Lecture 14: Asymmetric Information and Review

December 1, 2015
Overview

Course Administration

Ripped From Headlines

Principal-Agent Problems

Signaling as a Solution to Asymmetric Information Problems

My Evaluation

Review Questions
Course Administration

1. Collect final problem set
   - Return previous problem set(s)
   - Can collect final problem set(s) from Monika during office hours
2. Collect paper
3. Please fill out online survey: https://gwu.smartevals.com
4. Final exam is Dec. 15, 5:20 to 7:20, Rome 459
5. Extra office hours Dec. 11, 10 to 1 pm. Also Dec. 9, 10 to 1 pm.
6. Grades to date posted on BB – no PS 11 for evening quite yet
7. Anything that I’ve forgotten?
Ripped from the Headlines

Nothing next week!
Asymmetric Information

- Most of this course assumed complete information
- Last class we discussed the role of asymmetric information causing adverse selection in insurance markets – explain, please
Asymmetric Information

- Most of this course assumed complete information
- Last class we discussed the role of asymmetric information causing adverse selection in insurance markets – explain, please
- Today
  1. A problem caused by asymmetric information: principal-agent problem
  2. Signaling as a partial solution to asymmetric information
Principal-Agent Problems
What is a Principal Agent Problem?

- Principal hires the services of an agent
- Agent and principal have different utility functions
- Principal cannot perfectly observe the effort of the agent
What is a Principal Agent Problem?

- Principal hires the services of an agent
- Agent and principal have different utility functions
- Principal cannot perfectly observe the effort of the agent – asymmetric information
- What kind of relationships can be characterized by this dynamic?
What is a Principal Agent Problem?

- Principal hires the services of an agent
- Agent and principal have different utility functions
- Principal cannot perfectly observe the effort of the agent – asymmetric information
- What kind of relationships can be characterized by this dynamic?
  - You and your mechanic (accountant, hairdresser, dog walker, ...)
  - Automaker and supplier
  - Others?
What is a Principal Agent Problem?

- Principal hires the services of an agent
- Agent and principal have different utility functions
- Principal cannot perfectly observe the effort of the agent – asymmetric information
- What kind of relationships can be characterized by this dynamic?
  - You and your mechanic (accountant, hairdresser, dog walker, ...)
  - Automaker and supplier
  - Others?
- What kind of problems ensue?
What Contracting Strategies Can Mitigate the Principal Agent Problem?

In general, pay for performance, which can take many forms, including

- Commission
- Tips
- Granting of tenure
- Tournaments
- Stock options
- Firing
What Contracting Strategies Can Mitigate the Principal Agent Problem?

In general, pay for performance, which can take many forms, including

- Commission
- Tips
- Granting of tenure
- Tournaments
- Stock options
- Firing
Merchants, Pirates, and the Principal Agent Problem

- Two major types of commercial ships in the 1700s: merchant ships and pirate ships
- Merchant ships have two principal agent problems
  1. Merchant ship investors and ship captains.
Merchants, Pirates, and the Principal Agent Problem

- Two major types of commercial ships in the 1700s: merchant ships and pirate ships
- Merchant ships have two principal agent problems
  1. Merchant ship investors and ship captains. Strategies to mitigate
     - profit sharing
     - make captain residual claimant
     - hire a relative as captain
     - give autocratic powers to captain
  2. Ship captains and seamen.
Merchants, Pirates, and the Principal Agent Problem

• Two major types of commercial ships in the 1700s: merchant ships and pirate ships

• Merchant ships have two principal agent problems
  1. Merchant ship investors and ship captains. Strategies to mitigate
     • profit sharing
     • make captain residual claimant
     • hire a relative as captain
     • give autocratic powers to captain
  2. Ship captains and seamen. Strategies to mitigate
     • legal consequences: seamen can sue captain
     • reputation of captain
     • threat of mutiny
No absentee owners: pirates own their ships because they stole them

Pirates are “owner-employees”

But still need a captain to direct attacks. How do you limit his power?
Principal Agent Problem and Pirates

- No absentee owners: pirates own their ships because they stole them
- Pirates are “owner-employees”
- But still need a captain to direct attacks. How do you limit his power?
  - Elect him!
  - Also elect a quarter-master, who is in change in non-battle situations: he gives out food, weapons and plunder
- How do you incent owner-employees (treasure has public good aspects!)?
Principal Agent Problem and Pirates

