

Conflicts over Property Rights and Natural-Resource Exploitation at the Frontier

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Outline

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Conclusion

Introduction

- Some observations:
 - Land degradation and unsustainable land-use practices in many tropical forest areas
 - Conflicts over land ownership in these same areas
- Feature common to many tropical forest areas:
 - Located far away from markets and government services
 - ⇒ lower output price
 - ⇒ less government support in defining and protecting property rights
- How do these simultaneous effects impact on
 - the type of land use?
 - the decision to protect one's property rights?

Brazilian Amazon Frontier

Quote from Bunker (1985)

[...] The enormous distances to administrative centers, the lack of commercial value of the land itself, and the frequent absence of the appropriate authorities made the costs of registration far greater than any benefits it might bring. Informal institutions of land tenure based on occupation, use, or sometimes superior force superseded the juridical forms of possession that functioned in the capitalist Brazilian center.

The ranching and lumbering entrepreneurs, attracted by new roads and fiscal incentives, were able to exploit the discrepancies in land tenure institutions. In addition to the presumptive preeminence of national legal forms and titles over locally established use rights in land, these entrepreneurs had greater access to and influence over courts, police, and army detachments. They were further protected by distance from administrative centers to which local occupants might appeal against their violent expulsion. These factors impeded effective state action to control the violence and conflict. [...] (108-9)

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Haiti in the 1950's

After completion of irrigation works

Lundahl (1979) reports that around 1950 in Haiti, outsiders began evicting peasants in the lower Artibonite valley after the completion of irrigation works. It was later reported that:

It was of the opinion that the promise of prosperity created by the important works realized in the Artibonite had aroused an immediate desire to become owners of the lands close to the river among many citizens...

Among the latter there are not only enlightened peasants, but also, and above all, townsmen who have discovered a sudden vocation to become agricultors, and even friends, favorites and members of the previous government acting directly or via intermediaries. (DuVigneaud and Figaro, 1958, p. 1, quoted in Lundahl, 1979, p. 604.)

Lundahl concludes that a peasant's tenure security may be jeopardized by "anything that increases the value of peasant land (604)."

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- Insecurity of tenure \Rightarrow lower expected value of long-term gains
- **Well known:** Mechanics of ill-defined property rights and resource use
- **Less well known:** Type of resource use may affect costs of defining property rights and thus the precision of property rights definition
- Possible trade-off between:
 - investment in property rights definition
 - type of land use or investment in resource conservation

The Model

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- Two individuals:
 - a first settler (legitimate claimant)
 - a contestant
- Decision sets:
 - **Settler chooses**
 - type of land use: sustainable or not.
 - level of investment in defining his property rights
 $x_1 \in (0, \infty)$
 - **Contestant chooses**
 - level of effort (investment) to contest settler's claims
 $x_2 \in (0, \infty)$

Type of land use

- Sustainable use \rightarrow output flow rate y
- Unsustainable use (land mining) \rightarrow one-time stock S
- Assumption with perfectly- and costlessly- defined property rights:

$$\frac{py}{r} > pS$$

i.e. sustainable use has more value.

- N.B. We fix the distance for now.

Probability of eviction

- Assume exponential distribution, i.e. if τ is the realized date of eviction, then

$$Pr\{\tau(x_1, x_2) \leq t\} = 1 - \exp\{-f(x_1, x_2)t\}$$

where f is *arrival rate* of eviction.

- Assumptions on f :

$$f(x_1, x_2) \geq 0, \quad f_1 \leq 0, \quad f_2 \geq 0$$

$$f_{11} \geq 0, \quad f_{22} \leq 0, \quad f(x_1, 0)|_{x_1 \geq 0} = 0.$$

- Similarities with patent races.

