

## Asymmetric Information and Advertising

Industrial Organization

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### Limited Information about Price Tourists and Natives

- An Explanation for Price Dispersion
  - All firms have identical costs
  - Two types of consumers with different search costs: tourists and natives
  - Natives are informed consumers with zero search costs
  - Tourists are uninformed consumers who have search costs of  $c$ .
  - Natives buy only at low price stores.

- $\alpha L$  consumers are informed and  $(1-\alpha)L$  consumers are uninformed.
- Each consumer buys 1 unit of the good as long as the price is no higher than  $p^u$
- There are  $n$  firms
- Suppose all firms set the same price  $p^c$  (= to average cost) and they equally share sales
  - Each firm sells  $q^c = L/n$  units of output
  - If a firm raises its price to just above  $p^c$  it sells  $(1-\alpha)q^c$  units.

### Informed and Uninformed Customers

- If  $p > p^u$  then zero sales
- If  $p^c < p \leq p^u$  then it sells  $(1-\alpha)q^c$  units
- If  $p = p^c$  then it sells  $q^c$  units
- The one-price equilibrium can be broken if and only if its revenues at the higher price but lower volume, exceed its costs at the lower volume – note that at price  $p = p^c$  zero profits are made.
- So, there needs to be enough uninformed customers!

### Few informed customers

- If the firm can raise its price without losing many customers, then a two-price equilibrium can exist.
  - Implicitly define  $q^a$  as the level of output such that  $AC(q^a) = p^u$ .
  - Then, it pays for a firm to deviate if  $(1-\alpha)q^c > q^a$  or  $\alpha < 1 - q^a/q^c$

### Notes

- There cannot be an equilibrium in which everyone charges above  $p^c$  because a firm could deviate and gain all of the informed customers.
- Likewise, there can only be a two-price equilibrium, not a 3-price equilibrium – the firm charging the middle price would always make less than if it charged the high price.
- If there is a two-price equilibrium, the low-price firms charge  $p^c$  and the high price firms charge  $p^u$ .

### Telser (1964)

- “Hardly any business practice causes economists greater uneasiness than advertising. Among the many reasons for this feeling is the opinion held by some economists that competition and advertising are incompatible.”

### Nelson (1974)

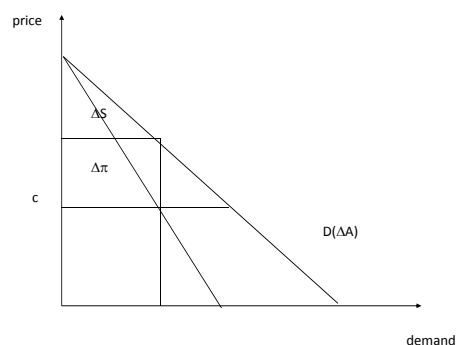
- Experience goods: can only know by consuming
- Search goods: can know from pre-purchase information
- Persuasive advertising changes people’s tastes
- Informative advertising tells customers that the good exists

### Advertising and Welfare

- Two views of advertising: advertising informs and improves welfare or advertising persuades and reduces welfare.

### Informing about the existence of a product

- Suppose monopolist with price  $p$  and cost  $c$  and marginal demand  $D$  (additional demand the advertising creates)
- Advertising cost is  $A$
- Then advertising creates a social surplus  $\Delta S$
- With extra profit  $\Delta \pi$  gross social benefit is  $\Delta S + \Delta \pi$
- Firm sets  $\Delta A = \Delta \pi$  for profit maximization
- So net gain is  $\Delta S$  (a positive externality on consumers)
- Implies socially too little advertising



- Business stealing effects
- Appropriability effects
- Butters Model (well-known, but we aren't going to do)– Optimal amount of advertising

#### Another View of Advertising

Welfare change is

$$\Delta W = \Delta \pi - q_1 \Delta p - \Delta A$$

At the margin a profit maximizing monopolist sets increase in profit equal to increase in cost

$$\Delta \pi = \Delta A$$

Therefore,

$$\Delta W = -q_1 \Delta p$$

which is negative

- If advertising increases prices there is at the margin in equilibrium an unequivocal welfare loss: socially too much advertising
- Oligopoly: Dropping the assumption of monopoly increases the incentive to advertise to steal business from rival firms. The private gain to advertising increases but the social gain is unchanged leading to an even greater social excess of advertising.

