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Imperfect targeted advertising with two-period competition

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Abstract: A two-period model is developed to investigate the competitive effects of targeted advertising with imperfect targeting in a duopolistic market. In the first period, two firms compete in price in order to recognize customers. In the second period, targeted advertising plays an informative role and acts as a price discrimination device. The firms' optimal advertising and pricing strategies under imperfect targeting are compared with those under perfect targeting. Equilibrium decisions show that, under imperfect targeting, when the advertising cost is low enough, both firms will choose to target ads at the rivals' old segments. This equilibrium, which could not exist under perfect targeting, results in two opposite results. When cost is high, the effect of mis-targeting will soften price competition and increase profits; on the contrary, when cost is low enough, it will lead to aggressive price competition and profit loss with the increase of imperfect targeting, so firms may have incentives to reduce the mis-targeting degree.

Key words: targeted advertising; imperfect targeting; price discrimination; two-period game

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Targeted advertising, as a new marketing approach, can target advertising to specific segments of consumers within a market. To date, much research has assumed that acquired data about consumer preferences and purchasing behavior are accurate and credible. However, in practice, because of personal and objective reasons, the data may not be accurate and cannot reflect the real attributes of individual consumers. This means that a firm's targeting based on previous purchase history is imperfect. In this paper, we investigate the competitive implications of this kind of imperfect targeting.

A two-period game is established to examine the targeted advertising with imperfect targeting. For example, when a new or upgraded product is introduced to the market, two firms compete in price during the first period which is the firm's data collecting and consumer recognition process. Through consumers' price choices, the market is segmented, so firms acquire the ability to send targeted advertising and price discrimination over the next period. The key feature of this paper is that the acquired data after period 1 is assumed to be imperfect, which will result in different conclusions compared with perfect targeting.

Many previous works stress the positive effects of targeted advertising, such as profit increases and price competition mitigation[1-7]. However, some research suggests that in certain circumstances, targeted advertising will play a negative role and result in aggressive competition, even profit loss[8-9]. Another stream of work related to our paper is behavior-based price discrimination and consumer recognition[10-12]. Our present work combines targeted advertising with price discrimination in which advertising is used as a price discrimination device[13]. In addition, in all of these papers above, consumers are perfectly segmented. This means that there is no mis-targeting between different groups.

This paper was inspired by the research on imperfect targetability which received limited attention in previous research. Chen et al.[14] provided the first rigorous analysis of individual marketing with imperfect targetability, but they only focused on targeted price. In this paper, we highlight the importance of advertising which acts as a price discrimination device. Iyer et al.[5] also paid attention to the leakage of targeted advertising and found that increasing leakage reduces the equilibrium profits. But Chen and Iyer et al. ignored the data collecting and consumer recognition process, which is the first step of behavior-based targeted advertising and price discrimination.

1 Assumptions

Consider a market consisting of two risk-neutral firms, denoted by A, B. Each firm i produces a homogeneous product but different brands to end consumers at a constant marginal production cost, which is, without loss of generality, normalized to zero. Firms do not incur any other cost for marketing except the advertising cost (in this paper, $i, j = A, B, i \neq j$).

On the demand side, every customer buys at most one unit of goods in each period and has a common reservation price r. To depict the heterogeneity of customers, following Varian et al.[15-16], we assume that there are three segments in the market. First, each firm has its loy-

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al customers with identical size α who are price-insensitive shoppers and purchase only from the firm as long as the charged price is below r. The rest consumers are price-sensitive comparison buyers with size β, and they switch between two brands according to the lowest price. The total number of customers is normalized to 1, so we have $2\alpha+\beta=1, \beta\in(0,1)$ and $\alpha\in(0,1/2)$.

Suppose that advertising plays an informative role and acts as a price discrimination device. According to Ref. [5], advertising cost is linearly related to the advertised segment size. So the expenditure for the entire market is c, to the loyal segment and comparison segment are αc, βc, respectively.

Firms are expected to maximize profit and behave non-cooperatively, taking the rival's strategy into account. The size of each segment is common knowledge to both firms, but an individual's specific type is a "mystery". In period 1, firms simultaneously set uniform prices. The firm with the lower price will attract all the switchers and thus lose the ability to distinguish between its own loyal consumers and switchers, at the same time, has no choice but to charge a uniform price in period 2. On the contrary, the firm with the higher price only sells to its loyal segment, so it can recognize these loyal customers and charge two prices in period 2: one for the identified segment, the other for the rest of the market which has not been identified. Through price competition and consumers' own choice, customer recognition will be achieved at the end of period 1. In period 2, they decide their advertising and pricing strategies.

