

Optimal targeted advertising strategies based on consumers' value attributes

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Abstract: To evaluate the effects of consumers' value attributes on a firm's marketing strategies with targeted advertising, each consumer's value is measured according to the consumer's consuming behavior and consumption features. The baseline model in which a firm sends targeted advertising to myopic consumers with constant valuations is established. The results show that, when a firm sells products to consumers with distinct values using the strategies of targeted advertising and discriminative price, the firm's equilibrium profit with targeted advertising may not always be higher than that using mass advertising, which depends on the ratio of high-value and low-value consumers. Then, three extension models are constructed. First, the firm sends targeted advertising to consumers with different targeting precisions. Secondly, the firm invests in the targeting precision of targeted advertising. Finally, the deliberation cost of rational consumers accepting the discriminative price and targeted advertising is considered. The results indicate that it is profitable for a firm to send targeted advertising to consumers with different value attributes.

Key words: targeted advertising; myopic consumer; rational consumer; high-value consumer; low-value consumer

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Informative advertising is used to generate demand for a product and make potential customers aware of the existence of the new product, as well as of its characteristics^[1]. Currently, many industries, including supermarkets, airlines, and credit cards, have compiled vast databases of consumers' transactions and can make specific offers to individual consumers by sending direct mail or other forms of targeted marketing^[2-3]. It is possible for a firm to send precisely targeted advertising to potential consumers^[4]. The traditional view on the role of targeted advertising is that targeting allows the firm to eliminate "wasted" advertising to consumers whose preferences do not match a product's attributes. Moreover, the targeting of advertising leads to higher profits, regardless of whether

or not the firms have the ability to set targeted prices^[5].

Although sellers can easily use targeted strategies for promotion, consumers are far from defenseless. With the development of anonymous technologies, no one is forced to join a loyalty program. In a previous study, advertising in the online social networking environment is more likely to be avoided if the consumer has an expectation of a negative experience or if the consumer is skeptical towards the advertising message^[6]. Not all customers are equally valuable to firms, because some consumers might purchase more than others or contribute more to a firm's profit^[7]. Only a small proportion of customers contribute to the majority of purchases and profits in a category^[8]. Therefore, it is feasible to create a discriminative price so as to distinguish high-value and low-value consumers, and the merchant will never find it optimal to do so^[3]. There is evidence that Internet merchants have attempted to use "dynamic pricing" on price discrimination^[9]. Otherwise, better consumer information enables firms to focus their targeted advertising spending on more valuable consumers^[10].

Our work relates to the previous economics literature on informative advertising and targeting. Grossman et al.^[11] introduced product differentiation via a circle model to show how informative advertising affects price competition in an oligopoly market and proved that targeting of advertising might reduce the firm's advertising cost. Esteban et al.^[12-13] argued that the overall level of advertising falls with targeting in a monopolistic framework and proved that the targeting allows sellers to charge higher prices and benefits firms and lower consumer surplus. Zhang et al.^[14] proved that customer recognition is critical for a firm. Likewise, Johnson^[15] considered the avoidance of targeted advertising by the consumers, and still he also argued that targeted advertising will always be beneficial for the firms. Unlike these contributions, Brahim et al.^[16] proved that a firm's equilibrium profits may be lower with perfect targeted advertising relative to mass advertising. The recent studies also show that when competition is high, the intermediary lowers the targeting accuracy so that the consumers see fewer relevant ads^[17]. With informative advertising, the quality of products can be described in detail, thereby affecting consumers' deliberation incentives, preferences, product choices as well as a firm's profit^[18]. Some firms in the luxury industry in

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the US secretly send informative mailing to their best clients^[19]. Generally, the customers can be divided into myopic and rational consumers. The myopic consumers will purchase as long as the price is lower than their expectations, whereas the rational consumers will refuse the current purchase due to the consideration of a future possible lower price^[20]. From the view of a firm, the customer's value can be measured according to their consuming behaviors and consumption features, which is the critical standard for its marketing decisions.

