

Decentralization, Tax Administration, and Taxation: Evidence from Brazil's Rural Land Tax

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Motivation

- **Property taxes** are under-utilized in developing countries
 - Revenues (as % of GDP) from these taxes are $4\times$ higher in high income countries than in low and middle income countries (Brockmeyer et al., 2021)
- Expanding **property taxation** could simultaneously increase the tax base and the progressivity of the tax system (OECD, 2023)
- **Constraints:** enforcement capacity, human resources, informality (Gordon and Li, 2009; Besley and Persson, 2014; Slemrod, 2019)
 - Problems likely more important for property taxes (no third party information, no transactions etc.)
- Which strategies are effective to relax these constraints?

This paper: Decentralization and rural land taxation

- **Decentralization** is often used to improve government performance
 - **Trade-off:** information vs. capture (Bardhan and Mookherjee, 2000)
 - Literature mostly focused on **public goods provision** (education, health etc.)
- This **paper** investigates the effects of decentralization on rural land taxation in Brazil
 - **Decree 6,433/2008:** authorized the decentralization of the administration of Brazil's rural land tax (ITR)
 - Decentralization agreements between **Brazil's Federal Revenue Service (RFB)** and **municipalities**
- **Questions:**
 1. Did decentralization influence ITR revenues?
 2. (if yes) How taxpayers react to it?

Context

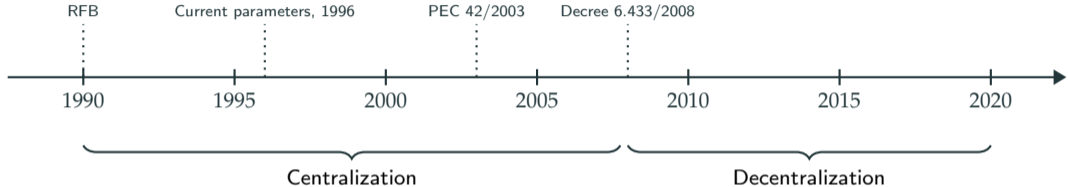
ITR

- ITR created in the 1960s, administered by RFB since 1990
- Three components:

$$ITR = \text{Land value} \times \text{Taxable area} \times \text{Tax rate}$$

- Key parameters are **self-reported**
- Effective tax rate: $< 0.1\%$
- Extremely low enforcement (esp. before 2008)

Decentralization



- **Pre 2008:** administered by RFB; 50% of the revenues distributed to municipalities
- **Post 2008:** municipalities and RFB allowed to sign decentralization agreements
 1. Municipalities collect information (e.g., land values) and enforce tax (e.g., audit properties)
 2. Municipalities receive 100% of the ITR revenues
 3. RFB responsible screening properties, imposing fines etc.

Data and Empirical Framework

Data

- **Land taxes (ITR):**

- Universe of returns from 1997-2021
- \approx 120 million observations
- Tax due, tax paid, land values, land use, area, tax rates

- **Other sources:**

- **FINBRA:** ISS (services tax), IPTU (urban property tax) etc.
- **MUNIC:** number of public employees, types of employees
- **Mapbiomas:** land cover by category, remote sensing

Empirical Framework

- Challenges:

- Municipalities choose enter in the program: non-random assignment
- Municipalities enter in different periods: TWFE is biased (Goodman-Bacon, 2021)

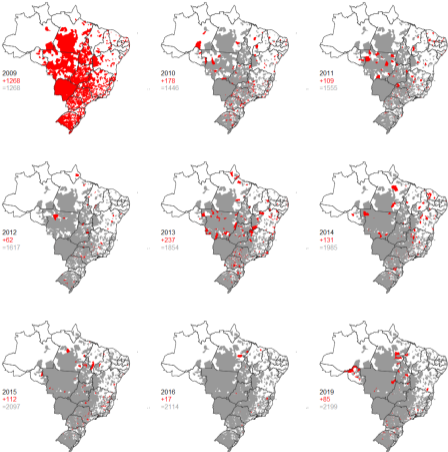
- Explore **differences** between municipalities that signed agreements in the same year:

- **Treatment:** implemented decentralization program
- **Control:** did not implement the decentralization program
- Dynamic **DID design** for each cohort.
- Pool effects:

