Does Local Politics Drive Tropical Land-Use Change? Property-Level Evidence from the Amazon

Erik Katovich University of Geneva Fanny Moffette Université du Québec à Montréal

EAERE

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"Those who deforest the Amazon completely dominate local politics... Representatives of the people are, in fact, representatives of those who deforest." -Federal Police Chief in Amazonas, quoted in Washington Post (2022)

 1,900 landholders accused of environmental violations were elected to public office in the Brazilian Amazon since 2000 (Washington Post, 2022)

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- Bragança & Dahis (2022): Deforestation and agricultural promotion when self-declared farmer mayors elected during period of weak federal enforcement (2000); no effects in 2004-2012
- ▶ Pailler (2018): Deforestation ↑ in years with local elections
- ► Abman (2014): Deforestation ↓ when mayor is eligible for reelection after introduction of municipal blacklist policy

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Context

- Deforestation is driven primarily by commodity agriculture:
 - $\begin{array}{ll} 1 & \mbox{FOREST} \rightarrow \mbox{low-input}, \\ & \mbox{low-productivity} \ \mbox{PASTURE} \end{array}$
- ➤ Only 20% of property may be legally cleared; ≈90% of existing deforestation is illegal
- Municipal elections occur every 4 years; municipal governments are important public goods providers



Figure: MapBiomas (2023)

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1 **Politicians' Self-Interest**: Do mayors increase deforestation or make costly land-use changes on their personal properties while in office?

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- 3 Interest Group Influence: Do mayors who receive campaign donations from landholders govern differently?
 - > Election of a landholder-financed mayor increases municipal deforestation, soy cultivation, environmental violations, and rural credit

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Identified land registries:

- Cadastro Ambiental Rural (MT/PA/RO, partial for other states)
- Terra Legal (Legal Amazon)
- SIGEF (Brazil)

Satellite data on land use (2000-2020):

- MapBiomas
- ► PRODES

Mayoral Candidates and Donors (2000-2016)

Tribunal Supremo Eleitoral



CAR property boundaries in Mato Grosso, Pará, and Rondônia

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Landholding is widespread among politicians: we match 25% of winning candidates and 8% of donors to land registries

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- Landholding politicians and donors tend to be largeholders: average mayoral candidate held 2,074 hectares; average donor held 1,538 hectares
- Deforestation is high on mayors' properties: average property lost 41% of forest cover between 2000-2019; 20% received an environmental violation

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Property-Level Empirical Strategy (Self-Interest and Patronage)

▶ Regress y_{it} (e.g., deforestation) on properties belonging to candidate *i* in municipality *m* in year *t* on relative time $K_{it} = (t - E_i)$ around year of entry into office E_i :

$$y_{imt} = \theta_i + \lambda_t + \sum_{k \neq -1} [\mathbb{1}(K_{it} = k)]\beta_k + \epsilon_{it}.$$

- Treated: candidates who win a close election (5% win margin); separately, donors to these candidates
- **Control:** candidates who lose a close election; donors to these candidates

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TWFE Problems: Already-treated units introduce bias in TWFE estimates \rightarrow Implement Callaway and Sant'Anna's *csdid* estimator

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Municipal-Level Empirical Strategy (Interest Group Influence)

$$y_{me} = \beta T_{me} + X'_{ime}\mu + \delta_m + \theta_e + \epsilon_{me}$$

yme are municipal-level outcomes over four years following mayor's election

- T_{me} is treatment indicator = 1 if elected mayor:
 - > is a landowner
 - > is a large landowner (\geq 500 ha.)
 - > received any donations from landowners
 - $^{>}$ received $\geq\!\!25\%$ donations from landowners
 - > received ≥50% donations from landowners
- X_{ime} is vector of winner i covariates (sex and education)
- ▶ δ_m and θ_e are municipality and election-period FEs; standard errors clustered at municipality-level

▶ Restrict sample to close elections (≤5% Win Margin)

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Candidates: Effects of Entry into Office on Own Land-Use



Note: Figures report ATT estimates and 90 and 95% confidence intervals from Callaway and Sant'Anna (2021) csdid estimator. Sample consists of successful and runner-up mayoral candidates in close elections (\leq 5% win-margin) in Amazon biome (2000-2016).

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Candidates: Effects of Entry into Office on Environmental Outcomes



Note: Outcomes are (i) hectares transitioned from natural vegetation (Forest & Savannah Formations) to anthropic use as a % of property area, and (ii) an indicator of whether an IBAMA embargo was registered to an individual's ID or properties in a given year.

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Donors: Effects of Supported Candidate's Entry Into Office on Land Use |10



Note: Figure reports ATT estimates and 90 and 95% confidence intervals from Callaway and Sant'Anna (2021) *csdid* estimator. Sample consists of donors to successful and runner-up mayoral candidates in close

mayoral elections (< 5% win-margin) in Amazon biome (2004-2016).

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Effects of Mayor Type on Municipal Land Use



Note: Figures report coefficient estimates and 90 and 95% confidence intervals from regression of outcome on municipality-election treatment dummies. Sample is panel of municipality-elections (2001-2005 through 2016-2019) in Amazon biome where win-margin between winner and runner-up mayor $\leq 5\%$. Outcomes are pasture, soy, and other crops as % of municipal area.

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Effects of Mayor Type on Environmental Outcomes



Note: Left figure reports estimated effects on deforestation (hectares of land that transitioned from natural vegetation (Forest & Savannah Formations) to anthropic use) as a % of municipal area. Right figure reports estimated effects on number of IBAMA embargoes registered on ID numbers and properties within municipal boundaries per thousand residents (asinh transformation).

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Effects of Mayor Type on Governance Mechanisms



Note: Left figure reports estimated effects on municipal spending on Agricultural Promotion; central figure reports estimated effects on likelihood municipality receives matching grant from Federal Ministry of Agriculture; right figure reports estimated effects on total value of rural credit per ha. of municipal area. Monetary values are deflated to constant 2010 \$BRL and transformed using asinh.

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Candidates and their donors increase soy cultivation while candidate in office → local political connections help farmers overcome barriers to agricultural intensification

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Mechanism is agricultural promotion, rather than corruption: landholder-financed mayors oversee significant growth in rural credit

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Contribution: channels of political influence were previously unobservable

- > Property-level land-use changes \rightarrow politicians' self-interest and patronage
- > Identifying landholding donors \rightarrow special interest influence

E-mail: erik.katovich@unige.ch

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Donors: Effects on Environmental Outcomes



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