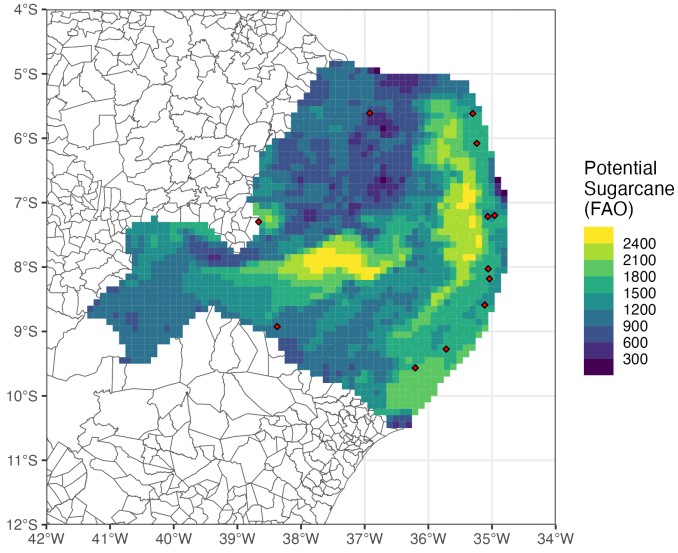
Georeferenced Land Grants Back

Pasture request + Land Usage in 2000



Georeferenced Land Grants Back

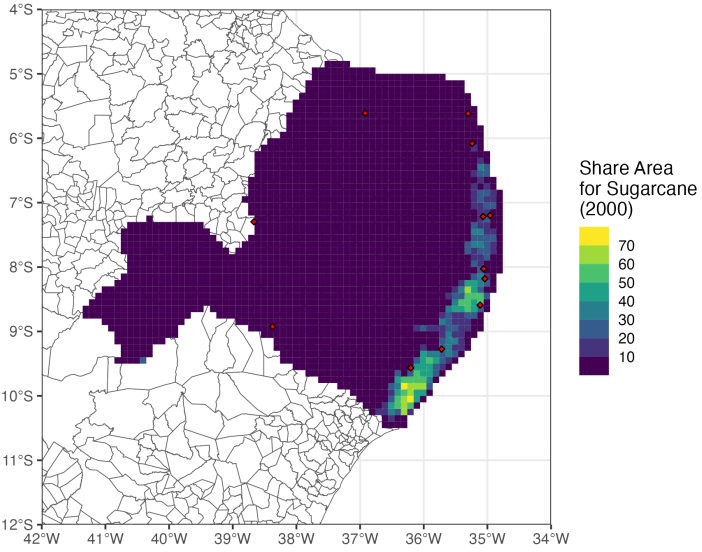
Sugarcane request + Potential Sugarcane Production



Georeferenced Land Grants

Back

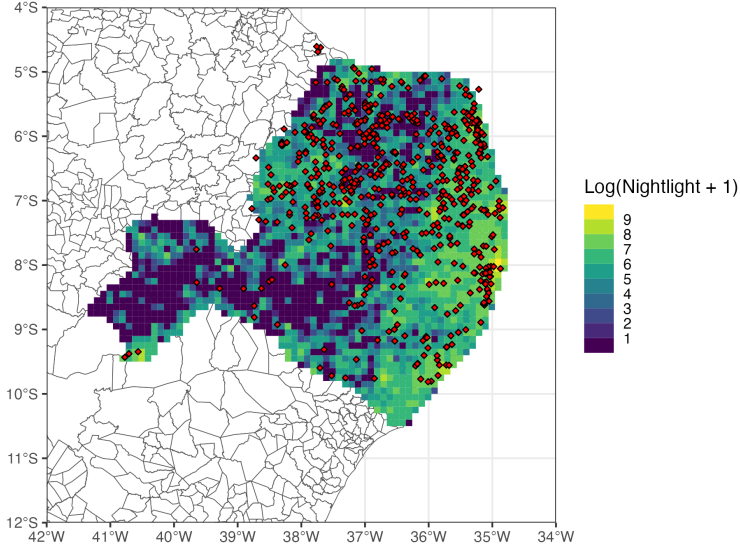
Sugarcane request + Area used for Sugarcane (2000)



Georeferenced Land Grants

Back

All requests + Nightlight data (2000)