Therefore, to explore the effect of consumers' value attributes on the firm's targeted advertising, the benchmark model with myopic consumers and monopolistic firm creating the discriminative price and targeted advertising is constructed. Then, the model with rational consumers and monopolistic firm performing investment on targeting precision is extended. Later, the effect of consumer's deliberation cost on the firm's advertising strategies is studied.

1 Model Setup

1.1 Assumptions

We begin with a simple model of a single profit-maximizing firm selling products with a zero marginal cost. We assume that the purchase histories of customers can be recorded by the firm with technologies such as loyalty program identification, credit card numbers, static Internet addresses, and HTTP cookies or other devices. Consumers are endowed with preferences over product attributes. We assume that the consumers do not search for information about the products; therefore, without advertising, the consumers do not know the existence of the products or their characteristics. The advertising of the product conveys the information that the product exists and its product attributes (which might also include the price). Informative advertising is necessary for the consumers to be in the market and to consider the product.

We also assume that consumers may avoid being tracked by deleting cookies from their browser, using different credit card numbers, or adopting other privacy-enhancing technologies such as anonymous payment. The mechanism is referred to as "anonymization technology". Consumers use advertising for new products to obtain information about key product features. The formulation is consistent with the role that advertising plays in mature product categories. For simplicity, we restrict the model to two consumer types and two periods. Each consumer's demand is considered to be for one product at most. Let v_h be the high-value type's willingness to pay for one unit of consumption after receiving the advertising (preservation price), and the fraction of these high-value consumers is α . Let v_l be the low-value type's willingness to pay for one unit of consumption (preservation price), and the fraction of these consumers is denoted as $1 - \alpha$. Let ϕ indicate the probability of consumers in both types that have

received the mass advertising or so-called advertising intensity. The cost of reaching fraction ϕ of consumers is assumed to be $A(\phi) = \lambda\phi^2/2$ with a maximum advertising expenditure of $\lambda/2$, where λ is the cost parameter.

1.2 Benchmark model

In this model, we consider that all consumers are myopic. The myopic consumers make their purchase decision according to the price they see today while receiving the advertisement, not recognizing the price they face on the next purchase which may depend on today's behavior. With mass advertising, the firm cannot perform price discrimination, and can set a high preservation price at $p_h = v_h$. In this situation, only a ϕ proportion of consumers can receive the ads. Clearly, when the consumers with distinct preservation price receive the ads, only the high-value consumers will purchase the product, which indicates that the firm can obtain profits from high-value consumers with mass advertising.

$$\pi_h^r = \alpha v_h \phi - \frac{\lambda}{2} \phi^2 \quad (1)$$

According to the FOC condition, $\frac{\partial \pi_h^r}{\partial \phi} = \alpha v_h - \lambda \phi = 0$.

As $\frac{\partial^2 \pi_h^r}{\partial \phi^2} = -\lambda < 0$, the firm's optimal advertising intensity can be expressed as $\phi^* = \frac{\alpha v_h}{\lambda}$. In equilibrium, $\pi_h^* = \frac{\alpha^2 v_h^2}{2\lambda}$.

Likewise, the firm can choose a low preservation price at $p_l = v_l$ when informative advertising is sent to all consumers, and only a probability of ϕ can acquire the ads. Clearly, as the preservation price is quite low, the consumers must purchase the products as long as they receive the ads. Then, the firm's profit can be expressed as

$$\pi_l^r = v_l [\alpha + (1 - \alpha)] \phi - \frac{\lambda}{2} \phi^2 \quad (2)$$

According to the FOC condition, $\frac{\partial \pi_l^r}{\partial \phi} = v_l - \lambda \phi = 0$.

As $\frac{\partial^2 \pi_l^r}{\partial \phi^2} < 0$, the optimal advertising intensity can be expressed as $\phi^* = \frac{v_l}{\lambda}$. In equilibrium, $\pi_l^* = \frac{v_l^2}{2\lambda}$.

