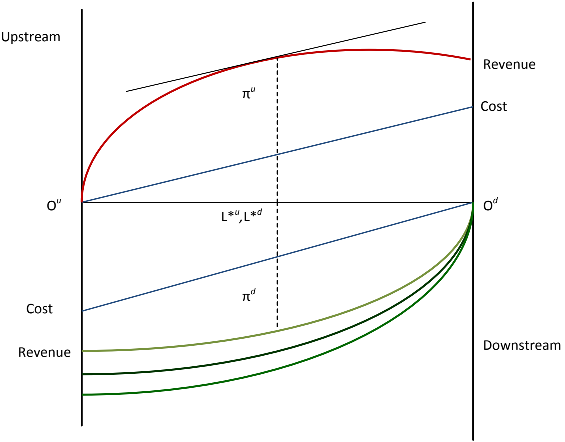
Simple Externalities Examples

River Pollution

- *Assume:*

1. Two firms are located along the same river
2. The *upstream firm u* pollutes the river
3. The production of the *downstream firm*,d, is affected
4. $P = 1$
5. Both firms produce the same output
6. Labor and Water are used as inputs
7. Water is free, labor receives w
8. $F^u(L^u)$ and $F^d(L^d, L^u)$ with $\frac{\partial F^d}{\partial L^u} < 0$
9. Each Firm acts independently and seeks to maximize its own profit: $\pi^i = F^i(\cdot) - wL^i$

- Equilibrium with river pollution



The Rat Race Problem

- It is a contest for relative position. It helps explain:
- Why students work too hard when final marking takes the form of a ranking.
- The intense competition for a promotion in the workplace when candidates compete with each other and only the best is promoted
- Assume that performance is judge not in *absolute* terms but in *relative* terms

		Player 2	
		Low effort	High effort
Player 1	Low effort	*(1/2,1/2)*	*(0,1-c)*
	High effort	*(1-c,0)*	*(1/2-c,1/2-c)*

- Note that $0 < c < 1/2$

Externalities and PG

MWG- Chapter 11

Simple Bilateral Externality

- *When external effects are present, CE are not PO. Assume:*

1. Two consumers $i = 1, 2$
2. The actions of these consumers do not affect prices $p \in \mathbb{R}^L$
3. w_i Consumers i's wealth
4. $U_i(x_{1i}, ..., x_{Li}, h)$
5. $\frac{\partial U_2}{\partial h} \neq 0$, consumer 1's choice of h affects consumer 2's well-being (externality)

- **Each consumer i derived utility function over the level of h:**

$$\begin{aligned} v_i(p, w_i, h) &= \max_{x_i \geq 0} u_i(x_i, h) \\ s.t \quad p \times x_i &\leq w_i \end{aligned}$$

- We shall assume that the consumer's ut. function takes a *quasilinear* form:
- $v_i(\cdot) = \phi_i(p, h) + w_i$
- we can rewrite $\phi_i(h)$ and assume $\phi_i''(\cdot) < 0$

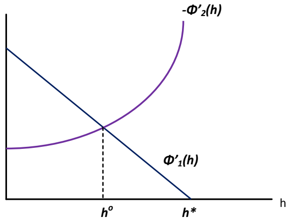
- Competitive Equilibrium: *each of the two consumers maximize her utility limited only by her wealth and P*

$$\begin{aligned} \phi_1'(h^*) &\leq 0\text{, with equality if } h^* > 0 \\ \text{Interior solution} &: \phi_1'(h^*) = 0 \end{aligned}$$

- Pareto Optimal Allocation: *the optimal level of h must maximize the JOIN surplus of the 2 consumers*

$$\begin{aligned} & \max \phi_1(h) + \phi_2(h) \\ FOC &: \phi_1'(h^o) \leq -\phi_2'(h^o) \\ \text{Interior solution} &: \phi_1'(h^o) = -\phi_2'(h^o) \end{aligned}$$

- Considers $(h^o, h^*) >> 0$. If $\phi_2'(\cdot) < 0$ (so h generates negative ext). Then, we have $\phi_1'(h^o) = -\phi_2'(h^o) > 0$, because $\phi_1'(h^o)$ is decreasing and $\phi_1'(h^o) = 0 \rightarrow h^o < h^*$



