Competitive Price Discrimination

Basic third degree model:

- Two firms $i \in \{1,2\}$
- Two markets $j \in \{1,2\}$
- Competition on a line : $\theta \sim U[0,1]$
  - $u(\theta) = \begin{cases} v - t_j\theta - p_1 & \text{if buy from 1} \\ v - t_j(1-\theta) - p_2 & \text{if buy from 2} \end{cases}$
- Obviously, $p_{ij}^* = c + t_j$
- Effects of banning discrimination

1] Usually high types helped, low types hurt
   - high - less willing to switch firms

2] Misallocation of goods is eliminated
   - This is not exhibited in this model, but it would be if the market was not covered or if individuals could buy more than one unit.

3] Welfare is ambiguous if output increases with discrimination.

4] will have $p_i^* = c + \frac{2t_1t_2}{t_1+t_2} < c + \frac{t_1+t_2}{2}$

Thisse and Vives (1988)

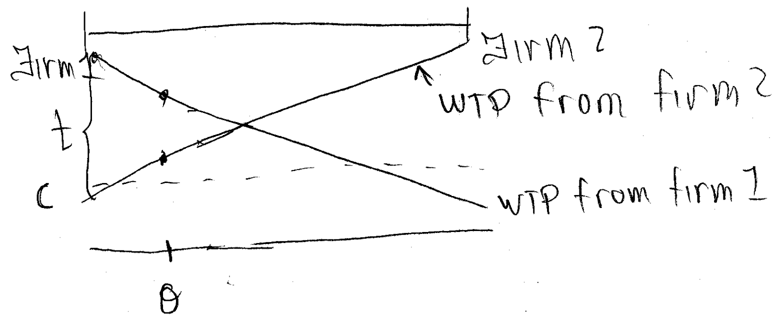
- Price discrimination can help all consumers

Their model

- Competition on a line with two firms

No discrimination: $p^* = c + t$

Discrimination: Suppose firms know θ and can set different prices



equilibrium: $p_1^*(\theta) = \begin{cases} c + t(1-2\theta) & \theta \le \frac{1}{2} \\ c & \theta \ge \frac{1}{2} \end{cases}$

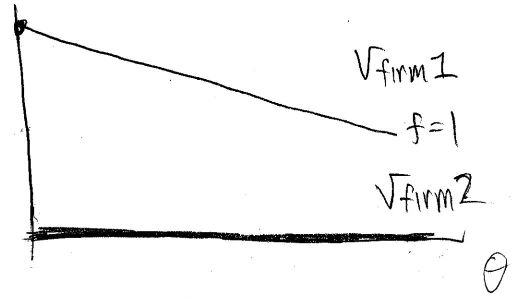
- all consumers are better off
  - average price is $c + t/2$

Corts (1998): shows two things

1. If demand for two firms satisfies symmetry condition, then price discrimination hurts some types and helps others.
   - symmetry condition: firms both charge high price to same group
   - If firms agree on which group is the "high type," then results are similar to monopoly price discrimination
2. In asymmetric case, price discrimination can lower prices to all <u>or</u> raise prices to all.

eg: Raise prices

- Two dimensional type space:
  $(\theta, f) \in [0,1] \times \{1,2\}$
  firm preferences



- ie $u(\theta,1) = \begin{cases} v-\theta-p_1 & \text{if buy 1} \\ -p_2 & \text{if buy 2} \end{cases}$
- With discrimination, $p_1^*(\theta, f) = v-\theta$ if $f=1$
  $p_2^*(\theta, f) = v-\theta$ if $f=2$
- Without discrimination: $p_1^* = v-1$ if v is sufficiently large.
  $p_2^* = v-1$
- Here price discrimination raises both prices

Competitive 2nd degree

- competition on two lines: can't observe which line consumer is on
- line L: $t_L(v-\theta) - p_1(v)$
  $t_L(v-(1-\theta)) - p_2(v)$
- line H: $t_H(v-\theta) - p_1(v)$
  $t_H(v-(1-\theta)) - p_2(v)$

Note: t_L, t_H multiply v as well as θ.

$\theta \sim U[0,1]$

- Suppose firms can produce quality v at cost c and quality $v+w$ at cost c
  - This "damaged good" assumption simplifies the algebra.

<u>Prop</u>: Suppose $\frac{t_H}{t_L} \in (3.2, 10)$, $\underbrace{w t_H > t_H}_{\text{H don't want to buy L}} - \underbrace{t_L > w t_L}_{\text{L don't want to buy H}}$

and $w < \bar{w} = \frac{2(t_L + t_H)}{\sqrt{t_L t_H}} - 4$. Then

a) NE of the model is

- $p_i^*(v) = c + t_L$
- $p_i^*(v+w) = c + t_H$
- Type L consumers buy v
- Type H consumers buy v+w

<u>Sketch of proof</u>: If sell v on L line, v+w on H line, then these are the only possible prices.

