Available online at www.sciencedirect.com
ScienceDirect
Games and Economic Behavior 58 (2007) 94–120
GAMES and Economic Behavior
www.elsevier.com/locate/geb

Competition and confidentiality: Signaling quality in a duopoly when there is universal private information ☆

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Received 19 January 2005
Available online 18 April 2006

Abstract

We model non-cooperative signaling by two firms that compete over a continuum of consumers, assuming each consumer has private information about the intensity of her preferences for the firms' respective products and each firm has private information about its own product's quality. We characterize a symmetric separating equilibrium in which each firm's price reveals its respective product quality. We show that the equilibrium prices, the difference between those prices, the associated outputs, and profits are all increasing functions of the ex ante probability of high safety. If horizontal product differentiation is sufficiently great then equilibrium prices and profits are higher under incomplete information about quality than if quality were commonly known. Thus, while signaling imposes a distortionary loss on a monopolist using price to signal quality, duopolists may benefit from the distortion as it can reduce competition. Finally, average quality is lower since signaling quality redistributes demand towards low-quality firms.

JEL classification: D43; D82; K13; L15

1. Introduction

How does the need to signal quality through price affect equilibrium pricing and profits, when a firm faces a similarly-situated rival? In this paper, we provide a model of non-cooperative signaling by two firms that compete over a continuum of consumers. We characterize a symmetric

☆ This research was supported by NSF Grant SES-0239908.
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0899-8256/$ – see front matter
doi:10.1016/j.geb.2006.03.001

separating equilibrium in which each firm's price reveals its respective product quality, and we indicate how crucial parameters affect the price–quality relationship. Finally, we describe circumstances under which the firms are better off for having to signal quality through price (as compared to an informational regime in which their qualities are exogenously known by competitors and by consumers). This contrasts with the results for a monopoly model, in which the usual signaling distortions are disadvantageous to the firm.

We assume "universal incomplete information"; by this, we mean that each market participant has some private information. Each consumer views the products as imperfect substitutes; all else equal, some consumers will prefer one firm's product while other consumers will prefer that of the firm's rival. Each consumer has private information about the intensity of her preference for the firms' respective products. We assume that each firm has private information about its own product's quality. To the best of our knowledge, signaling quality with this information structure has not been addressed previously in the literature; a more detailed discussion of this literature is provided below.

While we focus mainly on a model in which the quality attribute is safety (so that the legal system is brought into play), a particular specification of parameters yields a common model from the industrial organization literature in which quality is interpreted as the probability that a consumer will find the good satisfactory (as in Milgrom and Roberts, 1986).[1] In the product safety context, we view private information on the part of firms as arising through the use of confidential settlements. Daughety and Reinganum (2005a) provide a two-period model in which a single firm produces and sells a product in each period, and then observes the number of units that fail, causing harm. Assuming that consumers harmed in period one negotiate confidential settlements, consumers in the second period know that the firm has private information about its product's safety.

We view confidentiality as having several effects; some of these effects arise in the single-firm context, while others arise only in the multi-firm context. First, a direct effect of confidentiality (which usually results in a blanket gag order issued by a court) is that it prevents plaintiffs from learning about each other's cases and possibly sharing information that might improve the viability of their cases (see Hare et al., 1988; they argue that this is an important reason for defendants to seek confidentiality). Thus, confidentiality may reduce the viability of contemporaneous suits. Second, as indicated above, a firm that has settled previous lawsuits confidentially will have private information (both relative to current consumers and relative to its rival) about its product's safety. In this case, consumers will attempt to draw an inference about the firm's product's safety from its price; that is, the firm's price may be used to signal its product's safety. Finally, since the firm observes neither the intensity of the consumer's preference for its product (versus that of its rival) nor its rival's product's safety, the firm must charge all consumers the same price and must make its pricing decisions based upon its own product's safety and upon its conjectures about the rival firm's price-safety strategy. Of course, these conjectures must be correct in equilibrium.

We find that, for the two-type model presented below, there exists an (essentially) unique symmetric separating perfect Bayesian equilibrium (we restrict attention to symmetric separating equilibria), in which high quality is revealed by a high price. Although it is typical in monopoly signaling models that a separating equilibrium depends only on the support of the distribution, in this case uncertainty about the other firm's type will introduce distribution-dependence into

[1] In a subsequent paper (Daughety and Reinganum, 2005b), we extend the analysis of the consumer satisfaction model to the case of n firms facing a representative consumer with linear, downward-sloping demand.