Quotas and Taxes

- Suppose negative externality $h^o < h^*$

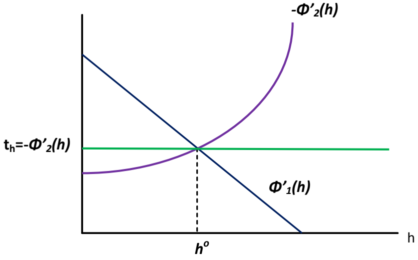
1. Government intervention to achieve efficiency is the direct control of the externality: Mandate $h = h^o$
2. Tax on the externality-generating activity

- Pigouvian Tax: $(A)\ t_h = -\phi_2'(h^o) > 0$
  - Consumer 1 then choose the level of h that solves:

$$\max_{h \geq 0} \phi_1(h) - t_h \times h$$
$$(B)\ FOC \quad : \quad \phi_1'(h) \leq t_h \ \ \text{(with equality if } h > 0\text{)}$$

  - Given that: $t_h = -\phi_2'(h^o)$, $h = h^o$ satisfies (B). In addition, $\phi_1''(h) < 0$, h^o must be unique to solution (A)

Quotas and Taxes

- 

- Assume: Property Rights with regard to the externality-generating activity
  - Assign the right to an externality-free environment to consumer 2
  - Consumer 1 is unable to produce externality without Consumer 2's permission
  - Assume consumer 2 makes consumer 1 a take-it-or-leave-it offer demanding a payment T
  - Consumer 1 accepts iff $\phi_1(h) - T \geq \phi_1(0)$
- Consumer 2 will choose her offer (h, T) to solve

$$\begin{aligned}
& \underset{h \geq 0, T}{Max} \, \phi_2(h) + T \\
s.t \; \phi_1(h) - T &\geq \phi_1(0) \\
& \underset{h \geq 0}{Max} \; \phi_2(h) + \phi_1(h) - \phi_1(0) \\
FOC &: \phi_2'(h) + \phi_1'(h) = 0 \\
h^o &= \phi_1'(h) = -\phi_2'(h)
\end{aligned}$$

Summary

- Consumer 1 has the right to generate as much as the externality she wants
- In the absence of any agreement, consumer 1 will generate h^*
- Consumer 2 will need to offer $T < 0$ to have $h < h^*$
- Consumer 1 will agree to have h iff: $\phi_1(h) - T \geq \phi_1(h^*)$
- Consumer 2 will choose her offer (h, T) to solve

$$\begin{aligned} & \underset{h \geq 0, T}{Max}\, \phi_2(h) + T \\ s.t\ \phi_1(h) - T &\geq \phi_1(h^*) \\ & \underset{h \geq 0}{Max}\ \phi_2(h) + \phi_1(h) - \phi_1(h^*) \\ FOC &: \phi_2'(h) + \phi_1'(h) = 0 \\ h^o &= \phi_1'(h) = -\phi_2'(h) \end{aligned}$$

- Consumer 1 pays $\phi_1(h) - \phi_1(0) > 0 \rightarrow$ to be allowed to set $h^o > 0$

- Consumer 1 receives $\phi_1(h^o) - \phi_1(h) < 0$ for setting $h^o < h^*$
- **Coase Theorem: If trade of the externality can occur then bargaining will lead to an efficient outcome no matter how PR are allocated.**

Assumptions

- Agents who suffers externalities are different than those who generates
- Generators of ext: Firms
- Experiencing ext: Consumers
- Partial equilibrium approach: Given price P of L tradable goods
- J firms generate the externality
- $\pi_j(h_j)$ derived profit function over the level of the externality
- I consumers, who have quasilinear utility function
- $\phi_i(\widetilde{h}_i)$ consumer i's utility over the amount of ext. $\widetilde{h}$
- Negative externality: $\phi_i'(\cdot) < 0, \phi_i''(\cdot) < 0, \pi_j''(\cdot) < 0$

- The externality experienced by each consumer is $\sum_j h_j$ (The total amount of the externality produced by the firm)
- At any CE, each firm will wish to set the h_j^* satisfying

$$\pi_j(h_j^*) \leq 0 \quad (\text{with equality if } h_j^* > 0)$$

- *In contrast, any PO allocation involves* $(h_1^o, ..., h_j^o)$

$$\underset{(h_1,...,h_j)\geq 0}{Max} \sum_{i=1}^{I} \phi_i(\sum_j h_j) + \sum_{j=1}^{J} \pi_j(h_j)$$

$$FOC \quad : \quad \sum_{i=1}^{I} \phi_i'(\sum_j h_j^o) \leq -\pi_j'(h_j^o)$$

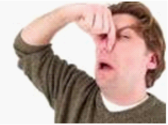
  - In the case of a Non-Depletable Externality, a market-based solution would require personalized markets for the externality, as in Lindhal eq. concept.
- In contrast, given adequate information, the government can achieve optimality using quotas or taxes

Presence of asymmetric information!