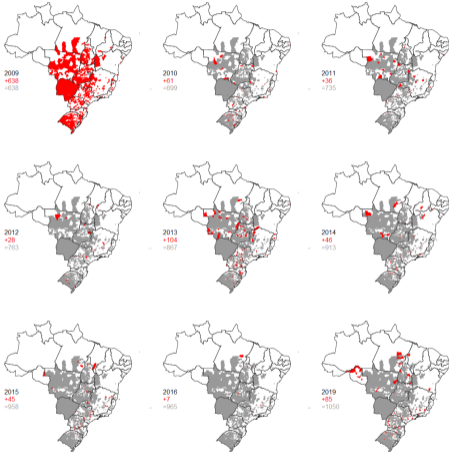
$$\log(y_{ict}) = \sum_{k=-6}^5 \beta_k T_{ic} + \gamma' \mathbf{X}_{ict} + \lambda_i + \lambda_{tc} + \epsilon_{ict}$$

- β_k : weighted average of **cohort-specific** effects

Evolution of Decentralization Agreements



(a) All municipalities



(b) Municipalities that implemented agreements

Treatment vs. Control

	Treatment	Control	Diff. (1-2)	p-value
	(1)	(2)	(3)	(4)
Municipality GDP	809.53	682.39	127.1	0.65
Public workers per capita	0.03	0.03	-0.00	0.87
Previous Year ISS (per Capita)	22.13	18.25	3.87	0.17
Previous Year IPTU (per Capita)	7.88	6.73	1.15	0.06
Previous Year ITR (per Capita)	5.38	2.14	3.23	0.00
Maize Productivity	8084.93	8197.25	-112.32	0.27
Soybean productivity	4244.20	4109.69	134.51	0.00

► Reweighting

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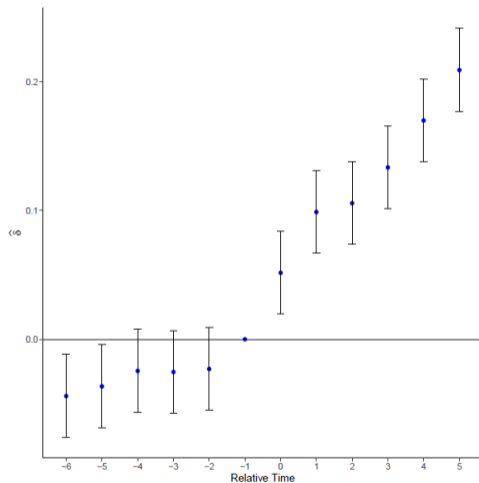
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► Reweighting

