Environmental and Development Economics
Module 6 - Political Economy and the Environment

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2024-10-08

Lecture 10

Political Economy and the Environment in LMICs

Housekeeping

- **Tuesday Oct. 8th class in Ruttan 230**
- Reviewers will be assigned tonight
  - Referee report due next Thursday
- Next: work on presentation
  - You will present in alphabetical order
- Replication due Oct. 21st
  - You can choose **any** env/dev paper, not just ones on syllabus
- Migration readings posted

Why political economy?

- There is a wedge between private and social value
  - Agents unlikely to volunteer conservation when benefits accrue elsewhere
  - Landowners cut forest for private value, ignore social value (e.g. biodiversity)

- **Government intervenes** to correct externality (regulation or prices)

- Weak governance: De Jure $\neq$ De facto deforestation
  - What drives actual deforestation?
  - Last time: weak monitoring, weak enforcement, spillovers
  - **Today:** political economy (i.e. "non-benevolant' ' social planner)

Political economy of the environment

- In first-best, low e means low $MWTP_e$ or high MC_e

$$MWTP_e = \frac{\partial c_e}{\partial \Delta e}$$

- Social planner sets e^* by aggregating over agents
  - Assumption: **no preferences of own**

Recent Work

- **Corruption:** Burgess et al. (2012), Oliva (2013)
- **Political cycles:** Balboni et al. (2021), Mahadevan (2024), Mahadevan and Shenoy (2023)
- **Favoritism:** Madhok and Gulati (2024), Abman and Carney (2020), Gordon et al. (2024)

Burgess et al. (2013): Political Economy of Deforestation

- **Question:** How do political incentives affect environmental quality?
  - What is the role of bureaucrates in natural resource extraction?
- **Setting:** Deforestation over eight years of institutional change in Indonesia
  - Local bureaucrats can facilitate illegal logging
- **Research Design:** Asynchronous district splits
  - changes in election timing and budget allocations
- **Results:** new jurisdictions $\uparrow$ deforestation and $\downarrow$ wood price
  - Deforestation increases even in places where logging is banned

Setting: Indonesia

- National government sets de jure forest rules
  - Rely on local bureaucrats for enforcement
- Central monitoring of local officials is costly
  - Local officials can allow deforestation above sanctioned amount
- This generates competition between districts:
  - **Idea:** district heads can sell "permits" to deforest in exchange for bribe
  - **Demand:** more permits sold, lower P per permit
  - **Market:** district heads engage in Cournot Competition
  - **Strategy:** one official in area means high price, few permits, less deforestation
  - **District split:** many heads, lower price, many permits, more deforestation

Aside: Cournot Market Structure

- **Oligopoly Setting**: Few firms produce homogeneous goods
- **Quantity Competition**: Firms choose q *simultaneously* to max. profits
- **Market Price**: Determined by total Q produced; firms account for rivals' output
- **Nash Equilibrium**: Each firm's output is optimal, given competitors' output
- **Strategic Substitution**: Firms'q are substitutes; increasing output lowers price
- **Key Outcome**: Q and P are between monopoly and perfect competition levels
  - Firms have *market power*, leading to P>MC

Model of Bureaucrat Behavior

- Logging firms choose where to log
  - Must obtain (legal or illegal) permit from district
- Districts choose number of permits to sell
  - Take # of permits issued by other districts as given
- Bribe is price for permit beyond legal limit
- Generates Cournot competition
  - More districts $\rightarrow$ more deforestation $\rightarrow$ lower wood price

Model Setup: Firms

- Downward sloping inverse demand for wood, $p(Q)$
- Firms' profit maximization problem:

$$\max_{q_{fd}} [p(Q)q_{fd} - cq_{fd} - b_d q_{fd}]$$

- q_{fd}: Quantity of wood logged by firm f in district d
- $p(Q)$: Price of wood, depends on total quantity Q in the province
- c: Constant marginal cost per unit of wood
- b_d: Permit cost per unit of wood in district d
- FOC [q]: WTP for permits: $b_d = p(Q) - c$

Model Setup: District Government

- Districts sell permits but risk being caught for exceeding legal quotas:

$$\max_{q_d} \left[b(q_d) q_d - \phi(q_d, \bar{q}) r_d \right]$$

- q_d: Total logging permits issued by district d
- $\phi(q_d, \bar{q})$: Prob. of being caught, increasing in illegal logging, $q_d - \bar{q}$
- r_d: Rent lost if detected
- Substitute firms' marginal bribe: $b_d = p(Q) - c$

