The Political Economy of Conservation

Robin Burgess, LSE
Francisco Costa, FGV EPGE
Allan Hsiao, Stanford
Benjamin Olken, MIT
Veronica Salazar Restrepo, GSEM

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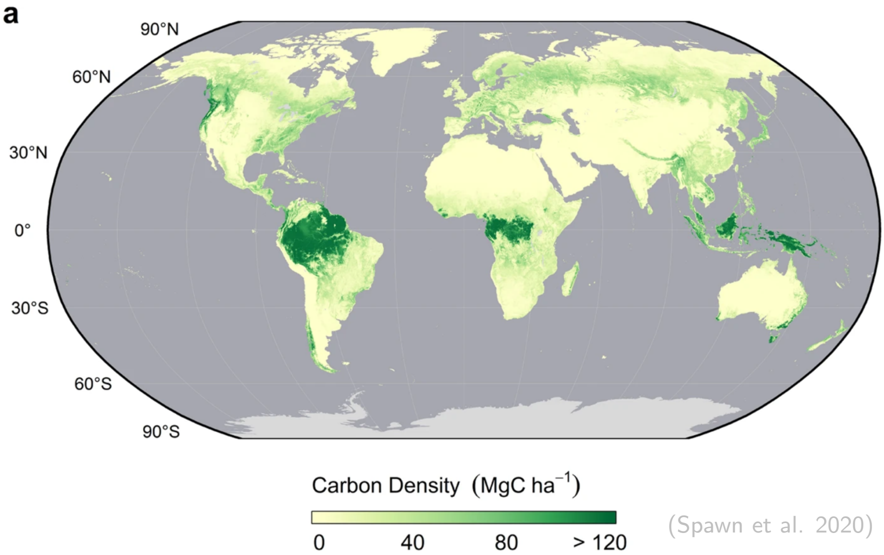
Forest conservation protects major carbon stocks



(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

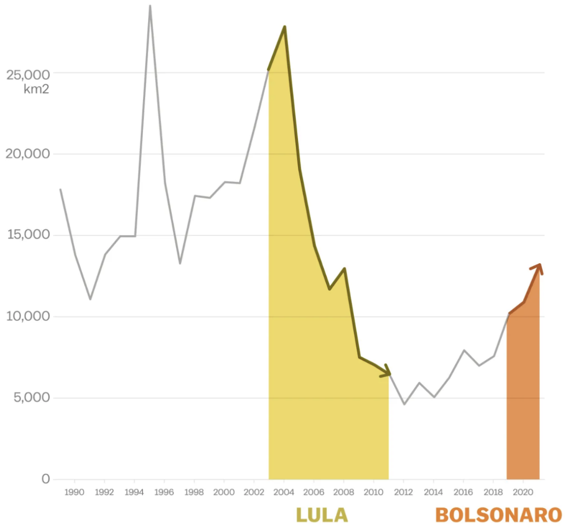
Mongabay

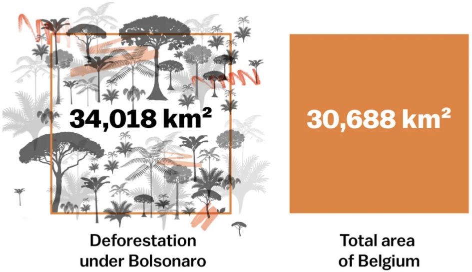
Indonesia palm oil lobby pushes 1 million hectares of new Sulawesi plantations

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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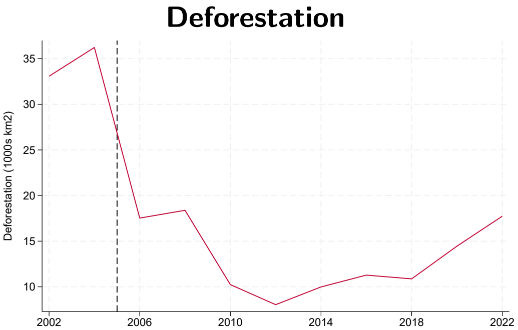
Regulation meets resistance

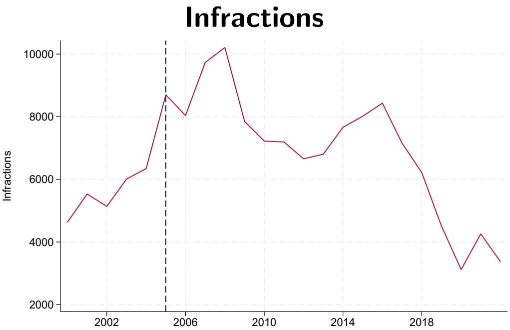
The Brazilian Amazon

- **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





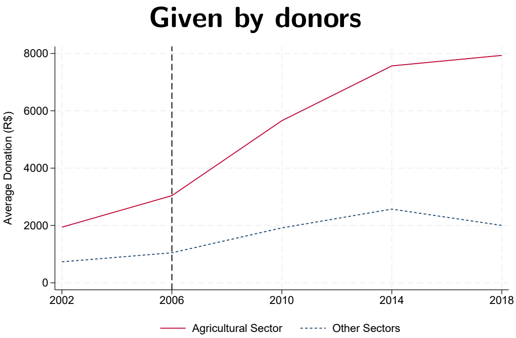
Data

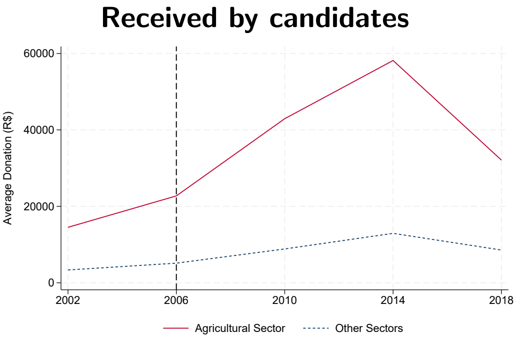
- Universe of formal donations (*Tribunal Superior Eleitoral*)
  - Every state and federal election from 2002 to 2018
  - For donors and candidates in Brazil
- Universe of firm registries (*Receita Federal*)
  - We identify donors and candidates who are agricultural firm owners
  - And thus are likely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