2 Benchmark Case

We start by establishing the benchmark case where consumer recognition based on price competition of period 1 is dependable and accurate. This benchmark case will help us isolate the competitive effect of imperfect targeting. Backward induction is used to derive the equilibrium.

2.1 Equilibrium in the second period

Starting with the second-period game, a firm's advertising and pricing strategies in this period depend on the results of price competition in the first stage. In period 1, according to the same logic as in Varian and Narasimhan[15-16], the deviant firm can always undercut price slightly enough to capture all the switchers and earn more profits. So there is no pure strategy equilibrium in prices and a unique mixed-strategy equilibrium exists where both firms' equilibrium price supports are identical. Define p_{it} as firm i's price in period t (i = A, B, t = 1, 2). Without loss of generality, we assume $p_{A1}<p_{B1}$. In this case, all switchers buy from Firm A in period 1. It means that, in period 2, Firm A's old consumers consist of its loyal consumers and switchers. So when choosing its advertising and pricing strategies, Firm A definitely does not target ads to the new segment (Firm B's loyal consumers) who can never be induced. To its old segment, it may choose to or not to advertise, if not, the profit is zero; if it does advertise, it has to charge a uniform price, denoted by p_{A2}. On the other hand, Firm B's previous consumers are precisely loyal segment α and thus it can charge two prices: one for the old identified loyal consumers p_{B2}^{o}, the other for the new non-identified segment p_{B2}^{n}. Clearly, it is profitable for B to target the old segment and charge the maximum price r. It also has a choice whether to target the new customers, and compete for the non-identified switchers. Therefore, there are four subgames (we use capital S for short).

S1: Both firms target ads only to their old segment.

S2: Firm A targets the old segment; Firm B chooses the entire market.

S3: Firm A does not advertise; Firm B only targets the old segment.

S4: Firm A does not advertise; Firm B chooses the entire market.

The payoffs of the four subgames are shown in Tab. 1. The results of S1, S3 and S4 are obvious, and the detailed computation of S2 follows Narasimhan[16].

Tab. 1 The payoff matrix under perfect targeting

Payoff		Firm B	
		Old segment	Entire market
Firm A	Old segment	$(\alpha+\beta)(r-c)$, $\alpha r-\alpha c$	$\alpha r-(\alpha+\beta)c$, $\alpha r-\alpha c+\frac{\alpha\beta r}{\alpha+\beta}-(\alpha+\beta)c$
	No ads	0, $\alpha r-\alpha c$	0, $\alpha r-\alpha c+\beta r-(\alpha+\beta)c$

Proposition 1 When the advertising cost $\frac{\alpha\beta r}{(\alpha+\beta)^2}\leqslant c<r$, both firms advertise to their old segment; when $0<c<\frac{\alpha\beta r}{(\alpha+\beta)^2}\leqslant 0.25r$, Firm A targets its old segment and Firm B chooses the whole market.

Proposition 2 When the cost is high $\frac{\alpha\beta r}{(\alpha+\beta)^2}\leqslant c<r$, an aggressive price competition will arise in the first period; on the contrary, when $0<c<\frac{\alpha\beta r}{(\alpha+\beta)^2}\leqslant 0.25r$, the price competition of period 1 will be mitigated.

2.2 Equilibrium in the first period

When making pricing decisions in period 1, firms rationally anticipate that their strategies will affect the profits in the second period. Similar to the previous analysis, a mixed symmetric equilibrium exists. A rational firm will make the choice to maximize the total profits of two periods. Denote the equilibrium distribution function $F_{i1}(p)$ as the possibility that firm i's price is lower than p in period 1. In the symmetric equilibrium where $F_{i1}(p)=F_{j1}(p)=F_1(p)$, each firm's two-period expected profit which is denoted by π_i is

$$\pi_i = [\alpha + (1 - F_{j1}(p_{i1}))\beta] p_{i1} + [(1 - F_{j1}(p_{i1}))\pi_{A2} + F_{j1}(p_{i1})\pi_{B2}] \quad p_{i1} \in [p_{1\min}, p_{1\max}] \tag{1}$$

$$F_1(p) = 1 - \frac{\alpha(r-p)}{\beta p + \pi_{A2} - \pi_{B2}} \quad p \in [p_{1\min}, p_{1\max}] \tag{2}$$

$$p_{1\max} = r,\ p_{1\min} = \frac{\alpha r + \pi_{B2} - \pi_{A2}}{\alpha + \beta} < r,\ \pi_i = \alpha r + \pi_{B2}$$

