# The Political Economy of Conservation

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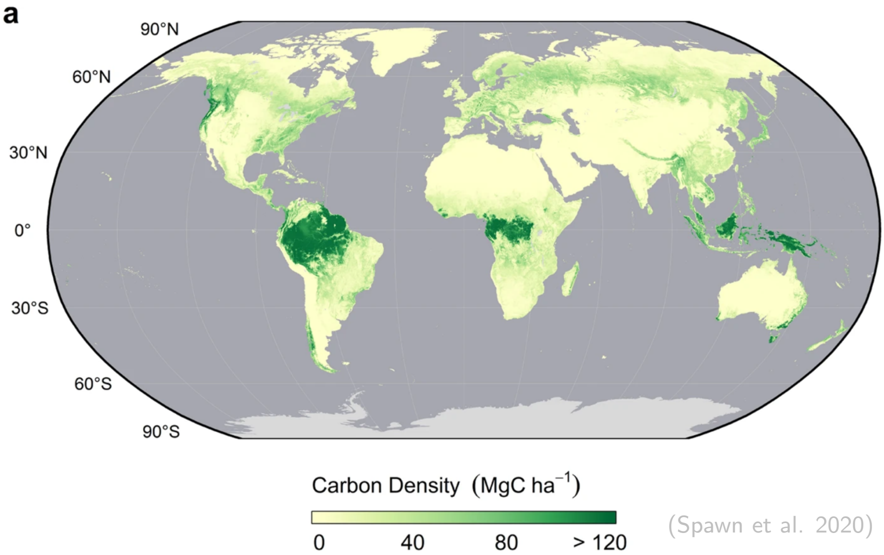
# Forest conservation protects major carbon stocks




(Spawn et al. 2020)

# But conservation is political

New Internationalist

**View from Brazil: Agribusiness lobby scuppers climate gains**

Lula wants Brazil to be a beacon in the fight against global warming, Leonardo Sakamoto. The powerful lobby that represents agribusiness in...

Sep 4, 2023

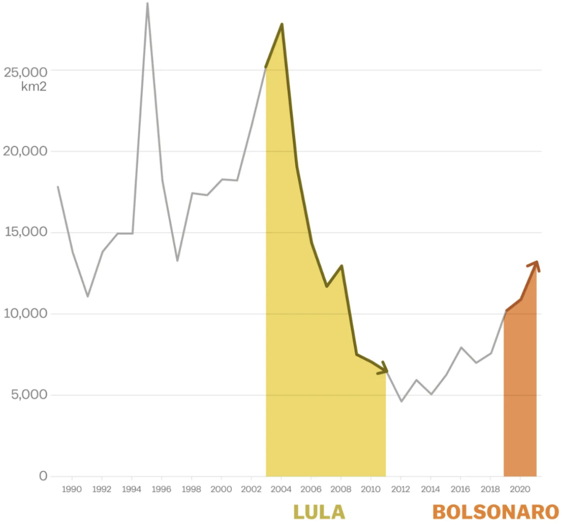
Mongabay

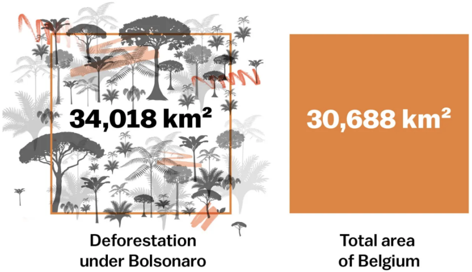
**Indonesia palm oil lobby pushes 1 million hectares of new Sulawesi plantations**

A state-owned palm oil company and an industry association have begun early work to push a vast new plantation strategy in Sulawesi,...

Aug 8, 2024

# And politics matter




(Northrop 2022)

# Question

How can conservation policy navigate political challenges?