#### Advertising and the Price and Quality of Optometric Services (Kwoka, AER, 1984)

- Advertising of optometric services permitted in some US cities, not in other
- Trained observers with similar eye conditions made 147 visits to optometrists in these cities.
- In cities where advertising permitted, distinguished suppliers with
  - (NONE): no advertising
  - Suppliers with prominent displays (STORE)
  - (SMALL) small advertisers
  - (LARGE) large advertisers, e.g. chains

- Optometrists in advertising cities had lower prices, the discount being larger the more the supplier advertised
- STORE, SMALL, and LARGE supplied slightly lower quality (as measured by time spent on the examination) on average, but not statistically significant
- NONE supplied very significantly higher quality (to compete with their low price advertising rivals in the market).
- Study suggests advertising increases elasticity of demand

## 2: Advertising

- Dorfman-Steiner condition: A monopoly's profit maximizing advertising and price levels should be set so that the ratio of advertising expenditure to revenue equals the (absolute value of the) ratio of the advertising elasticity to price elasticity. Formally,

$$\frac{A^M}{R^M} = \frac{A^M}{P^M Q^M} = \left| \frac{\varepsilon_A}{\varepsilon_p} \right|$$

- Advertising will be great in a market with low demand elasticity.
  - Advertising will be more intense the greater the market power
  - Does not mean that advertising creates market power
- Unless there is a change in demand that alters the ratio of the two elasticities, A/R ratio will be constant.

## Proof Methodology

- Write down general definition of price and advertising elasticity
- Maximize profits with respect to price and profits with respect to advertising
- Put both FOC in terms of price-cost mark-up and substitute in advertising quantities where appropriate
- Equate and then rearrange

Proof :

$$Q(A, p) = \beta A^{\varepsilon_A} p^{\varepsilon_p}, \text{ where } \beta > 0, 0 < \varepsilon_A < 1, \text{ and } \varepsilon_p < -1$$

$$\varepsilon_A = \frac{\partial Q(A, p)}{\partial A} \frac{A}{Q} \text{ and } \varepsilon_p = \frac{\partial Q(A, p)}{\partial P} \frac{P}{Q}$$

$$\pi = pQ - cQ - A = \beta A^{\varepsilon_A} p^{\varepsilon_p + 1} - c \beta A^{\varepsilon_A} p^{\varepsilon_p} - A$$

$$FOC(P) = 0 = \frac{\partial \pi(A, p)}{\partial p} = \beta A^{\varepsilon_A} (\varepsilon_p + 1) p^{\varepsilon_p} - c \beta A^{\varepsilon_A} \varepsilon_p p^{\varepsilon_p - 1}$$

$$p^M = \frac{\varepsilon_p}{\varepsilon_p + 1} c \rightarrow \frac{p^M - c}{p^M} = \frac{-1}{\varepsilon_p}$$

$$FOC(A) : 0 = \frac{\partial \pi(A, p)}{\partial A} = \beta \varepsilon_A A^{\varepsilon_A - 1} p^{\varepsilon_p} (p - c) - 1$$

$$\frac{p^M - c}{p^M} = \frac{1}{\beta \varepsilon_A A^{\varepsilon_A - 1} p^{\varepsilon_p + 1}}$$

EQUATE and REARRANGE!

## Advertising as a Signal of Quality (Klein and Leffler 1981)

New experience good of uncertain quality to consumers: could be high quality h, or low quality l

Average costs are  $AC_l$  and  $AC_h$  where  $AC_l < AC_h$

The low quality good is competitive so that  $p_l = AC_l$

Once a firm has cheated this is known to all consumers and will never again be able to charge  $p > p_l$

If price  $p_h = AC_h$ , then  $\pi_h = 0$  and the payoff to cheating is  $p_h q - AC_l(q) > 0$

Consumers, knowing this, will not pay  $p_h$  for the good (The Lemons problem)

There may, however, be a price higher than the perfectly competitive price of high quality output if this would

- 1) motivate honest production of the higher quality good
- 2) not completely dissipate consumers' surplus

If price  $p_h > AC_h$  a stream of profits is made from selling h, the present value of which may exceed the one-off gain from cheating.

Firms cannot signal by price what sort of firm they are, can they signal in another way?

These problems avoided if firm makes sunk expenditures on advertising increasing costs to  $AC_0$

Competition will ensure that firms advertise to the extent that sunk costs equal the capital value of the premium rental stream when high quality is supplied at the quality-assuring price.

Costs are sunk as cheating would make brand worthless and therefore advertising costs are not recoverable

The advertising need not convey any information, except that it was costly

## Conclusion

- Economists have clearly thought a lot about advertising, but do they understand it?