# Chapter 3 Advertising

- Persuasive Advertising
- Informative Advertising
- Targeted Advertising

# Persuasive Advertising

- Persuasive advertising: advertising that boosts the industry demand for the advertising product(s)
- Consider a monopoly firm selling a single product in a market where the curve is given by

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

$$\eta_A=\frac{\partial Q(A,p)}{\partial A}\frac{A}{Q}=\varepsilon_A \qquad \eta_p=\frac{\partial Q(A,p)}{\partial p}\frac{p}{Q}=\varepsilon_p$$

advertising elasticity price elasticity

# Persuasive Advertising (cont')

- The monopoly has two choice variable: the price ($p$) and the advertising expenditure ($A$)

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

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

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

$$\Rightarrow \quad \frac{A^M}{p^M Q^M}=\frac{\varepsilon_A}{-\varepsilon_p}$$

# Persuasive Advertising (cont')

- Example $\beta=64, \varepsilon_A=0.5, \varepsilon_p=-2, c=1$

$$Q=64\sqrt{A}p^{-2}; p=\frac{8A^{1/4}}{Q^{1/2}}$$

The monopoly's decision

$$\max_{A,p}\pi(A,p)=pQ-1Q-A=64A^{1/2}p^{-1}-64\beta A^{1/2}p^{-2}-A$$

$$\frac{\partial\pi(A,p)}{\partial p}=\frac{-64\sqrt{A}}{p^2}+\frac{128\sqrt{A}}{p^3}=0$$

$$\frac{\partial\pi(A,p)}{\partial A}=\frac{64}{2\sqrt{A}p}-\frac{64}{2\sqrt{A}p^2}-1=0 \qquad \frac{A^M}{p^M Q^M}=\frac{\varepsilon_A}{-\varepsilon_p}$$

$$\Rightarrow \quad p^M=2; A^M=64; Q^M=16\sqrt{A}=128$$

# Persuasive Advertising (cont')

- Socially optimal advertising level ($p^M$ =2)

$$CS(A)=\int_0^{16\sqrt{A}}\frac{8A^{1/4}}{Q^{1/2}}dQ-2\times16\sqrt{A}=32\sqrt{A}$$

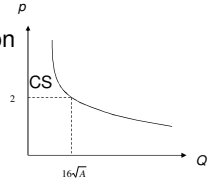
$$\pi(A,2)=16\sqrt{A}-A$$

- The social planner 's decision

$$\max_A W(A)=CS(A)+\pi(a,2)=48\sqrt{A}-A$$

FOC $\quad \frac{\partial W(A)}{\partial A}=\frac{24}{\sqrt{A}}-1=0$

$$\Rightarrow \quad A^*=24^2>A^M=64$$




Given a monopoly market structure, the equilibrium advertising level is below socially optimal level

# Informative Advertising

- Let *p* be the price of the product
- Let *m* denote the consumer's benefit from purchasing one unit of the product
- The consumer is given by

$$u=\begin{cases} m-p & \text{if he purchases the product} \\ 0 & \text{if does not purchase} \end{cases}$$

- There are two firms producing the same product. The cost of advertising is given by a constant denoted by *A*
- If the customer receives no ad, he buy none. If he receives two ads, he splits the transaction equally between the firms
- Profit of firm *i* is given by

$$\pi_i=\begin{cases} p-A & \text{if only firm } i\text{'s ad is received} \\ \frac{p}{2}-A & \text{if both firms's ads are received} \\ -A & \text{if firm } i \text{ sends an ad, but ad is not received} \\ 0 & \text{if firm i does not advertise} \end{cases}$$

# Informative Advertising (cont')

- Let δ be the probability that a message would be received
- The expected profit of firm *i* is given by

$$\pi_i = \begin{cases} \delta(1-\delta)(p-A) + \delta^2\left(\frac{p}{2} - A\right) - (1-\delta)A & \text{both advertise} \\ \delta(p-A) - (1-\delta)A & \text{only i advertises} \\ 0 & \text{i does not} \end{cases}$$

- At least one firm will engage in advertising if and only if

$$\frac{p}{A} \geq \frac{1}{\delta}$$

- Two firms will engage in advertising if

$$\frac{p}{A} \geq \frac{2}{\delta(2-\delta)}$$




# Informative Advertising (cont')

- The expected welfare is given by

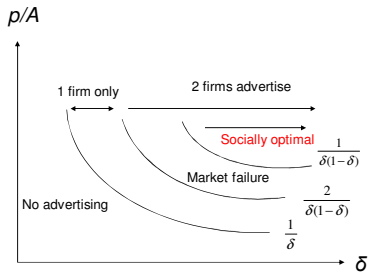
$$E(W) = \begin{cases} \delta(2-\delta)m - 2A & \text{both advertise} \\ \delta m - A & \text{only one advertises} \\ 0 & \text{both do not advertise} \end{cases}$$

⇨ Too many firms engage in advertising from a social welfare point of view when

$$\frac{2}{\delta(2-\delta)} < \frac{p}{A} < \frac{1}{\delta(1-\delta)}$$




# Informative Advertising (cont')







# Targeted Advertising

- There are two types of buyers
  - *N* consumers, who are first time buyers that we call inexperienced consumers.
  - *E* consumer, who purchased the product before and whom we call experienced consumers
  - The group of experienced consumers is divided into two subgroups. Letθ be the fraction of brand 1-oriened consumers . (1- θ) is the fraction of brand 2-oriented consumers




# Targeted Advertising (cont')

- There are two advertising methods: A firm can use persuasive advertising *P*, or informative advertising *I*
  - Persuasive advertising attracts only inexperienced consumers
  - Informative advertising attracts only the experienced consumers who are oriented toward the advertised brand




# Targeted Advertising (cont')

| *N* inexperienced consumers |
|---|
| θ*E* experienced Brand 1 -oriented |
| 1-θ*E* experienced Brand 2 -oriented |

| | (*P*,*P*) | (*P*,*I*) | (*I*,*P*) | (*I*,*I*) |
|---|---|---|---|---|
| $\pi^1$ | *N*/2 | *N* | θ*E* | θ*E* |
| $\pi^2$ | *N*/2 | (*1*-θ)*E* | *N* | (*1*-θ)*E* |
| $\pi^1 + \pi^2$ | *N* | *N*+(1- θ)*E* | θ*E* +*N* | *E* |

## Targeted Advertising (cont')

| Nash equilibrium | Condition (both won't deviate unilaterally) |
|---|---|
| (*P*,*P*) | $N/2 > \theta E$ AND $1-\theta < N/(2E)$ |
| (*I*,*I*) | $\theta E > N$ AND $1-\theta > N/E$ |
| (*P*,*I*) | $N > \theta E$ AND $(1-\theta)E > N/2$ |
| (*I*,*P*) | $\theta E > N/2$ AND $N > (1-\theta)E$ |




## Targeted Advertising (cont')

| Nash equilibrium | Condition |
|---|---|
| (*P*,*P*) | $1-\frac{N}{2E} < \theta < \frac{N}{2E}$ |
| (*I*,*I*) | $\frac{N}{E} < \theta < 1-\frac{N}{E}$ |
| (*P*,*I*) | $\theta < \min\{\frac{N}{E}; 1-\frac{N}{2E}\}$ |
| (*I*,*P*) | $\theta > \max\{\frac{N}{2E}; 1-\frac{N}{E}\}$ |