Targeting and Persuasive Advertising

Alain Egli *

August 2015

Abstract

Firms face a prisoner's dilemma when advertising in a competitive environment. In a Hotelling framework with persuasive advertising firms counteract this prisoner's dilemma with targeting. The firms even solve the prisoner's problem if targeted advertising is effective enough. Advertising turns from wasteful competition into profits. This is in contrast to wasteful competition as argument for regulations. A further result is maximum advertising differentiation: the firms target their advertising to the extremes in the market.

Keywords: Targeted advertising, persuasive advertising, prisoner's dilemma.

JEL-Classification Numbers: D43, L11, L13, M37

*Swiss Competition Commission (COMCO), WEKO, Monbijoustrasse 43, 3003 Bern, Switzerland, alain.egli@weko.admin.ch or alain.egli@gmx.ch. I thank Marc Blatter and Winand Emons for helpful comments. This paper exclusively represents the author's personal view and can not be attributed to the Swiss Competition Commission or its Secretariat.

1 Introduction

Many firms target their advertising. With targeted advertising, firms tailor their marketing activities to focus on certain consumers. Consider for instance advertisement for handbags. A handbag manufacturer may either direct its advertisement to the young female partygoer or to the elegant lady. Another example is a car manufacturer that targets sporty drivers or drivers with environmental awareness. Or, advertisement for outdoor goods may aim on hikers or on beach enthusiasts. Further examples are customized commercials and e-mails based on various criteria: past buying habits, the demographics of zip codes, or some other criteria like age and consumer attitudes.

To model targeting we build on a standard Hotelling framework with persuasive advertising. In this Hotelling framework we introduce targeting by the firms' possibility to focus their advertising on a target consumer. Advertising does no longer affect consumers uniformly. Instead, the effect from advertising differs across consumers.

This model allows us to contribute an additional rationale for targeted advertising to the existing literature. The literature suggests two lines of reasoning for targeted advertising.[1] First, targeted advertising facilitates better surplus extraction including market segmentation. Second, targeting results in more precise advertising. This reduces waste coverage. Costs per contact decrease.

In addition to these lines of reasonings, our model offers the following

[1]See Adams and Yellen (1977), Grossman and Shapiro (1984), Lewis and Sappington (1994), Hernández-García (1997), Roy (2000), Esteban, Agustin and Hernández (2001), Manduchi (2004), Iyer, Soberman and Villas-Boas (2005), Esteban, Hernández and Moraga-González (2006), Anand and Shachar (2009), Brahim, Lahmandi-Ayed and Laussel (2011), Bergemann and Bonatti (2011), Eliaz and Spiegler (2011), Tucker (2012), and Johnson (2013).

rationale: targeted advertising is a way for the firms to deal with a prisoner's dilemma situation arising in a competitive environment.

The reason for the prisoner's dilemma are unrealized gains from costly advertising.[2] Typically, advertising has ceteris paribus a positive effect on a firm's demand. Thus, firms have an incentive to advertise. However, there is a strategic interaction in a competitive environment. Advertising also has an effect on the other firms' demand. If this effect is negative, the firms tend to neutralize each other.[3] But the advertising activity involves costs. Overall, the firms spend money on advertising that has little or no effect. Firms' profits decrease. All firms would benefit from reducing the intensity of advertising. In other words, it is a dominant strategy for the firms to advertise more than the joint profit-maximizing amount.

This prisoner's dilemma represents an argument to regulate advertising: restricting or forbidding advertising saves firms from wasteful marketing activities. Actually, industry representatives are in favor of advertising regulation and may even lobby for it.[4] Indeed, some professional associations, like lawyers, give themselves rules of conduct that contain self-imposed restrictions on advertising.

We tackle this argument in a Hotelling framework with persuasive advertising. Introducing targeting in this framework allows us to compare targeted advertising with two situations. First, the situation with non-targeted advertising, where advertising affects consumers uniformly. Second, the situation without advertising. Compared to non-targeted advertising, firms always earn higher profits with targeting. Advertising does no longer completely

[2]See, for instance, Peitz and Belleflamme (2011, p. 149).

[3]Advertising from one firm can have positive effects on other firms' demand. In this case, however, firms' advertising efforts do not cancel out. A prisoner's dilemma does not occur.

[4]See Peitz and Belleflamme (2011, p. 151).

cancel out.