Proposition 3 With perfect targeting, in period 1, firms set prices according to

$$F_1(p) = \begin{cases} 1 - \dfrac{\alpha(r-p)}{\beta p + \beta r - \beta c} & p \in \left[\dfrac{\alpha r - \beta r + \beta c}{\alpha + \beta},\ r\right];\ \dfrac{\alpha\beta r}{(\alpha+\beta)^2} \leqslant c < r \quad (\text{S1}) \\ 1 - \dfrac{\alpha(r-p)}{\beta p + \alpha c - \dfrac{\alpha\beta r}{\alpha+\beta}} & p \in \left[\dfrac{\alpha r + \dfrac{\alpha\beta r}{\alpha+\beta} - \alpha c}{\alpha+\beta},\ r\right];\ 0 < c < \dfrac{\alpha\beta r}{(\alpha+\beta)^2} \quad (\text{S2}) \end{cases} \tag{3}$$

Each firm's two-period profits are given by

$$\pi_i = \begin{cases} 2\alpha r - \alpha c & \dfrac{\alpha\beta r}{(\alpha+\beta)^2} \leqslant c < r \\ 2\alpha r - \alpha c + \dfrac{\alpha\beta r}{\alpha+\beta} - (\alpha+\beta)c & 0 < c < \dfrac{\alpha\beta r}{(\alpha+\beta)^2} \leqslant 0.25r \end{cases} \tag{4}$$

3 Targeted Advertising with Imperfect Targeting

Consumer recognition of period 1 is a process to make consumers endogenously segmented into different groups. This classification is assumed to be accurate in the benchmark case, but in practice, it is always a less-than-perfect probability. This means that firms' perceived consumer segmentation differs from the actual situation. For example, the customer happens to purchase only when the firm offers promotions or when he/she receives coupons.

3.1 Equilibrium in the second period

Consistent with the assumption $P_{A1} < P_{B1}$, consumers are classified into two parts: Firm A's old segment (perceived A's loyal consumers and switchers: $\alpha + \beta$), B's old segment (perceived B's loyal consumers α). We depict the imperfect targeting as that, at the end of period 1, some switchers may not buy from A, but switch to firm B; similarly, some B's actual loyal consumers may be mistakenly classified into A's segment. There is no need to consider the mis-targeting between loyal consumers and switchers in segment A, because these consumers are mixed, and the mis-targeting does not affect Firm A's results. We require that firms' perception about the market segmentation should be unbiased, so the consumers exchanging between two firms' old segment will be the same, denoted by $\alpha\varphi$, where φ is the fraction of B's loyal consumers which are switchers. We assume that $\alpha\varphi \leqslant \beta \leqslant \alpha$, $\alpha \in \left[\frac{1}{3}, \frac{1}{2}\right]$, $\beta \in \left[0, \frac{1}{3}\right]$.

Due to imperfect targeting, the advertising and pricing strategies will be affected. Advertising plays an informative role and can target particular segments. So for Firm B, it is profitable to advertise to the old segment (including parts of B's loyal consumers and some switchers), and it also has a choice of the new part consisting of A's loyal consumers, parts of switchers and some of B's loyal consumers. Firm A, compared to the basic case that it definitely does not target a new segment, in the case of being imperfect, there is some probability for it to advertise to new segment for pursuing the mistaken switchers in B's old segment. Thus, there are also 2×2 subgames. The results are shown in Tab. 2

S1: Both firms target their old segment.

S2: Firm A targets the old segment; Firm B chooses the entire market.

S3: Firm A advertises to the entire market; Firm B only targets the old segment.

S4: Both firms choose the entire market.

Tab. 2 The payoff matrix under imperfect targeting

Payoff		Firm B	
		Old segment	Entire market
Firm A	Old segment	$(\alpha+\beta-\alpha\varphi)r - (\alpha+\beta)c$, $\alpha r - \alpha c$	$\alpha r - (\alpha+\beta)c$, $\alpha r - \alpha c + \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi} - (\alpha+\beta)c$
	Entire market	$(\alpha+\beta-\alpha\varphi)r - (\alpha+\beta)c + (\alpha-\alpha\varphi)r\varphi - \alpha c$, $(\alpha-\alpha\varphi)r - \alpha c$	$\alpha r - (\alpha+\beta)c + (\alpha-\alpha\varphi)r\varphi - \alpha c$, $(\alpha-\alpha\varphi)r - \alpha c + \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi} - (\alpha+\beta)c$

Proposition 4 When the advertising cost is high, $\dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} < c < r$, both firms only target their old segments; when the cost is mediate, $(\varphi - \varphi^2)r < c \leqslant \dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)}$, Firm A targets its old segment, Firm B chooses the entire market; when the cost is low, $0 < c \leqslant (\varphi - \varphi^2)r$, $\varphi \in \left(0, \dfrac{\beta}{\alpha}\right)$, both firms advertise to the entire market.