Cournot Equilibrium

- FOC for optimal logging permits:

$$q_d p' + p - c - \phi'(q_d, \bar{q}) r_d = 0$$

- With n districts in wood market s.t. $Q = nq_d$ yields Cournot equilibrium:

$$\frac{p - c}{p} = \frac{1}{n\epsilon} + \frac{\phi'(Q/n, \bar{q}) r}{p}$$

- ϵ: Price elasticity of demand for wood
- n: Number of districts
- Q: Total quantity of wood logged in the province

Model Implications

$$\frac{p-c}{p} = \frac{1}{n\epsilon} + \frac{\phi'(Q/n, \bar{q})r}{p}$$

1. More districts ($\uparrow$ n) leads to $\uparrow$ deforestation, $\downarrow$ wood prices
2. Substitution b/w illegal logging and other forms of rents r
   - If $\phi' > 0$ i.e. $q_d > \bar{q}$, then $\uparrow r$ leads to $\downarrow q_d$

Empirical Analog

- Let $p = \frac{\alpha}{q^\lambda}$ (CES demand), where $\epsilon = \frac{1}{\lambda}$, then effect of districts splits is:

$$\frac{1}{Q}\frac{dQ}{dn} = \frac{1}{n^2 - n\lambda}$$

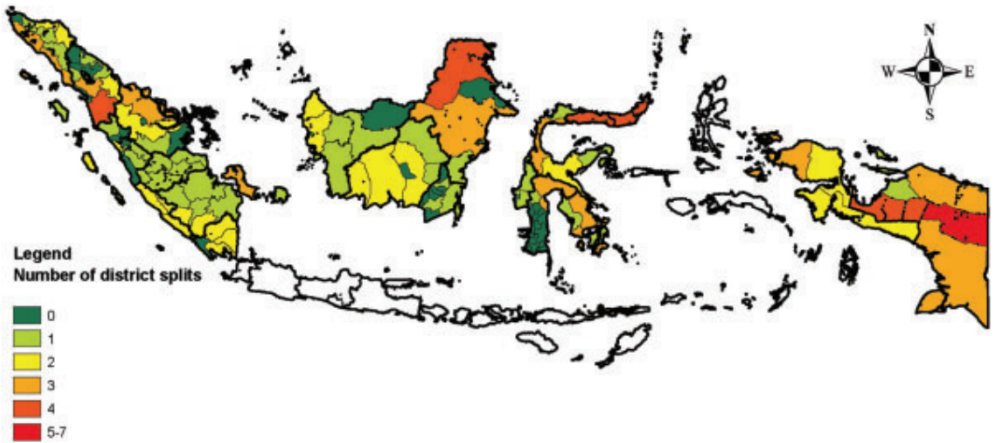
Background: Indonesia

- In 1998, Suharto's regime ends, leading to rapid decentralization of power
  - Number of districts increased from 292 in 1998 to 483 by 2008
- Natural resource rich regions demand greater control over revenue
  - Forest management shifted to district governments
- District forest offices became the key players in both legal and illegal logging
- Illegal logging, facilitated by district officials, accounts for 60-80% of total logging

Background Continued

- District splits determined by: 1) geography, 2) ethnicity, 3) public sector size
- Timing of splits determined by: lots of bureaucracy and red tape...
  - Not determined by pre-trends in deforestation
- Wood markets are localized
  - Raw log exports are banned
  - Timber first transported to local mills
  - **Prices vary across regions**

Political Economy Data



Empirical Strategy

Deforestation Effects

- Fixed effects Poisson quasi-maximum likelihood count model:

$$E(deforest_{pit}) = \mu_{pi} exp(\beta NumDistrictsinProv_{pit} + \eta_{it})$$

- $deforest_{pit}$: number of deforested pixels in province p, island i, time t

Price Effects

$$ln(y_{pt}) = \beta NumDistrictsinProv_{pit} + \mu_{wpi} + \eta_{wit} + \epsilon_{wpit}$$

- y_{wpit}: price of wood type w
- μ_{wpi}, η_{wit}: wood-by-province and wood-by-island-year FEs

