

## Econ 301: Microeconomic Analysis

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## Monopoly Behavior

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### Monopoly vs Competitive Equilibrium

- ▶ Compare FOC for optimal monopoly supply  $y_M^*$  and optimal competitive supply  $y_C^*$ :

$$\underbrace{p'(y_M^*)y_M^* + p(y_M^*)}_{MR_M(y_M^*)} = MC(y_M^*)$$
$$\underbrace{p(y_C^*)}_{MR_C(y_C^*)} = MC(y_C^*)$$

- ▶ What is relationship between  $y_M^*$  and  $y_C^*$ ?

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### Deadweight Loss of Monopoly

- ▶ Since  $p_M^* > p_C^*$ , we can calculate change in consumer surplus  $\Delta CS$
- ▶ We can also calculate competitive firm's profit and monopoly profit, giving  $\Delta PS = \Delta \pi$ 
  - ▶ Note that profits go up, so  $\Delta PS > 0$
  - ▶ Can also calculate PS from area above supply curve
- ▶ Calculate deadweight loss  $DWL = |\Delta TS| = |\Delta CS + \Delta PS|$ 
  - ▶ No tax revenue to worry about

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## Deadweight Loss of Monopoly

## Expanding the Monopolist's Toolkit

- ▶ So far we have made several assumptions about the monopoly setting
  - ▶ Can only set one price regardless of who purchases, or how much
  - ▶ Only selling one kind of good
  - ▶ No competitive pressure at all
- ▶ Now we break these assumptions and see what happens

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## Price Discrimination

## Price Discrimination

- ▶ We have *price discrimination* when monopolist can set different prices based on who is buying good and/or how much they are buying
- ▶ Three types of price discrimination:
  1. *First degree price discrimination*: sell every single unit for exactly its marginal utility
  2. *Second degree price discrimination*: Price depends on number of units sold but every consumer faces same discount
  3. *Third degree price discrimination*: Same price per unit for a given consumer, but different types of consumers pay different prices

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## First Degree Price Discrimination

- ▶ Also called *perfect price discrimination*
- ▶ Each marginal unit is sold to the person who values it most
- ▶ Thus price paid is equal to willingness to pay for that unit
- ▶ Sell up until price equals MC
- ▶ True first degree discrimination is very rare, since it is hard to know exact WTP of consumers
- ▶ What is consumer surplus in this case?
- ▶ Is outcome Pareto efficient?

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## Second Degree Price Discrimination

- ▶ Price depends on number of units sold to consumer (but not on the consumer's WTP)
- ▶ Also called *non-linear pricing*
- ▶ Example?
- ▶ Another version of second degree discrimination:
  - ▶ Rather than price depending on quantity, price can depend on quality
  - ▶ If prices are set correctly, consumers with high willingness to pay will sort into buying high-quality good
  - ▶ This is called *self selection*
  - ▶ Example?

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## Third Degree Price Discrimination

- ▶ Price depends on what type of consumer is buying good (but not how many units they buy)
- ▶ Example?
- ▶ Note that we are assuming monopolist can tell types of consumers apart (but still not measure their individual WTP exactly)

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## Third Degree Price Discrimination: Monopolist's Problem

- ▶ Suppose there are two types of consumers with inverse demands  $p_1(y_1)$  and  $p_2(y_2)$
- ▶ Monopolist solves

$$\max_{y_1, y_2} p_1(y_1)y_1 + p_2(y_2)y_2 - c(y_1 + y_2)$$

- ▶ What are FOC?

- ▶ Note marginal revenues from two types must be equal:  
 $MR_1(y_1) = MR_2(y_2)$

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## Third Degree Price Discrimination: Monopolist's Problem

- ▶ Which consumer type will get the better price?

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## Third Degree Price Discrimination: Linear Demand

- ▶ Suppose the demands for two types of consumers are given by  $x_1 = a - bp_1$  and  $x_2 = c - dp_2$
- ▶ Assume marginal cost is zero
- ▶ What are monopolist's optimal prices and quantities?

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## Third Degree Price Discrimination: Linear Demand

- ▶ What is price and quantity if monopolist can't discriminate? (ie must charge same price to both types of consumer)

- ▶ Note that total quantity supplied is the same as in discrimination case
  - ▶ True for linear demand but not in general
- ▶ In general, need to check that at optimal price, demand is positive for both types

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## Bundling

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## Bundling

- ▶ So far have assumed monopolist sells only one good
- ▶ If they sell multiple goods, they have another option that is distinct from price discrimination: bundling
- ▶ Suppose there are two types of consumers buying two software products from Microsoft:
  - ▶ Type A consumers: willing to pay \$120 for Word and \$100 for Excel
  - ▶ Type B consumers: willing to pay \$100 for Word and \$120 for Excel
- ▶ Assume equal proportions of types A and B, and  $MC = 0$

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## Monopolistic Competition

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## Bundling Strategies

- ▶ If producer treats these software products as two different goods, what is optimal pricing strategy?
- ▶ If producer *bundles*, ie treats the two programs together as one product, what is optimal price to set?

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## Location Model

- ▶ Suppose two ice cream vendors are choosing location on the boardwalk at the beach
- ▶ Boardwalk of length  $L$ , price is fixed by government
- ▶ Consumers prefer to walk to closest ice cream stand
- ▶ What is socially optimal location of two vendors?
- ▶ Will stands want to deviate from these locations?

- ▶ Same logic applies along any dimension: can differentiate based on quality, marketing, packaging etc

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## Location Model: Multiple Vendors

- ▶ What happens if we have three vendors?
- ▶ We will discuss this idea more generally in the next section, on *game theory*