

Contracts and Organizations

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Topic 5

Ownership of Public Goods

- Government provision vs. privatization or contracting out (Hart, Shleifer & Vishny, QJE 1997 and Besley & Ghatak, QJE 2001)
- Basic question: granted that government should subsidize provision of certain goods and services, should it provide these in-house or should it contract it out to a for-profit or non-profit firm?

- Boundaries of government
- Analogous to the issue of boundaries of a private firm: should you vertically integrate or buy from the market
- Framework to think about it: "property rights" theory of Williamson-Hart-Grossman-Moore
- Clearly without any contracting problems, ownership does not have allocative implications
- Ownership is different from residual claimancy of profit: it is residual control rights
- Even if you rent out your firm to someone so that he has residual claimancy, you can threaten not to renew the lease

- This affects investment incentives (e.g., those that will improve quality and/or reduce costs)
- Second best: choose ownership structure that gives you the best overall investment incentives
- Trade off: if party A is owner, he will have more incentives but party B will now have less (and vice versa)

Ownership of Private Goods

- Consider an upstream firm A and a downstream firm B
- A can invest x and B can invest y
- This boosts the value of trade $b(x, y) = ax + by$
- Cost of investment $\frac{1}{2}x^2$ and $\frac{1}{2}y^2$
- First-best

$$\begin{aligned}x^* &= a \\ y^* &= b.\end{aligned}$$

- Surplus:

$$S^* = \frac{1}{2}(a^2 + b^2).$$

- Assume x and y are non-contractible
- $b(x, y)$ is observable ex post
- Parties bargain over surplus

- Suppose A is owner
- Then at bargaining stage can fire B
- Outside options are

$$\begin{aligned}\bar{u}_A^A &= ax + \lambda by \\ \bar{u}_B^A &= 0.\end{aligned}$$

- Nash bargaining
- A gets share

$$\begin{aligned}& \frac{ax + by}{2} + \frac{\bar{u}_A^A - \bar{u}_B^A}{2} \\ = & \frac{ax + by}{2} + \frac{ax + \lambda by}{2} \\ = & ax + \frac{1}{2}(1 + \lambda)by\end{aligned}$$

- B gets share

$$\begin{aligned}
 & \frac{ax + by}{2} + \frac{\bar{u}_B^A - \bar{u}_A^A}{2} \\
 = & \frac{ax + by}{2} + \frac{0 - ax - \lambda by}{2} \\
 = & \frac{1}{2}(1 - \lambda)by
 \end{aligned}$$

- Ex ante investments will maximize the above s.t. the costs x and y

$$\begin{aligned}
 \hat{x} &= a \\
 \hat{y} &= \frac{1}{2}b(1 - \lambda)
 \end{aligned}$$

- Total surplus

$$\hat{S}_A = \frac{a^2}{2} + \frac{1}{2}b^2(1 - \lambda)\left\{1 - \frac{1}{4}(1 - \lambda)\right\}$$

- Clearly less than first-best surplus S^* .

- Reason: Consider expression $(1 - \lambda)\{1 - \frac{1}{4}(1 - \lambda)\}$
- This is increasing in $1 - \lambda$ for all $\lambda \in [0, 1]$
- How? Since its slope with respect to $1 - \lambda$ is $1 - \frac{1-\lambda}{2} = \frac{1+\lambda}{2}$ and that is always positive for $\lambda \in [0, 1]$
- So even for $1 - \lambda = 1$, i.e., $\lambda = 0$ it takes value $\frac{3}{4} < 1$.
- For $\lambda > 0$ it takes a lower value and so \hat{S}_A is decreasing in λ .