# This paper

1. Regulation meets resistance
   - In Brazil, deforesters resist regulation with campaign donations
2. Optimal policy considers politics
   - Regulation today may lead to repeal tomorrow
3. Policy design matters quantitatively
   - In Brazil and Indonesia, bans reduce emissions and minimize producer losses

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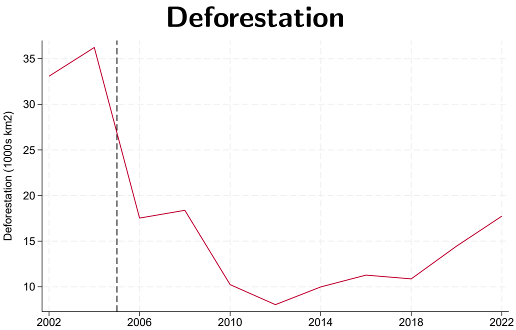
# Regulation meets resistance

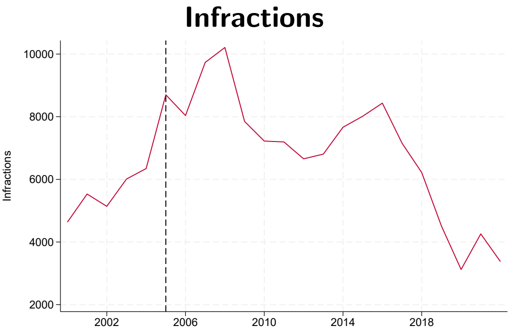
# The Brazilian Amazon

- **PPCDAm** strengthened forest regulation between 2005-2011
  - Enforcing Forest Code for private land (80% rule)
  - Criminalizing deforestation of unclaimed land

- We measure political resistance via campaign donations

# PPCDAm strengthened regulation



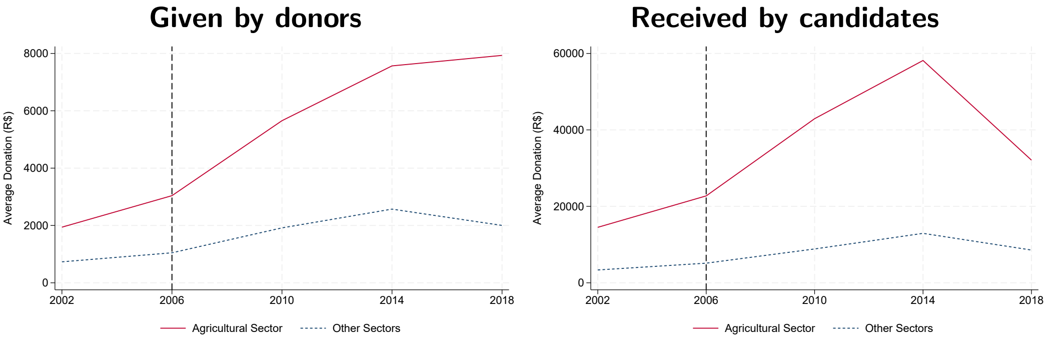
# Data

- Universe of formal donations (*Tribunal Superior Eleitoral*)
  - Every state and federal election from 2002 to 2018
  - For donors and candidates in Brazil
- Universe of firm registries (*Receita Federal*)
  - We identify donors and candidates who are agricultural firm owners
  - And thus are likely to oppose forest regulation

# Donors and candidates in the Legal Amazon

| | Individuals | | Donations |
|---|---|---|---|
| | Total | Agricultural firm owners | Agricultural firm owners |
| Donors | 62,987 | 3,509 | 1,488 |
| Candidates | 5,605 | 390 | 1,786 |

# Campaign donations over time



# Difference-in-differences

$$y_{imt} = \beta \, Ag_i \times \mathbb{1}\{t > 2006\} + \alpha_i + \gamma_{mt} + \varepsilon_{imt}$$

- Agriculture vs. non-agriculture, before vs. after the program

- Individuals $i$, municipalities $m$, election years $t$, fixed effects $(\alpha_i, \gamma_{mt})$
- Errors $\varepsilon_{imt}$ clustered by $i$

