Solutions to the Problem of Free Access

Part I

Transaction costs and property arrangements

2008

Outline

1. Introduction
   - Common pool problems
   - Solutions to oil common pool rent dissipations
   - Implications for natural resource use in general
2. Common property as decentralized solutions
   - Insights from Coase (1960)
   - Property regimes as social arrangements
   - Transaction costs in Common Property Resources (CPRs)
   - Repeated interactions, Punishment and Cooperation
3. Conclusion

Examples seen

- Fisheries (Gordon 1954)
- Global commons and population growth (Hardin 1968)
- The grazing commons (Dasgupta and Heal 1979)
- Hunting grounds and fur trade (Alchian and Demsetz 1973)

The case of oil extraction in the American Mid-West

Libecap and Wiggins, AER, 1984

- Extraction rates were everything but dictated by the Hotelling rule.
- Oil Common Pool:
  - Surface landowners own rights to minerals below surface.
  - Same oil pool can be accessed by many surface landowners.
  - Incentives to extract before others do (fast or competitive extraction)

Problems with fast extraction of oil

- Higher costs of pumping (presssure losses)
- Excessive number of wells (capital costs)
- Lower recovery rates (20-25% v. 85-90%)
- Surface storage costs with environmental damage and fire hazard.
- Low oil prices

Two large categories

1. Private contracting
2. Government imposed

Three types of private contracts considered

1. Consolidation through purchase
2. Unitization
3. Prorationing

Private contracts

- Unitization means that one operator assigns production rights and allocates costs and revenues according to a firm's *contribution* to the unit.
- Difficult to define *contribution*.
- Tract values are very difficult to estimate.
- According to L&W, prorationing is more flexible. Output quotas are simply distributed. No change in land ownership structures.
- Partial solution? Margins for rent dissipations remain.

When private parties cannot find solutions, governments intervene.

On Unitization

By Andrew B. Derman of Thompson & Knight, LLP
http://library.findlaw.com/2003/Jan/30/132512.html

Unitization, on the other hand, is a deliberate effort to consolidate all, or a sufficiently high percentage of, the royalty and participating interests in a pool as will permit reservoir engineers to plan operation of the pool as the natural energy mechanism unit which it is. This means taking production at the locations and rates it is most efficient to take it, *without disruption of the scheme by the legal rights inhering in competing properties* (my emphasis). In the case of secondary, recovery and pressure maintenance units, it means injecting gas and fluids where these will most efficiently aid in expelling reservoir contents, again without the scheme being disrupted by property lines, or the withdrawal by a competing producer of the gases and fluids injected at great expense. To realize the significance of what is attempted it must be appreciated that an oil pool is a highly complex energy mechanism, capable of desirable and undesirable responses depending on how it is handled. The artificial property lines man has drawn upon these pools, coupled with the lessor-lessee rights and obligations arising from competitive production methods sanctioned or even required by law, make virtually impossible maximum ultimate recovery in the absence of unitization, and this is true even though a jurisdiction has otherwise excellent conservation regulations to limit the worst rule of capture competitive producing practices. The loss can be dramatic. Additionally, regulated competitive practices would entail a much larger investment in wells and lease equipment.

Main lessons from L&W

- Successful private quota agreements when number of firms is small (less than 5).
- Some help from state enforcement required when numbers are 10-12.
- Use of troops was required with larger numbers.

Questions

- What are the necessary ingredients for a decentralized solution to emerge?
- What should states do?
- When do private contracts become social contracts?

Pigou, Coase, and externalities

- The Pigovian approach to externalities... (8-9)
- Coase's two objections:
  1. The factory is not the sole cause of the externality.
  2. Government intervention may not be required.
- Let us begin with the second... (10)

The Coase Theorem

- When transaction costs are negligible, people will negotiate their way to an efficient allocation of resources, regardless of the initial assignment of property rights.
- All that is necessary for efficiency is that the state assigns property rights.
- The initial distribution of property rights will, however, affect wealth distribution.

Coase (1960) and transaction costs

Example I

- Even in the presence of transaction costs, the *active* polluter should not be made solely responsible for the externality. (Pigou's *polluter-pay-principle* is generally wrong.)
- Consider the following situation:
  - A new factory emits ashes that fall into a previously clean park. The monetary equivalent damage is worth $ 100 per year.
  - The Pigovian tradition instructs us to impose a $ 100 tax on the factory in order to continue its emissions. If the factory can install scrubbers at a cost of $ 90, it saves $ 10 and the park is clean again.
  - The Pigovian tax apparently leads to an efficient outcome. But that is before we consider the alternatives for users of the park.
  - Suppose now that users could go to another park at a yearly cost of $ 40, say because they must walk a little farther and the other park is a little more busy.
  - There is a $ 50 gain from sending users to the other park and letting the factory send smoke to first park.