The comparison of π_h^* and π_l^* indicates that the firm might adopt the first high-price strategy and mass advertising when $\alpha v_h > v_l$. Or else, the firm must adopt the low-price strategy and mass advertising.

1.3 Targeted advertising and discriminative price

In this model, we assume that the advertising intensities of targeted advertising sending to both high-value and

low-value consumers are ψ_h^t and ψ_l^t , respectively.

Therefore, the firm's profit with targeted advertising toward distinct consumers can be expressed as

$$\pi^t = \alpha \left(v_h \psi_h - \frac{\lambda}{2} \psi_h^2 \right) + (1 - \alpha) \left(v_l \psi_l - \frac{\lambda}{2} \psi_l^2 \right) \quad (3)$$

According to the FOC condition, $\frac{\partial \pi^t}{\partial \psi_h} = 0$, $\frac{\partial \pi^t}{\partial \psi_l} = 0$. As $\frac{\partial^2 \pi^t}{\partial \psi_h^2} < 0$ and $\frac{\partial^2 \pi^t}{\partial \psi_l^2} < 0$, the firm's equilibrium profit can be expressed as

$$\pi_h^{t*} = \frac{v_h^2 \alpha}{2\lambda} + \frac{v_l^2 (1 - \alpha)}{2\lambda} = \frac{v_l^2 + (v_h^2 - v_l^2) \alpha}{2\lambda} \quad (4)$$

Proposition 1 When $\alpha v_h < v_l$, $\pi^{t*} > \pi^{r*}$. The firm's equilibrium profit using targeted advertising is higher than that using mass advertising; however, when $\alpha v_h > v_l$, $\pi^{t*} < \pi^{r*}$. The firm's equilibrium profit using targeted advertising is also higher than that using mass advertising.

Proof As $0 < \alpha < 1$, it is easy to acquire $\alpha^2 < \alpha$. According to the FOC condition, $\pi^{t*} = \frac{\alpha v_h^2 + (1 - \alpha) v_l^2}{2\lambda}$.

The following inequations can be easily obtained: $\frac{\alpha v_h^2 + (1 - \alpha) v_l^2}{2\lambda} > \frac{\alpha^2 v_h^2 + (1 - \alpha) v_l^2}{2\lambda} > \frac{\alpha^2 v_h^2}{2\lambda}$. According to

the aforementioned equation $\pi_l^{t*} = \frac{v_l^2}{2\lambda}$, the relation of the firm's equilibrium profits using targeted advertising and mass advertising can be derived, $\pi^{t*} > \pi^{r*}$.

2 Model Extension

2.1 Investment on the targeting precision of targeted advertising

Due to the asymmetric property between firms and consumers with distinct values, under some conditions, it is difficult for the firm to obtain the ideal information about the consumers and send targeted advertising to the targeted consumers. The firm can send imperfect targeted advertising to them. Here, the control variable of targeted precision is used to describe the proportion of accurate recognized consumers. We assume that the targeting precision of targeted advertising is κ . The firm needs to invest in the proper targeting precision, and the investment in the targeting precision is set to be f_κ . Clearly, when the firm uses targeted advertising for a better profit, it is necessary for a firm to afford the corresponding cost. Then, the firm's profit while using targeted advertising can be expressed as

$$\pi^t = \kappa \left[\alpha \left(v_h \psi_h - \frac{\lambda}{2} \psi_h^2 \right) + (1 - \alpha) \left(v_l \psi_l - \frac{\lambda}{2} \psi_l^2 \right) \right] - f_\kappa \quad (5)$$

Likewise, $\frac{\partial \pi^t}{\partial \psi_h} = 0$, $\frac{\partial \pi^t}{\partial \psi_l} = 0$, and $\frac{\partial^2 \pi^t}{\partial \psi_h^2} < 0$, $\frac{\partial^2 \pi^t}{\partial \psi_l^2} < 0$.

The firm's equilibrium profit can be expressed as

$$\pi^t = \kappa \frac{(1 - \alpha) v_l^2 + v_h^2}{2\lambda} - f_\kappa \quad (6)$$

Then, the comparison of the firm's profit with targeted advertising and mass advertising is shown in the following proposition.