Donors and candidates in the Legal Amazon

	Total	Agricultural firm owners	Donations to agricultural firm owners
Donors	62,987	3,509	1,488
Candidates	5,605	390	1,786

Campaign donations over time





Difference-in-differences

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

- Agriculture vs. non-agriculture, before vs. after the program
- Individuals i, municipalities m, election years t, fixed effects γ_{mt}

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 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

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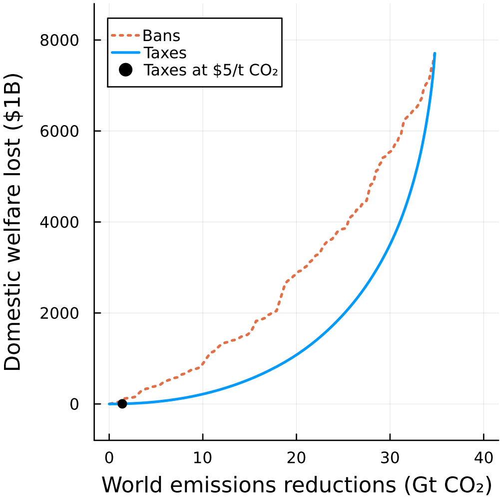
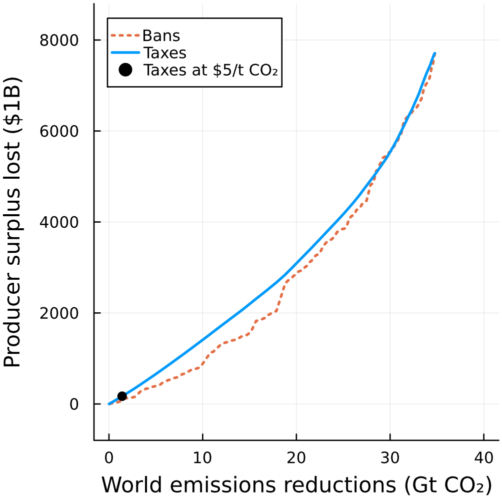
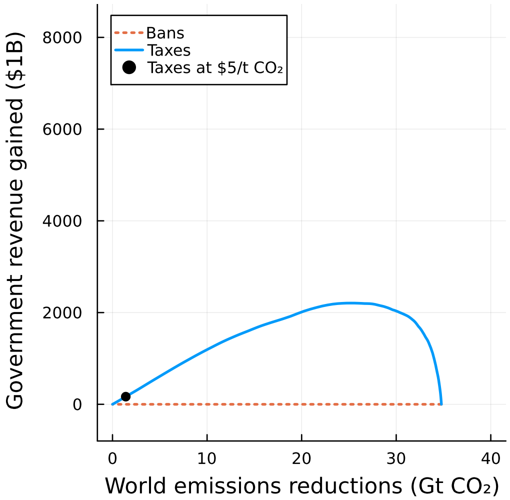
Brazil: taxes reduce $PS + G$ losses, bans reduce PS losses

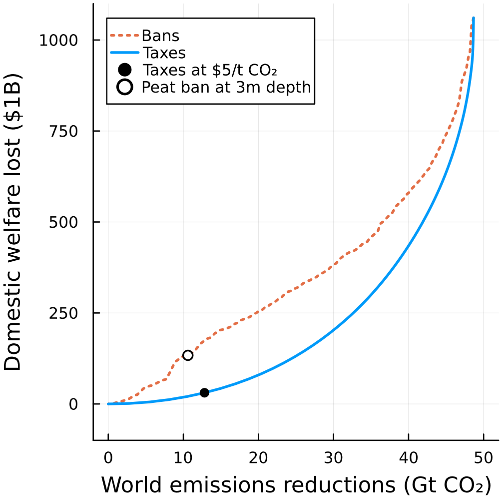


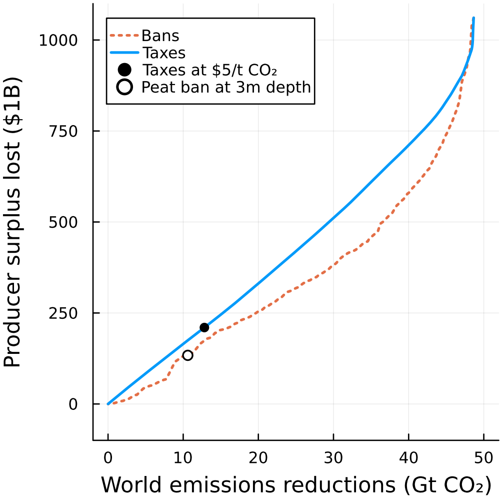


But bans give up G



Indonesia: similar patterns, with magnitudes driven by peat





Conclusion

Summary

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