“Comparative versus Informative Advertising in Oligopolistic Markets”

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3rd Workshop on the Economics of Advertising and Marketing at
IESE Business School, Barcelona 2010
Presentation Outline

• Introduction
  ■ Motivation/Purpose of the research

• The Model
  ■ Assumptions
  ■ Timing of the game

• Equilibrium Analysis

• Comparative Results

• Further Research

• Conclusions
I. Introduction
Definitions

**Informative advertising:**
“The type of advertising that aims to transmit direct information such as price, location and attributes or indirect information such as quality, to consumers”.

*(Bagwell, 2005)*

**Comparative advertising:**
“A form of advertising, that compares rival brands on objectively measurable attributes or price, and identifies the rival brand by name, illustration or other distinctive information”.

I. Introduction
Stylized Facts

Comparative advertising has received large publicity in the recent years.

✓ Muehling et al. (1990) suggested that:
In the U.S market, almost the 40% of all the advertising campaigns are comparative.

However, the empirical evidence about the effectiveness of comparative advertising is still controversial.

✓ Comparative advertising enhances consumers’ mistrust and leads to misidentification of the sponsoring brand.
[eg. Goodwin & Etgar (1980), Prasad (1976), Wilkie & Farris (1975)]

✓ Comparative ads tent to be more effective than non comparative ads.
[eg. Grewal et al. (1997), Jung and Sharon (2002)]
There exists a small body of theoretical literature on comparative advertising

**Aluf & Shy (2001)** suggested that:

- Comparative advertising weakens price competition and leads to higher prices and profits.

**Anderson & Renault (2009)** showed that:

- When the products are of similar quality, firms have strong incentives to advertise only their own products and comparative advertising plays no role.

- When the products are of sufficiently different quality, only the low quality firm has incentives to use comparative advertising (if it is legal) in order to survive in the market.
I. Introduction

Purpose of the Research

To develop a theoretical model that endogeneizes firms’ strategic advertising choices, in order to investigate:

 ✓ The firms’ incentives to invest in informative and/or in comparative advertising in a horizontally differentiated duopolistic market.

 ✓ The optimal expenditure level on each type of advertising that firms are willing to undertake in order to promote their products.

 ✓ The effects of the firms’ advertising decisions on market outcomes and social welfare.
II. The Basic Model

**Demand side:** A unit mass of homogenous consumers, each having a Häckner-type utility function:

\[
U(q_i, q_j) = (\alpha + \mu_i + \kappa_i - \kappa_j)q_i + (\alpha + \mu_j + \kappa_j - \kappa_i)q_j - \frac{1}{2}[q_i^2 + q_j^2 + 2\gamma q_i q_j]
\]

\(\mu_i \geq 0\), represents firm \(i\)'s **investment level** in Informative advertising.

\(\kappa_i \geq 0\) represents firm \(i\)'s **investment level** in Comparative advertising.

\(q_i\) represents the **quantity** of firm \(i\)'s good bought by the representative consumer.

\(\gamma \in [0,1]\) is the **degree of substitutability** between products.
Maximizing (1) w.r.t. $q_i$, $q_j$ we obtain the system of inverse demand functions:

$$p_i = \alpha + \mu_i + \kappa_i - \kappa_j - q_i - \gamma q_j \quad i, j=1,2, \ i \neq j$$

**Effects of the two alternative types of advertising on demand:**

- Informative advertising provides all the relevant information to consumers in order to identify the product that covers better their needs and thus, it shifts the demand curve outwards.

- Comparative advertising has a dual effect: It increases consumers' valuation for the advertised product, while it decreases consumers' valuation for the targeted product.
II. The Basic Model

Firms’ cost structure:

\[ C_i(.) = cq_i + b(\mu_i^2 + \kappa_i^2) \]

\( c \) denotes the marginal production cost that is given exogenously.

\( b \geq 0 \) represents the effectiveness of the advertising technology. The higher the \( b \) is, the lower is the effectiveness of the advertising technology.

