Information economics

- During the last 30 years or so most exciting developments in economics happened in information economics
- Information economics analyzes
  - Consequences of informational asymmetries between actors
  - Optimal design of contracts, institutions, etc. to deal with them
- Examples:
  - Insurance companies have imperfect information about the risk characteristics of their clients
    - Adverse selection
    - Screening
  - Firms do not know the abilities of job applicants
    - Signaling
  - Firms cannot observe the effort of their workers
    - Moral Hazard

Standard Paradigm: Neoclassical Model

- Exchange of goods in perfectly competitive frictionless markets
  - Perfect information
  - No externalities
  - No strategic interaction
- Rational agents take market prices as given to decide on actions
- Market prices adjust to equilibrate demand with supply
- Its theoretical apex: general equilibrium theory
  - Existence
  - Efficiency
    - First welfare theorem: Equilibrium is efficient
    - Second welfare theorem: Any efficient allocation can be achieved as an equilibrium after appropriate lump-sum transfers
- Later reformulated to account for uncertainty but in a rather uninteresting way
  - von Neumann and Morgenstern (1944): Preferences over uncertain outcomes
  - Arrow (1964) and Debreu (1959): State contingent commodities

Standard Paradigm: Paradoxes

- Why is there unemployment?
- Why does equity play such a small role in financing new investment?
- Why do firms pay dividends even though they are double-taxed?
- Why do firms offer lower premiums to insurees who accept higher deductibles?
- Why does an announcement of stock repurchase cause stock price to rise?
- many many more...
Imperfect Information

- Standard paradigm: Imperfect information is only a transaction cost
- Information economics: No!
- Small imperfections in information can have large consequences
- Why?
  - Agents' choices reveal information
  - When they choose an action they consider not only what is good for them but also how it changes others' beliefs about them

A simple example

- You are interested in taking over an existing company
- The value of the company for the current owner: \( V \) dollars
- It is 50% more valuable for you: \( 1.5V \)
  - You are willing to pay any price up to the expected value
- You have all the bargaining power
  - If your offer is at least as large as the expected value for the current owner, it will be accepted
- Three possible scenarios:
  1. Perfect information
  2. Imperfect but symmetric information
  3. Asymmetric information

A Simple Example

1. Perfect information: Both know \( V \)
   - What is the equilibrium price?
2. Imperfect but symmetric information: Both believe \( V \) is uniformly distributed between 0 and 100
   - What is the equilibrium price?
3. Asymmetric information: Current owner know \( V \), you believe it is uniformly distributed between 0 and 100
   - What is the equilibrium price?

More Examples

- Health insurance
  - Suppose insurance company offers a package tailored for average risk in the population
  - Only riskier people buy \( \rightarrow \) average risk in the insuree pool higher than that in general population
  - Company may lose money
  - Known as adverse selection
- Can the company do something about it?
  - Offer different packages and let people choose
    - High premium + Low deductible: High risk
    - Low premium + High deductible: Low risk
  - Known as screening
- Other examples of this sort:
  - Price discrimination by a monopolist
  - Regulation of monopolies
  - Financial contracts and credit rationing
More Examples

- Risk averse entrepreneur seeking finance for a risky project
- Entrepreneur has better information than lender about the risk-return profile of the project
- May cause many worthy projects not to be financed (credit rationing)
- Can an entrepreneur with a good project do something about it?
- Can put her money where her mouth is
  - Can retain some equity
  - This is costly for a risk averse entrepreneur
  - But less so for one with a better project
- This action signals private information
- Such models are known as signaling models
- Other examples include:
  - Education as a signal of ability
  - Warranty signals quality

More Examples

- More insurance coverage \(\rightarrow\) less effort to prevent accidents
- This is known as moral hazard in insurance (and now in economics)
- If you receive a fixed grade for this course you may not work as hard
- Models that include such concerns are also known as principal-agent or agency models
- General feature:
  - agent takes an action that affects both the principal and the agent
  - only an imperfect indicator of agent’s action is observed
- What is the optimal (compensation) contract?
- Two factors to take into account:
  1. Incentives: Payment must be sensitive to outcome to induce effort
  2. Risk sharing: If agent is more risk averse, he should not be exposed to too much risk