Results: Deforestation

	(1) All Forest	(2) Production/ Conversion	(3) Conservation/ Protection
Panel A			
Number of districts in province	0.0385**	0.0443**	0.0472
	(0.0160)	(0.0179)	(0.0331)
Observations	608	296	312
Panel B: including lags			
Number of districts in province (sum of L0–L3)	0.0822***	0.0809***	0.101**
	(0.0204)	(0.0193)	(0.0426)
Observations	608	296	312

- District split increases deforestation rate by 3.85%
- Similar impacts where logging is legal (production) or illegal (conservation)!
- Large medium run effects

Results: Prices

	(1)	(2)
	2001–2007	
	All wood observations	
Variables	Log price	Log quantity
Panel A		
Number of districts in province	−0.017	0.084*
	(0.012)	(0.044)
Observations	1003	1003
Panel B: including lags		
Number of districts in province	−0.0336**	0.135**
(sum of L0–L3)	(0.0134)	(0.0561)
Observations	1003	1003

- district split decreases prices by 1.7% (not significant)
- after three years, prices ↓ by 3.4%
- slope of demand curve = $\frac{dLnQ}{dlnP}$ = -2.27 (elastic)

Alternative Explanation: Enforcement

- **New district has less enforcement as it sets up**
  - Initial increase in deforestation, then decline over time
- But, we see initial $\uparrow$ in deforestation sustained over three years
- Also, if enforcement driving results, should see $\uparrow$ deforestation in new half of district
  - If Cournot competition, no differential effects b/w old and new part
  - **Result: no differential effects!**

Are oil and gas revenues substitutes for logging revenue?

- If detection removes both corruption opportunities, then they are substitutes
  - If corruption has fixed costs, then they are complements
- Share of central oil/gas revenue rebated back to districts
  - Half goes to producing districts, other half split equally w/n province
- Since, district splits influence oil/gas prices through the sharing formula, control for splits directly and estimate:

$$E(deforest_{dit}) = \mu_{di} exp(\beta PCOilandGas_{dit} + \gamma NumDistricts_{dit} + \eta_{it})$$

- $PCOilandGas_{dit}$: per capita oil revenue received by district
- Could there be other explanations for a significant β?

Results

Variables	(1) All forest	(2) Production/ Conversion	(3) Conservation/ Protection
Panel A			
Oil and gas revenue	−0.00316**	−0.00284*	−0.00597**
per capita	(0.00160)	(0.00165)	(0.00252)
Observations	6464	3064	3400
Panel B: lags			
Oil and gas revenue	−0.00492***	−0.00432**	−0.0113***
per capita	(0.00186)	(0.00190)	(0.00257)
Lag 1	0.000652	8.87e-05	0.00561***
	(0.00103)	(0.00126)	(0.00113)
Lag 2	0.00112	0.00132	0.000731
	(0.00130)	(0.00151)	(0.00138)
Lag 3	0.00519***	0.00530***	0.00574
	(0.00163)	(0.00160)	(0.00372)
Sum of L0–L3	0.00205	0.00240	0.000768
	(0.00134)	(0.00154)	(0.00195)

- Evidence of substitution: each $ 1 of oil/gas rents reduce logging by 0.3%
- Medium-run effect positive! Explanation: illegal rents attract "bad'' politicians

Negative Selection into Office

Variables	(1) All forest	(2) Production/ Conversion	(3) Conservation/ Protection
Oil and gas revenue per capita	−0.00523***	−0.00457***	−0.0122***
	(0.00143)	(0.00159)	(0.00174)
Postelection	0.0218	0.0240	0.0299
	(0.110)	(0.118)	(0.217)
Oil and gas × Postelection	0.00175*	0.00147	0.00517***
	(0.000989)	(0.000976)	(0.00180)
Oil + Oil * Postelection	−0.00348***	−0.00310**	−0.00698***
	(0.00129)	(0.00140)	(0.00134)
p-value	0.00128	0.0161	<0.001
Observations	6403	3037	3366

- negative effect of oil/gas rents attenuates once election is held
- 35% of substitution effect disappears after election
- Takeaway: change in political equilibrium reverses substitution effect

Takeaway

- **Decentralization Increases Deforestation**:
  - district splits increase competition, $\uparrow$ deforestation, $\downarrow$ timber prices.
- **Substitution of Corruption Opportunities**:
  - Illegal logging and oil/gas rents act as substitutes.
  - When alternative rents available, reduce illegal logging, though weakens over time
- **Cournot Competition Explains Deforestation Behavior**:
  - The Cournot model explains how bureaucrats incentives drive deforestation.

