Information, Information Asymmetry, and Pricing: A Quick Introduction to the New Rules

Context for Today

- First Class — Orientation, Purpose, Course Mechanics
  - Information, rather than information technology
- Second Class — Patterns and theories, for rapid recognition and strategic response
  - Role of patterns and theories, even before we explore information-based patterns and theories
  - Role of maps for speed of recognition, codification of knowledge
  - Nature of strategy as the deployment of resources to achieve a desired outcome
- Third Class (Today) — Information-based strategies, but mostly without data!
  - Information asymmetry and market collapse
  - Versioning
  - First degree / perfect price discrimination
  - Signaling, screening, and data mining

Overview

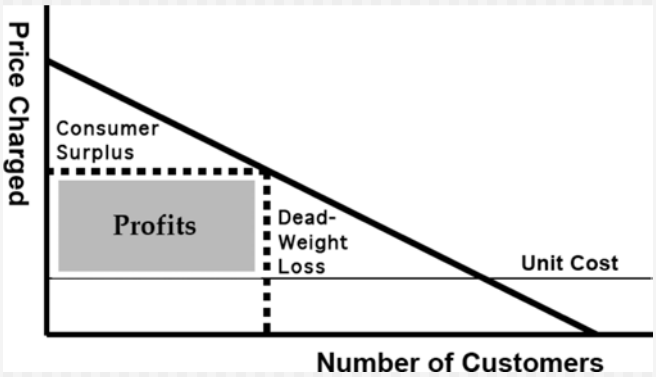
- ***Customer Heterogeneity***
  - Customers differ in ***willingness to pay*** for goods and services
  - Customers differ in ***cost to serve***
  - Information asymmetry between buyers and sellers
- ***Information asymmetry*** is sometimes a severe problem
- Information asymmetry always leads to lost opportunities
- Single ***monopoly profit-maximizing price***, when sellers have no information on individual customers
- But we can often do better than that
  - ***Versioning*** and multiple profit maximizing prices
  - Its twin, ***screening mechanisms*** and multiple prices
  - Their cousin, ***signaling***
  - And ***data mining***

Information Asymmetry and Market Collapse

- Akerlof and the Market for Lemons
  - Information asymmetry and the collapse of used car markets
  - Effective responses?
- eBay and the Market for Lemons
  - Information asymmetry and the collapse of the market for resale of Tiffany cufflinks
  - Effective responses?

Profit Maximizing Price Without Versioning

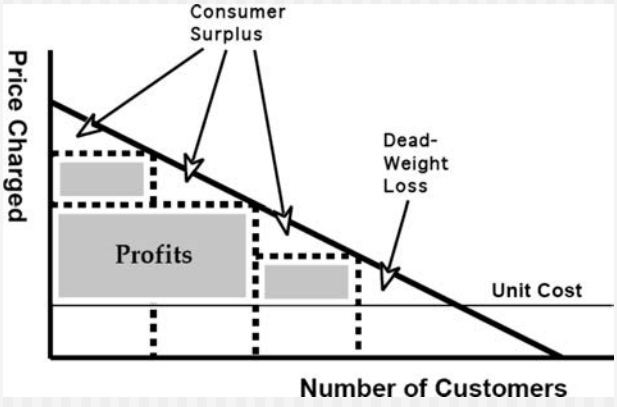
- Monopoly sellers can set ***profit maximizing price***
  - Leading to maximum (single price) profits
  - Leading to ***consumer surplus*** and ***producer surplus***
- Why does this require a monopolist seller?



- And why is this profit maximizing?
- Why not earn more on each sale by dropping the price?
- Why not sell more by lowering the price?

Multiple Prices and Profit Maximization with Versioning

- Monopoly sellers can ***sometimes*** set ***multiple prices*** to increase profits (versioning on the old French Railroad)
  - Create ***superior*** and ***inferior versions*** with different ***prices***
  - ***Increasing*** profits
  - ***Reducing*** both consumer surplus and deadweight loss



- But why does this work at all?
- Why don't all customers by the cheaper verdict, so we lose profits?
- Or why don't all customers ignore the inferior version, so we lose sales and profits?

Information Goods And Versioning

- Why do we restrict analysis of versioning mostly to information goods?
  - How do we version software?
  - How do we version data feeds?
  - How do we version SUVs?
  - How could we further version Remy Louis XIII if people can't taste the differences?

