Lecture 6: Monopoly

Primary reference: McAfee, Competitive Solutions, Ch. 11
Monopoly

- One firm in a market.
- Monopoly occurs when two conditions are satisfied.
  - There exists a product or a set of products with no close substitutes.
  - There are high barriers to entry.
- Monopoly typically occurs in one of three situations.
  - Control of a scarce resource with no close substitutes (example: the DeBeers diamond company).
  - Government regulation (example: utilities, patented pharmaceuticals).
  - Markets that yield profits that are too small for more than one firm.
  - Is the merged entity XM/Sirius a “monopolist?”
  - Not really. The FTC and DoJ ruled that XM/Sirius competed so much against terrestrial radio (a close substitute), that their “monopoly” of satellite radio would not result in significant, lasting price increases.
Monopoly Pricing

- A monopolist has complete **market power**, in that its customers have no alternatives.
  - This is like having all of the red cards in the Card Game. If someone with a black card wants to make money, they *must* do business with the person holding the red cards.
- A monopolist has no strategic rivals. Unless its set of customers is very small, it doesn’t really have strategic interdependence with anyone.
  - In a bilateral monopoly (1 buyer, 1 seller), such as the hold-up problem example, each monopolist interacts strategically with the other monopolist.
- In essence, a monopolist with a large number of customers is able to make take-it-or-leave-it offers to all customers simultaneously.
- This is kind of what Nintendo did in the late 1980s, right?
DeBeers

- The first diamond discovery in 1867 led to a diamond rush in the 1870s. Prices fluctuated wildly in the 1870s and 1880s as the market, which included lots of small claimants, was flooded from time to time.
- Cecil Rhodes patiently bought up claims and eventually set his sights on the Kimberley mine, the largest.
- Rhodes outwitted Barry Barnatto to gain majority control of the Kimberley mine, forcing Barnatto to merge with him.
- DeBeers consolidated mines formed in 1888 in South Africa. At the time, DeBeers controlled 95% of the world’s uncut diamonds.
- DeBeers’ share of the world’s uncut diamonds fluctuated between 60-95% throughout the 20th century.
DeBeers: A Diamond is Forever

- Cecil Rhodes decided to base the supply of diamonds on number of weddings in diamond buying nations, most importantly the US.
- The N.W. Ayer agency coined the slogan “a diamond is forever” in 1947. This conjures romance and reinforces DeBeers goal of not having recycled diamonds on the market.
- After conquering the US, DeBeers looked elsewhere and generally succeeded. In 1967, only 6% of Japanese brides received diamonds upon engagement. By 1982, the number was 65%.
DeBeers: The Central Selling Organization

- DeBeers routed all uncut diamond sales through one office in London, the CSO.
- Ten times a year, the CSO conducted “sights” for about 150 buyers.
- Buyers could request an amount of stones and a quality grade.
- The buyers traveled to London to inspect the stones.
- DeBeers made a take-it-or-leave-it offer for a particular packet of stones. No cherry picking, no haggling over price.
- Buyers refusing the offer were not invited back.
- Now this is a lot like the Card Game.
The monopolist chooses an optimal $P^*$ that is a mark up over unit cost,

$$\frac{P^* - C}{P^*} = \frac{1}{\epsilon},$$

where $\epsilon$ is the elasticity of demand at price $P^*$. 

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Monopoly: The Basic Single-Price Model

![Monopoly Graph]

- Marginal Revenue
- Demand
- Marginal Cost (competitive price)

$P^*$

$C$

$\text{Q}^*$

\[Q\]
The single-price monopoly outcome is a good one for the monopolist, but is still inefficient.

They *could* sell some units for a price between $C$ and $P^*$, and earn additional profit...but how might they do this?
In the summer of 2007, Apple introduced the iPhone at a price of $600.

Ten weeks later, they dropped the price to $400.

In principle, this partly solves the problem of inefficiency with a single price. The monopolist gets to charge consumers with a high willingness to pay what they will pay, and charge consumers with a low willingness to pay what they will pay.
Early Adopter Pricing - The iPhone

There's a problem, though...
Consumers who paid $600 were livid!
Why? They knew they could have waited a short period of time and paid less.
Apple eventually offered $100 vouchers for iTunes to consumers who paid $600 for the iPhone.
Presumably, some consumers willing to pay $600 did wait, probably expecting it to take longer before Apple dropped the price. Who would wait?
Early Adopter Pricing - The iPhone

- Suppose customers get services over four periods. A customer who gets $150 worth of services per period is just willing to pay $600 in the first period for the iPhone...assuming that the price will never be lower. A company might even promise to never change the price...but

- What if the company changes its mind a period later, after it has already picked off the early adopters? It will lower price.

- If this same customer anticipates the price dropping to $400 in the second period, he will strictly prefer to wait until the second period, as he would get $450 worth of services and pay only $400, yielding an extra surplus of $50 over what he gets by buying in the first period.

- This lowers first-period demand. Because the good is durable (it delivers services over multiple periods), the monopolist has a commitment problem...because it will be a greedy price-cutter in the future, it competes against a price cutter (itself) in the present.
Ronald Coase reasoned that if firms sell durable goods and cannot commit to not lower prices later, consumers will anticipate such future cuts and be less willing to pay today.