Results

ITR revenues grow by 20% in five years



▶ No controls

▶ Reweighting

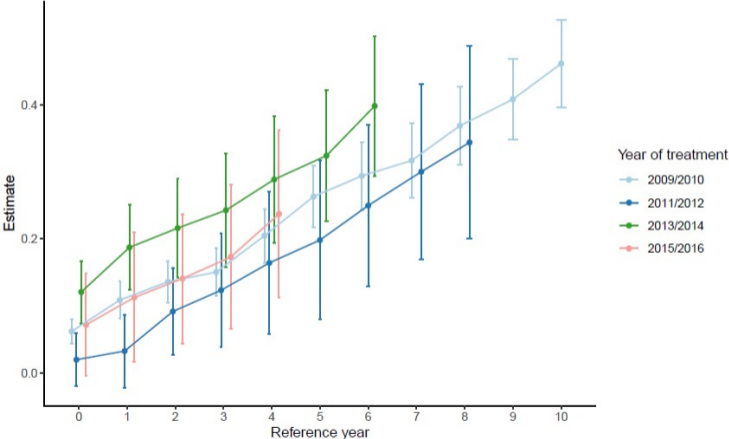
▶ Weighted by area

▶ Callaway & Sant'anna

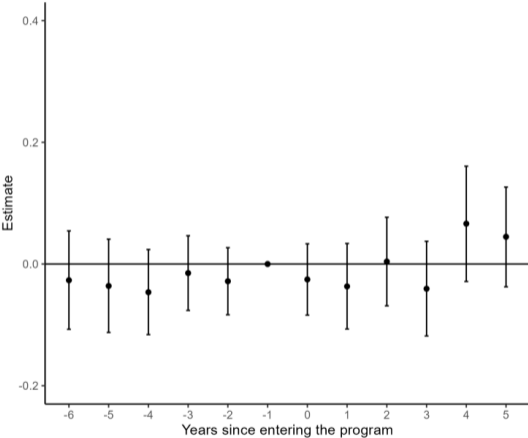
▶ By size

▶ By region

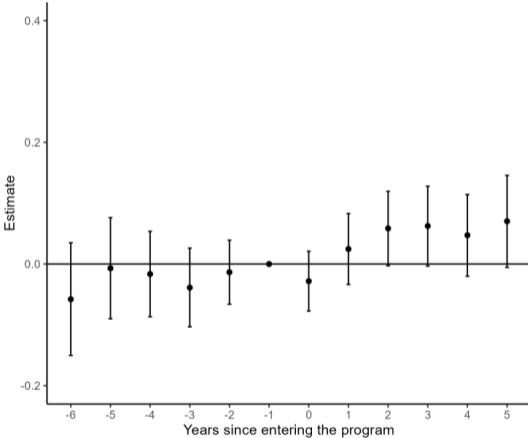
Effects are comparable across cohorts ($\approx 40\%$ in one decade)



Placebos

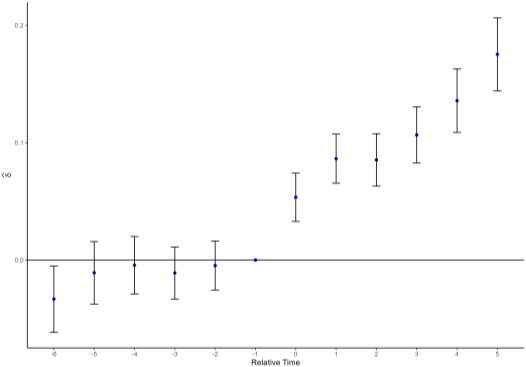


(a) Urban Land Tax

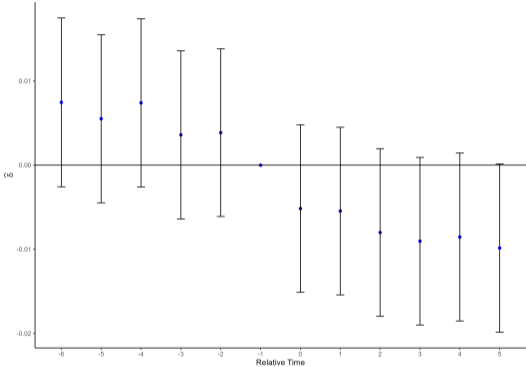


(b) Services Tax

Decomposition I (land values vs. tax rates)

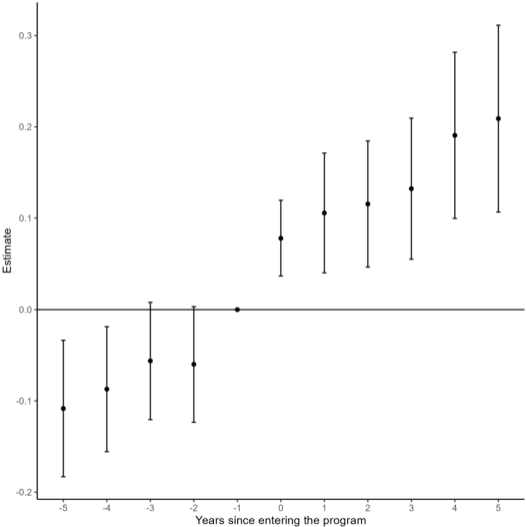


(a) Land Values (self-reported)

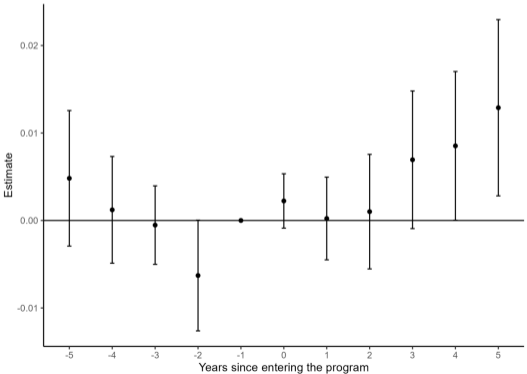


(b) Tax rate (implied)

Decomposition II (intensive vs. extensive margin)