Dealing with Information Asymmetry — Priceline

- Priceline, airline seats, name your own price
- A ***rare opportunity*** for ***first degree price discrimination*** or ***perfect price discrimination***
- Avoid ***cannibalizing***, sell only incremental seats that would not have been bought
  - Damage the seat? How can that be done?
- Honest revelation, discourage or eliminate sequential ***low-balling***
  - How can that be done?
  - What is the significance of ***really bad*** possibilities?
  - What is the significance of ***enough*** really bad possibilities?

Dealing with Information Asymmetry — Mechanisms

- But opportunities for perfect price discrimination are rare
- More general mechanisms for dealing with information asymmetry
  - ***Signaling*** — actions you take intentionally to ***announce*** your ***own type***
  - ***Screening*** — actions you take to cause the ***other party*** to ***rationally reveal its true type***
  - ***Data Mining*** — analysis of actions that may, ***unintentionally***, ***reveal other party's type***
- Can be used singly or in combination
- Key role of ***intentionality***

Signaling

- Assume individuals are of two ***types***, one more ***desirable*** than the other
  - Hard workers and lazy workers
  - Honest bankers and dishonest bankers
  - Stinky prey you don't want to eat, or other prey you may be able to catch and eat
- A signal is an action a desirable individual takes, to reveal his or her ***own*** type to others
  - The action should be difficult or expensive for individuals of the other type to take, to discourage ***masquerading***
  - Building a large expensive marble bank
  - Purchasing a large performance bond, versus labeling with TRUSTe

Signaling

- First academic description, Michael Spence
- Claim: Harvard College undergraduate degree confers ***little of commercial value***
  - Spence compared graduates of Boston Latin without college to those who went on to Harvard
- Same undergrad degree confers ***significant salary advantage***
- Theory one — economics does not explain labor markets
- Theory two — workers are of two types, and education ***signals*** to employers ***which*** of the two types a potential employee is

Signaling

- Workers are of two types, and everyone knows this, and knows that everyone knows this
  - Workers know their own types
  - Employers only know that two types exist
- Workers have indifference curves between education and starting salaries, explains behavior
  - Some breeze through Harvard, earn more
  - Some avoid suffering, stop after high school, earn less
- Firms offer high salaries for educated workers, low salaries for others
  - ***Pure Separating Equilibrium*** can exist
  - But why does this occur?
  - Sufficient differences in indifference curves relative to salaries

Signaling

- Signaling works in the animal world, both intra-species and inter-species
  - Bower birds, white tail deer, and peacocks signaling to attract mates
  - Rabbits and foxes, Thompson gazelles and lions, and monarch butterflies and birds that eat them, all signaling to deter chosen as food

Dealing with Masquerading

- A serious problem created by incentives
- If the productivity differences of the two types of workers are great enough, the salary differences will be great as well
- If the salary difference is great enough, some low-productivity workers may ***masquerade*** as high productivity workers and struggle their way through Harvard
- This reduces productivity differences between high salary and low salary workers
- Which reduces salary differences offered
- This can break separating equilibrium if preferences are not different enough … everyone tries to go to Harvard
- How would an employer address this?

Screening

- Screening involves the design of the product or service offering by one party
- **To induce the *other* party to reveal his *own* type by self-selection**
- Your own selection of product or service and rejection of others indicates your own true type
- And if products are designed properly, each individual selects the product or service that the other party wants him to select
- Alternative to signaling by individual
- And a close cousin of versioning
- If individual types are too similar, then screening may not succeed in producing a stable separation

Screening

- Insurance example:
  - Applicants are of two types, which everyone knows
  - Some are high risk, some are low risk
  - Applicants know their own types
  - Insurance company only knows the attributes of each type
  - Design appropriate products
  - Self reporting? How will that work out?
  - ***Smokers' Friend***™ Life Insurance

Screening

- Applicants have different utilities for insurance, based on their expectations concerning losses
- By designing different products, with different costs and different benefits, customers can be induced to select the appropriate product
- ***Product design*** addresses adverse effects of ***self-selection*** and ***information asymmetry***

Screening

- The missing piece for Capital One's balance transfer product
- Applicants have different utilities for lower interest rates, leading to different willingness to be placed on hold for 45 minutes
- By designing an inefficient manual process, Capital One developed an effective screen!
- ***Process design*** addresses ***information asymmetry***