Therefore, firm \( i \)’s profit function is:

\[ \Pi_i = (\alpha + \mu_i + \kappa_i - \kappa_j - q_i - \gamma q_j)q_i - cq_i - b(\mu_i^2 + \kappa_i^2) \]

**Assumption 1** To guarantee existence of interior solutions under all circumstances, we assume that

\[ b > \frac{\gamma^2 + 4\gamma + 8}{(4 - \gamma^2)^2} \]
We consider a two-stage game with observable actions:

- **Stage 1:** Firms decide, independently and simultaneously, upon the type(s) of advertising to launch, as well as the investment level on each type of advertising that they launch.

- **Stage 2:** Firms compete by setting their quantities.

**Solution:** We employ Subgame Perfect Nash Equilibrium.
Proposition 1: In equilibrium, firms’ choose to invest in both Informative and Comparative advertising. The equilibrium investment levels are:

\[
\mu^* = \frac{2(\alpha - c)}{b(2 - \gamma)(2 + \gamma)^2 - 2} > 0 \quad \kappa^* = \frac{2(\alpha - c)(2 + \gamma)}{b(2 - \gamma)(2 + \gamma)^2 - 2} > 0
\]

Intuition: Clearly, firms are willing to undertake both types of advertising in order to increase their demand not only by attracting consumers through the use of informative advertising but also by decreasing the rival’s demand through the comparison.

Note that the optimal investment mix, \( \mu^*/\kappa^* = 2/(2 + \gamma) \)
is decreasing in the degree of product substitutability \( \gamma \) and is independent of the effectiveness of the advertising technology.
IV. Equilibrium Analysis.

Further, from the above we observe that:

\[
\frac{\partial \mu^*}{\partial \gamma} < 0 \text{ if and only if } \gamma \in [0,0.66]
\]

\[
\frac{\partial \kappa^*}{\partial \gamma} > 0 , \quad \frac{\partial \kappa^*}{\partial b} < 0 , \quad \frac{\partial \mu^*}{\partial b} < 0 \quad \forall \gamma
\]

Lemma 1:

i. The equilibrium investment in informative advertising is non-monotonic in the degree of product substitutability. It is decreasing (increasing) in the degree of product substitutability for low (high) \( \gamma \). Moreover, it increases as the advertising technology becomes more effective (lower \( b \)).

ii. The equilibrium investment in comparative advertising is increasing in the degree of product substitutability \( \gamma \). Moreover, it increases as the advertising technology becomes more effective (lower \( b \)).
IV. Equilibrium Analysis.

Moreover, in equilibrium we have:

\[ q^* = \frac{b(a - c)(4 - \gamma^2)}{b(2 - \gamma)(2 + \gamma)^2 - 2} > 0, \quad \frac{\partial q^*}{\partial \gamma} < 0, \quad \frac{\partial q^*}{\partial b} < 0 \]

\[ \Pi^* = \frac{(\alpha - c)^2 b[\gamma(4 + \gamma)(4 - \gamma^2)^2 - \gamma - 8]}{[b(2 - \gamma)(2 + \gamma)^2 - 2]^2} > 0, \quad \frac{\partial \Pi^*}{\partial \gamma} < 0, \quad \frac{\partial \Pi^*}{\partial b} > 0 \]

**Lemma 2:**

Equilibrium output and profits are decreasing in the degree of product substitutability \( \gamma \). Equilibrium output increases, while equilibrium profits decrease, as the advertising technology becomes more effective (lower \( b \)).
Benchmark Case: No Advertising.

In this case firms do not undertake any advertising activities, $\mu_i = \mu_j = 0$, $\kappa_i = \kappa_j = 0$. Thus, the market outcomes can be described by the standard Cournot game with horizontally differentiated products.

The Case of Mere Informative Advertising.

In this case firms invest only in Informative advertising, $\kappa_i = \kappa_j = 0$. Thus, firms compete by setting, first, their informative advertising investment levels and then, their outputs.

In equilibrium, each firm’s optimal investment in informative advertising is:

$$
\mu^{IN} = \frac{(\alpha - c)}{b(2 + \gamma)^2 - 1} > 0
$$
V. Comparative Results. Informative Advertising Expenditures.