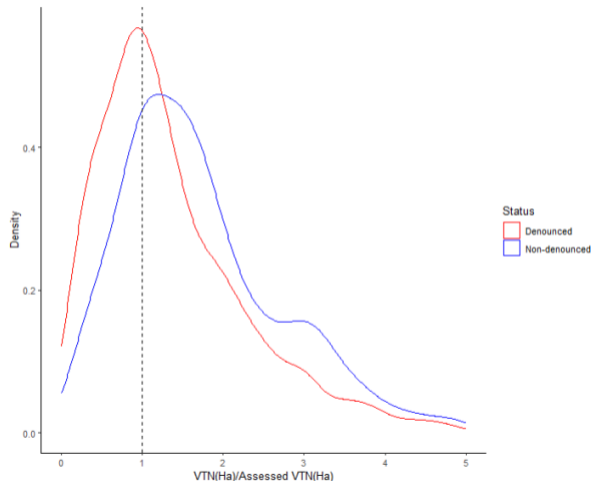


(a) Average ITR

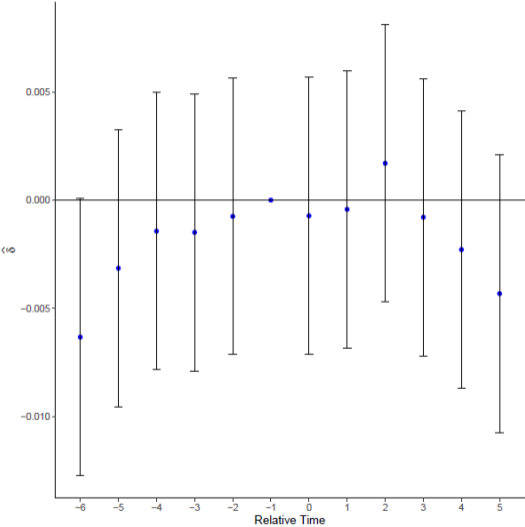


(b) log(Number of Properties)

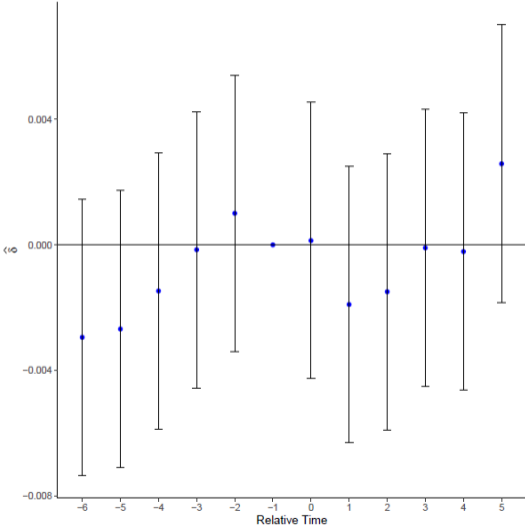
No evidence of more bunching at minimum land values



Increase in taxation does not influence land use decisions



(a) Pastureland



(b) Cropland

Cost Benefit Analysis

Cost/Benefit Analysis - (For year 2021)

Description	Amount (BRL)
Total Revenue Gain by Municipality (1260)	940,000
Average increase in revenue collection by municipality	537,000
Tax transference from federal to municipality	403,000
Cost of Assessing Land	50,000
Cost of Land Tax Administration by Municipality	40,000 - 80,000
Total Cost by Municipality	90,000 - 130,000
Total Net Gain in Tax Revenue by Municipality	407,000 - 850,000
Total Per Capita Gain in Taxes (Including transference)	55
Net Per Capita Gain in Taxes	28

Increasing enforcement and taxpayers response to tax notices

- The number of tax notices began to increase since 2018 - 6,930 in 2018, 5,917 in 2020 and 18,717 in 2022.
- 55% of the amount of tax notices is paid in full or confessed (to be paid in installments) - less than 5% in the other taxes administered by the RFB
- Municipalities are increasing the investments in auditing ITR in the last couple of years

Conclusion

Conclusion

Recap: Decentralization of land taxation in Brazil:

- ↑ revenues (20% in 5 years; 40% in 10 years)
- Driven by increases in self-reported land values of existing taxpayers
- Low efficiency costs

Implications:

1. Cooperation bt/ central and local govt improves tax administration (~ Balan et al. (2022))
 - **Important:** initial compliance is extremely low
2. Low efficiency costs (\neq Brockmeyer et al. (2021))
 - **Important:** liquidity constraints negligible in our setting
3. Under-reporting of land values is pervasive
 - Using market assessments would more than double revenues (Instituto Escolhas 2019)

THANKS!