Screening Complication 1 — **Multiple Types**

- In credit card operations, ***Slow pays*** are most desirable, ***fast pays*** are less desirable
- ***No pays*** are the worst possible
- Both slow pays and no pays prefer low interest rates and both are profitable as long as they pay
- Screening mechanisms? Not for this
- No separating equilibrium, no self-reporting, which results in pervasive masquerading
- We try ***data mining***

Screening Complication 2 — **Changing Types**

- ***Data Mining*** — No intentional disclosure, no masquerading
- Examples
  - First uses of credit card for cash advance at Vegas or Tahoe!
  - First uses of credit card for fast food!
  - First uses of credit card for fast food on weekends?
- Risk of spurious and meaningless correlations
- Importance of hypothesis generation
- Danger of ***tormenting and abusing*** the data
  - People born under the sign Leo are 15% more likely to be admitted to hospital with gastric bleeding than those born under other signs
  - Sagittarians are 38% more likely than others to land up there because of a broken arm
  - www.economist.com/science/displaystory.cfm?story_id=8733754
  - What percentage of hypotheses are supported at 5% level?

Screening Complication 3 — **Regulatory Implications**

- Discussion with my young daughter after Abby's mother died of cancer
- *"Will Abby still be able to eat?"*
- Easy to frame questions that obviously have significant implications for fairness and social policy
- Easy to frame questions that have no universally acceptable answers

Screening Complication 3 — **Regulatory Implications**

- With alternative product offerings, customers make informed self-selections
  - ***Smokers' Friend™***
  - Prices reach equilibrium
- Insurance regulators and legislators more concerned with politics than economics, are singularly unhelpful
  - What happens when you forbid exclusions?
  - What happens when you raise prices for all customers?
  - (Think about raising prices to protect insurance companies against people planning suicide)

Screening Complication 4 — **Ethical Implications**

- Regulation and regulatory confusion
- Problems with information asymmetry and uniform pricing in health care / affordable care act?
  - Who gets hurt?
  - Who rationally opts out of the market?
- Maximal market participation as regulatory objective
  - Justification? Externalities
- Who benefits when regulators attempt to protect sick applicants by forcing pooling?
- As President Putin said to President Obama, *"Don't think you are smarter than the market!"*
- And yet, something is clearly necessary
  - *"Why would I want to insure sick people?"*

Role of Information And Information Technology

- Calibration
  - How much price difference is necessary?
  - What percentage salary vs. performance bonus will be effective?
  - What sort of difference in quality is necessary for an effective screen?
- Data Mining

Examples — Signals And Screens

- The king looking for a true princess for his son— *the princess and the pea*
- A king looking for a true prince for his daughter (1) — offer a choice, hunting with hawks or watching him sit in judgment in court
- The king looking for a true prince for his daughter (2) — watch which magazine the young man chooses from those set out before him, *The Wyse Judge* or *Moderne Hawkes and Falcons*
- The king looking for a true prince for his daughter (3) — find out what magazines he subscribes to

Examples — Signals And Screens

- Consulting firm hiring only graduates of top business schools
- Consulting firm hiring only graduates of top business schools *and* dividing comp into base plus bonus
- Consulting firm hiring only graduates of top business schools *and* dividing comp *and* promoting to partner after no more than 7 years
- Consulting firm hiring only graduates of top business schools *and* dividing comp *and* promoting to partner after no more than 7 years and never hiring partners from outside

Examples — Signals And Screens

- Is it always clear when something is a signal or a screen or data mining?
  - I offer a good driver discount if you have no traffic violations for 5 years
  - I offer you a discount on auto insurance if you install a GPS tracker in your car and I can track your driving
  - I offer you a discount on life insurance if you wear a smart watch and I can track your life style
- Are signals always reliable?
- Are screens stable, even when both parties understand the screen?
  - Spartans and Helots during the Peloponnesian War

Conclusions

- Information asymmetry, adverse selection, market collapse
- Reducing information asymmetry
  - ***Signaling***, ***screening***, ***data mining***
  - ***Signaling***, strengths and weaknesses
  - ***Screening***, strengths and weaknesses
  - ***Data mining***, strengths and weakness
  - Competitive advantage or strategic necessity?
- Use in combination
- Difference between optimal competitive strategy and issues of social fairness