Proposition 5 When the advertising cost is high, $\dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} < c < r$, price competition in period 1 will be mitigated with the increase of the extent of mis-targeting φ. This mitigation continues to occur when the cost is mediate, $(\varphi - \varphi^2)r < c \leqslant \dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)}$;

however, when the cost is low, $c \leqslant (\varphi - \varphi^2) r$, price competition will be promoted with increasing φ.

3.2 Equilibrium in the first period

A symmetric mixed equilibrium exists. Denote the equilibrium distribution function $F_{i1}^{\mathrm{IM}}(p)$ as the possibility that firm i's price is lower than p in period 1 under imperfect targeting. At a symmetric equilibrium where $F_{i1}^{\mathrm{IM}}(p) = F_{j1}^{\mathrm{IM}}(p) = F_1^{\mathrm{IM}}(p)$, each firm's two-period expected profit is given by

$$\pi_i^{\mathrm{IM}} = [\alpha + (1 - F_{j1}^{\mathrm{IM}}(p_{i1}))\beta] p_{i1} + [(1 - F_{j1}^{\mathrm{IM}}(p_{i1}))\pi_{\mathrm{A2}} + F_{j1}^{IM}(p_{i1})\pi_{\mathrm{B2}}] \qquad p_{i1} \in [p_{1\min}, p_{1\max}] \tag{5}$$

$$F_1^{\mathrm{IM}}(p) = 1 - \frac{\alpha(r-p)}{\beta p + \pi_{\mathrm{A2}} - \pi_{\mathrm{B2}}} \qquad p \in [p_{1\min}^{\mathrm{IM}}, p_{1\max}^{\mathrm{IM}}] \tag{6}$$

$$p_{1\max}^{\mathrm{IM}} = r,\ p_{1\min}^{\mathrm{IM}} = \frac{\alpha r + \pi_{\mathrm{B2}} - \pi_{\mathrm{A2}}}{\alpha + \beta},\ \pi_i^{\mathrm{IM}} = \alpha r + \pi_{\mathrm{B2}}$$

Proposition 6 With imperfect targeting, in period 1, firms set prices according to

$$F_1^{IM}(p) = \begin{cases} 1 - \dfrac{\alpha(r-p)}{\beta p + \beta r - \beta c - \alpha\varphi r} & p \in \left[\dfrac{\alpha r - \beta r + \beta c + \alpha r\varphi}{\alpha + \beta},\ r\right];\ \dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} < c < r \quad (\mathrm{S1}) \\ 1 - \dfrac{\alpha(r-p)}{\beta p + \alpha c - \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi}} & p \in \left[\dfrac{\alpha r + \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi} - \alpha c}{\alpha+\beta},\ r\right];\ (\varphi-\varphi^2) r < c \leqslant \dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} \quad (\mathrm{S2}) \\ 1 - \dfrac{\alpha(r-p)}{\beta p + 2\alpha\varphi r - \alpha r\varphi^2 - \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi}} & p \in \left[\dfrac{\alpha r - 2\alpha\varphi r + \alpha r\varphi^2 + \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi}}{\alpha+\beta},\ r\right];\ c \leqslant (\varphi-\varphi^2) r \quad (\mathrm{S4}) \end{cases} \tag{7}$$

Each firm's two-period profits are given by

$$\pi_i^{\mathrm{IM}} = \begin{cases} 2\alpha r - \alpha c & \dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} < c < r \\ 2\alpha r - \alpha c + \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi} - (\alpha+\beta) c & (\varphi-\varphi^2) r < c \leqslant \dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} \\ (2\alpha - \alpha\varphi) r - \alpha c + \dfrac{\alpha\beta r}{\alpha+\beta-\alpha\varphi} - (\alpha+\beta) c & c \leqslant (\varphi-\varphi^2) r \end{cases} \tag{8}$$

4 Competitive Effects of Imperfect Targeting

From the analysis above, firms' strategies in the second period will be changed because of imperfect targeting. In that case, firms may have an incentive to distort their first-period behavior for the adjustment in period 2. At the same time, there is some impact on total profit.