<https://arthurbraganca7.github.io/>

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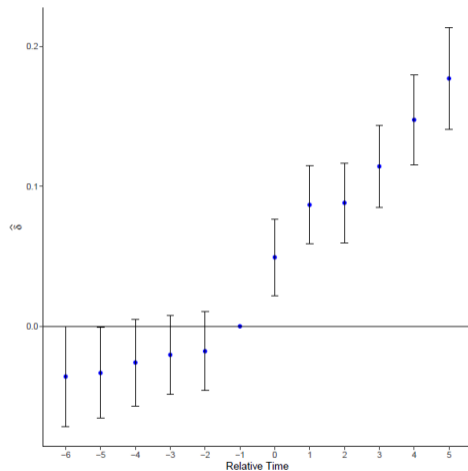
Tax Rates

Property Area (ha)	Degree of Utilization - GU (%)				
	Over 80	65 - 80	50 - 65	30 - 65	Up to 30
Up to 50	0.03	0.20	0.40	0.70	1.00
50 - 200	0.07	0.40	0.80	1.40	2.00
200 - 500	0.10	0.60	1.30	2.30	3.30
500 - 1000	0.15	0.85	1.90	3.30	4.70
1000 - 5000	0.30	1.60	3.40	6.00	8.60
Over 5000	0.45	3.00	6.40	12.00	20.00

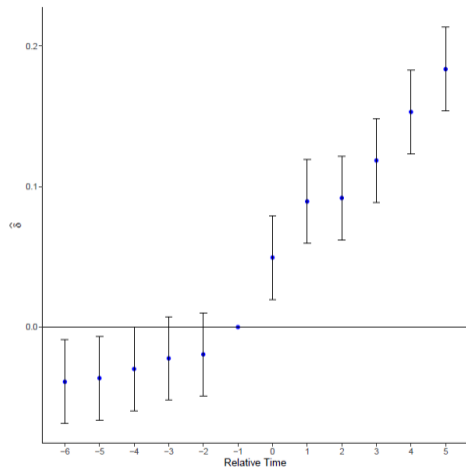
Descriptive statistics after reweighting

	Non-denounced (Treated group)	Denounced (Control)
Log(ITR due)	11.62 (1.61)	10.96 (1.64)
Log(Land Value)	18.41 (1.72)	19.16 (1.32)
IHS(IPTU)	12.17	11.67
IHS(ISS)	13.20	12.97
IHS(Number of paying declarations)	7.23 (0.67)	6.98 (0.71)
Average tax rate	0.14 (0.10)	0.18 (0.03)
Share of pasture	0.22 (0.02)	0.18 (0.03)
Share of agriculture	0.32 (0.05)	0.30 (0.06)
n. Municipalities	1,074	1,149

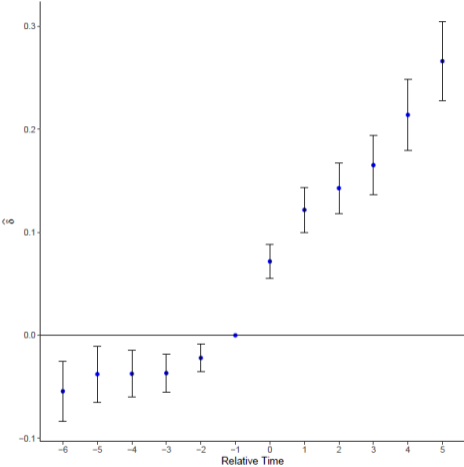
Reweighting (Hainmueller, 2012)



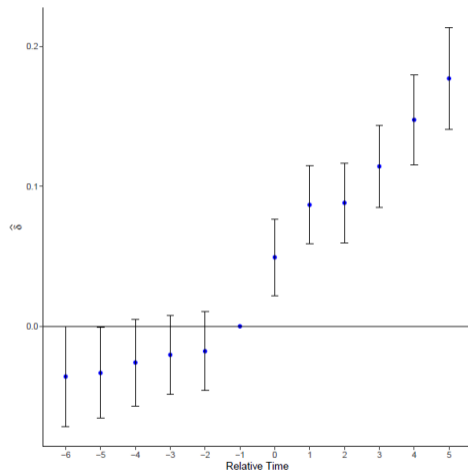
Other Robustness (No Controls)



