The Political Economy of Conservation

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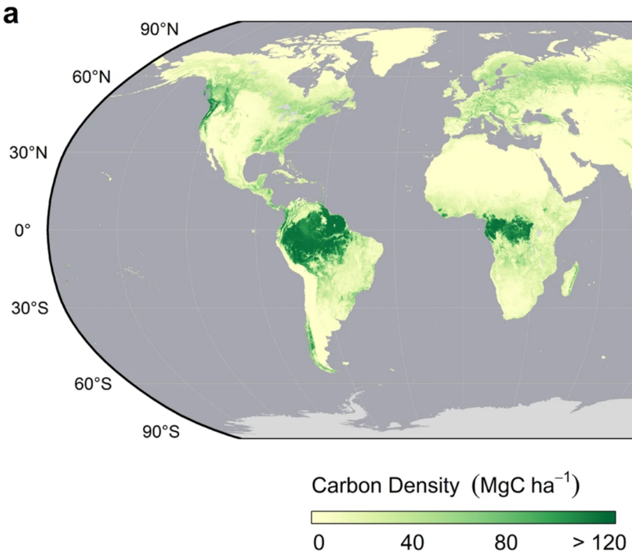
Forest conservation protects major carbon stocks (Spawn et al. 2020)



But conservation is political

New Internationalist

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

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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

Question

How can conservation policy navigate political challenges?

This paper

1. Conservation is political
   - Regulation today may lead to repeal tomorrow
2. Producers resist regulation
   - In Brazil, producers resist regulation with campaign donations
3. Regulatory design matters quantitatively
   - In Brazil and Indonesia, bans reduce emissions and minimize producer losses

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Conservation is political

Regulation with repeal

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

- Regulation τ affects welfare today and tomorrow
  - Pigouvian tax τ^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 π (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 π

- 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

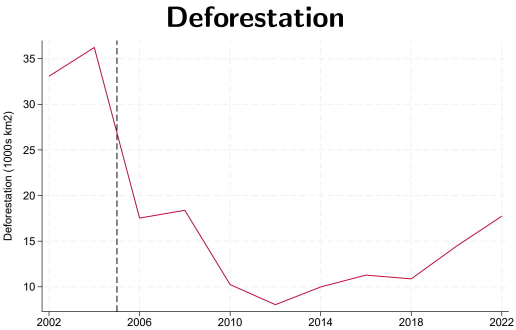
Producers resist regulation

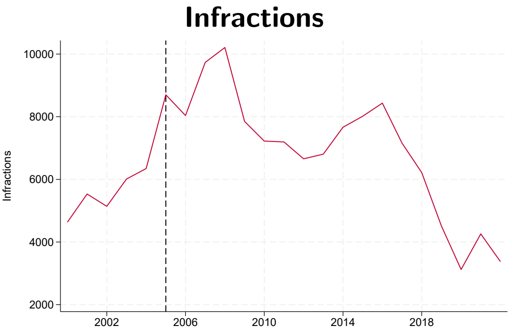
The Brazilian Amazon

- **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



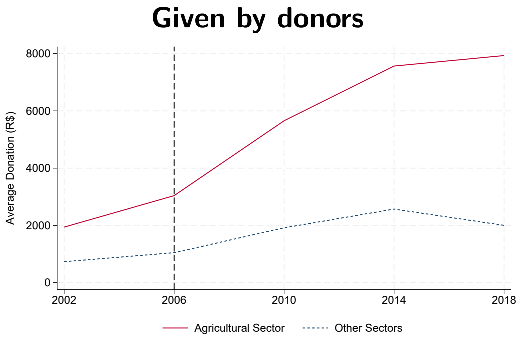


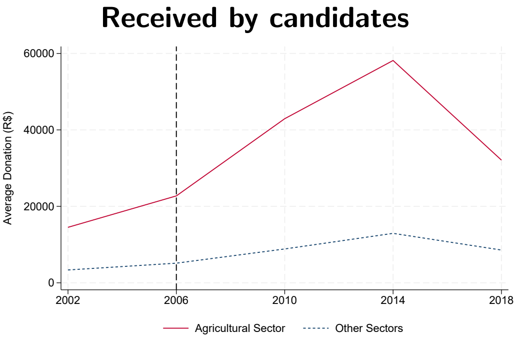
Data

- 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

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 (α_i, γ_{mt})
- Errors ε_{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 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

Bans induce less resistance than taxes

Sample:	High clouds	No new PAs	Full sample
$Ag \times Post$ 2006	2.50**	10.87***	10.65***
	(1.17)	(2.68)	(2.51)
$Ag \times Post$ 2006 $\times$ $New\ PAs$	-0.53		-4.45
	(5.17)		(4.43)
$Ag \times Post$ 2006 $\times$ $Clouds$		-12.68**	-12.44***
		(5.06)	(4.58)
Municipality-year FEs	x	x	x
Observations	10,460	24,155	27,385