In comparison to the second situation represented by the original Hotelling model without advertising, targeting has an ambiguous effect on firms' profits. Individual profits are higher with targeted advertising if targeting is effective enough. In this case, the firms completely overcome the prisoner's dilemma. Advertising is no longer wasteful competition for the firms.

This result has a policy implication with regard to the argument for advertising regulation. The results suggest to abandon wasteful advertising as argument when regulation advertising. Especially for effective targeting, the prisoner's dilemma disappears. Firms do not invest in wasteful advertising.

Furthermore, we find that the firms maximally differentiate in advertising. The firms target the extremes in the market.

To model targeted advertising, we rely on von der Fehr and Stevik (1998).[5] Von der Fehr and Stevik examine the relationship between the degree of product differentiation and the intensity of persuasive advertising. A way is that persuasive advertising may increase the willingness to pay.

As in von der Fehr and Stevik, the basis for our model is a Hotelling framework with persuasive advertising that increases the willingness to pay.[6] This setting features favorable characteristics for studying the prisoner's dilemma problem. First, the prisoner's dilemma arises in its most extreme form. Advertising does not increase total demand. Rather, advertising shifts the demand between the firms. Consequently, the firms' advertising efforts completely cancel. Second, advertising intensities are independent of the extent to which products are differentiated. Third, the setting assumes that the consumers are aware of the existence of different firms operating in the mar-

[5] See also Peitz and Belleflamme (2011, pp. 149).

[6] The literature on advertising is vast. A survey is not our objective. For a good survey, see Bagwell (2007).

ket. All consumers buy one good and share the same information about the goods. If all consumers buy a good and are uniformly informed, better surplus extraction and market segmentation are not the explanation for targeting.

The reason why targeted advertising softens or even avoids the prisoner's dilemma is a non-uniform effect on consumers. With targeting the advertising intensity differs across consumers. As a consequence, the firms' advertising efforts do not cancel each other out. The direct effect is a simultaneous impact on the firms' demand: targeting intensifies the increase in a firm's own demand and lessens the decrease in the other firm's demand. The indirect effect is a strategic commitment for the pricing behavior. With targeting, the firm reinforces its commitment to set a high price in the second stage. At the same time, targeting relaxes the pressure on the other firm to set a low price. Overall, targeted advertising relaxes price competition. If targeting is effective enough, the competition-relaxing effect is so strong that advertising is always beneficial.

We organize the remainder of the paper as follows. In section 2 we set up a model with targeted advertising. For this model, we specify the demand functions in section 3.1. Next, we turn to the firms' equilibrium behavior in section 3.2. In section 4 we discuss the equilibrium and study its comparative static properties. Last, we conclude in section 5.

2 The Model

Consider a Hotelling-type model with two firms. Firms are located at the endpoints of the unit line $[0, 1]$. Without loss of generality, firm 1 is located at point $l_1 = 0$ and firm 2 at point $l_2 = 1$. We can interpret the unit line as a geographical or a characteristic space for a good. So, the firms supply a horizontally differentiated good. Firm i charges mill price p_i. Let us assume, for simplicity, that both firms produce at zero costs.

There is a unit mass of consumers uniformly distributed on the unit line. All consumers have the same gross valuation r for exactly one unit of the good. Assume that the gross valuation r is sufficiently high such that in equilibrium all consumers buy from one of the firms. In this case, valuation r is never binding. In other words, the market is always covered.

Each consumer has a most preferred location or characteristic. This is her ideal position θ. If a consumer buys a good with a different-than-ideal position, she suffers a disutility. This disutility depends on the distance between the consumer and the firms. Let t be transportation costs per unit distance. Then, a consumer at position θ incurs linear transportation costs $t|l_i - \theta|$ when buying form firm $i = 1, 2$.

Up to this point we follow the original linear Hotelling model with firms located at the two edges of the "beach". To introduce targeted advertising we build on von der Fehr and Stevik (1998). Firm i chooses an advertising intensity λ_i. The advertising intensity increases consumer willingness to pay.

In our model, however, the firms do not uniformly increase the consumers' willingness to pay. Instead, the firms direct their advertising activities towards a target. This target is a position q_i on the unit line. We call q_i the target position. The consumer at this position is the target consumer.

For the target consumer, advertising intensity is maximal. That is, advertising increases the target consumer's valuation by $\beta\lambda_i$, where β is a positive parameter. All other consumers are less affected by advertising. The effect decreases with the distance between a consumer and the target position. If a consumer is far away from the target position, the effect is small.