Proposition 2 When the firm sends targeted advertising to the consumers for marketing, the firm needs to improve the accurate recognized degree of consumers, which is called targeting precision. A higher targeting precision needs an additional investment for a firm. However, the firm's profit using targeted advertising may be higher or lower than that using mass advertising. Otherwise, this difference is dependent on the investment cost for the targeting precision of κ . The variation of targeting cost affects the firm's profit directly. When $\kappa \in$

$\left(\frac{2\lambda f_\kappa \alpha^2 v_h^2}{(1 - \alpha)(\alpha v_h^2 + v_l^2)}, 1 \right)$, $\pi^{t*} > \pi^{r*}$; when $\kappa = \frac{2\lambda f_\kappa \alpha^2 v_h^2}{(1 - \alpha)(\alpha v_h^2 + v_l^2)}$, $\pi^{t*} = \pi^{r*}$; whereas if $\kappa < \frac{2\lambda f_\kappa \alpha^2 v_h^2}{(1 - \alpha)(\alpha v_h^2 + v_l^2)}$, $\pi^{t*} < \pi^{r*}$.

Proof The firm's profit with targeted advertising and mass advertising is compared. $\pi^{t*} - \pi^{r*} = \kappa \frac{(1 - \alpha) v_l^2 + v_h^2}{2\lambda} - f_\kappa - \frac{\alpha^2 v_h^2}{2\lambda}$. Consider three distinct conditions including $\pi^{t*} - \pi^{r*} > 0$, $\pi^{t*} - \pi^{r*} = 0$ and $\pi^{t*} - \pi^{r*} < 0$. Therefore, the correlation between targeting precision of targeted advertising and the consumers' value can be obtained.

2.2 Effect of rational consumers on the firm's advertising strategy

Here, we extend our model and assume that all consumers are rational. Consequently, all consumers, especially those high-value consumers, may adopt anonymization technologies to avoid the recognition of their true preservation value by the firm. The consumers are targeted for purchasing the product as low-value consumers, thereby avoiding paying a high price. Therefore, all the consumers' expected value is considered as $E(v) = \alpha v_h + (1 - \alpha) v_l$. In equilibrium, the consumer deliberation is induced. In this situation, the consumer is induced to truthfully disclose his/her ex post type according to targeted advertising with different advertising intensities for high-value consumer at ψ_h and low-value consumers at ψ_l . The optimization problem facing the seller with incentive compatibility constraints is given as

$$\max_{p_h, p_l, \psi_h, \psi_l \geq 0} \Pi^t = \alpha \left(p_h \psi_h - \frac{\lambda}{2} \psi_h^2 \right) + (1 - \alpha) \left(p_l \psi_l - \frac{\lambda}{2} \psi_l^2 \right) \quad (7)$$

$$\begin{aligned}
\text{s. t.} \quad & v_h \psi_h - p_h \psi_{h\max} \geq v_h \psi_l - p_l \psi_{l\max} \\
& v_h \psi_h - p_h \psi_{h\max} \geq 0 \\
& v_l \psi_l - p_l \psi_{l\max} \geq v_l \psi_l - p_h \psi_{h\max} \\
& v_h \psi_l - p_l \psi_{l\max} \geq 0 \\
& \psi_{h\max} = 1, \quad \psi_{l\max} = 1 \\
& p_h \leq v_h, \quad p_l \leq v_l
\end{aligned}$$

Additionally, the efficient advertising levels allow us to determine the socially efficient deliberation choice. Deliberation creates surplus by matching the supply of advertising with consumers' heterogeneous valuations.

$$\alpha(v_h \psi_h - p_h \psi_{h\max}) + (1 - \alpha)(v_l \psi_l - p_l \psi_{l\max}) - c \geq (E(v) \psi_h - p_h \psi_{h\max}, E(v) \psi_l - p_l \psi_{l\max}, 0) \quad (8)$$

