# Advertising

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# Outline

Many of our greatest talents have worked or been used in advertising



from Picasso and Dali

To this —

# Introduction

- We spend (or create) 2-3% of GDP in advertising, in most developed countries, with the advertising expenditures to sales ratio varying from 0 to nearly approximately 15% across industries.
    - Microsoft spends almost $11 billion, Coca Cola more than 2 billion
    - Apple is famous for (because of?) its ads
- Controversial: Is advertising wasteful or productive?
- Should all marketing people be exiled to an alien planet?
    - as the Golgafrinchans did with insurance salesmen, personnel officers, security guards, management consultants and telephone sanitizers? (D. Adams, Hitch Hiker's Guide To The Galaxy)
- How to analyze advertising? Are our models of the perfectly informed consumer misleading?

# Main questions about advertising

There are three main questions regarding advertising that preoccupy economists:

1. What is the mechanism through which advertising influences consumers' choices?
2. Is adverting good for welfare or is it wasteful?
3. What is the relationship between market structure and advertising?

# How does advertising work?

Two basic views:

1. Persuasive advertising: Changing preferences, no new information.
2. Informative advertising: Provides information and signals quality

- Generally accepted that both types of advertising are empirically important.

# Persuasive advertising

- Basic view: Advertising changes consumers' preference orderings.
- Problems: Consumer sovereignty breaks down.

# Welfare effects of persuasive advertising

- If persuasive advertising changes preferences, which preferences should we use to evaluate the effect of advertising on a consumer's welfare?
  - If you convince a Pavarotti-hating heavy-metal-fanatic to go to the opera and in the end he likes it, does his utility rise?

- Dixit and Norman (1978) argue: use pre- *and* post-advertising preferences: if both preferences indicate the same effect on welfare, then the answer is unambiguous.

- How can advertising be good for welfare when judged using pre-advertising preferences?
  - advertising will occur when there is an element of monopoly power.
  - monopoly power is associated with a "too low output"
  - advertising can then expand the output in the industry and welfare loss associated with monopoly.

- Dixit and Norman consider monopoly, oligopoly (and monopolistic competition); common to these models are that output is initially inefficiently low.
- Dixit and Norman show, however, that profit maximization leads to an *excessive level* of advertising even when measured with post-advertising preferences. Why?
- The firms maximize profits and do not take into account the fact that the consumer end up paying a higher price to cover the cost of the advertising: a small decrease in advertising from the profit maximizing level would benefit the consumer more than it would hurt the firms.

- Consider the monopoly case here
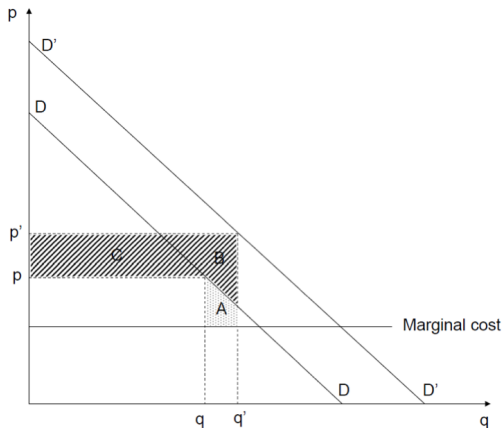


- In Fig 1, *DD* represents initial demand (pre-advertising preferences) while $D'D'$ represents demand after some advertising has taken place (post-advertising preferences)

- Assume that the profit maximizing level of advertising increases both price and output level. Reasonable assumption since empirically, advertising associated with demand being inelastic (see below).
- Consider the impact on welfare and profits using the pre-advertising profits.
  - Increase in welfare due to increase in output. Area A
  - Increase in profits due to increase in output and price: Area A+B+C
- Thus, the private value of advertising (to the firm) exceeds the social value.
- In equilibrium, the level of advertising is chosen to maximize the profits (i.e. the private value); hence in equilibrium, there is excessive advertising.
- We will consider the analysis using post-advertising preferences in a seminar.

## CONCLUSION

Dixit and Norman conclude that *some positive level* of persuasive advertising can be good for welfare in so far as it expands the output in industries characterized by monopoly power and otherwise too low outputs. However, persuasive advertising is likely to be excessive since the firms do not take into account the negative effect of a higher price on the welfare of the consumers.

- Policy recommendation? Restrict persuasive advertising, but not abolish.
- Analysis has been criticized on grounds of ignoring the intrinsic/information value of advertising.

