Advertising and Newspaper Differentiation: On the Role of Readers' Advertising Taste

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Abstract

Newspapers have an incentive to moderate their profile in order to gain a larger readership and thus higher advertising revenue. We show that this incentive is weakened both if readers are ad-haters and if they are ad-lovers.

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1 Introduction

It is well known in modern Industrial Organization that in a Hotelling game with price competition, firms will be *maximally* horizontally differentiated in order to reduce the competitive pressure. The press industry, however, derives revenue from both readers and advertising, where the latter depends positively on circulation. This gives each newspaper an incentive to locate close to its rival in order to increase its readership and thus its advertising revenue. As shown by Gabszewicz et al. (2001, 2002), newspapers become *minimally* horizontally differentiated if advertisers' willingness to pay is sufficiently high and readers are *indifferent* to advertising.

The purpose of this note is to analyze how readers' attitude towards advertising affect the profile of competing newspapers. To this end we extend Gabszewicz et al. 2001 by allowing readers to be ad lovers or ad haters.[1] When readers dislike ads, newspapers will have less advertising than what maximizes advertising revenue. Hence, advertising finance has less of an impact as a moderator on each newspaper's profile. It may therefore not be surprising that newspapers become more differentiated in this case. One might be inclined to expect that the opposite would be true when readers are ad lovers. However, our main finding is that the incentive to moderate content is weakened also if readers like advertising. The reason for this is that the newspapers then choose a higher level of advertising than what maximizes advertising receipts. This strengthens the newspapers' incentive to differentiate their profile in the same way as when readers dislike ads.

2 Model

Readers can choose between two newspapers, which are located on the Hotelling line. The location of the newspapers is given by $\theta_1 = a$ and $\theta_2 = 1 - b$, where $(1 - b) \geq a$. The newspapers are perfect (horizontal) substitutes if $(1 - b) = a$, while they are maximally (horizontally) differentiated if $a = b = 0$.

Readers differ with respect to their preference for editorial stance as measured by θ,

[1] Both attitudes have been verified empircially. See Sonnac (2000) on newspaper readers' attitudes and Depken II and Wilson, (2004) for attitudes among magazine readers.

which is uniformly distributed on the unit-interval. The utility of a θ-type reader who consumes newspaper $i = 1, 2$ equals

$$u_i = v - t(\theta_i - \theta)^2 - p_i - \gamma a_i, \tag{1}$$

where p_i is the price readers pay per copy of newspaper i, and a_i is the advertising volume. The readers suffer a utility loss when the newspaper's editorial content θ_i differs from their most preferred profile (θ), and the utility loss is given by the quadratic function $t(\theta_i - \theta)^2$, $t > 0$. Readers dislike advertisements when $\gamma > 0$, whilst they appreciate them when $\gamma < 0$. As such $p_i + \gamma a_i$ can be interpreted as the hedonic price readers pay per newspaper. The parameter $v > 0$ is assumed to be sufficiently large to ensure market coverage (such that each consumer buys one newspaper).

Let n_i be the number of readers of newspaper i. We express the number of readers of newspaper i in terms of the utility they derive from reading that newspaper. Therefore n_i is a non-decreasing function of u_i and defined as

$$n_i = \phi(u_i),$$

where $\partial\phi/\partial u_i \geq 0$.

Advertisers benefit from informing readers about the existence and characteristics of their product, and the net benefit for a firm of type α from advertising in newspaper i is

$$B_i = \alpha n_i - s_i, \tag{2}$$

where s_i is the price for an ad in newspaper i. We assume that the advertisers are price takers, and that α is distributed on $[0, 1]$ with density $4k$. The induced demand for advertising is then[2]

$$a_i = 4k(1 - s_i/n_i). \tag{3}$$

The marginal cost for the newspaper of inserting an ad is normalized to zero, while the marginal cost of printing and distributing a newspaper copy is $c \geq 0$. This means that the profit level of newspaper i in terms of utilities equals

$$\pi_i = s_i a_i + n_i(p_i - c) = s_i a_i + \phi(u_i)(p_i - c). \tag{4}$$

[2] The platform has a monopoly power over its readers as an advertiser can only contact a potential customer who reads newspaper i by placing an advert in that newspaper. Thus each newspaper firm is a competitive bottleneck (see Armstrong 2006).