Advertising intensity decreases analogously to the disutility when buying a different-than-ideal good: the decrease is quadratic with respect to the distance between firm i's target position and a consumer's ideal position. When denoting the advertising decrease per unit distance by b, the decrease is given by $b(q_i - \theta)^2$. For a consumer with position θ, advertising intensity is $\beta(\lambda_i - b(q_i - \theta)^2)$.

We can interpret the parameter b as effectiveness in targeting. The higher the parameter b, the more effective is targeting. Relative to the other consumers, the advertising intensity for the target consumer is high if the parameter b is high. If the parameter b is low, the advertising intensity aligns across consumers. The extreme case $b = 0$ is non-targeted persuasive advertising. Targeting has no effect.

Taking into account targeted advertising, consumer θ has gross valuation

$$r_i(\lambda_i, q_i) = r + \beta(\lambda_i - b(q_i - \theta)^2).$$

Note that advertising addresses consumers uniformly if $b = 0$. There is no targeting. We refer to this situation as non-targeted advertising.

Altogether, consumer θ's utility when buying from firm i is:

$$u_i(\theta) = r + \beta(\lambda_i - b(q_i - \theta)^2) - t|l_i - \theta| - p_i.$$

Figure 1 illustrates the effects from targeted advertising on consumers' utility. In Figure 1 we depict the utility when buying from firm 1. The dotted line in figure 1 shows the utility for consumer θ without advertising. This is the utility in the original Hotelling model.

Now, advertising increases this utility. The utility with advertising is

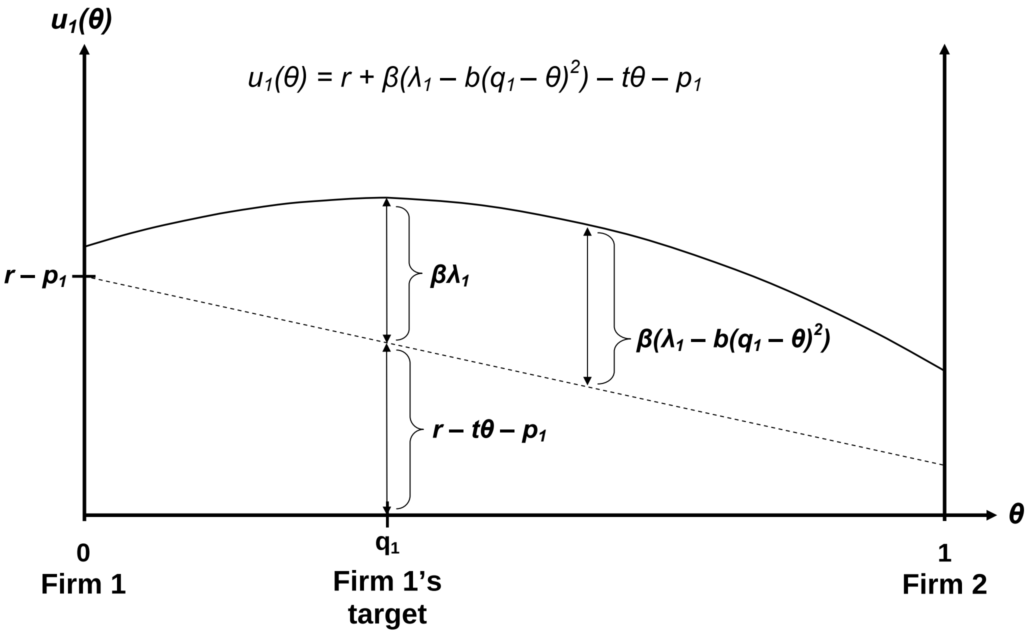

Figure 1: Effect from Targeted Advertising on Consumers

given by the solid line. For the target consumer the advertising effect is strongest, i. e., for the consumer with $\theta = q_1$. For the other consumers the advertising effect is decreasing in the distance to firm 1's target position. As depicted in figure 1, the effect may be even such that the target consumer has a higher utility than the consumer at firm 1's location.

Here, we can give another interpretation for the advertising effect $\beta(\lambda_i - b(q_i - \theta)^2)$. As long as $\beta(\lambda_i - b(q_i - \theta)^2) \in [0, 1]$, the advertising effect may represent the probability that the firm reaches consumer θ. This probability is $\beta\lambda_i$ for the target consumer $\theta = q_i$. The probability to reach the other consumers is lower. The further away a consumer from the target point is, the lower is the probability that advertsing catches her eye.