According to the aforementioned equations of the strict condition, we can solve

$$\alpha(v_h \psi_h - p_h) + (1 - \alpha)(v_l \psi_l - p_l) - c \geq E(v) \psi_l - p_l \quad (9)$$

As the consumer's expected benefit can be expressed as $E(v) = \alpha v_h + (1 - \alpha) v_l$, we can solve

$$p_h - p_l \geq v_l(\psi_h - \psi_l) + \frac{c}{1 - \alpha} \quad (10)$$

Meanwhile, according to (8), we can acquire the following inequation:

$$p_h - p_l \leq v_h(\psi_h - \psi_l) - \frac{c}{\alpha} \quad (11)$$

Therefore, the following proposition can be obtained.

Proposition 3 When all consumers are deemed as rational consumers, if there is some deliberation cost for the consumers, all consumers will not purchase the product even if the price of product is equal to the preservation price. Then, the price of product for the low-value consumers should be set as $p_l = v_l \psi_l$. However, the price of product for high-value consumers should be set as $p_h = v_l \psi_l + \psi_h(\psi_h - \psi_l) - \frac{c}{\alpha}$. Thus, the price of product for low-value consumers shows no correlation with that of deliberation cost, whereas it is correlated with the price for high-value consumers.

According to Proposition 3, the firm's profit can be expressed as

$$\begin{aligned}
\max_{\psi_h, \psi_l \geq 0} \Pi^t = & \alpha \left(v_h - \frac{\lambda}{2} \right) \psi_h^2 + (1 - \alpha) \left(v_l - \frac{\lambda}{2} \right) \psi_l^2 + \\
& \alpha(v_l - v_h) \psi_h \psi_l - c \psi_h
\end{aligned} \quad (12)$$

The constrained conditions (9) and (10) indicate that

$$\psi_h - \psi_l \geq \frac{c}{\alpha(1 - \alpha)(v_h - v_l)} \quad (13)$$

To obtain the firm's optimal profit, the Lagrange multiplier

(ξ) and the Kuhn-Tucker conditions (13) are used, and the following equation can be obtained:

$$\begin{aligned}
\min_{\psi_h, \psi_l, v_h, v_l \geq 0} F(\psi_h, \psi_l, \xi) = & -\alpha \left(v_h - \frac{\lambda}{2} \right) \psi_h^2 - \\
& (1 - \alpha) \left(v_l - \frac{\lambda}{2} \right) \psi_l^2 - \alpha(v_l - v_h) \psi_h \psi_l + c \psi_h + \\
& \xi \left[\psi_l - \psi_h + \frac{c}{\alpha(1 - \alpha)(v_h - v_l)} \right]
\end{aligned} \quad (14)$$

After solving this model, we can acquire the following proposition.

Proposition 4 When the firm has perfect targeting precision, it can send targeted advertising to the population with different values. If all the consumers are rational consumers, the advertising intensity of advertising sending to the high-value consumers and low-value consumers are considered to be

$$\begin{aligned}
\psi_l^* = & \min \left(\frac{c(v_l - v_h)}{-(1 - \alpha)(2v_l - \lambda)(2v_h - \lambda) + \alpha(v_l - v_h)^2}, 1 \right) \\
\psi_h^* = & \min \left(\frac{c(1 - \alpha)(2v_l - \lambda)}{\alpha(1 - \alpha)(2v_l - \lambda)(2v_h - \lambda) - \alpha^2(v_l - v_h)^2}, 1 \right)
\end{aligned}$$

or

$$\begin{aligned}
\psi_l^* = & \min \left(\frac{c[\lambda - 2v_l - \alpha(v_h - v_l)]}{(2v_l - \lambda)(1 - \alpha)(v_h - v_l)}, 1 \right) \\
\psi_h^* = & \min \left(\frac{c[(2v_l - \lambda)(1 - \alpha) - \alpha^2(v_h - v_l)]}{\alpha(2v_l - \lambda)(1 - \alpha)(v_h - v_l)}, 1 \right)
\end{aligned}$$

Additionally, the advertising intensity of targeted advertising is proportional to the deliberation cost of an individual consumer, which means that the advertising intensity increases with an augmented deliberation cost of consumers.