First-Stage Estimates - 1872 Back

Effects of Potential Sugarcane Output on Land Grants

	Any Land Grants		Sugar Land Grants	
	(1)	(2)	(3)	(4)
Maximum Sugarcane Output (Thousand of Tons per hectare)	-0.085	-0.068	0.027	-0.041
	(0.079)	(0.109)	(0.064)	(0.073)
N	104	104	104	104
Geographical Controls		✓		✓
R^2	0.15	0.23	0.02	0.12

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

First-Stage Estimates - 2010 Back

Effects of Potential Sugarcane Output on Land Grants - 2010

	Any Land Grants		Sugar Land Grants	
	(1)	(2)	(3)	(4)
Maximum Sugarcane Output (Thousand of Tons per hectare)	-0.039	-0.093**	0.001	-0.019*
	(0.038)	(0.042)	(0.006)	(0.010)
N	677	677	677	677
Geographical Controls		✓		✓
R^2	0.09	0.19	0.00	0.04

* p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01

First-Stage Estimates - Grid

Back

Effects of Potential Sugarcane Output on Land Grants

	Any Land Grants		Sugar Land Grants	
	(1)	(2)	(3)	(4)
Maximum Sugarcane Output (Thousand of Tons per hectare)	0.054***	-0.009	0.002	-0.005*
	(0.020)	(0.023)	(0.003)	(0.003)
N	2083	2083	2083	2083
Geographical Controls		✓		✓
R^2	0.11	0.13	0.00	0.01

* p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01

OLS - Economic Activities

Back

OLS of Land Grants on Present Day Economic Activity

	Area dedicated to Sugarcane		Area dedicated to Livestock	
	(1)	(2)	(3)	(4)
Sugar Land Grants	10.132**	4.022	-15.872***	-10.327**
	(4.810)	(3.827)	(5.837)	(5.139)
Livestock Land Grants	-0.051	-0.609*	7.505***	6.052***
	(0.389)	(0.328)	(1.366)	(1.330)
Geographical Controls		✓		✓
DV Mean	2.79	2.79	30.96	30.96
N	2083	2083	2083	2083
R^2	0.15	0.34	0.11	0.27

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

OLS - Economic Development

Back

OLS of Land Grants on Economic Development

	Ln(Nightlight + 1)		Urban Area (%)	
	(1)	(2)	(3)	(4)
Sugar Land Grants	2.308***	0.623**	1.283	0.395
	(0.539)	(0.315)	(0.989)	(0.928)
Livestock Land Grants	0.658***	0.425***	0.203	0.108
	(0.158)	(0.137)	(0.182)	(0.180)
Geographical Controls		✓		✓
DV Mean	4.25	4.25	0.57	0.57
N	2083	2083	2083	2083
R^2	0.11	0.34	0.00	0.06

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

OLS - Land Usage

Back

OLS of Land Grants by Year of Grant on Land Usage

	Sugarcane Area (%)		Pasture Area (%)		Urban Area (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
Grants Pre-1697	5.223***	1.605	-7.529***	-7.339***	2.302**	1.824**
	(1.511)	(1.260)	(2.613)	(2.378)	(0.953)	(0.887)
N	2083	2083	2083	2083	2083	2083
Geographical Controls		✓		✓		✓
DV Mean	2.79	2.79	30.96	30.96	0.57	0.57
R^2	0.16	0.34	0.10	0.27	0.03	0.07

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

OLS - Agglomeration

Back

OLS of Land Grants on Surrounding Grids

	Surrounding Grids Land Grant Presence (0/1)		Surrounding Grids Number of Land Grants			
	(1)	(2)	(3)	(4)	(5)	(6)
At Least One Land Grant	0.147***	0.084***	1.195***	0.921***		
	(0.021)	(0.021)	(0.164)	(0.153)		
Total Land Grants					0.770***	0.620***
					(0.116)	(0.106)
Geographical Controls		✓		✓		✓
DV Mean	0.6	0.6	1.93	1.93	1.93	1.93
N	2083	2083	2083	2083	2083	2083
R^2	0.30	0.41	0.33	0.39	0.34	0.40