# Agricultural donors increased donations

| | Total | To ag candidate |
|---|---|---|
| $Ag \times Post$ 2006 | 5.81*** | 3.27*** |
| | (0.97) | (0.57) |
| Effect as % of mean | 242.1 | 297.4 |
| Municipality-year FEs | x | x |
| Observations | 35,195 | 35,195 |

# Especially under strong regulation

| Heterogeneity $H$: | Deforestation reduction (2004-2006) | Cloud coverage |
|---|---|---|
| $Ag \times Post\ 2006$ | 3.59*** | 11.55*** |
| | (0.85) | (2.49) |
| $Ag \times Post\ 2006 \times H$ | 1.10*** | -15.20*** |
| | (0.34) | (4.49) |
| Municipality-year FEs | x | x |
| Observations | 34,275 | 27,785 |

# And controlling for firm differences (matching)

| | Total | To ag candidate |
|---|---|---|
| $Ag \times Post$ 2006 | 3.24*** | 3.36*** |
| | (1.19) | (0.63) |
| Effect as % of mean | 135.0 | 305.7 |
| Municipality-year FEs | x | x |
| Match-pair FEs | x | x |
| Observations | 7,100 | 7,100 |

Matching: 2002 donations, establishment year, *Simples Nacional* tax regime participation, ownership type, firm size, equity capital

# And relative to the non-Amazon (triple-difference)

| Non-Amazon sample: | Rest of Brazil | Neighboring states |
|---|---|---|
| $Ag \times Post\ 2006$ | 0.65 | -0.08 |
| | (0.55) | (1.43) |
| $Ag \times Post\ 2006 \times Amazon$ | 2.70*** | 3.77** |
| | (0.97) | (1.66) |
| Municipality-year FEs | x | x |
| Observations | 367,295 | 147,905 |

# Agricultural candidates received more donations

| | Total | From ag donor |
|---|---|---|
| $Ag \times Post\ 2006$ | 32.85*** | 11.08*** |
| | (2.79) | (1.17) |
| Effect as % of mean | 176.6 | 257.8 |
| Municipality-year FEs | x | x |
| Observations | 15,660 | 15,660 |

# And also more votes (!)

| | Federal Congress | | State Congress | |
|---|---|---|---|---|
| | Votes | Elected | Votes | Elected |
| $Ag \times Post$ 2006 | 32.61*** | 0.33*** | 10.37*** | 0.30*** |
| | (4.35) | (0.05) | (0.92) | (0.03) |
| Effect as % of mean | 71.2 | 81.6 | 87.6 | 75.5 |
| Municipality-year FEs | x | x | x | x |
| Observations | 1,378 | 1,378 | 4,995 | 4,995 |

# Optimal policy considers politics

# Regulation with repeal

$$\underbrace{W_1(\tau)}_{\text{today}} + \underbrace{[1-\rho(\tau)]W_2(\tau) + \rho(\tau)W_2(0)}_{\text{tomorrow}}$$

- Regulation $\tau$ affects welfare today and tomorrow
  - Pigouvian tax $\tau^P$ maximizes $W_1(\tau)$ today
  - Producer losses induce repeal $\rho(\tau) = R(\Delta PS(\tau))$ tomorrow

- Pigouvian tax helps today, but not tomorrow

# Example: deforestation for agricultural production

$$L = \{i \mid e_i \leq \pi\}, \quad H = \{i \mid e_i > \pi\}$$

- Plots $i$ of low (L) and high (H) conservation value
  - Common private profits $\pi > 0$
  - Heterogeneous carbon stocks $e_i$

- **First best:** deforest $L$, protect $H$

# Pigouvian taxes $e_i$

$$L = \{i \mid e_i \leq \pi\}, \quad H = \{i \mid e_i > \pi\}$$

- Plots $L$: deforest and pay tax, so lose $e_i$
- Plots $H$: protected, so lose $\pi$ (for $\pi < e_i$)

- Achieves first best, but large producer losses risk repeal

# Uniform taxes $u$

$$L = \{i \mid e_i \leq \pi\}, \quad H = \{i \mid e_i > \pi\}$$

- Cannot achieve the first best
  - Need to treat $L$ and $H$ differently
- Targeting principle applies
  - Poor targeting on emissions, so not efficient

