Introduction: Asymmetric Information and the Coase Theorem

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Introduction

- standard neoclassical economic theory assume all agents have access to all information relevant to their decisions e.g., about characteristics of goods or about available technology
- in reality: lots of uncertainty and imperfect information e.g. labor productivity, consumer demand, goods quality
- this issue is addressed by economics of information and contract theory; questions:
  - what are market outcomes and the optimal contracts under asymmetric information?
  - can asymmetric information help to explain actual (institutional) arrangements?
  - what are the welfare implications of asymmetric information?
- information economics/contract theory have been extremely influential
  - very important practical implications (policy)
  - provide fundamental insights to all areas of economics
The Coase Theorem

An Example with Externalities

- two agents $i = A, P$
- agent $A$ has project/decision $q \in \{1, 0\}$
- utilities

$$u_A(q, \theta, x) = \theta q + x \quad \text{and} \quad u_P(q, \sigma, x) = -cq + x$$

- $x = \text{composite consumption good (money)}$
- $\theta = \text{net benefit of } A,$
- $c = \text{negative external effect on } P$

- Pareto optimality requires: $q = 1 \Leftrightarrow \theta - c \geq 0$
- “market solution” is $q^M = 1 \Leftrightarrow \theta \geq 0$
- $\rightarrow \text{market solution is not efficient whenever } c \neq 0$
- Pigou: corrective tax on project $\tau = c$
- Coase: state intervention not necessary
The Coase Theorem

**Theorem (Coase):** If bargaining involves no transaction cost, and property rights are well defined and enforceable, then rational parties will agree to the efficient solution and enforce this solution through a private contract.

**Corollary** If preferences display no wealth effects, then the agreement reached will not depend on the initial assignment of property rights or on bargain power.

**Proof.**

- suppose ‘property rights’ over \( q \) belong to \( A \) and consider contract \( \{ q, t \} \) specifying decision \( q \) and compensation payment \( t \) from \( P \) to \( A \)
- utilities \( u_A(q, t, \theta) = \theta q + \tilde{t}, \ u_P(q, t) = -cq - t \)
- assuming \( A \) makes take-it-or-leave-it offer to \( P \) optimal contract is

\[
q(\theta) = q^*(\theta) = 1 \iff \theta + -c \geq 0 \quad \text{and} \quad t(\theta) = \sigma[q^*(\theta) - q^M(\theta)]
\]

- analogous if \( B \) makes take-it-or-leave-it offer to \( A \) of if property rights belong to \( P \)
Failure of the Coase Theorem

- Suppose $\theta =$ private information of $A$
- $P$ only knows that $\theta \sim F(\theta)$ on $[\underline{\theta}, \bar{\theta}]$, $\underline{\theta} < 0 < \bar{\theta}$
- Continue to assume that $A$ makes take-it-or-leave-it offer $\{q, t\}$ to $P$
- Let $q(\theta)$ and $t(\theta)$ be agreed upon decision and transfer if $A$ is of type $\theta$
- Can efficient decision $q(\theta) = q^*(\theta)$ ever be part of agreement?
- Suppose $P$ has agreed to contract, for offer $\{t(\theta), q(\theta)\}$ to optimal for $A$, need in particular:

$$\forall \theta, \theta' \quad U_A(\theta) = \theta q(\theta) + t(\theta) \geq \theta q(\theta') + t(\theta') \quad (IC')$$

- For agreement to be mutually beneficial, need

$$u_A(\theta) = \theta q(\theta) + t(\theta) \geq \max(\theta, 0) \quad (IR_A)$$

$$E[u_P] = E_{\{\theta|\cdot\}} \left[ -cq(\theta) - t(\theta) \geq -cq^M(\theta) \right] \quad (IR_P)$$
Failure of the Coase Theorem

- agreement involves efficient decision, \( q(\theta) = q^*(\theta) = 1 \iff \theta - c \geq 0 \)
- assume \( \bar{\theta} - c > 0 \), implications of \((I C')\) constraint
  \[
  \begin{align*}
  \theta, \theta' \geq c \quad (I C') & \Rightarrow t(\theta) = t(\theta') \equiv t_1 \\
  \forall \theta, \theta' < c \quad (I C') & \Rightarrow t(\theta) = t(\theta') \equiv t_0 \\
  \forall \theta < c \leq \theta' \quad (I C') & \Rightarrow t(\theta) = t(\theta') + c \Rightarrow t_0 = t_1 + c
  \end{align*}
  \]
- implications of \((IR_A)\) constraint
  \[
  c \geq \theta > 0, \quad t_0 = t_1 + c \geq \theta \Rightarrow t_1 \geq 0, t_0 \geq c
  \]
- implications of \((IR_P)\) constraint if contract offer is \{0, t_0\}
  \[
  -t_0 \geq -c \frac{F(c) - F(0)}{F(c)} \iff t_0 \leq c \frac{F(c) - F(0)}{F(c)} < c
  \]
  \[
  \Rightarrow \text{efficient decision cannot be part of contract that is proposed by } A \text{ and accepted by } P \text{ if } \bar{\theta} - c \geq 0
  \]
Conclusion

- if $\bar{\theta} \geq c$, and $A$ is privately informed about $\theta$, there does not exist a mutually acceptable contract that implements the efficient outcome.

- this conclusion also holds more generally, e.g., for different bargaining games between $A$ and $P$ [see Klibanoff - Murdoch (1995, ReStud)].

- **Intuition.** Threat of opportunistic behavior of $A$ (may overstate value of decision to increase compensation) makes it impossible to differentiate compensation payments based on $\theta$. Hence, $P$ must pay the same (maximal) compensation amount in every state where the project is not realized. $P$ is not be willing to that much because chances are $A$ won’t go ahead even without agreement.
A General Characterization of Agency Problems

- relationship between two (sometimes more) parties; one party’s utility depends on the other party’s information or action
- one party is – or will be – better informed about some state of nature that is relevant to the relationship than the other party; the informed party is the **agent** $A$ and the uninformed party the **principal** $P$
- private information ex ante (pre-contractual opportunism) 
  $\Rightarrow$ **adverse selection** (hidden information)
  - uninformed party moves first $\rightarrow$ **screening**
  - informed party moves first $\rightarrow$ **signaling**
- private information ex post (post-contractual opportunism) 
  $\Rightarrow$ **moral hazard** (hidden action)
  Examples: Insurance Company – Car Owner, Employer – Employee, Plaintiff – Attorney, Homeowner – Contractor, Shareholder – Manager, Patient – Physician,