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Balance Tables

Back

Grid Level

Summary Statistics for the Land Grants - Grid Level

	At least 1 Land Grant (N=427)		No Land Grants (N=1656)			
	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in Means	Std. Error
Geographical						
Distance to Nearest River (km)	296.0	115.0	182.3	140.7	-113.7**	6.6
Distance to the Coast (km)	105.9	86.9	187.7	144.3	81.9**	5.5
Mean Slope (m)	2.3	1.6	2.4	1.6	0.1	0.1
Mean Elevation (m)	267.8	206.4	347.3	208.8	79.5**	11.2
Latitude	-36.6	1.1	-37.5	1.6	-0.9**	0.1
Longitude	-7.0	1.1	-7.8	1.3	-0.8**	0.1
Agriculture						
Potential Sugarcane Output (FAO)	1318.8	542.8	1320.0	447.9	1.2	28.5
Maximum Calories Pre-1500 (Galor, 2016)	11331.1	1568.6	11022.0	2253.7	-309.0**	94.0
Maximum Calories Post-1500 (Galor, 2016)	11567.7	1320.4	11186.7	2166.6	-381.0**	83.2
Satellite Data						
Sugarcane Area (%)	2.9	9.2	2.8	9.7	-0.2	0.5
Livestock Area (%)	31.9	22.0	30.7	24.4	-1.2	1.2
Urban Area (%)	1.1	4.8	0.4	2.0	-0.7**	0.2
Ln(Nightlight + 1)	744.4	1155.1	394.2	685.6	-350.2**	58.4

Balance Tables

Back

1872 Municipality Level

Summary Statistics for Municipalities in 1872

	At least 1 Land Grant (N=86)		No Land Grants (N=18)			
	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in Means	Std. Error
Geographical						
Distance to Nearest River (km)	230.3	129.7	136.8	115.9	-93.6**	30.7
Distance to the Coast (km)	79.3	90.2	83.9	134.8	4.6	33.2
Mean Slope (m)	2.7	1.1	3.1	1.5	0.4	0.4
Mean Elevation (m)	259.0	199.8	193.2	207.2	-65.9	53.4
Agriculture						
Potential Sugarcane Output (FAO)	1436.2	422.4	1647.6	333.9	211.4**	90.9
Maximum Calories Pre-1500 (Galor, 2016)	11061.2	1506.3	9963.2	1514.2	-1098.0**	392.1
Maximum Calories Post-1500 (Galor, 2016)	11494.7	1054.4	10714.4	1300.4	-780.3**	326.9
Demographics						
Total Population	17591.1	14256.7	15940.1	11420.2	-1650.9	3099.8
Enslaved Population as Total (%)	8.0	4.3	10.8	6.1	2.8***	1.5
Ratio of Free Men to Free Women	1.0	0.1	1.0	0.1	0.0***	0.0
Ratio of Enslaved Men to Enslaved Women	1.1	0.3	1.0	0.1	-0.1***	0.0
Labor						
Proportion of Industrial Workers (%)	0.9	0.8	1.3	1.4	0.4	0.3
Proportion of Enslaved People working in Farming (%)	36.5	20.4	38.8	18.6	2.3	4.9
Proportion of Farmers (%)	31.6	15.3	27.5	13.4	-4.1	3.6
Proportion of Free Men Farmers (%)	44.3	16.9	39.2	17.6	-5.0	4.5
Proportion of Free Women Farmers (%)	17.4	17.8	12.5	12.5	-5.0	3.5
Human Capital						
Literacy Rate (%)	16.3	8.3	13.5	6.2	-2.8	1.7

Balance Tables

Back

Summary Statistics for the Land Grants

	Granted between 1624-1696 (N=101)		Granted between 1697-1750 (N=531)			
	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in Means	Std. Error
Distance to Nearest River (km)	359.6	873.8	342.9	345.6	-16.7	88.2
Distance to the Coast (km)	183.7	926.9	119.9	342.8	-63.9	93.4
Mean Slope (m)	2.2	2.1	2.2	2.5	0.0	0.2
Mean Elevation (m)	200.5	224.9	253.2	201.8	52.7**	24.1
Potential Sugarcane Output (FAO)	1413.0	522.1	1281.0	549.0	-132.0**	57.6
Maximum Calories Pre-1500 (Galor, 2016)	10473.6	1993.8	11482.7	1316.7	1009.1**	208.4
Maximum Calories Post-1500 (Galor, 2016)	11022.9	1754.8	11660.0	1073.5	637.2**	182.4