In a roundabout way, this is exactly what happened with the iPhone. Customers who *would have* waited complained and got rebates. The story is a bit different because they actually didn’t wait to buy. What would have changed had Apple waited longer before dropping the price?

The moral of the story is that a monopolist selling a durable good does face a situation with strategic interaction...with itself. This can be overcome.
Overcoming the Durable Goods Problem

- In the 1960s, Xerox overcame this problem by primarily leasing its fleet of plain-paper copiers.
  - This effectively removes the durability factor out of pricing decisions. Now a price is charged per period for services.
- Artists who make prints commit to a fixed number by destroying the mold and writing the total number of prints made on each print.
  - This (partially) removes the greedy future self from the picture.
Price Discrimination

- The example we just saw illustrates (intertemporal) *price discrimination*, where different consumers are charged different prices for the same good.
- What about charging different prices in the same period?
- To do it, you need to be able to segment the market and prevent resale
Pharmaceutical prices vary by country.

They are high in the US, lower elsewhere. In 1998 a 20mg dose of fluoxetine (Prozac, Sarafem) cost $72.16 in the US, less than half that in most European countries.

As a result, Texans have an incentive to travel to Mexico to buy drugs. Most Americans cannot do this, however.
Methyl methacrylate (MM) was sold by duPont and Rohm & Haas in the 1940s, acting as a cartel.

MM has a variety of industrial uses as a plastic.

MM is particularly good for making dentures.

The two firms charged $.85 per pound (as a powder) for MM for industrial uses and charged $22.00 per pound (as a liquid) for MM to licensed dental labs.

There were other differences, but bootleggers nonetheless successfully bought the powder, reworked it and sold it to the dental labs at a discount.

Rohm & Haas apparently debated adulterating the product so it would be unhealthy to use in dentures, and eventually just planted a rumor that they had done so.
Types of Price Discrimination (Pigou 1920)

- **First-Degree** price discrimination: charge a different price to each consumer.

- **Second-Degree** price discrimination: offer a menu of different combinations of price and quality or price and quantity, allowing consumers to choose.

- **Third-Degree** price discrimination: charge different consumers different prices based on an observable characteristic, such as age
This is the simplest type of price discrimination, conceptually.

Suppose you are selling movie theater tickets and have two groups of customers, students and non-students. It is possible to identify students by requiring an ID and the cost of serving them is identical, $C$ per customer.

Suppose you know the demand curves for students and non-students, and that they are different. Then your optimal pricing structure is

\[ \frac{P^*_S - C}{P^*_S} = \frac{1}{\epsilon_S} \]

\[ \frac{P^*_S - C}{P^*_{NS}} = \frac{1}{\epsilon_{NS}} \]

If $\epsilon_S > \epsilon_{NS}$, then students are charged less.
Third-Degree Price Discrimination

$P_{NS}^*$

Non-Student Demand

$P_S^*$

Student Demand

Quantity

MC

$
Recall that the **price elasticity of demand** measures the % increase in quantity demanded resulting from a 1% decrease in price.

- With $\epsilon = 2$, a 10% drop in price results in a 20% increase in quantity demanded.
- When demand from a group of consumers is such that $\epsilon$ is higher, the consumers are more *price sensitive*.

Optimal third-degree price discrimination calls for charging lower prices to more price sensitive customers, like students or senior citizens at movie theaters.

Note that to do this, you need an observable characteristic that is correlated with price sensitivity.
First-Degree Price Discrimination

- Suppose a set of $N$ consumers each demand one unit of a good.
- Suppose each consumer has a different reservation value for the good, and that the monopolist knows this value.
- Let’s rank the reservation values, such that $v_1 > v_2 > \ldots > v_N$.
- For simplicity, suppose the good is produced without cost.
First-Degree Price Discrimination

- Demand for the good follows a stair-step pattern. For prices between \( v_1 \) and \( v_2 \), say, total demand does not change.
First-Degree Price Discrimination: Optimal Prices

Charge consumer 1 a price of $P_1 = v_1$, charge consumer 2 a price of $P_2 = v_2$, ..., charge consumer $N$ a price of $P_N = v_N$.

The monopolist captures all of the surplus.
First-Degree Price Discrimination: Examples

- To execute first-degree price discrimination, you must know both the preferences and income levels of your customers, i.e. *a lot* of stuff.
- Service providers with repeat customers could learn such information.
  - Prior to reformation, the Roman Catholic Church had (within the Christian community) a monopoly on salvation. This permitted them to extract surplus from parishioners that depended on their wealth (Ekelund, Hebert and Tollison).
  - Small-town doctors might accept cakes or other baked goods from their lower-income customers as payment for services.
- Sellers with the ability to force information revelation could also learn such information.
  - Elite colleges grant “financial aid” to students based on their ability to pay. Colleges typically require applicants to fill out the Free Application for Federal Student Aid (FAFSA) form. Using this form, they determine what someone can pay and charge them that for admission.