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Exposure order effects and advertising competition

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ABSTRACT

This paper applies the theories of exposure order effects, developed in the psychology literature, to an industrial organization model to explore their role in advertising competition. There are two firms and infinitely many identical consumers. The firms produce a homogeneous product and distribute their brands through a common retailer. Consumers randomly arrive at the retailer and buy their most preferred brands. The order in which a consumer sees the advertising messages affects his brand preferences. Under the primacy effect the consumer prefers the brand he first saw advertised, under the recency—the last encountered brand. The equilibrium of the advertising game is characterized separately under the primacy and the recency effects. In the first setting all consumers are initially unaware of the product existence. The equilibrium advertising intensities, remarkably, do not depend on the type of exposure order effect. In the other two settings some consumers have already formed their brand preferences. The primacy and the recency effects give rise to different equilibrium outcomes.

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1. Introduction

Traditionally, advertising has been studied by two very different subfields of social science, economics and psychology.[1] The economics literature on advertising has been concerned with such important questions as the informational content of ads, the socially optimal level of advertising, and firm rivalry. The psychology literature, among other things, has explored the connection between information processing and advertising effectiveness. The goal of this paper is to develop a model that incorporates economics and psychology to examine how information processing biases affect advertising competition between firms.

Past research in psychology has shown that the order in which consumers are exposed to brands influences consumer preferences. Two advertising order effects have received attention. The primacy effect is characterized by greater persuasion consequence of the first advertising message. On the other hand, the recency effect occurs when the last encountered brand is preferred. Whether exposure order results in the primacy effect or in the recency depends on different factors, such as overall involvement, motivation, attitude strength, and the time between information exposure and preference construction.

Lana (1963) showed that subjects greatly interested in the topic exhibited the primacy effect, whereas subjects with minimal interest exhibited the recency effect. The primacy effect occurs when participants are motivated to elaborate the initial message and show critical thinking toward later information, whereas the recency effect occurs when motivation is low

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[1] Of course, advertising is one of the primary subjects studied in the field of marketing. Most papers in marketing concerning advertising, however, can be classified as having either economic or psychologic foundations.

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(Haugtvedt and Wegener, 1994). Brunel and Nelson (2003) examined how advertising order effects connect to gender differences. Their results suggested that under conditions of low involvement, females exhibited the primacy effect, males—the recency effect. Under conditions of higher involvement, females continued to exhibit the primacy effect; the recency effect with males disappeared when the advertisement matched their values. Niedrich and Swain (2008) found the primacy effect when the delay between attribute encoding and preference construction is long (a few days). On the other hand, the recency effect is more likely to occur when the delay is short (a few minutes).

The model presented here applies the primacy and the recency effects to advertising competition. The agents of the model are two firms and infinitely many identical consumers of total mass one. The firms produce a homogeneous product, firm *A* produces brand *A* and firm *B* produces brand *B*. The firms distribute their brands through a common retailer. Each consumer randomly (according to a Poisson process) arrives at the retailer and buys his most preferred brand. Consumers learn about the product existence and form their brand preferences through the firms' advertising. The order in which a consumer sees the advertising messages affects his brand preferences. Under the primacy effect the consumer purchases the brand he first saw advertised, whereas under the recency effect—whichever brand he most recently saw advertised.

The firms compete in advertising intensities—the rate parameters of Poisson processes that advertising messages follow. The equilibrium of the advertising game is characterized separately under the primacy and the recency effects. Three setting are considered. In Setting I (new market) consumers initially are unaware of the product existence. In this setup the equilibrium advertising intensities are symmetric and, remarkably, do not depend on the type of exposure order effect.

In Setting II (growing market) it is assumed that at the beginning of the game a number of consumers believe brand *A* is better, the equal number prefer brand *B*, and the rest are unaware of the product existence. In this setup the two exposure order effects give rise to different equilibrium outcomes. Results show that the firms choose higher advertising intensities under the recency effect than under the primacy. In Setting III firm *A* has advantage over firm *B*. Specifically, at the beginning of the game a number of consumers prefer brand *A*, and the rest are unaware of the product existence. Under the primacy effect the equilibrium advertising intensities are symmetric, whereas under the recency effect firm *B* chooses higher advertising intensity than firm *A*. Various welfare implications are investigated.

This paper contributes to the small but growing body of economic literature on advertising grounded in psychological research. Krähmer (2004) developed a monopolistic model in which the buyer may not recall correctly his past experience with the product. Advertising can activate memory and help consumers to recollect their past experiences, or distort actual consumption experiences. Shapiro (2006) explored two alternative advertising mechanisms that yield very different predictions. In the first, advertising converts memories of bad experiences into memories of good ones. In the second, advertising makes favorable experiences more likely to be remembered. Brekke and Rege (2007) captured availability heuristic phenomenon, according to which consumers cannot distinguish between the recommendations or real people and fictitious characters in advertisements. Their analysis showed that even if a person knows that his observations of others may be distorted by advertising, it is still rational for him to choose whichever product he has observed most often.

In the next section, the formal model is presented. The three settings are analyzed in Sections 3–6. Concluding remarks appear in Section 7. All proofs are relegated to Appendix A.

2. The model

2.1. Firms and consumers

Two firms, *A* and *B*, produce a homogeneous product using zero marginal cost technology. The firms distribute their brands through a common retailer. The demand side consists of infinitely many identical consumers of total mass 1. Consumers are risk-neutral, possess continuous-time discount rate $r > 0$, and have a sequence of unit demands for the product. In particular, a consumer receives a gross payoff of 1 whenever he arrives at the retailer and buys his most preferred brand. The number of times the consumer visits the retailer follows a homogenous Poisson process with rate parameter $\sigma > 0$. That is, in a small time interval Δt the consumer visits the retailer with infinitesimal probability $\sigma\ \Delta t + o(\Delta t)$.[2]

Consumers learn about the product existence and form their brand preferences through advertising. The number of ads describing brand *A* a consumer receives is a homogeneous Poisson process with rate parameter α_A; the number of ads describing brand *B* he receives follows a Poisson process with rate parameter α_B. It is assumed that consumers receive advertising messages independently from each other, as they watch/listen to different TV and radio programs at different times.

Advertising intensities, α_A and α_B, are chosen by the firms. The discounted cost needed to achieve intensity $\alpha > 0$ is $c(\alpha)/r$. Function $c(\cdot)$ is convex and increasing, $c' > 0$ and $c'' > 0$. The standard boundary assumptions, $c(0) = c'(0) = 0$ and $\lim_{\alpha\to\infty} c'(\alpha) = \infty$, guarantee the existence of an interior solution.

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[2] Formally, let N_t denote the number of times a consumer visits the retailer by time *t*. N_t is a Poisson process with rate parameter $\sigma > 0$ if and only if (i) the number of visits during one time interval is independent of the number of visits during a different non-overlapping time interval; (ii) in a small time interval Δt the consumer visits the retailer with probability $\Pr(N_{t+\Delta t} = N_t + 1) = \sigma\Delta t + o(\Delta t)$, and he visits the retailer more than one time with probability $o(\Delta t)$. On Poisson processes see, example, Doob (1990).

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