To have closed form solutions we assume that advertising intensity entails costs $a\lambda_i^2/2$. Furthermore, advertising costs are independent of targeting. This assumption ensures that savings due to lower costs of getting a message to the relevant consumer are not the reason for targeting. Moreover, we impose the condition $\beta^2 < 9at$. This ensures that second order conditions are satisfied. More specifically, it is a result from second order conditins for non-targeted advertising that we use as benchmark for comparative statics.

The game proceeds in two stages. In the first stage, firms simultaneously choose their advertising intensity λ_i and their target position q_i. Firms set prices in the second stage. To solve the game, we look for the subgame perfect Nash equilibrium by using backwards induction. We focus on pure strategies for both stages.

3 The Equilibrium

3.1 Demand Specification

For the equilibrium analysis we need the firms' demand functions. The demand functions depend on consumers' buying decisions. A consumer buys from firm i if it yields a higher utility than buying from firm j. Given advertising intensities, target positions, and prices, a consumer buys from firm 1 if $u_1 > u_2$:

$$r + \beta(\lambda_1 - b(q_1 - \theta)^2) - t\theta - p_1 > r + \beta(\lambda_2 - b(q_2 - \theta)^2) - t(1 - \theta) - p_2.$$

By contrast, a consumer buys good 2 if $u_1 < u_2$. If $u_1 = u_2$ the consumer is indifferent between buying good 1 and good 2.

The indifferent consumer $\hat{\theta}$ determines the demand functions. If the consumer is indifferent, she has position

$$\hat{\theta} = \left(t - p_1 + p_2 + \beta(\lambda_1 - \lambda_2) - b\beta(q_1^2 - q_2^2)\right) / (2t + 2b\beta(q_2 - q_1)). \tag{1}$$

All consumers with position $\theta \leq \hat{\theta}$ have a higher utility with good 1. These consumers buy from firm 1. The demand for firm 1 is $D_1 = \hat{\theta}$. Demand for firm 2 is $D_2 = 1 - \hat{\theta}$.

3.2 Firms' Equilibrium Behavior

To find the subgame perfect Nash Equilibrium we solve the two-stage advertising-with-targeting game by backwards induction. In the second stage, the firms simultaneously set prices to maximize profits $\pi_i = p_i D_i - a\lambda_i^2/2$. The firms take advertising intensities and target positions as given. They are already chosen in the first stage. For firm 1 the maximization problem is

$$\begin{aligned} \max_{p_1} \quad & (t - p_1 + p_2 + \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(q_1 + q_2)) \\ & \times p_1/(2t + 2b\beta(q_2 - q_1)) - a\lambda_1^2/2. \end{aligned}$$

And firm 2 solves

$$\begin{aligned} \max_{p_2} \quad & (t + p_1 - p_2 - \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(2 - q_1 - q_2)) \\ & \times p_2/(2t + 2b\beta(q_2 - q_1)) - a\lambda_2^2/2. \end{aligned}$$

Accordingly, the firms set prices that meet the first order conditions for their optimization problems. The resulting price functions are the firms' reaction functions:

$$\begin{aligned} p_1(p_2) &= (t + p_2 + \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(q_1 + q_2))/2, \\ p_2(p_1) &= (t + p_1 - \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(2 - q_1 - q_2))/2. \end{aligned}$$

Note that that the second derivative for the profit function with respect to the price is negative for both firms, i. e., $\partial^2 \pi_i / \partial p_i^2 < 0$. Moreover, the third derivative with respect to price is zero for both firms. The profit functions are strictly concave in prices. So, the first order conditions are not only necessary but also sufficient for the determination of a solution to the firms' maximization problems. It follows that the first order conditions characterize the optimal price reaction functions.