Discussion

- Do you buy this story?
- Model extensions?
- Alternative story?

Lecture 11

Political Economy of the Environment (continued)

Housekeeping

- Presentation order next week (30 mins)
  - **Oct 15:** 1) Matt B 2) Jovin L 3) Ryan M
  - **Oct 17:** 1) Gustavo M 2) Giang T 3) Sarah W

- Peer review due Thursday at midnight
  - Remember to give **constructive** criticism + **suggestions**
  - Look at instructions in assignment folder on github!
  - Submit through Canvas (not email)
  - I will send it to authors by Friday afternoon

- Thursday: migration (1 hour), future research directions (30 mins)
  - Migration readings posted on syllabus (no presentation)

Back to Political Economy

- Recall, inefficiency comes from social planner not being "benevolent' '
  - Include own utility weights in social welfare function
- In Indonesia, this comes in the form of taking bribes
  - Fuels competition b/w bureaucrats for (illegal) logging permits
- In Amazon, this comes in the form of rents from supporting ag. lobby
  - Incentives: monetary returns, electoral returns
  - See Katovich and Moffette (2024)
- Test: will removing potential rents curb deforestation?
  - We saw this already with pollution (Duflo et al., 2013)

Braganca and Dahis (2022): Cutting Special Interests by the Roots

- **Research Question:** Does conservation policy change political incentives?
- **Setting:** Deforestation policy in Amazon
  - Test effect of policy on "special interest' ' farmer politican groups
- **Data:** politician characteristics, elections, deforestation
- **Design:** 1) Difference-in-differences, 2) close election RDD
- **Results:** Corrupt municipalities deforest more before but not after policy
  - **mechanism:** policy reduces rents from illegal deforestation, reducing incentives for farmer politicians to cater to special-interest farmer groups

Background: Brazil Deforestation

- De jure: unauthorized deforestation is punishable crime
  - De facto: Lack of coordination + high regulatory costs $\rightarrow$ limited effectiveness
- Environmental enforcement is a **federal** responsibility
  - In practice: mayors can indirectly influence deforestation
  - e.g. mayor consent needed for land grabbing or illegal logging
- 2004: PPCDAM deforestation policy enacted
  - Satellite based monitoring to identify deforestation hotspots
  - See Moffette et al. (2021)

Background: Political Economy

- Bribes/lobbying used to reduce environmental enforcement
- Strong farmer lobby: 1/4 of Congress are members of rural caucus
- Incentives of "farmer' ' politicians depends on conservation policy
  - w/o policy, high returns to deforestation $\rightarrow$ pro-deforestation lobbying by farmers
  - with policy, low returns from deforestation $\rightarrow$ less incentive to allow deforestation

Conceptual framework

- Farmer politicians promote deforestation through three mechanisms:

- **Preferences**: pro-deforestation preferences
  - prediction: electing farmer mayor raises local deforestation
  - policy: will not affect politician preferences

- **Monetary Returns**: benefit financially from deforestation
  - prediction: electing farmer mayor raises local deforestation
  - policy: increases cost of deforestation, mitigating negative mayor effect

- **Electoral Returns**: gain votes by supporting pro-deforestation policy
  - prediction: electing farmer mayor increases local deforestation
  - policy: unclear, but expect it to decrease electoral returns

See model in paper

Data (2001-2016)

- **Elections:** party, gender, age, occupation, education
  - **farmer politician** = agriculture occuption (18% of sample)
- **Deforestation:** Global forest change
  - Number of deforestation pixels in municipality-year
- **Land use:** MapBiomas
  - forest, pasture, crops, non-forest
- **Public finance:** revenue and expenditures by type and source
- **Land conflict:** conflicts, murders, and settlements

Empirical Strategy

- Term-specific differences in outcomes b/w farmer and non-farmer places:

$$Y_{it} = \beta_t P_{it} + \gamma_t' X_{it} + \delta_t + \epsilon_{it}$$

- Y_{it} = environmental outcome in municipality i during term t
- $P_{it} = 1$ if i is governed by a farmer politician during term t
- Four terms: 2001-04, 2005-08, 2009-12, 2013-16

- Predictions: $\beta_t > 0$, $\beta_t - \beta_{01-04} < 0$
- **Question:** Why is there no municipality FEs?

Identification assumptions

- How does this differ from difference-in-differences?

