1 Monopoly Behavior

Suppose there are three people willing to pay \$3, \$2, \$1 for a good respectively. The firm has zero costs.

Price	# Buyers	Profit
\$3	1	\$3
\$2	2	\$4
\$1	3	\$3

1.1 Types of Price Discrimination

First Degree- We charge everyone their willingness to pay.

What do I need? Know the exact willingness to pay of everyone. The ability to charge different. people different prices.

This is more of a baseline thought experiment. It doesn't really exist. Airline tickets is the closest example I can think of because everyone pays a different price.

Second Degree- You don't know anyone's willingness to pay, but you can create different "packages" that cost different amounts and let the consumers choose for themselves. The key here is self-selection.

Coach and first-class travel. Whiskey. Reserve wines. Car washes. Football tickets. Uber premium, uber black, etc.

Third Degree- There are different groups of people and on overage their willingness to pay is different. The groups can be identified and charged differently.

Student tickets.

Bundling- This can be used when a firm sells more than one product. The firm forces people to buy a bundle of the products as some bundle price and does not allow them to buy the individual products.

Cable tv. Microsoft office.

Two Part Tariff- This requires that individuals demand more than one unit of a good. You charge them a low unit-cost and then soak up the consumer surplus with a upfront fee for the right to buy the good at a low unit cost.

Amusement parks. Free-coffee-for-the-month club.

1.2 First Degree Price Discrimination in Action

Get all of the consumer surplus possible and there is no dead-weight lost. All of the potential surplus from the market end up in the hands of the monopolist.

1.3 Third Degree Price Discrimination in Action

I'm using y for quantity instead of q.

Suppose there are two groups of people: students and non-students. A movie theater sells tickets to both groups. Assume the firm has zero marginal cost so that $c(y) = 0$ (cost is zero regardless of output). Students have demand function: $y_s = 100 - 2p$ and non-students have demand function: $y_n = 100 - p$.

First, let's figure the optimal price to charge if we charge both groups the same price. (No price discrimination).

Total demand:

$$y = y_s + y_n$$

$$y = (100 - 2p) + (100 - p) = 200 - 3p$$

The inverse demand:

$$p = \frac{200}{3} - \frac{1}{3}y$$

$$\pi(y) = \left(\frac{200}{3} - \frac{1}{3}y\right)y$$

Maximize profit:

$$\frac{\partial\left(\left(\frac{200}{3} - \frac{1}{3}y\right)y\right)}{\partial y} = 0$$

$$\frac{200}{3} - \frac{2y}{3} = 0$$

$$\frac{200}{3} = \frac{2y}{3}$$

$$100 = y$$

Optimal amount of tickets to sell is 100. Plugging this into the inverse demand function gives the most I can charge to sell 100 tickets:

$$p = \frac{200}{3} - \frac{1}{3}(100)$$

$$p = \frac{100}{3} = 33.3333$$

$$\pi(y) = \frac{100}{3}100 = 3333.33$$

1.3.1 Price Discrimination: What to charge students?

Let's figure the most that the firm can earn from students if it sells y_s student tickets and charges them a price p_s.

$$y_s = 100 - 2p$$

Inverse demand:

$$p = 50 - \frac{1}{2}y_s$$

Profit from students:

$$\pi(y_s) = \left(50 - \frac{1}{2}y_s\right)y_s$$

Maximize this:

$$\frac{\partial\left(\left(50 - \frac{1}{2}y_s\right)y_s\right)}{\partial y_s} = 50 - y_s$$

$$50 - y_s = 0$$

$$y_s = 50$$

Plug this into the inverse demand for students to get the price we can charge them:

$$p_s = \left(50 - \frac{1}{2}(50)\right) = 25$$

$$\pi_s = 1250$$

1.3.2 Non-student market:

Demand:

$$y_n = 100 - p$$

Inverse demand

$$p = 100 - y_n$$

Profit:

$$(100 - y_n)\, y_n$$

$$\frac{\partial\left((100 - y_n)\, y_n\right)}{\partial y_n} \quad = \quad 100 - 2y_n$$

$$100 - 2y_n = 0$$

$$100 = 2y_n$$

$$y_n = 50$$

To get the price, plug this into the non-student inverse demand:

$$p = 100 - 50 = 50$$

$$\pi_n = 50 * 50 = 2500$$

Total profit from both groups:

$$2500 + 1250 = 3750$$

The additional profit from price discrimination is:

$$416.667$$