- No absentee owners: pirates own their ships because they stole them
- Pirates are “owner-employees”
- But still need a captain to direct attacks. How do you limit his power?
  - Elect him!
  - Also elect a quarter-master, who is in charge in non-battle situations: he gives out food, weapons and plunder
- How do you incent owner-employees (treasure has public good aspects!)?
  - Pirates earn a fixed share of booty, plus bonuses for courage
  - Usually offer some form of insurance for pirates wounded in battle
Signaling as a Solution
One Solution to the Problem of Asymmetric Information

- We know that asymmetric information problems can cause markets to fail.
- One way to solve this problem is for the seller to signal information about the quality of the good or service.
- Solves the problem insofar as the signal is credible.
Simple Framework to Explain Signaling

- Imagine two kinds of guys in the world, each with prevalence $\frac{1}{2}$
  - more productive guys who produce $y_h$
  - less productive guys who produce $y_l$
- Assume $y_h > y_l$
Simple Framework to Explain Signaling

- Imagine two kinds of guys in the world, each with prevalence $\frac{1}{2}$
  - more productive guys who produce $y_h$
  - less productive guys who produce $y_l$
- Assume $y_h > y_l$
- If workers cannot signal their ability,
Simple Framework to Explain Signaling

• Imagine two kinds of guys in the world, each with prevalence $\frac{1}{2}$
  • more productive guys who produce $y_h$
  • less productive guys who produce $y_l$

• Assume $y_h > y_l$

• If workers cannot signal their ability, employers can’t tell the difference between more and less productive guys, and would like to pay only $\frac{1}{2} y_l + \frac{1}{2} y_h$
Education as Signal

- Now suppose that a worker can purchase education
- Education has no intrinsic value
  - We can weaken this assumption to be more realistic
  - But we can find investment in education even without any intrinsic value of education
Education as Signal

- Now suppose that a worker can purchase education
- Education has no intrinsic value
  - We can weaken this assumption to be more realistic
  - But we can find investment in education even without any intrinsic value of education
- Further assume that education is more costly for less productive guys than more productive guys
  - Suppose $c_l$ and $c_h$ are the costs of education
  - And that $c_l > c_h$
Education as Signal

• Now suppose that a worker can purchase education
• Education has no intrinsic value
  • We can weaken this assumption to be more realistic
  • But we can find investment in education even without any intrinsic value of education
• Further assume that education is more costly for less productive guys than more productive guys
  • Suppose \( c_l \) and \( c_h \) are the costs of education
  • And that \( c_l > c_h \)
• Then, if the more productive guy can make up his investment in education with an increased wage, he will signal his ability by purchasing education
Education as Signal

- Now suppose that a worker can purchase education
- Education has no intrinsic value
  - We can weaken this assumption to be more realistic
  - But we can find investment in education even without any intrinsic value of education
- Further assume that education is more costly for less productive guys than more productive guys
  - Suppose $c_l$ and $c_h$ are the costs of education
  - And that $c_l > c_h$
- Then, if the more productive guy can make up his investment in education with an increased wage, he will signal his ability by purchasing education
  - The case when $c_h < y_h - \left( \frac{1}{2} y_l + \frac{1}{2} y_h \right)$
Education as Signal

- Now suppose that a worker can purchase education
- Education has no intrinsic value
  - We can weaken this assumption to be more realistic
  - But we can find investment in education even without any intrinsic value of education
- Further assume that education is more costly for less productive guys than more productive guys
  - Suppose $c_l$ and $c_h$ are the costs of education
  - And that $c_l > c_h$
- Then, if the more productive guy can make up his investment in education with an increased wage, he will signal his ability by purchasing education
  - The case when $c_h < y_h - (\frac{1}{2}y_l + \frac{1}{2}y_h)$
- Note that everything hinges on the education being less costly for the more productive guys
Intuition in Pictures

Costs and benefits of college (thousands of $)

\[ C_L = 50,000y \]

\[ C_H = 25,000y \]

\[ B = \text{lifetime wage premium of $125,000 for 4 years of college} \]
What Are Other Signals?
What Are Other Signals?

- Dressing nicely
- Masters degree?
- Others?
Today: Asymmetric Information and One Solution

- Principal agent problems as a problem of asymmetric information
- Potential solutions to the principal agent problem
- Signaling as a potential solution
• Please do online evaluation!
• And this one gives me more specific feedback on course elements
• I don’t open them until I re-do the syllabus the summer before the course
Review Questions

The floor is yours.