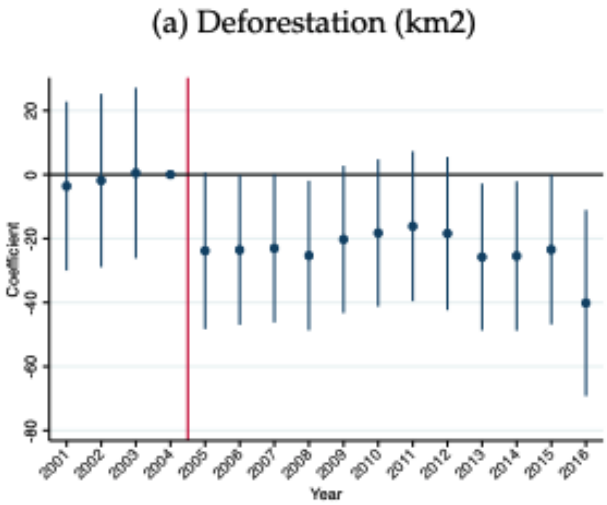
Event Study

- Year specific changes in deforesation in farmer vs. non-farmer municipalities:

$$Y_{it} - Y_{i2004} = \sum_{\tau=2001}^{\tau=2016} \beta_\tau P_{it} + \sum_{\tau=2001}^{\tau=2016} \gamma_\tau' X_{it} + \delta_t + \epsilon_{it}$$

- β_τ: change in environment b/w t and 2004 in farmer vs. non-farmer places
- Prediction: $\beta_t = 0 \quad \forall \tau < 2004$, $\beta_t < 0 \quad \forall \tau > 2004$

Results: Event Study



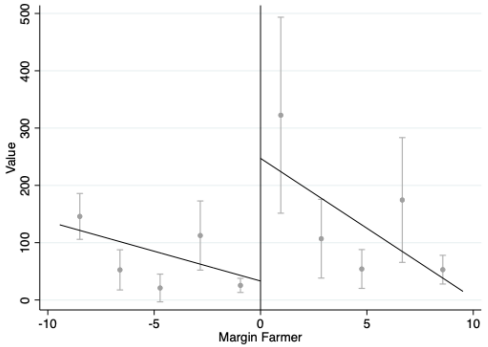
Results: Farmer Politicians and Deforestation

	Cross Section	Switchers	Constant Selection	RD
	(1)	(2)	(3)	(4)
Panel A: Deforestation (km^2)				
2001-04	94.80***	31.20**	136.58**	153.19**
	(33.68)	(12.21)	(56.69)	(78.11)
2005-08	5.05	-2.12	26.99*	-18.31
	(13.75)	(10.75)	(14.84)	(44.29)
2009-12	26.74**	-41.37	80.09**	63.76
	(12.90)	(33.96)	(31.70)	(72.70)
2013-16	-19.12	-85.78**	39.69	-14.58
	(16.87)	(42.84)	(45.78)	(59.55)
Δ *(2005-08) - (2001-04)*	-89.76**	-33.32***	-109.59**	-171.50*
	(35.82)	(12.90)	(54.55)	(89.02)
Δ *Post - Pre*	-89.19***	-74.29***	-87.66**	-147.61*
	(34.09)	(25.49)	(41.24)	(84.18)

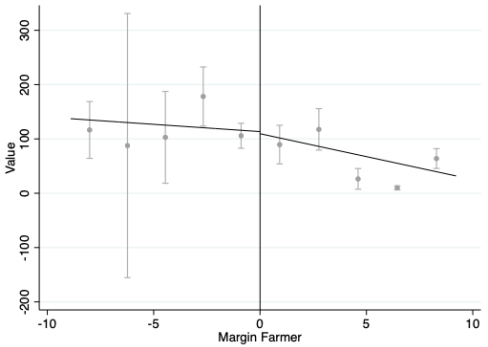
- Deforestation was $95 km^2$ higher in farmer politician places pre-policy
- Sharp drop in deforestation post-policy $\Delta(2005-08)-(2001-04)$

Close Election RDD Estimates

(a) 2001-04



(b) 2005-08



How do politicians influence deforestation?