- Generators of ext: Firms
- Experiencing ext: Consumers
- $\phi(h, \eta)$ consumer's derived utility
- $\pi(h, \theta)$ derived profit function $\theta \in \mathbb{R}$
- η and θ are privately observed
- The ex-ante likelihoods (prob. distribution) of various values of η and θ are publicly known
- η and θ are independently distributed
- $\phi(h, \eta)$ and $\pi(h, \theta)$ are strictly concave in h for any given value of θ and η

Clarke's example: Sausage Company

Two types of individuals: affected (sensitive nose) and unaffected



Two types of firms: efficent and inefficient

Presence of asymmetric information

- Measurement of firm's benefits: $b(\theta) = \pi(h, \theta) - \pi(0, \theta) > 0$
- Measurement of consumer's cost from $\bar{h}$: $c(\eta) = \phi(0, \eta) - \phi(\bar{h}, \eta) > 0$
- $G(B)$ and $F(C)$ distribution functions of these two variables induced by the underlying probability distribution of η and θ
- density functions $g(b)$ and $f(c)$
- In the absence of an agreement $h = 0$
- Any arrangement that guarantees PO outcomes, the firm should allow to set $h = \bar{h}$ whenever $b > c$

Decentralized Bargaining

- h? when consumer cost is c

1. Firms will agree to pay T iff $b \geq T$
2. Consumers knows that if she demands a payment of T, the prob. that the firm accepts is equal the prob. that $b \geq T \rightarrow (1 - G(T))$

$$\underset{T}{Max}(1 - G(T))(T - c)$$
$$Solution \quad : \quad T_c^* > c$$

- The aggregate surplus from ext: $\phi(h,\eta)+\pi(h,\theta)$
-

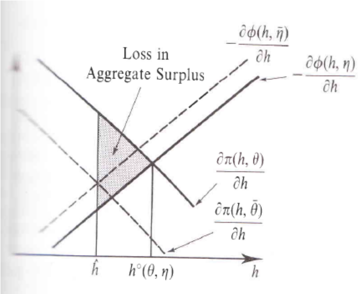
$$\begin{aligned} \text{Firm} &: \max_{h\geq 0}\pi(h,\theta) \\ st\ \ h &\leq \widehat{h} \\ Optimal\ \ Choice &: h^{o}(\widehat{h},\theta) \end{aligned}$$

- The effect of the quota is to make h less sensitive to η and θ than is required by optimality. Firms will be insensitive to η

- The loss in aggregate surplus arising under the quota for types η and θ is given by:

$$\phi(h^q(\widehat{h},\theta),\eta)+\pi(h^q(\widehat{h},\theta),\theta)-\phi(h^o(\theta,\eta),\eta)-\pi(h^o(\theta,\eta),\theta)$$
$$=\int_{h^o(\theta,\eta)}^{h^q(\widehat{h},\theta)}\left(\frac{\partial\pi(h,\theta)}{\partial h},\frac{\partial\phi(h,\eta)}{\partial h}\right)dh$$

- The loss in aggregate surplus under a quota for types (θ,η)



Externalities

- $$\text{Firm:}\max_{h\geq 0}\pi(h,\theta) - t\times h, \quad \textit{Optimal Choice}: h^t(t,\theta)$$

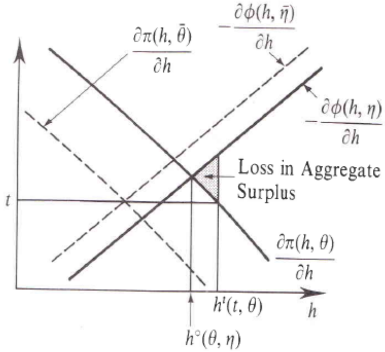
- The loss in aggregate surplus arising under the tax for types η and θ is given by:

$$\phi(h^t(t,\theta),\eta) + \pi(h^t(t,\theta)),\theta) - \phi(h^o(\theta,\eta),\eta) - \pi(h^o(\theta,\eta),\theta)$$
$$= \int_{h^o(\theta,\eta)}^{h^t(t,\theta)} \left(\frac{\partial\pi(h,\theta)}{\partial h}, \frac{\partial\phi(h,\eta)}{\partial h}\right) dh$$