4.1 First-period prices

Proposition 7 When the advertising cost is high, the mis-targeting effect can soften price competition. However, when the cost is low, an aggressive price competition will arise with the increase of φ, and qualitatively change the incentive environment.

Compared (3) with (7), when the cost is high, $\dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} < c < r$, both firms only target their old segments (S1); when the cost is mediate, $\dfrac{\alpha\beta r}{(\alpha+\beta)^2} c < \dfrac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)}$, they choose S1 under perfect targeting and S2 under imperfect targeting. If the cost is low, $(\varphi-\varphi^2) r < c < \dfrac{\alpha\beta r}{(\alpha+\beta)^2}$, they both choose S2. It is easy to prove that the support of equilibrium prices in benchmark case is lower than that of imperfect targeting.

Similarly, compared the equilibrium distribution functions under perfect targeting with that under imperfect targeting, denoted by $F_i(p)$, $F_i^{\mathrm{IM}}(p)$, respectively, we find that in the three kinds of situations above, $F_i(p)$ first-order stochastically dominates $F_i^{\mathrm{IM}}(p)$. It means that the average first-period price under imperfect targeting is higher than that under perfect targeting, so the price competition is softened. When the advertising cost is low enough, $0 < c \leqslant (\varphi-\varphi^2) r$, they choose S2 under perfect targeting and choose S4 under imperfect targeting. This kind of equilibrium cannot exist under perfect targeting. In contrast to the previous conclusion, in this case, the support of equilibrium prices in the benchmark case is higher than that of imperfect targeting, meanwhile the equilibrium distribution functions $F_i^{\mathrm{IM}}(p)$ first-order stochastically dominates $F_i(p)$, the average price under imperfect targeting will be lower than that of perfect targeting, so price competition in period 1 is intensified. The first part of conclusion is consistent with Ref. [14], in which the mis-targeting effect can soften price competition, but we prove that when advertising is low enough, the price competition will be intensified.

When the advertising cost is high and two firms can only target their old segments, the increase of the mis-targeting extent φ under imperfect targeting results in a great profit loss to the low price firm in period 1, in that case,

forward looking firms have an incentive to raise prices in order to avoid the profit loss in the next period. When the advertising cost is lower and only the high price firm of period 1 is beneficial to target the rival's segment, the firm can obtain more profits resulting from extra switchers as loyal consumers under imperfect targeting, so the support of prices and the average price will be higher. If the advertising cost is low enough, the mis-targeting will cause two firms to compete in each other's old segment which does not exist under perfect targeting. We know that, in S2 under perfect targeting, the profit of the high-price firm is always larger than that of the low-price firm, so the price competition is mitigated. In comparison with that, under imperfect targeting, the higher φ, the more benefit for low-price firms in period 1, which encourages two firms to reduce prices. So an aggressive price competition will arise; meanwhile this situation will make the high-price firm of period 1 reduce the error rate or increase targetability. This conclusion can also be explained by Proposition 3 and Proposition 5.

Fig. 1 plots for $r=1, \alpha=\frac{2}{5}, \beta=\frac{1}{5}, \varphi=0.2$. $F_i(p)$, $F_i^{\mathrm{IM}}(p)$ are shown with different advertising costs, respectively. Obviously, firms under imperfect targeting charge higher expected first-period price when the advertising cost is relatively high; however, when the cost is low enough, the expected price under imperfect targeting is lower than that under perfect targeting.

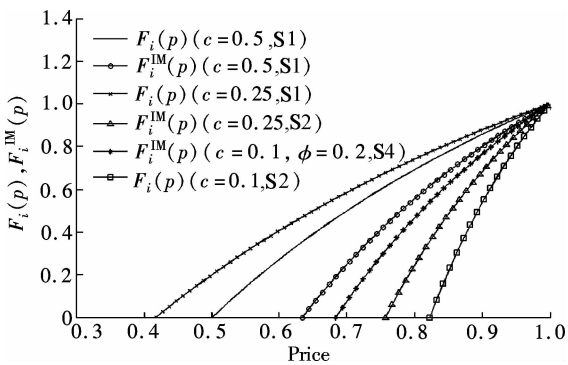

Fig. 1 Cumulative distribution functions for prices under perfect and imperfect targeting

4.2 Profits

Proposition 8 when the advertising cost is high, $\frac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)} < c < r$, overall expected profit remains unchanged; when the cost is reduced to $(\varphi-\varphi^2)r < c < \frac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)}$, expected profit increases because of the existence of mis-targeting; however, when the cost is low enough, the overall profit will decrease under imperfect targeting compared with perfect targeting.