Inspection of the reaction functions shows that they are linearly increasing in the other firm's price. Firms' prices are strategic complements. Therefore, the solution to the system of equations given by the reaction functions yields the Bertrand-Nash equilibrium prices for the second stage. Given first-stage advertising levels and advertising target positions, these Bertrand-Nash equilibrium prices are

$$p_1^*(\lambda_1, \lambda_2, q_1, q_2) = \left[3t + \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(q_1 + q_2)\right]/3,$$
$$p_2^*(\lambda_1, \lambda_2, q_1, q_2) = \left[3t - \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(2 - q_1 - q_2)\right]/3.$$

As expected by the literature, the price functions show the effect from advertising intensities on pricing strategies. According to von der Fehr and Stevik (1998), advertising has a direct and an indirect effect in two-stage models. The direct effect is the impact from advertising on demand. The indirect effect is strategic in nature: it is the impact from advertising on pricing strategies.[7] With more intensive advertising in the first stage, a firm commits, keeping all other things constant, to set a high price in the second stage. At the same time, a higher advertising intensity forces the other firm to set a low price. In short, advertising serves as a commitment strategy.

In our model, targeting has an effect on this commitment effect. If a firm

[7] See also Peitz and Belleflamme (2011, p. 151).

moves the target position close to its location in the first stage, it commits to set its own price higher in the second stage. At the same time, a target close to the own location also drives the other firm to set a higher price. This counteracts the effect from advertising intensity on the other firm to lower the price. Put together, the firms relax price competition if they move their targets away from each other.

Let us turn to the first stage now. In the first stage, the firms set advertising intensities and target positions anticipating the resulting eqilibrium prices. Firm i maximizes profits $\pi_i = p_i^*(\lambda_1, \lambda_2, q_1, q_2) D_i(\lambda_1, \lambda_2, q_1, q_2) - a\lambda_i^2/2$ with respect to λ_i and q_i.

Again, the indifferent consumer determines the demand functions. Plugging in the price functions given by the second stage in equation 1 for the indifferent consumer, the indifferent consumer becomes

$$\hat{\theta} = (3t + \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(2 + q_1 + q_2))/(6t + 6b\beta(q_2 - q_1)).$$

Then, the firms' maximization problems are

$$\begin{aligned}
\max_{\lambda_1, q_1} \quad & \left[3t + \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(2 + q_1 + q_2)\right]^2 / [18t + 18b\beta(q_2 - q_1)] \\
& - a\lambda_1^2/2, \\
\max_{\lambda_2, q_2} \quad & \left[3t - \beta(\lambda_1 - \lambda_2) + b\beta(q_2 - q_1)(4 - q_1 - q_2)\right]^2 / [18t + 18b\beta(q_2 - q_1)] \\
& - a\lambda_2^2/2.
\end{aligned}$$

To determine the firms' optimal behavior, let us rewrite the firms' maximization problems as

$$\max_{\lambda_1, q_1} N_1^2/18D - a\lambda_1^2/2$$

and

$$\max_{\lambda_2, q_2} N_2^2/18D - a\lambda_2^2/2.$$

First, examine the choice about the advertising intensity. First order conditions with respect to advertising characterize firms' optimal advertising behavior:

$$\beta N_1 = 9aD\lambda_1,$$
$$\beta N_2 = 9aD\lambda_2.$$

Solving the system consisting of these first order conditions yields optimal advertising intensity given firms' targets:

$$\lambda_1(q_1, q_2) = t\beta/3aD + b\beta^2(q_2 - q_1)(9aD(2 + q_1 + q_2) - 6\beta^2)/(9aD(9aD - 2\beta^2)),$$
$$\lambda_1(q_1, q_2) = t\beta/3aD + b\beta^2(q_2 - q_1)(9aD(4 - q_1 - q_2) - 6\beta^2)/(9aD(9aD - 2\beta^2)).$$

For optimal advertising intensities $\lambda_1(q_1, q_2)$ and $\lambda_2(q_1, q_2)$ first order conditions with respect to targets can not be met. The partial derivative with respect to target is negative for firm 1 and positive for firm 2:

$$\partial\pi_1/\partial q_1 = -N_1 b\beta[4D(1 + q_1) - N_1]/18D^2 < 0,$$
$$\partial\pi_2/\partial q_2 = N_2 b\beta[4D(2 - q_2) - N_2]/18D^2 > 0;$$

by making reference to

$$\lambda_1(q_1, q_2) - \lambda_2(q_1, q_2) = -2b\beta^2(q_2 - q_1)(1 - q_1 - q_2)/(9aD - 2\beta^2).$$

Thus, firms set the corner solutions $q_1^* = 0$ and $q_2^* = 1$ to maximize profits.

That is, firms choose maximum advertising differentiation in equilibrium.