**Proposition 2:**
Firms' expenditures on informative advertising under the mixed advertising case is always higher than that of the mere informative advertising case (except if $\gamma=0$, in which case they are equal)

$$\mu^* \geq \mu^{IN} \text{ for all } \gamma > 0$$

**Intuition:** The use of comparative advertising intensifies market competition which in turn, leads firms to invest even more in informative advertising.
V. Comparative Results

Output

\[ q^* > q_{IN} > q^C \quad \text{for all } \gamma > 0 \]

Intuition...

Firm \( i \)’s reactions functions are given respectively by:

**Mixed advertising case:**

\[
R_i(q_j) = \frac{\alpha - c - \gamma q_j}{2} + \frac{\mu_i + \kappa_i - \kappa_j}{2}
\]

**Mere informative ads case:**

\[
R_{iN} (q_{jN}) = \frac{\alpha - c - \gamma q_{jN}}{2} + \frac{\mu_{iN}}{2}
\]

✓ Firm \( i \)’s expenditures on advertising \((\mu_i, \kappa_i)\) tend to increase its demand and thus, to shift the reaction function outwards.

✓ Firm \( j \)’s expenditures on comparative advertising tend to decrease firm \( i \)’s demand and thus, to shift the reaction function inwards.

✓ In equilibrium, each firm’s investment in comparative advertising tend to neutralize one another and therefore, only the beneficial effect of informative advertising prevails.
Further, comparing equilibrium profits under the three alternative cases we have that:

$$\Pi^{IN} > \Pi^C > \Pi^* \text{ for all } \gamma$$

Clearly, firms’ decision to invest both in informative and comparative advertising leads them to a prisoner’s dilemma situation, where they end up to be worse off.

Thus, comparative advertising can be characterized as “wasteful advertising” since it increases market competition and leads firms to lower profits. As a consequence, firms would prefer this aggressive type of advertising to be prohibited.
Consumers’ surplus when firms invest both in informative and comparative advertising is higher than that of the benchmark case and the mere Informative Advertising case since:

\[ CS^* > CS^{IN} > CS^C \text{ for all } \gamma > 0 \]

✓ Firms’ investment in advertising (Comparative and/or Informative) leads to an increase in consumers’ valuation of the products, that acts beneficially to the consumers’ surplus.

✓ The fiercer competition, due to firms’ expenditures on advertising, leads to higher total production, that makes consumers better off.
V. Comparative Results

Social Welfare

\( TW^* > TW^C \) if and only if \( \gamma \in [0, 0.4] \)

When the products are poor substitutes, the beneficial effect of advertising on consumers’ surplus dominates the detrimental effect of advertising on the firms’ profitability, while the opposite is true when the products are close substitutes.

\( TW^{IN} > TW^*, \quad TW^{IN} > TW^C \) for all \( \gamma \)

Firms’ investment only in informative advertising always leads to higher social welfare.
VI. Conclusions.

✓ In this paper we investigate the firms’ incentives to invest in comparative and/or informative advertising, along with the consequences of these strategic marketing decisions on market outcomes and social welfare.

Our main findings suggest that:

- Firms’ optimal choice is to invest both in informative and in comparative advertising.

- Firms’ expenditures on comparative advertising are positively related to the degree of product substitutability.

- In contrast, firms’ expenditures on informative advertising are U-spaded with respect to \( \gamma \).
Firms’ optimal decision to invest in both types of advertising always leads to a prisoner’s dilemma situation, where firms end up to be worse off, while consumers are better off.

The use of both advertising strategies leads to higher social welfare when the products are poor substitutes while, it leads to lower social welfare when the products are close substitutes.

The use of comparative advertising increases market competition and leads to higher total production and lower firms’ profits. Thus, comparative advertising is beneficial for the consumers and harmful for the firms.

Our main results are robust to alternative modes of competition (i.e. hold also under Bertrand Competition).
VII. Further Research.

- How the main results would change under cost and/or demand asymmetries among firms?
- What would happen if there exist more than two firms in the industry?
- The role of cost/demand uncertainty
THANK YOU

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