# Bans on $H$

$$L = \{i \mid e_i \leq \pi\}, \quad H = \{i \mid e_i > \pi\}$$

- Plots $L$: deforest and no tax, so lose $0$
- Plots $H$: protected, so lose $\pi$

- Targeting principle applies differently
  - Poor targeting on emissions, but still efficient
  - Good targeting on marginality by leaving $L$ alone

- Dominates Pigouvian tax
  - Smaller producer losses, lower risk of repeal

# Policy design matters quantitatively

# Bans induce less resistance than taxes

| Sample: | High clouds | No new PAs | Full sample | Matched sample |
|---|---|---|---|---|
| $Ag \times Post$ 2006 | 2.50** | 10.87*** | 10.65*** | 9.65*** |
| | (1.17) | (2.68) | (2.51) | (2.56) |
| $Ag \times Post$ 2006 $\times$ $New\ PAs$ | -0.53 | | -4.45 | -2.55 |
| | (5.17) | | (4.43) | (3.58) |
| $Ag \times Post$ 2006 $\times$ $Clouds$ | | -12.68** | -12.44*** | -16.09*** |
| | | (5.06) | (4.58) | (4.78) |
| Municipality-year FEs | x | x | x | x |
| Match-pair FEs | | | | x |
| Observations | 10,460 | 24,155 | 27,385 | 5,770 |

Observations are donors; outcomes are total donations

# Noting that protected areas seem not to be highly selected

| Sample: | High clouds | No new PAs | Full sample | Matched sample |
|---|---|---|---|---|
| *Post* 2006 × *New PAs* | -0.01 | | -0.05* | -0.00 |
| | (0.02) | | (0.03) | (0.01) |
| *Post* 2006 × *Clouds* | | 0.15*** | 0.16*** | 0.08*** |
| | | (0.02) | (0.02) | (0.02) |
| Municipality FEs | x | x | x | x |
| Year FEs | x | x | x | x |
| Match-pair FEs | | | | x |
| Observations | 2,277 | 3,609 | 4,554 | 1,242 |

Observations are municipalities; outcomes are deforestation

# Quantification: Brazil and Indonesia

- Brazil: pasture, soy, maize
- Indonesia: palm oil + peatlands

- Spatial data on plantations, crop yields, market access, carbon stocks

- Simulate regulation and evaluate welfare $(CS = 0)$
  1. Bans $\tau_i^{\text{ban}}(b) = B \cdot \mathbb{1}(e_i > b)$ for cutoff $b$, big $B$
  2. Taxes $\tau_i^{\text{tax}}(t) = te_i$ for tax rate $t$

# Land use for plots $i$

- Profits $\pi_i$ from plantations $n_i$ under regulation $\tau_i$

$$\pi(n_i) = (r_i - c_i - \tau_i)n_i$$

- Revenues $r_i$ vs. costs $c_i$ per hectare of production

$$r_i = \left(\frac{P}{1-\beta}\right)y_i, \quad c_i = \gamma_{g(i)} + \delta^d d_i + \delta^e e_i + \frac{1}{2}\psi n_i + \varepsilon_i$$

- Estimating equation from first order condition

$$n_i = \frac{1}{\psi}\left(r_i - \gamma_{g(i)} - \delta^d d_i - \delta^e e_i - \tau_i - \varepsilon_{it}\right)$$