For maximum differentiation in advertising, optimal equilibrium advertising intensity is for both firms equal to

$$\lambda^* = \beta/3a.$$

For a global maximum the second order conditions must also be satisfied. Since firms choose corner solutions, it is sufficient to verify second order conditions only with respect to advertising intensities. Second order conditions require $9a(t + b\beta(q_2 - q_1)) > \beta^2$. Taking into account $9at > \beta^2$ and the fact that $q_1 < q_2$ implied by the corner solutions, second order conditions are satisfied.

The following Proposition 1 summarizes the firms' equilibrium behavior.

Proposition 1 *In the Hotelling two-stage targeted advertising-then-pricing game firms choose target positions* $q_1^* = 0$ *and* $q_2^* = 1$ *with advertising intensity* $\lambda_1^* = \lambda_2^* = \beta/3a$*, set prices* $p_1^* = p_2^* = (3t + b\beta)/3$ *and earn profits* $\pi_1^* = \pi_2^* = t/2 + \beta(9ab - \beta)/18a$*.*

4 Discussion and Comparative Statics

In our model, targeting leaves advertising intensity unchanged compared to non-targeted advertising. Therefore, equilibrium advertising intensity λ^* does not depend on target effectiveness b. By contrast, advertising intensity depends on β and a as in the case of non-targeted advertising. Advertising intensity is higher, the higher the effect β from advertising on consumer's willingness to pay. Intuitively, the reverse is true for advertising costs a: the higher the advertising costs, the lower are firms' spending on advertising.

However, equilibrium prices increase with targeted persuasive advertising. Prices are higher than in the Hotelling model without advertising. Likewise, prices are higher than in the Hotelling model with non-targeted persuasive advertising. The reason is that targeted advertising does not increase the willingness to pay uniformly over consumers.

Since firms do not advertise consumers uniformly, the pressure from advertising on the other firm to set a lower price decreases. An increase in advertising intensity in the first stage allows the rival to set a higher price in the second stage. This relaxes price competition. Due to relaxed price competition targeting results in higher profits compared to non-targeted advertising. Thus, the firms do not neutralize each other.

Firms' target positions affect this competition-relaxing effect. The advertising intensity decreases by the square of the distance between the target and a consumer's position. With a decrease quadratic in distance, firms relax price competition more if they move their target positions away from each other. Targets locate at the extremes in the market. Thus, targeted advertising that increases the willingness to pay results in maximum advertising differentiation.

The effect from targeting on profits is ambiguous when compared to the original Hotelling model. Targeting results in higher equilibrium profits if $9ab > \beta$. This is true for effective targeting and high advertising costs in relation to the effect β from advertising. Persuasive advertising with targeting makes firms better off. This finding inverts if targeting is ineffective and advertising costs are low compared to the effect β. Then, profits are lower with targeting.

At this point, we highlight the case where consumers assess the distance between position and targets in exactly the same way as the distance between position and firm locations. This means total advertising decrease per unit distance βb equals transportation costs per unit distance t. If $\beta b = t$, targeting is effective enough such that it is always profitable.

Overall, targeted persuasive advertising that increases the willingness to pay softens the "prisoner's dilemma"-problem. The firms may even overcome the prisoner's dilemma with targeting. For the firms, advertising is beneficial. Advertising does not involve wasteful competition.

For policy considerations, these results motivate that wasteful advertising as reason for regulation should be treated carefully. At least our model shows profitable advertising if targeting is effective. For firms, advertising is not a waste of resources.

5 Conclusions

In this paper we provide another rationale for targeted advertising. With targeted advertising firms mitigate or even avoid a prisoner's dilemma problem. To study this prisoner's dilemma we introduce targeted persuasive advertising in a Hotelling framework. Persuasive advertising is of a type that increases the willingness to pay.

In our model the firms always earn higher profits with targeted advertising compared to non-targeted advertising. Compared to the original Hotelling model without advertising, the firms earn higher profits if targeting is effective. In this case, the firms avoid the prisoner's dilemma problem with targeting. Advertising is no longer wasteful competition for the firms. In any case, targeted advertising softens the prisoner's dilemma problem.

On these grounds, there is little theoretical evidence to use wasteful advertising as justification for regulations on advertising. Rather, firms have the possibility to avoid the prisoner's dilemma if they use targeting. Advertising is associated with additional profits. This contrasts the argument of wasteful advertising as reason for regulations.