- Suppose B is owner
- Then at bargaining stage can fire A
- Outside options are

$$\begin{aligned}\bar{u}_A^B &= 0 \\ \bar{u}_B^B &= \mu ax + by.\end{aligned}$$

- Nash bargaining
- A gets share

$$\frac{ax + by}{2} + \frac{\bar{u}_A^B - \bar{u}_B^B}{2}$$

- B gets share

$$\frac{ax + by}{2} + \frac{\bar{u}_B^B - \bar{u}_A^B}{2}$$

- Investments will be (analogous to previous case)

$$\begin{aligned}\hat{x} &= \frac{1}{2}a(1 - \mu) \\ \hat{y} &= b\end{aligned}$$

- Total surplus

$$\hat{S}_B = \frac{a^2}{2}(1 - \mu)\left\{1 - \frac{1}{4}(1 - \mu)\right\} + \frac{1}{2}b^2$$

- As before, it is always less than S^*
- Also, it is decreasing in μ .

- Which form of ownership is better?
- Depends on a, b, λ, μ
- Higher is a relative to b , \hat{S}_A will dominate \hat{S}_B
- Vice versa higher is b relative to a
- Higher is μ relative to λ , \hat{S}_A will dominate \hat{S}_B
- Vice versa higher is μ relative to λ
- Intuition
 - The more important is the investor's marginal contribution (a or b) the more efficient he/she is owner

- The more scope for opportunism (high λ or μ) the more important is the hold up problem, and so the other party should be owner
- If there is only investing party (say $a = 0$ or $b = 0$) then that party should be owner.

Ownership of Public Goods

- Suppose one specific person or firm has the capacity to provide the service
- Do you hire this person as a government employee or make the firm as part of the ministry of education
- Do you let them provide the service, and pay them a fee
- Suppose there is one investing party, called the manager
- Can either own a facility (a school, hospital) or work for the government
- Investment leads to reduction in cost, but also affects quality of the service

- In particular, if the manager invests an amount e .
 - the cost of the project is $C(e) = C_0 - c(e)$
 - the quality of the project is $B(e) = B_0 - b(e)$
 - manager's cost of investing effort $c(e) = e$
- That is, cutting costs leads to some sacrifice of quality
- Suppose the government's puts a welfare weight of $\theta_g > 0$ on the benefit from the project
- If e was contractible then the value of e chosen to maximize joint-surplus is given by

$$\max_e \theta_g B(e) - C(e) - e$$

- This yields

$$c'(e) - \theta_g b'(e) = 1.$$

- We assume $c(e)$ is concave and $b(e)$ is convex
- This is the first-best effort level
- Suppose e is observable *ex post*, but non-contractible *ex ante*
- However, C_0 and B_0 are contractible, and the parties can negotiate an initial price of P_0
- Since you cannot write contracts on e , parties will renegotiate after e is sunk & observed
- Assume parties follow the Nash bargaining solution

- Divide the surplus equally, but make an adjustment for the relative bargaining powers of the parties
- In particular, G and M will get

$$\frac{c(e) - \theta_g b(e)}{2} + \frac{\bar{u}_g - \bar{u}_m}{2}$$

$$\frac{c(e) - \theta_g b(e)}{2} + \frac{\bar{u}_m - \bar{u}_g}{2}.$$

- What organizational form is chosen matters for what these disagreement payoffs are
- If the government is the owner, it can fire the manager if they have a bargaining dispute, but then only a fraction λ of the results of the manager's investment stays on the project.
- Hence the disagreement payoffs of the government and the manager are

$$\bar{u}_g^g = \lambda \{c(e) - \theta_g b(e)\}$$

$$\bar{u}_m^g = 0.$$

- In this case, the manager anticipates this *ex ante* and chooses e to:

$$\max_e \frac{c(e) - \theta_g b(e)}{2} - \frac{\lambda \{c(e) - \theta_g b(e)\}}{2} - e$$

- This yields

$$\frac{1 - \lambda}{2} \{c'(e) - \theta_g b'(e)\} = 1$$

- e is lower than the first-best (why? because it is as if there is a "tax" of $\frac{1-\lambda}{2}$ on the objective function)
- If the manager is the owner, then the disagreement payoffs are

$$\begin{aligned} \bar{u}_g^m &= -\theta_g b(e) \\ \bar{u}_m^m &= c(e) \end{aligned}$$