Value of settler's "project"

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$$\begin{aligned} V^1(x_1, x_2) &= \int_0^{\infty} p y e^{-rt} e^{-f(x_1, x_2)t} dt - x_1 \\ &= \frac{p y}{r + f(x_1, x_2)} - x_1 \end{aligned}$$

Value of contestant's "project"

$$\begin{aligned} V^2(x_1, x_2) &= \int_0^{\infty} p y e^{-rt} (1 - e^{-f(x_1, x_2)t}) dt - x_2 \\ &= \frac{py}{r} - \frac{py}{r + f(x_1, x_2)} - x_2 \\ &= \frac{py}{r} - [V^1(x_1, x_2) + x_1] - x_2. \end{aligned}$$

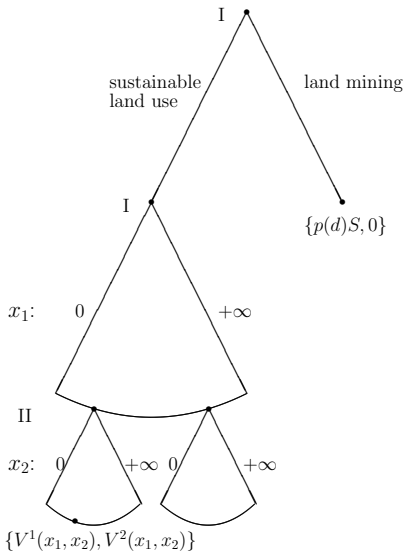
- Assumption: After successful eviction, property rights become perfectly secure for contestant.
- Remark

$$V^1 + V^2 = \frac{py}{r} - x_1 - x_2 > 0$$

Aggregate appropriative expenditures do not exceed "social" value of coveted land.

Timing of the Game

- 1 Settler first chooses type of land use and x_1 .
- 2 Contestant observes settler's decisions and then chooses x_2 .
- Sequential equilibrium:
 - Both investments are made at the outset
 - But **ability to precommit** for settler
- We will begin by solving for the choice of a sustainable use.



$$V^1(x_1, x_2) = \frac{py}{r+f(x_1, x_2)} - x_1$$

$$V^2(x_1, x_2) = \frac{py}{r} - \frac{py}{r+f(x_1, x_2)} - x_2$$

Proposed functional form

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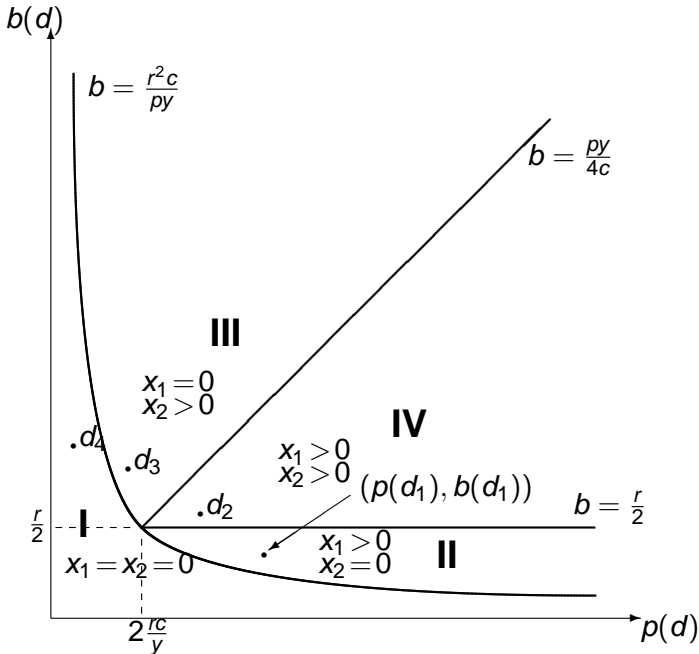
The Equilibria

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$$f(x_1, x_2) = \frac{b(d)x_2}{c + x_1}, \text{ with } b(d), c \geq 0 \text{ and } b'(d) > 0.$$

Equilibrium regimes with sustainable use

- 1 REGIME I: no conflict, no appropriative expenditures:
 $x_1 = x_2 = 0$ and $f = 0$
- 2 REGIME II: no conflict with appropriative expenditures by settler: $x_2 = 0$, $f = 0$ and
 $x_1 = p(d)yb(d)/r^2 - c$
- 3 REGIME III: no conflict? with appropriative expenditures by contestant: $x_1 = 0$,
 $x_2 = (c/b)(\sqrt{pyb/c} - r)$, $r + f = \sqrt{pyb/c}$
- 4 REGIME IV: conflict: $x_1^L = py/4b - c$,
 $x_2^F = (2b - r)py/4b^2$, $r + f = 2b(d)$