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

Regulatory design matters quantitatively

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 π_i from plantations n_i under regulation τ_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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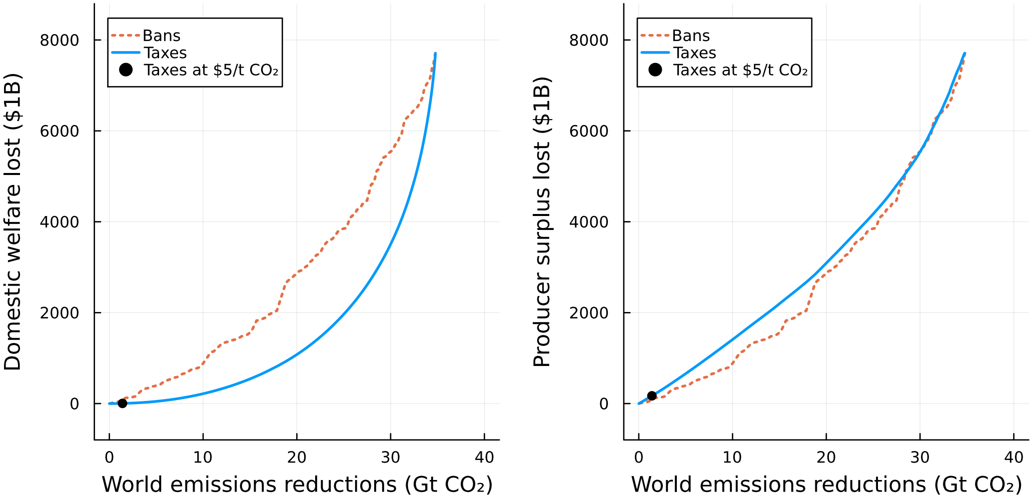
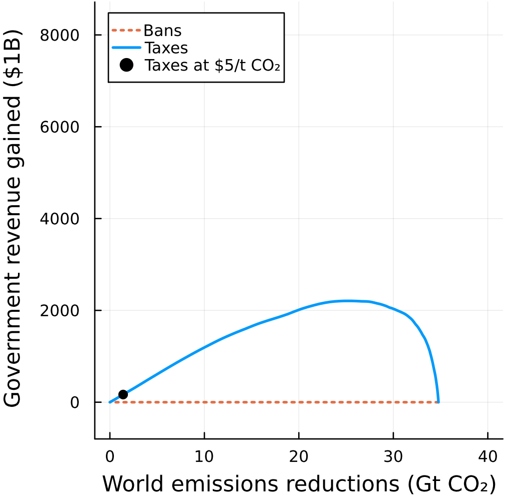
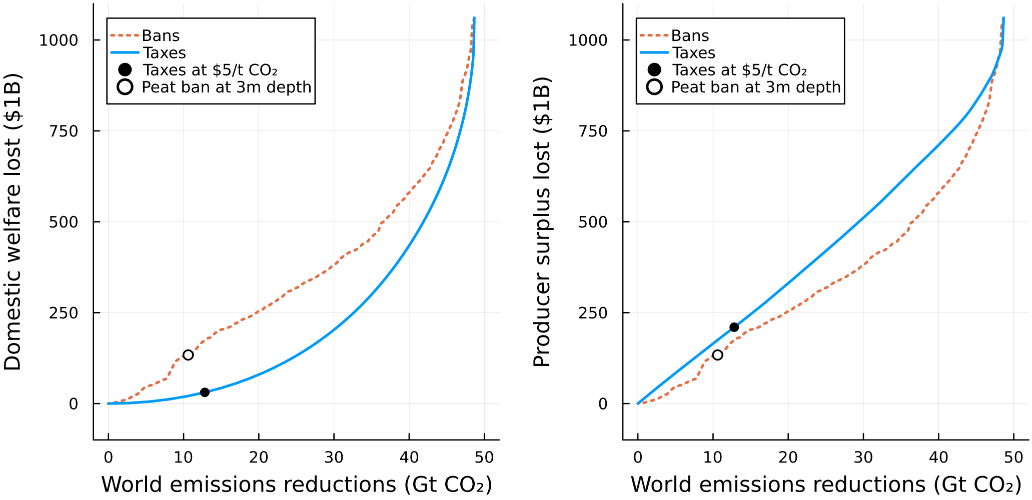
Brazil: taxes reduce $PS + G$ losses, bans reduce PS losses



But bans give up G



Indonesia: similar patterns, with magnitudes driven by peat



Conclusion

Summary

- Conservation is political
  - Regulation should account for producer resistance
- Quantitatively important in Brazil and Indonesia
  - And perhaps in other high-value conservation zones