From Eqs. (4) and (8), it is shown that with different advertising costs and equilibrium strategies, the competitive effect of imperfect targeting on profits is different. If advertising cost is high, the profit loss in period 2 is compensated by the additional profit in period 1, so the expected profit stays unchanged $\pi_i=\pi_i^{\mathrm{IM}}$. If the cost is mediate, only the high price firm in period 1 is able to target the rival's segment which means that the existence of mis-targeting gives the firm an opportunity to obtain more profits $\pi_i<\pi_i^{\mathrm{IM}}$. If the advertising cost is low enough, under imperfect targeting, it is beneficial for two firms to compete for the rival's segment in period 2. However, the fierce price competition in the whole market may lead to a great profit loss compared with perfect targeting, so $\pi_i>\pi_i^{\mathrm{IM}}$. Fig. 2 also plots for $r=1, \alpha=\frac{2}{5}, \beta=\frac{1}{5}, \varphi=0.2$. The equilibrium profits change with cost c under imperfect and perfect targeting. The picture below proves Proposition 8. Fig. 3 describes the equilibrium profits as a function of φ under imperfect targeting. When the cost is mediate, $(\varphi-\varphi^2)r < c < \frac{\alpha\beta r}{(\alpha+\beta)(\alpha+\beta-\alpha\varphi)}$, profits are improved with the increase of φ; however, when the cost is low enough, $0<c\leqslant(\varphi-\varphi^2)r$, profits become worse along with higher φ.

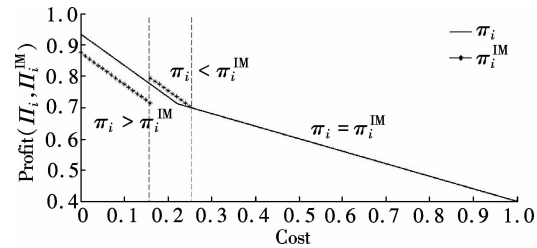

Fig. 2 Profits as a function of cost c under imperfect and perfect targeting

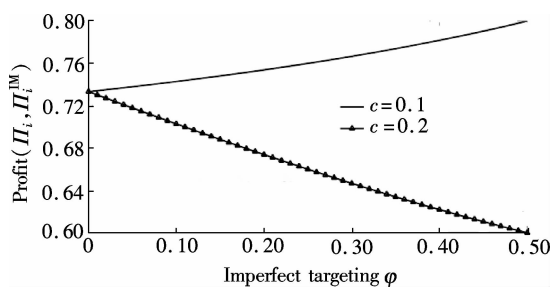

Fig. 3 Profits as a function of imperfect targeting φ

5 Conclusion

This paper compares the firms' optimal advertising and pricing strategies under imperfect targeting with those under perfect targeting. A two-period model is developed to investigate the competitive effects of imperfect targeting in a duopolistic market. Results show that: 1) The existence of imperfect targeting results in an additional conclusion compared to perfect targeting; that is when the ad-

vertising cost is low enough, two firms competing with each other in the rivals' segment. 2) The mis-targeting effect can soften price competition and increase profit when the advertising cost is high enough, which is consistent with Chen's results; however, when the cost is low enough, an aggressive price competition and profit loss will arise with the increase of mis-targeting. So firms may have incentives to reduce the mis-targeting degree.

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不完美定向广告的两阶段竞争模型

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摘要:研究了双寡头市场条件下,基于不完美定向的定向广告竞争模型. 通过两阶段博弈来描述新产品或升级产品引入时不完美定向对企业广告及定价决策带来的影响. 第一阶段通过价格竞争辨识消费者,第二阶段广告作为传递产品信息和价格歧视的工具. 比较分析不完美定向与完美定向情况下企业的广告和定价策略,均衡结果显示:在不完美定向条件下,当广告成本足够低时,会出现在完美定向情境下不可能出现的均衡,即两企业均会选择向对方的优势市场投入广告. 这一均衡的存在会导致 2 种相反的结果:当广告成本较高时,不完美定向能缓和价格竞争并增加企业利润;但当广告成本足够低时,随着不完美定向程度的增加,反而会加剧市场竞争并导致企业利润损失,因此,企业有动机降低定向误差的程度.

关键词:定向广告;不完美定向;价格歧视;两阶段博弈

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