- But now assuming that a tax is set a $t = -\frac{\partial\phi(h^o(\overline{\theta},\overline{\eta}),\overline{\eta})}{\partial h}$

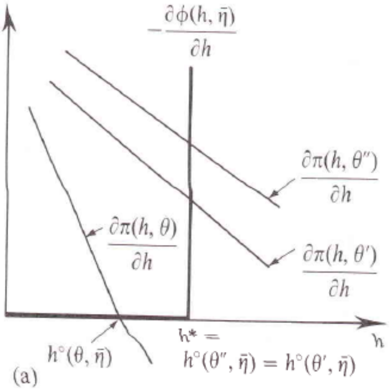
Externalities

- the loss in aggregate surplus under a tax for types (θ, η)



- Note that quotas and taxes, the level of externality is responsive to changes in Mg benefits but not to changes in the Mg cost of the consumer.

- Quota or Tax performs betters?
  - It depends!
- Quota $h = h^*$ Maximizes aggregate surplus for all θ



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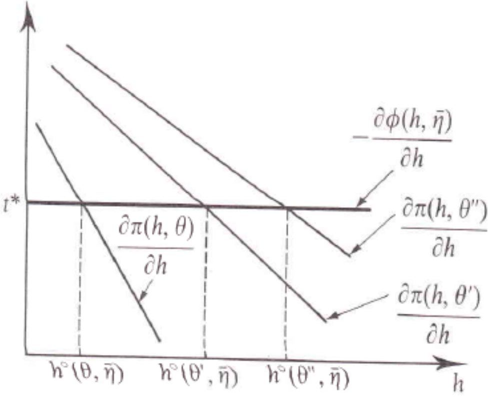


(b)

The Problem of Social Cost

Main Points

Why are we dealing with a problem of reciprocal nature?

1. *Stories: Doctor vs Confectioner and Cattle vs Crops*
2. *Why the value of what is sacrificed matters?*
3. *Liability vs No Liability, EQUAL RESULTS*
4. "*The ultimate result (which maximizes the value of production) is independent of the legal position if the price system is assumed to work without cost*"

- **Let us talk about Sturges vs Bridgman**

Main Points

- The Cost of Market Transactions!

1. Why firm is not the only possible answer?
2. Alternative Solution.... Government??? OMG ;)
3. Role of Information? Problems of the governmental administrative machine?
4. Do nothing?
5. *The problem is one of choosing the appropriate social arrangement for dealing with harmful effects*
6. **IF Market transaction were costless, all that matters is that rights of the various parties should be well-defined.**

Main Points

- "But even in the most advanced States there are failures and imperfections. . . there are many obstacles that prevent a community's resources from being distributed. . . . in the most efficient way. The study of these constitutes our present problem. . . .. its purposes is essentially practical. It seeks to bring into clearer light some of the ways in which it now is, or eventually may become, feasible for governments to control the lay of economic forces in such wise as to promote the economic welfare, and through that, the total welfare, of their citizens as a whole......It might happen. . . that costs are thrown upon people not directly concerned, through, say, uncompensated damage done to surrounding woods by sparks from railway engines."
- Why Coase criticizes Pigou's Railway example?

Main Points

- Why Coase considers that alternative social arrangements are better than taxes???
- Why tax is different than compensation?
- Role of the fall in the value of production
- Information Again

Property Rights

Kolstad - Chapter 6

Introduction

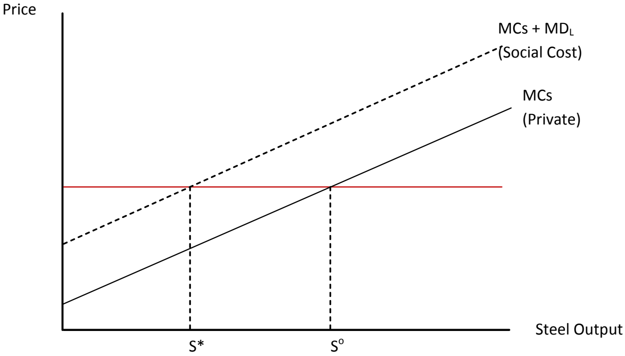
- "*The Polluter and the Victim*": *Who should have rights?*
- It makes any difference who has the right to pollute?
- What is the correct amount of pollution?
- Assume:

1. Steel mill produces steel, S, and Pollution emissions at a cost $C_s(S)$
2. Laundry produces clean clothes, L, at a cost $C_L(L, S)$ and $C_L^s(\cdot) > 0$
3. P_s price of steel and P_L price of laundry (they are fixed)
4. Benchmark Case: How much to produce if we could internalize the externality? Simple way is to merge these firms!

$$\pi_m(S, L) = P_s S + P_L L - C_s(S) - C_L(L, S)$$

-

$$\max_{S,L} \pi_m(S, L)$$



- Assume a world in which some producers or consumers are subject to externalities generated by other producers or consumers. Further, assume:
- Everyone has perfect information
- Consumers and producers are price takers
- There is a costless court system for enforcing agreements
- Producers maximize profits and consumers max. utility
- There are no income or wealth effects
- There are NO transaction costs
- In this case initial assignment of PR regarding the externalities does not matter for efficiency. If any of these conditions does not hold, the initial assignment does matter!

- What is the relevance of the Core to the Coase Theorem?
- Failure is an empty core. Status quo prevails!
- Example:
- Suppose 3 firms: Laundry (L), Steel mill (S) and Railroad (R)
- Possible cooperative arrangements:

A_1={R,S,L}	A_2={R,(S,L)}	A_3={(R,S),L}
A_4={(R,L),S}	A_4={(R,L,S)}	

-

Partition	Payoff	Description
A_1	{3,8,24}	**Each firm actas independently**
A_2	{3,36}	**Steel mill and laundry merge**
A_3	{15,24}	**rail road and steel mill merge**
A_4	{31,8}	**rail road and laundry merge**
A_5	{40}	**All three merge**

A Solution to the Problem of Externalities When Agents Are Well-Informed

Hal R. Varian. The American Economic Review, Vol. 84, No. 5 (Dec., 1994), pp. 1278-1293

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- The agents involved know the relevant technology and the tastes of all other agents.
- The **"regulator"** who has the responsibility for determining the final allocation, does not have this information
- How can the regulator design a mechanism that will implement an efficient allocation?

Introduction

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    - In the case of public goods, the mechanisms implement Lindahl allocations;
    - in the case of a negative externality, the injured parties are compensated (*compensation mechanisms*)

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- x will not be efficient

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- Price-setting stage of the game:
  - If firm 1 believes that firm 2 will announce p_2, then: $p_1 = p_2$

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    - $r = c'(x) + e'(x)$ which is the condition for social optimality!

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- The only equilibrium for the mechanisms occurs if firm 2 is just compensated (*on the margin*) for the cost that firm 1 imposes on it

Three agents

- Suppose that agent 1 imposes an externality on agents 2 and 3.

- p_{ij}^k represents the price announced by *agent* k that measures (in equilibrium) the marginal cost that agent j's choice imposes on agent i.
- Compensation mechanism for this problem has payments of the form:

- $\pi_1 = rx - c(x) - [p_{21}^2 + p_{31}^3]x - \left\| p_{21}^1 - p_{21}^2 \right\| - \left\| p_{31}^1 - p_{31}^3 \right\|$

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- Differentiating with respect to x, t_1, and t_2..................

- *Analyze the case of a repeated game!!*

- The compensation mechanism provides a simple mechanism for internalizing externalities in economic environment
- Transfer payments can be chosen so that the compensation mechanism is balanced, and penalty payments, when they are used, can be chosen to be arbitrarily small.
- The main problem with the mechanism is that it requires complete information by the agent

Information and the Coase Theorem

Joseph Farrell. "The Journal of Economic Perspectives," Vol. 1, No. 2 (Autumn, 1987), pp. 113-129

Introduction

- On first acquaintance, the Coase theorem seems much more robust.
- Like the welfare theorem, it says:
  - that if everything is tradeable then Pareto-efficient outcomes result.
- Unlike the welfare theorem:
  - it makes no strong assumptions about convexity, price-taking, and complete markets.
- Instead, a one-line argument says that, *absent barriers to contracting, all must be well!*

1. It does not use the assumption of PC
2. But, it assumes that no mutually beneficial agreement **is missed**
3. It demands a lot of coordination and negotiation

Introduction

- The author deals only with problems involving pairs of people-the bilateral externality problems of a pair of neighbors.
- How, then, can we evaluate the claim that in bilateral negotiations rational economic people are likely to emerge with relatively efficient outcomes?
- What are the causes of imperfections in bargaining?
- How policy affects transaction costs, and
- When these problems are severe compared with some alternative such as central direction?

