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On informative advertising and product differentiation ☆

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Abstract

We study informative advertising within a random utility, non-localized competition model of product differentiation. Quasi-concavity of profits may fail, as each firm may prefer to deviate to a high price, targeting consumers who only become informed about its own product. When a symmetric equilibrium exists, it is unique. Increasing the number of firms may increase or decrease the equilibrium price. Advertising tends to be suboptimal when product differentiation is low and excessive otherwise. We also revisit Grossman and Shapiro [Grossman, G., Shapiro, S., 1984. Informative advertising with differentiated products. Review of Economic Studies 51, 63–81], focusing on similarities in constructing a symmetric equilibrium in the two models, but also illustrating differences in their welfare properties.
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1. Introduction

In differentiated products markets, consumers typically do not know all the competing product varieties or their prices. Since each consumer's purchasing choices are made from a

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restricted set, an important role exists for advertising, as firms may wish to inform consumers about their products and prices. In this paper we study informative advertising within a product differentiation oligopoly model with non-localized competition. We build on Perloff and Salop's (1985) "random utility" model, one that has also provided the basis for important analyses in the field.[1] In this setting we introduce informative advertising, as first formalized by Butters (1977). Naturally, in such a model, firms' pricing and advertising decisions are jointly endogenous.[2]

The main features of our model are as follows. A number of firms compete with differentiated products and are able to inform the consumers via costly advertising about the existence of their products and their prices. Firms choose prices and advertising intensities simultaneously. Consumers choose to purchase a unit of the product that leaves them with the highest net surplus. We examine the existence of a symmetric equilibrium and explore its comparative statics and other properties. Specifically, our main focus is on symmetric equilibria where all consumers would purchase one unit when they receive an ad from at least one firm.

Understanding how informative advertising interacts with a random utility non-localized model of product differentiation is important, as such a model represents one of the most straightforward ways to examine advertising in oligopoly. The analysis presents some technical challenges: while constructing the symmetric equilibrium, we find that the profit function may not be quasi-concave in each firm's own price over the entire range of relevant prices. Equilibrium existence is, thus, not guaranteed and the solution to the first-order conditions represents an equilibrium only for a certain range of the parameters, although local concavity holds. The economic intuition for the possible lack of quasi-concavity is important. Under standard assumptions about informative advertising, consumers that have not received an advertisement from a given firm cannot purchase its product. Thus, with positive probability, some consumers have only received advertisement from one and only one firm — this firm then enjoys monopoly power relative to these "captive" consumers and may have an incentive to raise its price to a high level. Of course, whether such a high price strategy is profitable or not depends (among other factors) on how many consumers become informed from advertising, which is endogenously determined. It follows that, when constructing a symmetric equilibrium, we have to examine possible deviations not only locally but also to much higher levels.

While profit functions are not, in general, quasi-concave in price, a symmetric equilibrium does exist for a large space of parameters and we prove that, if it exists, it is unique. When we examine the comparative statics of the equilibrium, we find among other results that an increase in the number of firms does not necessarily reduce the equilibrium price. Still, increasing the number of firms decreases the per-firm profit, implying that, if entry were endogenized, there would be a

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[1] See e.g. Wolinsky (1986) and Anderson et al. (1992) for a review.

[2] Advertising in our model informs consumers about both a product's existence and its price. As we discuss in detail below, the closest work to ours is by Grossman and Shapiro (1984) who have studied advertising in the context of Salop's (1979), localized competition, "circle" model. Alternative formulations exist. In Meurer and Stahl (1994) consumers observe prices while firms decide whether to inform them about product characteristics; in Bester and Petrakis (1995) consumers know that two firms exist and the price of the product in their region but only learn the price of the other firm once they receive an ad; in Baye and Kovenock (1994) advertising may inform consumers about a commitment to a lower price than that of the rival. Anderson and Renault (2006) study advertising content (i.e. product vs. price information, or both). Of course, besides direct information, advertising also plays other roles, including signaling (e.g. Kihlstrom and Riordan, 1984), coordination (Bagwell and Ramey, 1994) or persuasion (Dixit and Norman, 1978; Bloch and Manceau, 1999), to mention just a few. See Bagwell (2005) for a review of research on advertising, as well as a collection of papers on "Advertising and Differentiated Products" by Baye and Nelson (2001) that includes evidence from a number of markets.

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