Proof According to the FOC condition,

$$\begin{aligned}
\frac{\partial F}{\partial \psi_h} = & -\alpha(2v_h - \lambda) \psi_h - \alpha(v_l - v_h) \psi_l + c - \xi = 0 \\
\frac{\partial F}{\partial \psi_l} = & -(1 - \alpha)(2v_l - \lambda) \psi_l - \alpha(v_l - v_h) \psi_h + \xi = 0 \\
\text{s. t.} \quad & \psi_l - \psi_h + \frac{c}{\alpha(1 - \alpha)(v_h - v_l)} \leq 0 \\
& \xi \geq 0 \\
& \xi \left[\psi_l - \psi_h + \frac{c}{\alpha(1 - \alpha)(v_h - v_l)} \right] = 0
\end{aligned}$$

Here, the parameter ξ is the Lagrange multiplier, meanwhile, ψ_l^* and ψ_h^* are considered as the KKT points. Therefore,

1) When $\xi = 0$, we can obtain

$$\begin{aligned}
\psi_h^* = & \frac{c(1 - \alpha)(2v_l - \lambda)}{\alpha(1 - \alpha)(2v_l - \lambda)(2v_h - \lambda) - \alpha^2(v_l - v_h)^2} \\
\psi_l^* = & \frac{c(v_l - v_h)}{-(1 - \alpha)(2v_l - \lambda)(2v_h - \lambda) + \alpha(v_l - v_h)^2}
\end{aligned}$$

2) When $\xi \neq 0$, we can obtain

$$\psi_1^* = \frac{c[\lambda - 2v_1 - \alpha(v_h - v_1)]}{(2v_1 - \lambda)(1 - \alpha)(v_h - v_1)}$$

$$\psi_h^* = \min\left(\frac{c[(2v_1 - \lambda)(1 - \alpha) - \alpha^2(v_h - v_1)]}{\alpha(2v_1 - \lambda)(1 - \alpha)(v_h - v_1)}, 1\right)$$

2.3 Targeting only high-value consumers

In fact, when the advertising cost is limited, the firm may send targeted advertising to only high-value consumers. All rational consumers show the same purchase desire although the consumers have distinct preservation values with different deliberation costs. Then, the firm's profit can be expressed as

$$\max_{p, \phi \geq 0} \Pi = \alpha\phi p - \frac{\lambda}{2}\phi^2 p \quad (15)$$

$$\begin{aligned} \text{s. t.} \quad & v_h \phi - p\phi_{\max} \geq 1 \\ & v_1 \phi - p\phi_{\max} < 0 \\ & \alpha(v_h \phi - p\phi_{\max}) - c \geq \max(v_m \phi - p\phi_{\max}, 0) \\ & \phi_{\max} = 1 \end{aligned}$$

After solving the aforementioned inequations, we can obtain the following proposition.

Proposition 5 When the consumers have distinct deliberation cost, the firm will only send targeted advertising to the high-value segment, and the optimal advertising intensity can be expressed as $\phi^* = \frac{c}{2v_h - \lambda}$ or ϕ^*

$$= \frac{c}{\alpha(1 - \alpha)(v_h - v_1)}.$$

Proof From the constrained conditions of (15), we can obtain the price as $v_1 \phi + \frac{c}{1 - \alpha} \leq p \leq v_h \phi - \frac{c}{\alpha}$. Therefore, the optimal price is $p^* = v\phi - \frac{c}{\alpha}$. Likewise, the optimal price of the product can be expressed as

$$\max_{p, \phi \geq 0} \Pi = \alpha\phi^2 v_h - \phi c - \frac{\lambda}{2}\phi^2 \alpha \quad (16)$$

According to constrained conditions, $\phi \geq \frac{c}{\alpha(1 - \alpha)(v_h - v_1)}$. We assume that ζ is a Lagrange multiplier, and ϕ^* is a corresponding KKT point. Therefore, the optimal function can be expressed as $\max_{p, \zeta \geq 0} \Pi = F(\phi, \zeta)$.