- Need to check $\boxed{1}$ IC constraint.

  $\boxed{2}$ Non-local deviations. (don't want to sell H to everyone.)

b) For some of the same parameter values, the model also has a NE with

- $p_i^*(v+w) = c + \frac{2 t_L t_H}{t_L + t_H}$
- $p_i^*(v) \geq c + \frac{2 t_L t_H}{t_L + t_H} - w t_L$
- all consumers buy v+w.

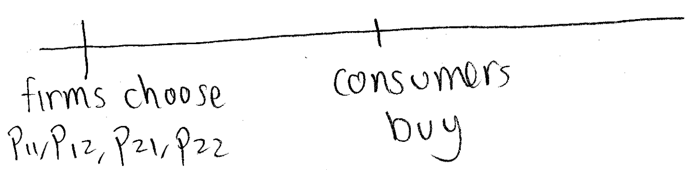
Comment: [1] Some complementarity price discrimination.

- If others are price discriminating, it can be a best response for me to price discriminate.

Loss Leaders

Suppose firms sell two distinct products to the same consumers: p_{ij} = price of good j at firm i.

- $$\begin{cases} v_1 + v_2 - t\theta - (p_{11} + p_{12}) & \text{if buy from 1} \\ v_1 + v_2 - t(1-\theta) - (p_{21} + p_{22}) & \text{if buy from 2} \\ v_1 + v_2 - t(\theta + (1-\theta)) - (p_{11} + p_{22}) & \text{if buy from } \underbrace{1}_{\text{good 1}} \text{ and } \underbrace{2}_{\text{good 2}} \end{cases}$$

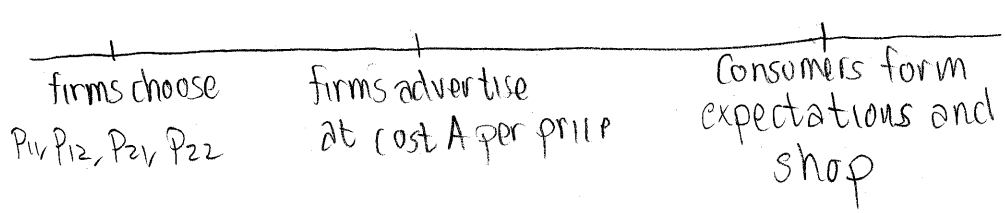


$\Rightarrow$ prices are indeterminate: only $p_{i1} + p_{i2}$ is determined.

- here, $p_{i1}^* + p_{i2}^* = c_1 + c_2 + t$

"Why does turkey go on sale on Thanksgiving?"

Consider alternate game:



Observations

$\exists$ Equilibrium is $p_{11}^* = c_1 + c_2 + t - v_2$ with good 1 advertised

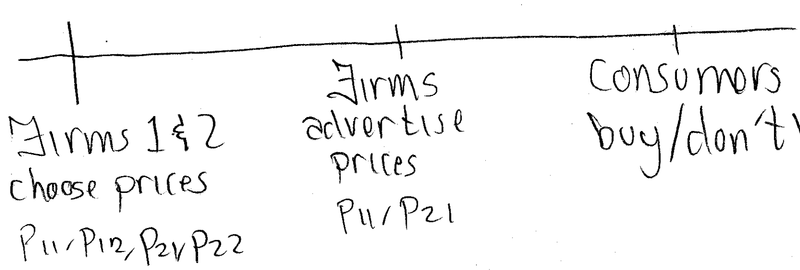
$$p_{12}^* = v_2$$

- Chevalier, Kashyap, Rossi - if $\exists$ good loss leader, other prices go up.

add-On Charges

- Hotel long-distance charges
- High price of renting a car seat
- Why don't firms precommit to not charging these high add-on charges? (If not for advertising costs.)

Competition on two lines



Good 1: v
Good 2: w
Good 1 + Good 2 = $v + w$
= High quality good

Prop: Suppose $\frac{t_H}{t_L} \in [3.2, 10]$, $w \in (\underline{w}, \overline{w})$ as before. Then $\exists$ a sequential equilibrium of this game is

- $p_{i1}^* = c + \bar{t} - \frac{w\bar{t}}{2}$, $\bar{t} = \frac{2t_1t_2}{t_1+t_2}$
- $p_{i2}^* = w/t_H$
- Line L buys good 1
- Line H buys goods 1 and 2

2] Profits are higher than in either of the other equilibria we discussed previously.

Intuition:

1] Use of loss leaders / add-ons creates an adverse selection problem.
- If you have a sale, you attract cheap-skates. (adverse selection problem)
- reduced incentive to cut prices

Ellison 2005

Lars Stole (2005?) - survey of price discrimination
- sort of miss the point at times:

$t_1 v - t_2 \theta - p$

- simplifying assumption eliminates the effects of vertical differentiation.

Next class: Theory of dynamic competition

- Read the Porter paper