# Advertising and demand elasticity: the Dorfman-Steiner argument

- Central empirical observation: advertising associated with demand being inelastic.
- What is the direction of causality: did advertising make demand inelastic or is advertising higher when demand is inelastic?
- Dorfman and Steiner (1954) argue for the latter.
- Consider the choice of level of advertising by a monopolist. Let demand be

$$q(p, A) \tag{1}$$

where $A$ is expenditures on advertising. Naturally: $\partial q / \partial p < 0$, $\partial q / \partial A > 0$.

- Profit maximization

$$\max_{p,A} \{pq(p,A) - cq - A\} \quad (2)$$

where $c$ is the marginal cost (Nb. assumption of constant marginal cost is not critical)

- First order conditions

$$q + \frac{\partial q}{\partial p}(p - c) = 0, \quad (3)$$

$$\frac{\partial q}{\partial A}(p - c) = 1 \quad (4)$$

- Extending and rearranging (3), yields

$$\frac{p - c}{p} = -\frac{q}{p}\frac{\partial p}{\partial q} = -\frac{1}{\varepsilon_p}. \quad (5)$$

The left hand side is the price-cost margin or the Lerner index (of market power), $\varepsilon_p = \frac{\partial q}{\partial p}\frac{p}{q}$ is the demand elasticity (with respect to price).

- This is a standard rule for a monopoly pricing: the Lerner index is inversely related to the demand elasticity.
- Rearrange (4) and multiply with $p$:

$$p\frac{\partial q}{\partial A} = \frac{p}{(p-c)}, \tag{6}$$

extend by multiplying by $A/(pq)$

$$\frac{\partial q}{\partial A}\frac{A}{q} = \frac{p}{(p-c)}\frac{A}{pq} \tag{7}$$

define $\varepsilon_A = \frac{\partial q}{\partial A}\frac{A}{q}$ as the advertising elasticity of demand.

- Then combine with the monopoly pricing rule (5) to obtain

$$\frac{\varepsilon_A}{-\varepsilon_P} = \frac{A}{pQ} \tag{8}$$

- This is known as the Dorfman-Steiner (1954) condition.

## CLAIM

The monopoly's profit maximizing price and advertising level is such that the ratio of advertising expenditures to revenue equals the ratio of the advertising elasticity and the price elasticity.

## CONCLUSION

the *greater* the consumers responsiveness to advertising and the *lower* the responsiveness to price, the *larger* will be the optimal level of advertising relative to sales.

- Makes sense: in the end, profits to the firm obtain from the price exceeding the marginal cost!

## RELEVANCE

The Steiner-Dorfman condition predicts a negative association between price-sensitivity and the level of advertising. However, it was *not* advertising that made demand inelastic! It was the fact that demand was inelastic that made advertising relatively profitable.

# Informative Advertising

- Some advertising is directly informative (price, location etc).
- However, much (most?) adverts are seemingly uninformative.

## QUESTION

Can seemingly uninformative brand-image-building advertising nevertheless be informative?

- Nelson (1970) distinguishes between: (i) *search goods*, and (ii) *experience goods*.

*Search goods are goods whose quality and other characteristics can be evaluated prior to the purchase.*

*Experience goods are goods whose quality and other characteristics can only be evaluated after the purchase.*

**EVIDENCE**: A general pattern:

| Type of Good | Type of Adv. | Amount of Adv. |
|:---:|:---:|:---:|
| Search | more informative | less |
| Experience | less informative | more |

- Search goods: False/vague claims about search goods can easily be detected.
- Experience goods: Three times higher level of advertising as measured by the advertising/sales ratio.

### QUESTION (restated)

Can seemingly uninformative advertising of experience goods have an indirect information value?

- Nelson: Advertising of experience goods can be *informative about quality*.
- Logic of the argument (signalling model):
    - Two time periods: $t = 0$ (present) and $t = 1$ (future).
    - Two firms launch similar products: firm 1 produces a high quality good, firm 2 a low quality good.
    - Consumers do not know initially the qualities of the products: can only learn the quality of a product by buying it.
    - Firm 1 launches its product together with an expensive advertising campaign; firm 2 doesn't.
    - The ad campaign is interpreted as a signal/message: "Our product is high quality; we can afford to spend this much on advertising. Consumers should rationally believe that our product has high quality and buy it; they will not be disappointed and will want to buy again in the future."

- Is signalling of this type a credible message? Why doesn't the low-quality firm also spend as much on advertising? Are consumers behaving rationally if they equate costly advertising with quality?
- The answer is yes, under some conditions: The return to capturing a first-time buyer is higher for the high-quality firm due to the higher probability of a repeat purchase.
- Implies that there will exist some level of advertising that only a high quality firm will find it profitable to undertake.
- There will be some extra slides on signalling models and the game will be solved formally in the Seminar

## CONCLUSION

In equilibrium, the level of advertising reveals the product quality to the consumers. Hence even if the advert itself is seemingly uninformative, it can be indirectly informative about quality.