Introduction

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    - Roth and Murnighan (1982) report experiments confirming that when bargainers' payoffs are common knowledge, little disagreement results.
- We cannot assume that all mutually beneficial contracts are signed, unless we assume perfect information.

- **Three reasons:**

1. They are surprising.
2. Decentralization results give us a taxonomy of inefficiency. The WT lets us classify inefficiencies as due to monopoly, externalities....
3. People often use decentralization results (especially the Coase theorem) as arguments against government intervention.

- Centralization has some obvious advantages, as in problems of equity
- A common complaint about centralized decisions is that they cannot properly adjust to the special circumstances, as decentralized decisions can.
- True decentralization consists in delegating decisions to those who know more about them.
- Modern analysis of bargaining under incomplete information shows that PR and negotiation will not lead to fully efficient outcomes in that interesting case

- One must give people incentives to reveal what they know, assuming that the central authority can cope if they do so. The study of such incentives is the theory of *mechanism design*.
- People with private information may not readily reveal it, especially if they know that it will be used in a decision that affects them.
    - Unless everyone shares the same goals, people typically have incentives to lie.

- Formal framework:
  - There is a central authority, "the king".
  - He must make some decision, and
  - To make a good decision he needs some facts that other people (his "subjects") know.
  - Because the subjects care about the decision, but their goals differ from his, he must give them incentives to tell the truth.
  - To do so, the king can commit himself to an incentive scheme.
  - This scheme specifies how the decision, and perhaps some money payments, will depend on the reported information.

- Solomon had to decide which of two women was in fact the mother of a living infant boy whom they both claimed:
  - *Then the king said, "The one says, 'This is my son that is alive, and your son is dead'; and the other says, 'No; but your son is dead, and my son is the living one."' And the king said, "Bring me a sword." So a sword was brought before the king. And the king said, "Divide the living child in two, and give half to the one, and half to the other." Then the woman whose son was alive said to the king, because her heart yearned for her son, "Oh, my lord, give her the living child, and by no means slay it." But the other said, "It shall be neither mine nor yours; divide it." Then the king answered and said, "Give the living child to the first woman, and by no means slay it; she is its mother." And all Israel heard of the judgment which the king had rendered; and they stood in awe of the king, because they perceived that the wisdom of God was in him, to render justice.*

- Could Solomon rely on finding some clever scheme?
  - Mechanism design theory answers this question for us, and broadly the answer is yes.
  - Requires some side payments, which help establish people's true willingness to pay for particular outcomes, and thus show what decision would maximize net benefits.
  - By paying for the effects of your claim on others' expected welfare, you internalize the whole social problem
- *In this example, if you must pay for your neighbor's lost sleep, you will only tell Solomon you must have a party when in fact your urge is especially intense; similarly, your neighbor will only claim that he must get a good night's sleep when in fact he really needs it, since he must pay for your lost party.*

- *While Coase suggested that the efficiency of ideal bargaining means that everything can be decentralized, the mechanism-design view is that it means the opposite: centralization lets us have such a process (through an expected-externality scheme) while we know that decentralized bargaining is imperfect when there is private information.*

- For instance, suppose two people should have an indivisible object, a "seller" (who originally has it) or a "buyer."
    - *The efficient solution is that whoever in fact values it more should have it, with perhaps some payment to the other.*
    - *The king can easily achieve this outcome using an incentive-compatible scheme if participation is compulsory.*
    - *For example, he can confiscate the item from the "seller" and then auction it off, dividing the revenues equally between the two people*
    - *But this solution is not feasible with voluntary trade;*
    - *A lump sum payment to the seller could solve that problem*
    - *But then the buyer (who would have to make that payment) might prefer to withdraw*
    - *And payments to encourage participation conditional on reported " type" (value) would upset the incentive properties of the confiscation/auction scheme.*

- Central authority helps when decisions are so interdependent that they cannot well be delegated;
- and it can also help efficiency by making recalcitrant people participate in schemes that benefit society in general

- *But there are some problems!!*
  - One problem arises if people do not trust the king's commitment to an incentive scheme
  - Another problem is whether the king can handle the job of collecting and using the relevant information regardless of the incentives.