Contracts

- In standard competitive model contracts are very simple:
  - I will pay a certain amount if you do such and such
- In real world they are much richer
- Compensation contracts
  - depend on absolute as well as relative performance
  - may also include fixed payments plus stock options
- Financial contracts
  - specify not only interest rates but also collateral requirements
  - control rights
- Economics of information help us understand why
  - hence known also as Contract Theory

Applications

- An impressive number of diverse areas including
  - Design of institutions and organizations
  - Corporate finance
  - Regulation, auditing
  - Development economics
  - Macroeconomics
  - Public finance: optimal taxation
  - Allocation of ownership: vertical integration, privatization
  - Accounting
  - Law
  - Political Science
Why Do We Care About Asymmetric Information?

- Both moral hazard and adverse selection have been recognized as severe problems by the insurance industry.
- We see their workings everyday.
- Savings and Loan crisis in the US:
  - Government insured savings deposits of up to $100,000.
  - Newly deregulated S&Ls made riskier investments than they would have otherwise.
  - During the 80s and 90s, 747 S&Ls failed.
  - Cost: $160 billion, of which government paid $125 billion.
- Similar issues during 2007 financial crisis:
  - Financial institutions and investors have asymmetric information about the riskiness of financial securities.
  - The US government bailed out Fannie Mae and Freddie Mac and AIG.
  - Should it have bailed out Lehman Brothers?
- Moral hazard is cited as an important consideration in this decision.
- I will very briefly describe two empirical studies:

Cutler and Zeckhauser (1998)

An Example of Adverse Selection

- Two health plans: moderate and generous.
- Two risk types: Low and High.

<table>
<thead>
<tr>
<th>Cost</th>
<th>Moderate</th>
<th>Generous</th>
<th>Cost Difference</th>
<th>Benefit Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
<td>40</td>
<td>60</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>High Risk</td>
<td>70</td>
<td>100</td>
<td>30</td>
<td>40</td>
</tr>
</tbody>
</table>

Efficient outcome:
- High risk into generous plan (40 > 30).
- Low risk into moderate plan (15 < 20).

Cutler and Zeckhauser (1998)

Starting from this outcome premiums, to cover cost, should be:
- 100 for generous plan.
- 40 for moderate plan.

But then everybody would choose moderate plan.
- Extra 60 is not worth the extra benefit of 40.

What is the cost of moderate plan now? More than 40.

An example of adverse selection.

They look at two cases of employee health insurance:
- Harvard University.
- Group Insurance Commission (GIC) of Massachusetts.

Harvard University:
- Two types of health insurance:
  - A generous PPO (Preferred Provider Organization).
  - Several HMOs (Health Maintenance Organization).
- Additional cost of PPO was about $500 for an employee.
- 20% chose PPO.
Cutler and Zeckhauser (1998)

- In mid-90’s a budget deficit forced Harvard to
  1. switch to equal contribution towards all the plans
  2. negotiate lower premiums for HMOs
- HMO premiums fell but PPO premiums stayed constant
- In 1995 cost difference for the employee rose to $1,000
- Enrollment fell to 15%
  ▶ Those who left PPO were younger and healthier
- PPO lost money and in 1996 raised its premium
- Cost difference increased to $2,000
- Still more younger and healthier people left PPO
- In 1997 PPO was abandoned
- Adverse selection death spiral


- Do workers respond to incentives?
- Theory: If they are paid on the basis of output they will produce more
- Analyzed data on Safelite Glass Corporation
  ▶ installs windshields on cars
- In 1994 the company moved from hourly wage to piece-rate pay, with a guaranteed minimum of $11 an hour
- How would that affect the company?


**Theory**

- **Incentive effect**: Average output per worker will increase
- **Variance** of output per worker will increase
- **Screening effect**: New hires will be more productive

**Evidence**

- 44% increase in average output per worker
- 12% increase in standard deviation
- They are and half the increase in output per worker can be attributed to this effect

A Taxonomy of Models