## COROLLARY

The equilibrium with advertising may welfare dominate the outcome in the absence of advertising. E.g. without the possibility of signalling high quality, the high quality product may not be profitable.

- If consumers think all cars are as good as BMWs, then why should BMW still produce good cars?
- More favourable view on advertising: improves the consumers' choices.

## EVIDENCE

Correlation between advertising and quality not overly strong.

# Advertising and market concentration

- Should we expect to see more or less advertising in concentrated industries?
- Do you expect a lot of advertising in the oil or steel industry?
- Discussion here follows Cabral Ch. 13.
- Answer is based on the Dorfman-Steiner formula. Recall: A firm's advertising intensity is high when:

  1. Advertising elasticity of demand is high, and
  2. Price elasticity of demand is low (or the greater is the price-cost margin)

### QUESTION

How do the firm's advertising and price elasticities vary with the market structure?

- Consider first the relation between market structure and **price elasticity** of demand: The greater the no. of firms, the greater the price sensitivity for the individual firm.
  - By lowering its price, the firm boosts total demand as well as its market share.
  - From point 1 above, follows we expect less advertising in fragmented industries due to high price sensitivity.

- Consider next the relation between market structure and **advertising elasticity** of demand. Two extreme cases:

  1. Advertising as an industry **public good**: advertising by any one firm increases the demand for all firms equally (a homogenous good).

     - In this case: **advertising elasticity** decreases when there are more firms due to spillover effect.

  2. Advertising purely as **market share shifter**: advertising by one firm does not increase total demand, but shifts demand towards the advertising firm.

     - In this case: **advertising elasticity** increases when there are more firms
     - The intuition is that with more competitors, your ads will steal demand from more firms. On the contrary if there is a monopoly the market share shifting effect is zero; there is noone to steal clients from.

- Put the effects together:
    - Expect more advertising in concentrated industries (few firms) due to low price elasticity and large public good effect.
    - Expect less advertising in concentrated industries due to market share shifter effect.

## CONCLUSION

Overall ambiguous relationship between market structure and advertising intensity.

- What is the empirical evidence?
- Ambiguous as well: Advertising intensity appears highest in intermediate concentrated industries.

- So what about the steel industry?
    - (a) not much advertising (very low ad elasticity) and (b) probably fewer ads when there are less firms (cause market share effect much larger than public good effect and price elasticity relatively independent of concentration)
- What industry is the opposite of steel?
- Possibly advanced consumer electronics.
    - Ad elasticity is high (Steve Jobs said he is creating products people were not even aware they need)
    - Public good effect probably quite large. The iPad created a whole industry.

# Advertising and Price Competition

- The previous analysis considered how market structure ("competitiveness") affected advertising incentives.
- We will now consider the opposite direction of causality: how advertising can affect the degree of competitiveness.

### INSIGHT

Advertising can increase product differentiation and soften price competition.

- Example (from Cabral):
  - Two firms $j = 1, 2$.
  - Differentiated goods: Goods at $\theta_1$ and $\theta_2$ in a "linear city".
  - Initially consumers are unaware of the difference in the products – consider both as "identical".
  - By advertising the firms can make the consumers aware of the differences.
  - Impact of advertising: transforms the pricing game from Bertrand game (with seemingly homogenous goods) to a Hotelling game (with differentiated goods).
  - Recall: Bertrand – fierce price competition ($p = MC$), Hotelling – soft price competition ($p > MC$).

- In the previous example the products were in fact differentiated and advertising was genuinely informative.
- Needn't be the case: Firms can advertise in order to appear to have a superior product when in actual fact the products are identical.
- *Spurious product differentiation* may be common.

### EXAMPLE

Nutrasweet is aspartame (generic product); yet heavily advertised to create subjective sense of differentiation. Other examples: cigarettes, drugs, etc.

- This observation underlies the view that advertising is wasteful and anti-competitive.

# What to remember from this lecture

- Persuasive advertising (changing preferences) - Informative advertising (provides information and signals quality)
- Welfare effect of persuasive advertising (Dixit-Norman argument).
- Search goods and experience goods. That advertising can serve as a quality signal (the Nelson-argument)
- That advertising can soften price competition by inducing (actual or spurious) product differentiation.
- Dorfman-Steiner argument: Advertising intensity high when advertising elasticity high and price elasticity low.
- The link between market structure and advertising intensity.