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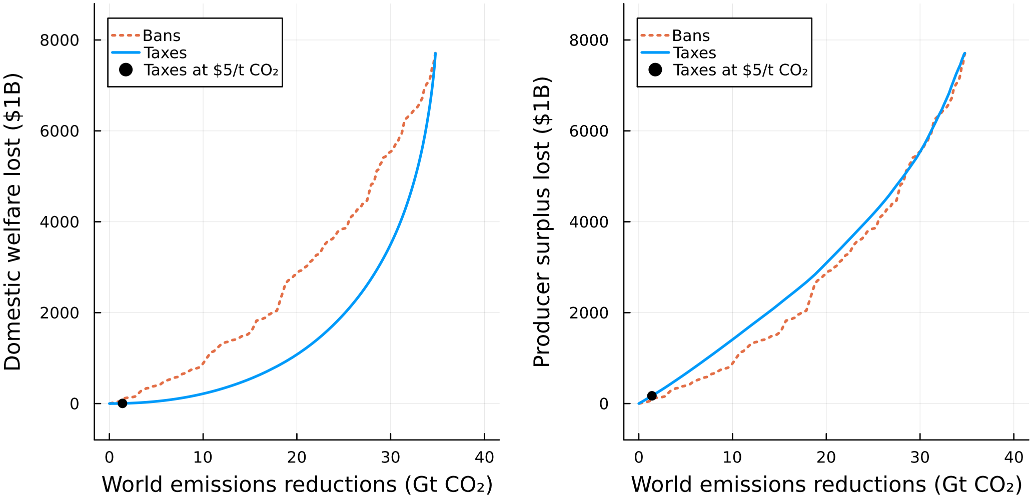
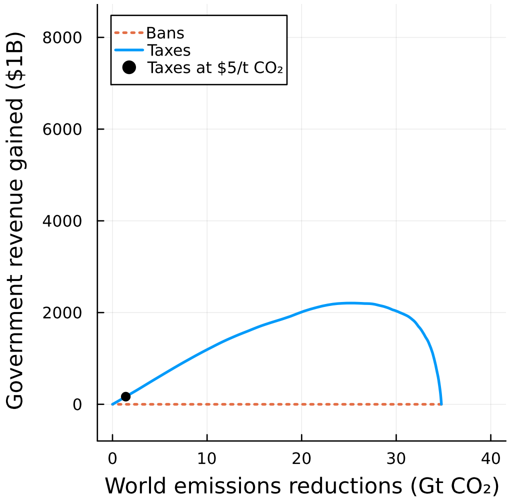
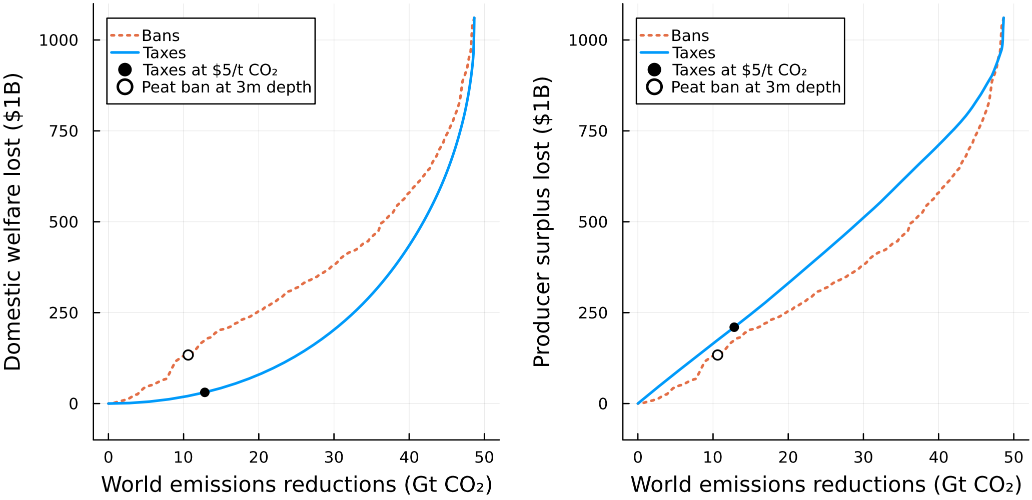
# Brazil: taxes reduce $PS + G$ losses, bans reduce $PS$ losses



# But bans give up $G$



# Indonesia: similar patterns, with magnitudes driven by peat



# Conclusion

# Summary

- Conservation is political
  - Regulation must consider politics
- Quantitatively important in Brazil and Indonesia
  - And perhaps in other high-value conservation zones