We consider a game where the newspapers simultaneously and non-cooperatively choose their ideological stance at stage 1. At stage 2 each newspaper maximizes profit with respect to utility, as in Armstrong (2006), while they select advertising prices at stage 3. We focus on subgame-perfect equilibria which exhibit positive newspaper prices.

At stage 3 each newspaper maximizes profits with respect to s_i keeping readers' utility u_i constant. At an interior solution, the first-order condition is

$$\left(a_i + s_i\frac{\partial a_i}{\partial s_i}\right) + \phi(u_i)\left.\frac{\partial p_i}{\partial s_i}\right|_{du_i=0} = 0. \tag{5}$$

From equations (1) and (3) it follows that $\frac{\partial a_i}{\partial s_i} = \frac{4k}{\phi_i}$ and $\left.\frac{\partial p_i}{\partial s_i}\right|_{du_i=0} = \frac{\gamma 4k}{\phi_i}$, so that the third-stage equilibrium advertising price and the associated amount of advertising are

$$s_i = (1+\gamma)\frac{\phi_i}{2} \qquad \text{and} \qquad a_i = 2k(1-\gamma). \tag{6}$$

To ensure that the non-negativity constraint on the advertising price and the amount of advertising are not binding, we impose $|\gamma| < 1$ throughout. Total advertising revenue for newspaper i is given by

$$\omega_i = s_i a_i = \tilde{k}\phi_i, \quad \text{where} \quad \tilde{k} = k\left(1-\gamma^2\right). \tag{7}$$

From equation (7) we see that optimal advertising revenue is increasing in the size of the audience ($\phi_i = n_i$), and that optimal per-reader advertising revenue $\tilde{k}$ is decreasing in $|\gamma|$. It is also evident from equation (7) that advertising revenue (ω_i) is maximized if consumers are indifferent to ads ($\gamma = 0$). Hence, there is a humped-shaped relationship between γ and ω_i with a peak at $\gamma = 0$.

The humped-shaped relationship is illustrated in Figure 1. If the audience is ad-averse ($\gamma > 0$), it is optimal for each newspaper to choose a relatively low advertising level in order to attract readers (confer (6)). Although the newspaper charges a higher advertising price than when $\gamma = 0$, total advertising revenue is lower. If readers like advertising ($\gamma < 0$) it is optimal for the newspaper to have a higher level of advertising (and charge a lower advertising price) than the quantity which maximizes advertising revenue.