In order to induce an efficient outcome, park users should bear the cost of the scrubbers.

Coase (1960) and transaction costs

Example II

- Another example:
  1. Night flights at an airport cause $ 1,000,000 damage to its surrounding community.
  2. Night flight suspension impose a net loss of $ 850,000 to the airport.
  3. The problem could be eliminated entirely if homeowners were to install double windows at a cost of $ 600,000.
  4. Efficiency dictates to install double windows and continue night flights. It will be attained in the absence of transaction costs. The allocation of rights will only determine who is to pay to resolve the problem.
  5. Suppose now that an agreement entails transaction costs of $ 300,000 in terms of damage cost estimation, negotiator salaries, notary fees to ratify contract, etc.
  6. If rights to noise level is given to homeowners, they will ask airport to cover total costs of $ 900,000. The airport refuses and discontinues night flights, which is inefficient.
  7. If rights to noise level is given to airport, flights continue and homeowners install windows, which is efficient.

Coase (1960) and transaction costs

Some implications

- It may sometimes be preferable to assign rights to “active" generator of externality. The Pigovian approach and polluter-pay-principle are too rigid. That probably explains why the “Law of Nuisance" in Common Law is quite flexible. (38)
- In general, the party that suffers damage is also part of the problem. (27)
- When transaction costs are important, initial allocation of rights has an effect on resource allocation, and thus efficiency. Assignments of rights by courts or legislation is tantamount to deciding on resource use. Legal and social systems do matter when transaction costs are high.
- Inputs are more than just physical entities, they are a bundle of rights. The right to take an action that affects someone else must be seen as an input to production. The cost of exercising a right, i.e. using an input, must be equal to the damage imposed on others. (44)
- The firms, the market, and legal system are all costly social arrangements. When choosing on a social arrangement, one must compare their *total* social product, including transaction costs. Comparing private and social costs is not sufficient. (34)
- The choice of a property rights structure depends on the interests, values, and constraints of those who control the state...

Property regimes and transaction costs

1. Open and unrestricted access: Access is open to all and there are no restriction on use.
2. Limited and unrestricted access: Access is limited to a certain group of people but there are no restriction on use.
3. Open and restricted access: Access is open to all but there are restrictions on use.
4. Limited and restricted access (Common property): Access is limited to a certain group of people and there are restrictions on use.

1. Open and unrestricted access

- No transaction cost
- Maximum losses from overuse. (Dasgupta and Heal (1979) with infinite number of firms.)
- Only the opportunity cost of the inputs puts a limit to exploitation level.

2. Limited and unrestricted access (free access)

- Transaction costs: Enforcement of exclusion. (Hotte 2005)
- Less severe overuse with a smaller number of people. (Dasgupta and Heal (1979) with finite number of firms.)
- Individuals within group are rights holders:
  - They can exclude outsiders
  - They cannot exclude each other

3. Open access but restricted use

- Calls for enforcement of restrictions.
- What happens to rents?
  - Open access should lead to erosion of rents *as far as users are concerned*.
  - Outcome depends on type of restriction
    - Tax on catch can lead to socially efficient outcome.
    - Controlling inputs at some margins generally leads to inefficiencies at other margins.
- Could make a difference on the resource stock (eg season closure).

4. Limited and restricted access

Common property

- Costly enforcement of exclusion.
- Costly enforcement of restrictions.
- Less people combined with restrictions on inputs leads to more rents.
- Members are rights holders:
  - They may differ from actual users.
  - They exclude outsiders and each other through restrictions.

Where does that leave *private ownership*?

- A degenerate case of common property with a single member (rights holder).
- Exclusion must be enforced.
- As with common property, users are not necessarily the same as rights holders. (Stevenson 1991:40)
- A single rights holder will hire workers to supervise, or resort to sharecropping, or other. This arrangement leads to other types of transaction costs.

Types of transaction costs

- Two broad types:
  1. The “establishment" of common property: Determines who are the rights holders.
  2. The “maintenance" of common property: Determines the rules of use.
- Both types involve enforcement costs and require
  1. monitoring
  2. punishment for non-compliance

Punishment is a fundamental issue.

Common property and cooperation

- The tragedy of the commons and free-access stories may be too pessimistic.
- It assumes that individuals do not try to improve on the situation.
- Decentralized mechanisms that induce cooperation may exist.
- Three theoretical arguments:
  1. Decentralized contracting with side payments. The Coase solution as in LW (1984).
  2. Repeated interactions.
  3. The payoff structure of the PD game may not be representative.

Summary

- Continued with part II on CPRs.

Outlook

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