Conflict with sustainable use

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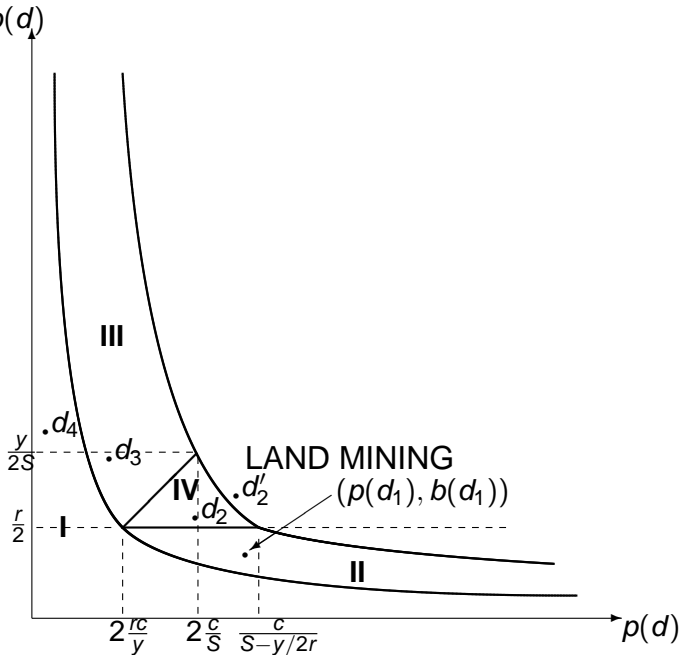
Conclusion

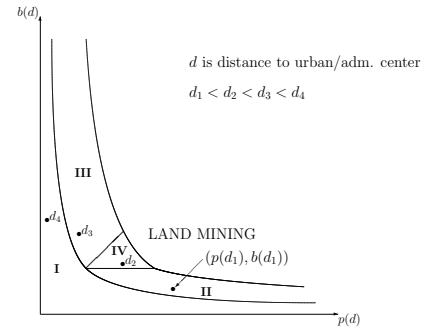
- What happens when distance increases?
- Land turnover increases with distance in IV?
- Introduce option to mine the resource.
- Impact of a decrease in the discount rate.

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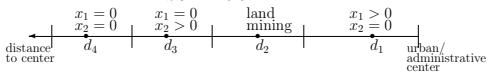
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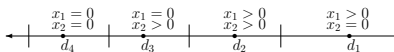




SCENARIO A

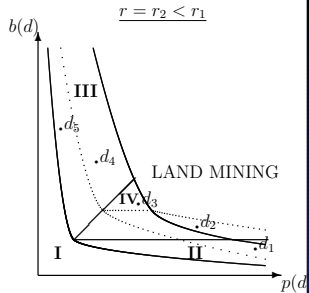
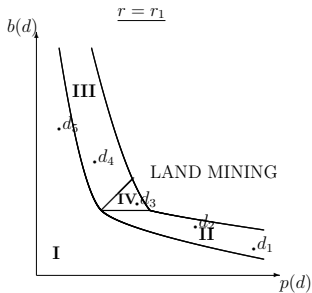


SCENARIO B



SCENARIO C





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Summary

- 1 Increasing the distance yields many possible scenarios.
- 2 Absence of conflict does not necessarily imply absence of important losses from appropriative activities.
- 3 Rent dissipation can also take the form of appropriation activities or conflict.
- 4 A decrease in the discount rate may discourage resource conservation.

- Solve for the case with insecure property rights after eviction.
- Introduce time factor, i.e. development of the frontier.
- Investigate optimal level and timing of state expenditures in support of property rights definition.
- Incentives to conserve natural resources may be adversely affected by anything that increases the value of a resource (e.g. irrigation works, access rural credit, better access roads) → Any of these should be backed by better state support in defining property rights.