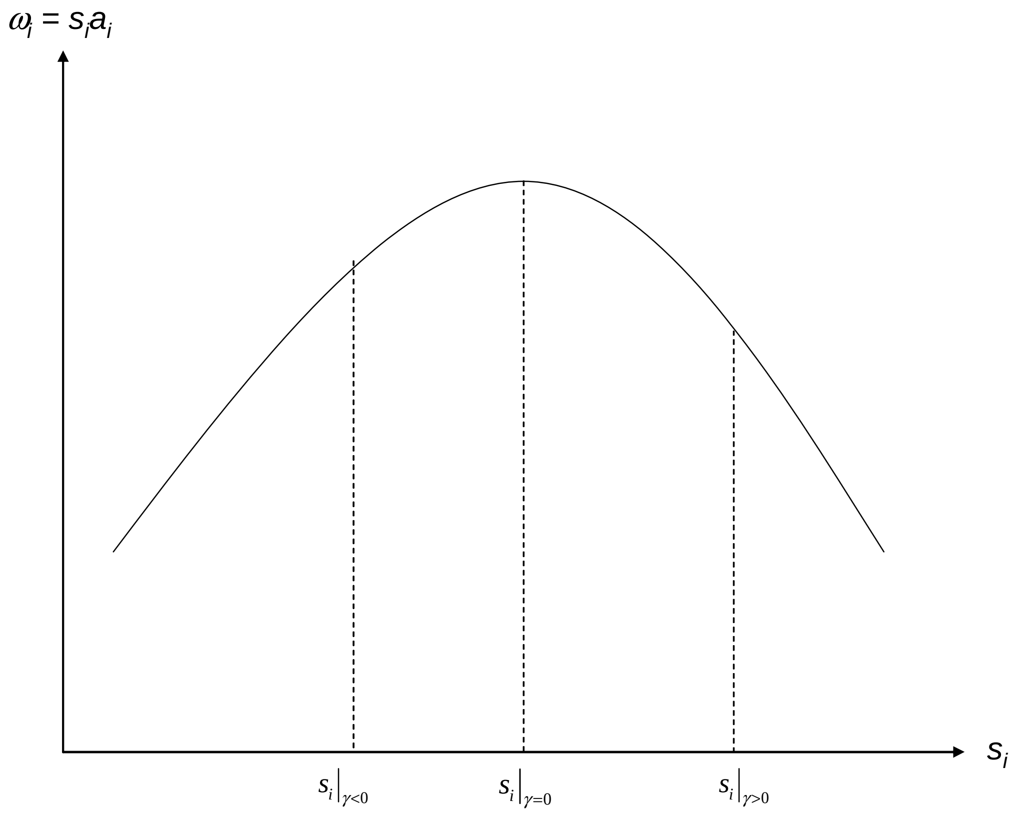

Figure 1: *Advertising revenues.*

At stage 2 newspaper i maximizes profit with respect to u_i, taking into account how advertising levels will be affected at stage 3. Formally, it solves $u_i = \arg\max \pi_i$, where

$$\pi_i (u_i, u_j) = \tilde{k}\phi_i(u_i) + \phi_i(u_i)(p_i - c)\,;\ i \neq j. \tag{8}$$

The willingness to pay for newspaper 1 is greater than for newspaper 2 for all consumers satisfying

$$u_1 - t(a-\theta)^2 - \gamma a_1 > u_2 - t(1-b-\theta)^2 - \gamma a_2.$$

Using that $a_1 = a_2$ we thus find that demand for the two newspapers is given by

$$\phi_1 = a + \frac{u_1 - u_2}{2t(1-a-b)} + \frac{1-a-b}{2} \text{ and } \phi_2 = 1 - b + \frac{u_2 - u_1}{2t(1-a-b)} + \frac{1-a-b}{2}, \tag{9}$$

where the demand functions resemble standard Hotelling demand functions, except that they are expressed in terms of utilities instead of prices.

At the first stage the newspapers maximize (8) subject to (9), and it can be shown that there exists an equilibrium with full differentiation if and only if $\tilde{k} < c + t/2$.[3] An

[3]We omit the details of the computations and refer the reader to Gabszewicz et al. (2001) and, in particular, to Gabszewicz et al. (2002). The same steps apply here if we substitute k for $\tilde{k}$ (thus allowing for the possibility that $\gamma \neq 0$).

important implication is that, since $\tilde{k}$ is decreasing in $|\gamma|$ (see above), a full differentiation equilibrium will more likely emerge the more strongly readers (dis)like advertising:

Proposition 1 *Newspapers are more likely to locate at the extremes of the profile spectrum the stronger the readers' attitude towards advertising, i.e. the larger* $|\gamma|$.

Behind this result is the fact that advertising revenues are lower the more readers care (positively or negatively) about the level of advertising in newspapers (confer Figure 1). Each newspaper therefore faces less of an incentive to moderate its profile in order to be an attractive media outlet for advertisers.

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