We need to recognize that centralized schemes must be relatively simple, in the sense of ignoring much relevant information.

- *Property rights and voluntary private negotiation fail to achieve "first-best" efficient outcomes when there is important private information. And such outcomes often can be achieved, despite the information problems, by a wise and benevolent king who is prepared to coerce people to participate in an incentive scheme.*

COMPARISON

- Example: *Sleepy and noisy neighbors, we want to compare the likely efficiency of their imperfect negotiation with that of a city ordinance that bans noise.*

- Suppose that a decision x must be taken,
- Two people, A and B, care about it.
- Each privately prefers some value for x: A would like $x = a$, and B would like $x = b$, where $a < b$.

COMPARISON

- Each dislikes deviations of x from his preferred value.
- Payoffs are:
  - $u(x, a) = -\alpha(x - a)^2$ (A's payoff)
  - $v(x, a) = -\beta(x - b)^2$ (B's payoff)
- A and B are risk-neutral.
- The utility functions u and v are common knowledge, as α and β, which represent the importance of the choice to A and to B $(\alpha + \beta) = 1$

COMPARISON

- Only A knows a and only B knows b.
- b is uniformly distributed on an interval $[b\_, b_+]$;
- a is (independently) uniform on $[a\_, a_+]$;
- Assume that $a_+ < b\_$.
- $E(a)$ is the expected value of a, $E(a) = [a\_ + a_+]/2$, and
- $E(b) = [b\_ + b_+]/2$.
- C is the expected degree of conflict, $E(b) - E(a)$.
- r is the variance of a, $r = [a_+ - a\_]^2/12$, and s for the variance of b, $[b_+ - b\_]^2/12$.

COMPARISON

- If a and b were public, then Pareto-efficiency *would simply* minimize $\alpha(x-a)^2+\beta(x-b)^2$
- Solving the minimization problem wrt x, $x^* = \alpha a + \beta b$
- efficiency would simply require that $x = x^*$.
- x^* depends on a and b, so that the private information **is relevant**.

COMPARISON: THEORY OF MECHANISM DESIGN

- The king ask A and B to tell him a and b, promising $x = x^*$,
- Assumption: A and B tell the truth;
- A and B would have to pay each other, sums of money that depend on their reported values of a and b
- If A reports that $a = a'$, then he has to pay the $E(b) = \beta(\alpha a' + \beta b - b)^2$,"the net effect on B's payoff of A's reporting a'"
- Similarly, B must pay the expected net effect of his report b' on A 's welfare.
- Each person internalizes the whole social payoff, and so each has incentives to report accurately: to set $a' = a$ and $b' = b$
- So Solomon gets x^*.

COMPARISON

- The bumbling bureaucrat is not up to Solomon's standard, and cannot handle such a scheme.
- He must make his decision based only on public information.
- Because u and v are quadratic, his best choice is to set x at $x^B = \alpha E(a) + \beta E(b)$.
- If a and b happen to be at $E(a)$ and $E(b)$ then it is fully optimal.
- But because the bureaucrat can use only public information, his decision cannot respond to variations in a and b around their means.
- The resulting loss in welfare is the variance in a and b that makes the bureaucrat inefficient.
- We can assess his imperfection (compared to Solomon) at $\alpha^2 r + \beta^2 s$

COMPARISON

- Evaluate the *"property rights"* system that gives one of the parties (say, A) the right to choose x,
  - but lets B offer bribes to affect A's choice of x. Assume:
  - No restrictions on the complexity of the contract,
  - and no transaction costs on the parties in negotiating it.
  - suppose (for definiteness) that B offers a "menu" of bribes in return for different possible choices of x.
- What happens?
- The welfare comparison is **ambiguous**: *depending on the parameters, the outcome of negotiation may be more or less efficient on average than the bumbling bureaucrat*

COMPARISON

- This ambiguous result should make us hesitate to use the Coase theorem to argue for laissez-faire.
- The author shows that this conclusion does not generally hold. When there is private information, voluntary private contracts are only imperfectly efficient. The comparison with a very bumbling bureaucrat can go either way.