	Deforestation	Inside PA	To Pasture	To Crops
	(1)	(2)	(3)	(4)
Panel A: Cross-Section				
2001-04	94.80***	90.45***	49.67***	0.10
	(33.68)	(33.80)	(14.15)	(0.85)
2005-08	5.05	7.04	10.86	-1.05**
	(13.75)	(12.68)	(8.38)	(0.50)
2009-12	26.74**	22.46**	22.10*	1.29
	(12.90)	(10.58)	(11.57)	(2.58)
2013-16	-19.12	-20.13	18.07	-2.20
	(16.87)	(12.36)	(25.67)	(1.74)
Δ *(2005-08) - (2001-04)*	-89.76**	-83.40**	-38.81**	-1.15
	(35.82)	(35.42)	(16.18)	(0.95)
Δ *Post - Pre*	-89.19***	-85.65**	-33.30**	-0.70
	(34.09)	(33.91)	(16.04)	(1.27)

- Differences b/w farmer and non-farmer area driven by successful PA policy
- Cleared land is converted to (low productivity) pastureland, not cropland

Results: Violence and Conflict

	Homicide Rate	Conflicts	Murders	Settlements
	(1)	(2)	(3)	(4)
Panel A: Cross-section				
2001-04	27.11***	0.08	0.11***	-0.00
	(7.13)	(0.08)	(0.04)	(0.03)
2005-08	6.94	0.04	0.04	-0.03
	(6.53)	(0.10)	(0.04)	(0.02)
2009-12	-6.80	-0.04	0.08	0.02
	(7.51)	(0.11)	(0.05)	(0.03)
2013-16	-9.11			
	(7.74)			
Δ *(2005-08) - (2001-04)*	-20.17**	-0.05	-0.07	-0.02
	(9.65)	(0.13)	(0.06)	(0.04)
Δ *Post - Pre*	-28.83***	-0.09	-0.07	-0.00
	(8.24)	(0.10)	(0.05)	(0.03)

- Violent deaths larger in farmer politician places pre-policy, but not after
- Similar (but weaker) for land conflict

Mechanisms: Electoral Outcomes

	% Farmer Cand. Next Term	% Vote Farmer Next Term	Farmer Next Term	Incumbent Reelected
	(1)	(2)	(3)	(4)
Panel A: Cross-Section				
2001-04	12.73***	14.13***	0.20***	0.02
	(3.16)	(3.43)	(0.05)	(0.04)
2005-08	10.54***	10.99***	0.10**	-0.07
	(2.82)	(3.08)	(0.04)	(0.05)
2009-12	6.04**	6.60**	0.07*	-0.10**
	(2.72)	(3.00)	(0.04)	(0.05)
2013-16	4.25	6.56*	0.11**	-0.03
	(3.30)	(3.70)	(0.05)	(0.05)
Δ *(2005-08) - (2001-04)*	-2.19	-3.14	-0.10	-0.08
	(4.20)	(4.56)	(0.07)	(0.06)
Δ *Post - Pre*	-5.36	-6.28*	-0.11*	-0.05
	(3.41)	(3.75)	(0.06)	(0.05)

- No evidence evidence that electoral incentives affected farmer politician behavior

Discussion

- Limiting illegal rents from helping special interest groups can break the link between local politics and environmental degradation
- But, Moffette et al. (2021) find no effect of deforestation alert technology
- Alternative stories?

Back to Political Economy

- MC_e needed to solve first-best social planner problem
- Idea: "too' ' low e in LMICs implies $MB < MC$
  - Which means, we should be able to abate until:

$$MWTP_e = \frac{\partial c_e}{\partial \Delta e}$$

- BUT, $\frac{\partial c_e}{\partial \Delta e}$ may be inflated due to **low state capacity**
  - Empirical estimates of MAC_e is not enough
- Political economy (state capacity) keeps $\frac{\partial c_e}{\partial \Delta e}$ high and explains low e in LMICs
- Test: improve state capacity and see what happens (e.g. Duflo et al., 2013)

Saavedra (2024): State Capacity and Illegal Mining

- **Research Question:** Can ↑ state capacity reduce illegal mining?
- **Setting:** Colombia: New technology to disclose illegal mines to government
- **Design:** Randomly provide technology to different groups
  - 2x2 RCT: 1) local authority (mayor), 2) enforcer (national gov't), 3) both, 4) none
- **Results:** improving state capacity ↓ illegal mining
  - Similar effects across treatments
  - But, some negative spillovers
  - No effects on deforestation