A further result is maximum advertising differentiation. In our model, the decrease in advertising intensity is quadratic with respect to the distance between a consumer and firms' targets. This is analogous to Hotelling-type models with quadratic transportation costs to measure the disutility between actual and ideal good. If transportation costs are quadratic, firms have a tendency to choose the corners for their locations. As expected, this tendency also shows for target positions in our model. The firms tailor their advertising to target the extremes in consumer space.

References

[1] Adams, William James, Yellen, L. Janet, 1977, 'What Makes Advertising Profitable?', The Economic Journal, 87(347), 427-449.

[2] d'Aspremont, Claude, Gabszewicz, J. Jean, Thisse, Jacques-François, 1979, 'On Hotelling's "Stability" in Competition', Econometrica, 47(5), pages 1145-1150.

[3] Bagwell, Kyle, 2007, 'The Economic Analysis of Advertising', in M. Amstrong and R. Porter, Eds., Handbook of Industrial Organization, 3, North Holland, Amsterdam, 1701-1829.

[4] Anand, N., Bharat, Shachar, Ron, 2009, 'Targeted advertising as a signal', Quantitative Marketing and Economics, 7(3), 237-266.

[5] Belleflamme, Paul, Peitz, Martin, 2011, 'Industrial Organization - Markets and Strategies', Cambridge University Press.

[6] Bergemann, Dirk, Bonatti, Alessandro, 2011, 'Targeting in Advertising Markets: Implications for Offline Versus Online Media', The RAND Journal of Economics, 42(3), 417-443.

[7] Bloch, Francis, Manceau, Delphine, 1999, 'Persuasive advertising in Hotelling's model of product differentiation', International Journal of Industrial Organization, 17, 557-574.

[8] Brahim, Nada Ben Elhadj-Ben, Lahmandi-Ayed, Rim, Laussel, Didier, 2011, 'Is targeted advertising always beneficial?', International Journal of Industrial Organization, 29(6), 678-689.

[9] Bühler, Stefan, Halbheer, Daniel, 2012, 'Persuading Consumers with Social Attitudes', Journal of Economic Behavior & Organization, 84(1), 439-450.

[10] Dixit, Avinash, Norman, Victor, 1978, 'Advertising and Welfare', The Bell Journal of Economics, 9(1), 1-17.

[11] Eliaz, Kfir, Spiegler, Ran, 2011, 'Consideration Sets and Competitive Marketing', The Review of Economics Studies, 78(1), 235-262.

[12] Esteban, Lola, Gil, Agustín, Hernández, M., José, 2001, 'Informative Advertising and Optimal Targeting in a Monopoly', The Journal of Economics and Management Strategy, 49(2), 161-180.

[13] Esteban, Lola, Hernández, M., José, Moraga-González, José Luis, 2006, 'Customer Directed Advertising and Product Quality', The Journal of Industrial Economics, 15(4), 943-68.

[14] Grossman, M., Gene, Shapiro, Carl, 1984, 'Informative Advertising with Differentiated Products', The Review of Economic Studies, 51(1), 63-81.

[15] Hernández-García, M., José, 1997, 'Informative Advertising, Imperfect Targeting and Welfare', Economics Letters, 55(1), 131-137.

[16] Hotelling, Harold, 1929, 'Stability in Competition', The Economic Journal, 39, 41-57.

[17] Iyer, Ganesh, Soberman, David, Villas-Boas, J., Miguel, 2005, 'The Targeting of Advertising', Marketing Science, 24(3), 461-476.

[18] Johnson, P., Justin 2013, 'Targeted Advertising and Advertising Avoidance', The RAND Journal of Economics, 44(1), 128-144.

[19] Lewis, R., Tracy, Sappington, E. M., David 1994, 'Supplying Information to Facilitate Price Discrimination', International Economic Review, 35(2), 309-327.

[20] Manduchi, Agostino, 2004, 'Price Discrimination of Buyers with Identical Preferences and Collusion in a Model of Advertising', Journal of Economic Theory, 116(2), 347-356.

[21] Roy, Santanu, 2000, 'Strategic Segmentation of a Market', International Journal of Industrial Organization, 18(8), 1279-1290.

[22] Tucker, E., Catherine, 2012, 'The Economics of Advertising and Privacy', International Journal of Industrial Organization, 30(3), 326-329.

[23] von der Fehr, Nils-Henrik, Stevik, Kristin, 1998, 'Persuasive Advertising and Product Differentiation', Southern Economic Journal, 65(1), 113-126.