- In this case, the manager chooses e *ex ante* to:

$$\max_e \frac{c(e) - \theta_g b(e)}{2} + \frac{c(e) + \theta_g b(e)}{2} - e$$

- This yields

$$c'(e) = 1$$

- Naturally, e is higher than the first-best (why? no weight on $b(e)$ which is a cost term)
- Therefore, we have demonstrated that under private ownership e is too high & under public ownership e is too low.
- However, we cannot say anything more than this.
- One form will be better than the other depending on how much is the loss of surplus with respect to first-best
- Suppose we plot surplus $S(e)$ against e

- Think about first-best as the globally tallest mountain peak
- What we have shown is government ownership will have lower e than this, and private ownership higher e than this
- We also know that these mountain peaks are lower than the first-best
- But we don't know which one is lower than the other
- Depending on how important is the $b(\cdot)$ function (quality cutting) relative to the $c(\cdot)$ function (cost cutting)

Extensions

- What if there is no cost-quality trade off?
 - Set $b(e) = 0$.
 - Then we can immediately see that privatization achieves the first-best
 - Give property rights to the person who undertakes the investment
 - Bargaining power to other parties just diminishes investment incentives
- In general, the more important is cost reduction, & the less important is loss of quality this holds (garbage collection)
- On the other hand, the more important is loss of quality & the less important is cost reduction, government ownership is better (army, legal system)

- What if government does not care?
 - Set $\theta_g = 0$
 - Privatization achieves the first-best
- Otherwise get the interesting result that government ownership may be optimal even if "government" does not invest (different from private goods)

- What about joint ownership or public private partnership (PPP)
- One way to interpret this is both parties have veto power
- Both needs to agree if the project is to go ahead.
- But then $\bar{u}_g^{ppp} = \bar{u}_m^{ppp} = 0$

- Then manager will choose

$$\max_e \frac{c(e) - \theta_g b(e)}{2} - e$$

- This yields

$$\frac{1}{2} \{c'(e) - \theta_g b'(e)\} = 1$$

- Clearly, better than government ownership (e closer to first-best).

- Suppose that the private provider cares about quality (motivated agent)

- Now manager's non-pecuniary payoff is $\theta_m B(e)$

- First best: $c'(e) - (\theta_g + \theta_m) b'(e) = 1$.

- Under government ownership disagreement payoffs are

$$\begin{aligned}\bar{u}_g^g &= \lambda \{c(e) - \theta_g b(e)\} \\ \bar{u}_m^g &= -\lambda \theta_m b(e).\end{aligned}$$

- First order condition for effort choice

$$\frac{1 - \lambda}{2} c'(e) - \left[\frac{1 - \lambda}{2} \theta_g + \frac{1 + \lambda}{2} \theta_m \right] b'(e) = 1$$

- Under private ownership disagreement payoffs are

$$\begin{aligned}\bar{u}_g^m &= -\theta_g b(e) \\ \bar{u}_m^m &= c(e) - \theta_m b(e)\end{aligned}$$

- First order condition for effort choice

$$c'(e) - \theta_m b'(e) = 1$$

- Clearly, the privatization/contracting out option leads to lower level of e than before (but still greater than first-best)
- Government provision leads to lower level of e than before as well (and further lower than first-best)
- Contracting out to non-profits dominates contracting out to for-profits or privatization

– More interestingly, if $\theta_m > \theta_g$ then non-profit ownership is more likely to dominate government ownership

* same weight on cost term as in first-best

* higher weight on benefit term compared to government $\frac{1-\lambda}{2}\theta_g + \frac{1+\lambda}{2}\theta_m < \theta_m$ as $\frac{1-\lambda}{2} + \frac{1+\lambda}{2} = 1$.

- What could be potential problem with non-profits: they may not be as efficient in cutting costs
- Indeed, NGOs are mostly praised for their commitment to the cause even though in terms of efficiency it might be dominated by a for-profit firm or even the government with more resources in its disposal
- For social service delivery (health, education) NGOs are preferred

- Here non-contractible quality matters, and so the commitment of NGOs is important
- For management of infrastructure for-profit contractors are preferred as cost efficiency is more important (road maintenance, water supply)