Illegal Mining in Colombia

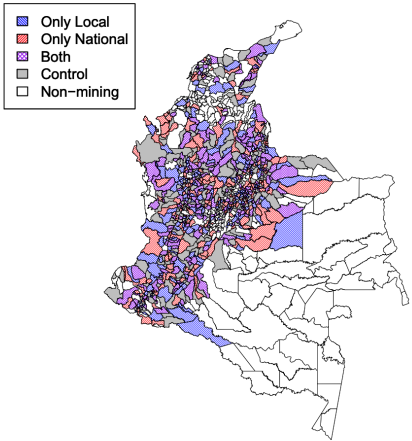
- **82% of mined areas are illegal**, mostly gold and coal
- **Criminal vs. Informal Mining**: Criminal mining funds armed groups; informal mining is done by locals evading the law
- **Severe environmental impact**, including deforestation and pollution.
- **Enforcement challenges**: Local authorities handle soft enforcement, while national authorities manage punitive actions
- **Monitoring technology** like satellite imagery crucial for detecting illegal mining

Treatment: Detecting illegal mines

- Machine learning algorithm using satellite images to detect illegal mining
- After finding mining activity, assess legality with geotagged mining permits

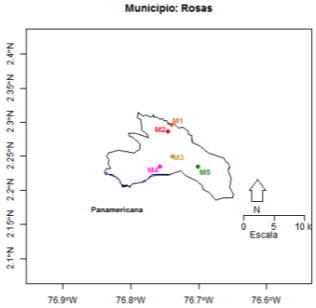
State capacity intervention

- 2x2 RCT design
- 200 municipalities in each group
- Treatment: send letters disclosing five *predicted* mining locations
  - Letters sent in 2017, 2019, 2021
  - 40% of local mayors field-verified disclosed location



Treatment: Information Letter

Como parte de mi investigación en la Universidad del Rosario hemos desarrollado un modelo de machine learning para detectar actividad minera usando imágenes satelitales. Para su municipio en particular, predecimos que en los siguientes puntos hay actividad minera.



Prediccion	Latitud	Longitud	SI hay mineria	NO hay mineria
Mina 1	2.29608118	-76.73956063	☐	☐
Mina 2	2.28630785	-76.74521233	☐	☐
Mina 3	2.24942041	-76.73869571	☐	☐
Mina 4	2.23447786	-76.75674665	☐	☐
Mina 5	2.2340023	-76.70011267	☐	☐

Determinants of Mayor Verification

Table A.2: Determinants of local authority's responding with verifications

Dependent variable:	Verified=1				
	(1)	(2)	(3)	(4)	(5)
Share illegal	-0.084				-0.016
	(0.11)				(0.12)
Model accuracy		0.16**			0.16**
		(0.069)			(0.069)
Distance (Km)			-0.0081***		-0.0075***
			(0.0018)		(0.0020)
Armed Group				-0.12**	-0.043
				(0.057)	(0.061)
N. of obs.	400	389	400	400	389
Mean of Dep. Var.	0.41	0.41	0.41	0.41	0.41

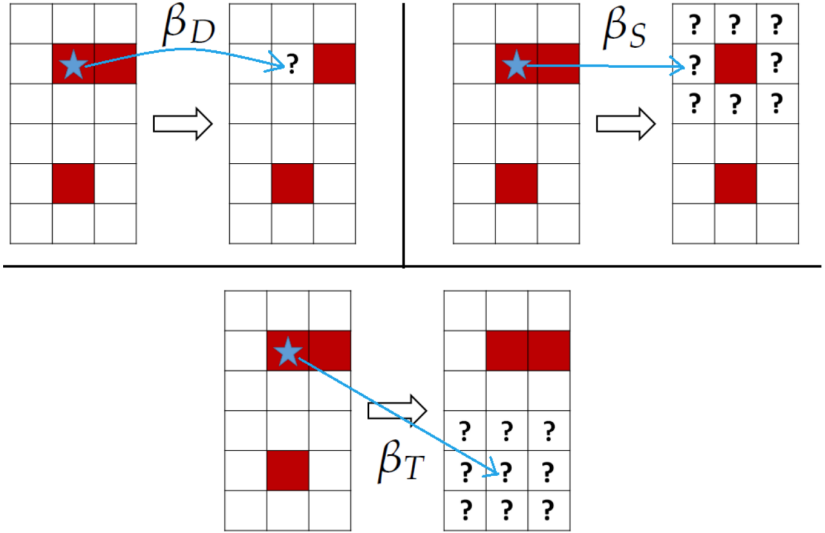
Empirical Strategy

- Three locations within treated groups: 1) locations disclosed in letters, 2) neighbors of disclosed points, 3) locations further away from disclosed point
- Grid cell level equation:

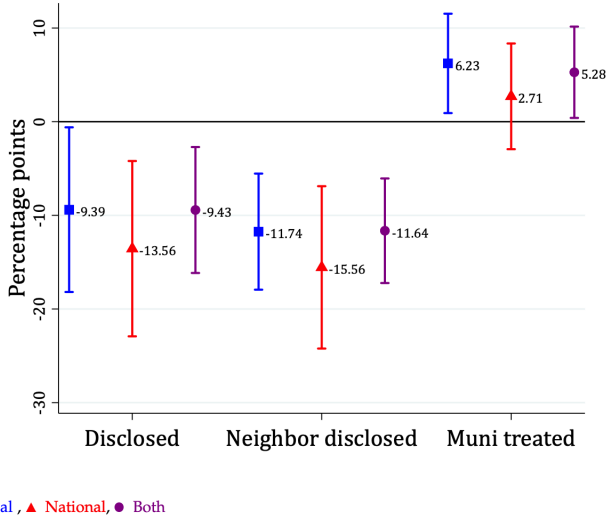
$$y_{gmdt} = \beta_D(After_t \times Disclosed_{gm}) + \beta_S(After_t \times Neighbor_{gm}) + \beta_T(After_t \times MuniTreated_{gm}) + \gamma_m + \gamma_{dt} + \epsilon_{m,dt}$$

- where y_{gmdt} is % illegally mined area in cell g of municipality m (UNODC)
- β_D: effect of disclosing gridcell on illegal mining in that gridcell
- β_S: effect of disclosing gridcell on illegal mining in neighbor cell
- β_T: effect of disclosing gridcell on illegal mining far away

Coefficient Interpretation



Results: Reduction in illegal mining



Results: No impact on other outcomes

Dependent variable:	% Gold mined illegally		Defo rate	Poverty	Child Labor
	(1)	(2)	(3)	(4)	(5)
Local only X After	-2.77	-2.67	-0.045	3.49	0.43
	(3.72)	(3.79)	(0.080)	(2.97)	(0.46)
National only X After	-2.41	-2.38	-0.092	-4.06	0.13
	(2.75)	(2.76)	(0.067)	(3.79)	(0.52)
Both X After	-7.09**	-6.86*	0.061	0.10	-0.014
	(3.30)	(3.59)	(0.093)	(3.20)	(0.43)
After X % Neighb. treated		0.015			
		(0.039)			
Mean Dep. Var. Before	85.40	85.40	0.35	61.38	3.40
Obs.	363	363	880	110	110
N. Munis	110	110	110	110	110
R^2	0.87	0.87	0.81	0.35	0.25

- No impact on deforestation. Why?

Mechanisms: endline survey

Dependent variable:	Complaints	Processes Mining auth.	Processes Police	Mines Closed 2020	Mines Closed 2021	Police Closed 2019-20
	(1)	(2)	(3)	(4)	(5)	(6)
Local X After	0.95***	0.13***	0.051	0.39	0.22	0.14
	(0.27)	(0.049)	(0.14)	(0.26)	(0.19)	(0.26)
Mean Dep.Var. Control	0.647	0.057	0.365	0.273	0.241	1.386
Min. Detect. Effect	0.37	0.04	0.24	0.22	0.21	0.37
N. Obs	138	555	548	552	581	537
R^2	0.27	0.03	0.06	0.03	0.03	0.11

- Increase in illegal mining investigations w/ National mining authority (col 2)
- Increase in hard enforcement (col 3-6)

Discussion

- Improved state capacity $\downarrow$ illegal activity
- Thoughts?

Political Economy of the Environment

- Politician incentives for rent-seeking leads to over-extraction
  - Burgess et al. (2012), Baranca and Dahis (2024), Katovich and Moffette (2024), Pailer (2018), Mahadevan (2024)
- Institutions and the environment
  - Kuusela and Amacher (2016), Burgess et al. (2024), Lipscomb and Mobarak (2016), Gulzaar et al. (2023)
- State capacity and the environment
  - Saavedra (2024), Moffette et al. (2023), Duflo et al. (2013)
- Leader identity and the environment
  - Gender: Jagnani and Mahadevan (2024)
  - Ethnicity: Madhok and Gulati (2024), Gulzaar et al. (2023), Abman and Carney (2020)