$$\begin{aligned} \max_{p, \zeta \geq 0} \Pi = & -\alpha\phi^2 v_h + \phi c + \frac{\lambda}{2}\phi^2 \alpha + \\ & \zeta \left[\frac{c}{\alpha(1 - \alpha)(v_h - v_1)} - \phi \right] \end{aligned} \quad (17)$$

Therefore, according to the FOC condition, it is not difficult to acquire the following expression:

$$\frac{\partial \Pi}{\partial \phi} = 0 \Rightarrow -2\alpha\phi v_h + c + \lambda\alpha\phi - \zeta = 0 \quad (18)$$

$$\begin{aligned} \text{s. t.} \quad & \frac{c}{\alpha(1 - \alpha)(v_h - v_1)} - \phi \leq 0 \\ & \zeta \geq 0 \\ & \zeta \left[\frac{c}{\alpha(1 - \alpha)(v_h - v_1)} - \phi \right] = 0 \end{aligned} \quad (19)$$

Consequently, we can obtain the following results:

1) When $\zeta = 0$ and $\frac{c}{\alpha(1 - \alpha)(v_h - v_1)} - \phi \leq 0$, according to the above function, the optimal advertising intensity is $\phi^* = \frac{c}{(2v_h - \alpha)\alpha}$.

2) When $\zeta > 0$ and $\frac{c}{\alpha(1 - \alpha)(v_h - v_1)} - \phi \leq 0$, the optimal advertising intensity is $\phi^* = \frac{c}{\alpha(1 - \alpha)(v_h - v_1)}$.

From Proposition 5, a firm should perform an effective analysis on consumers' value attributes. When the firm's advertising expenditure and the degree of market coverage are limited, the firm should adhere to the principle of "manage the major". Consequently, the firm should acquire more information on high-value consumers and send targeted advertising to obtain higher profits. Otherwise, the firm should manipulate distinct strategies of service to change the customers' deliberation cost, and send targeted advertising with distinct intensities to the consumers with different value properties.

3 Conclusion

A firm offers different ads to distinct types of consumers. However, consumers may not know their preferences without painstaking deliberation and will only deliberate if they have sufficient motivation. In this study, the results indicate that the firm's equilibrium profit with targeted advertising may not always be higher than that with mass advertising, which depends on the ratio of high-value and low-value consumers. In addition, the optimal equilibrium price for low-value consumers shows no correlation with deliberation cost, but shows positive correlation with high-value consumers. Generally, it is profitable for a firm to send targeted advertising to different consumers, even when the consumers are rational consumers with deliberation cost. With the rapid development of e-commerce, the firm can not only obtain the firm's historic purchase behaviors, but also current purchase behaviors. Therefore, in the future study, we should consider the customers' previous and current purchase history together, thereby predicting each consumer's true value attribute and explore the effects of consumers' value attributes on a firm's targeted advertising strategies. Additionally, in our study, the customers are only divided into high-value and low-value consumers, and future studies can extend to more different types of consumers.

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基于消费者价值属性的最优定向广告策略

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摘要:为了研究消费者价值属性对企业定向广告策略的作用,根据消费者的消费行为和消费特征测量出消费者价值,构建企业针对固定价值的短视消费者投放定向广告的基础模型.研究表明,当企业联用定向广告和歧视性定价策略向不同价值属性的消费者进行产品销售时,企业的均衡利润可能并非总高于采用大众广告时的利润,而是依赖于高价值消费者和低价值消费者的比例.然后,分别构建3种拓展模型:允许企业以不同的定向精度向消费者投放定向广告;企业进行定向精度投资;考虑不同价值的理性消费者接受定向广告和歧视性定价的审议成本.研究表明,企业针对不同价值属性的消费者投放定向广告总是有利可图的.

关键词:定向广告;短视消费者;理性消费者;高价值消费者;低价值消费者

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