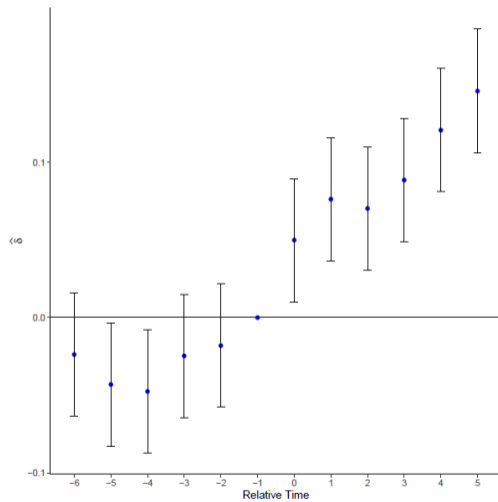
Other Robustness (Callaway and Sant'anna)



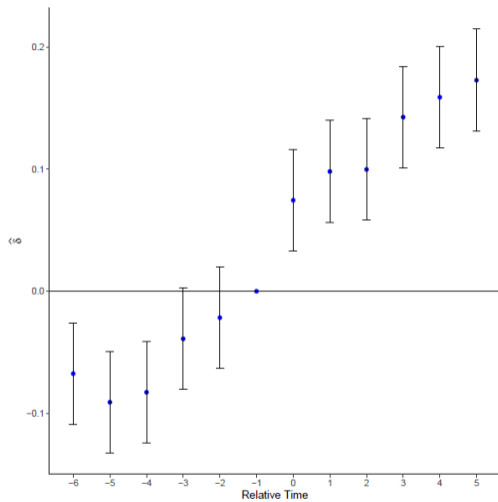
Other Robustness (Municipality areas as Weights)



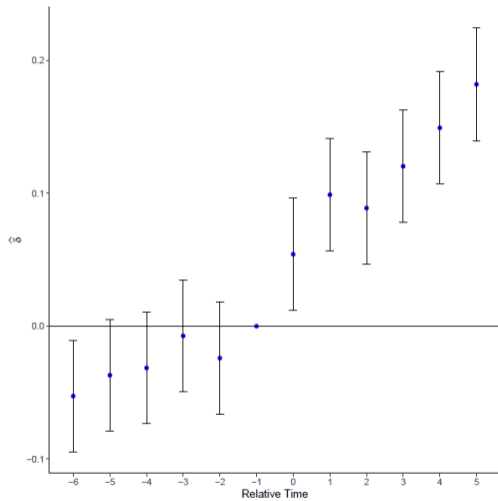
Heterogeneity by Size (< 50 ha)



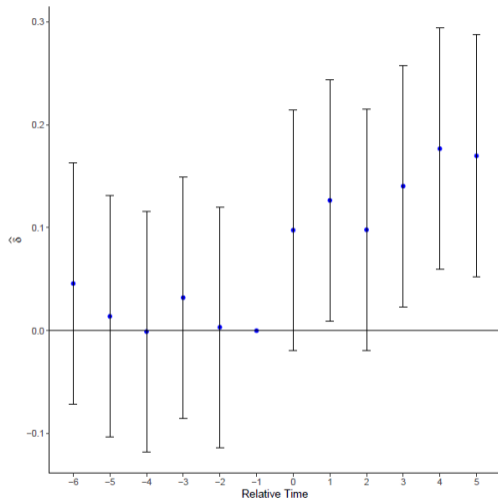
Heterogeneity by Size (50-100 ha)



Heterogeneity by Size (100-1000 ha)



Heterogeneity by Size (> 1000 ha)



Heterogeneity by Region

Sub-samples:	North	Northeast	Southeast	Midwest	South
Post × Non-denounced	0.1300** (0.0524)	0.0724 (0.0996)	0.1549*** (0.0261)	0.2473*** (0.0241)	0.0735*** (0.0186)
<i>Controls</i>					
Municipality	Yes	Yes	Yes	Yes	Yes
Year-Cohort	Yes	Yes	Yes	Yes	Yes
Baseline Characteristics	Yes	Yes	Yes	Yes	Yes
<i>Fit statistics</i>					
Observations	14,975	14,677	17,493	17,774	18,469
# Municipalities	1,207	1,178	1,410	1,433	1,483
Mean Dep. Var	10.63	10.64	10.81	10.91	10.79

Land Values System (SIPT)

Municipality	Good Agric Aptness	Average Agric Aptness	Restricted Agric Aptness	Planted Pasture	Natural Pasture	Preservation
Porto Murtinho - MS	R\$ 11.212,22	R\$ 7.826,13	R\$ 4.440,04	R\$ 3.633,88	R\$ 2.427,45	R\$ 2.064,17

▶ Back