Discrimination pricing strategy with asymmetric competitive platforms

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Abstract

Behavior based price discrimination is the common strategy of competitive platforms. In this paper, establishing two stage dynamic pricing model with asymmetric competitive platform, we study the impact of behavior based price discrimination strategy on pricing and profit of the asymmetric platform with cross group externalities. The results of the research show that platform use BBPD for new or old users depends on the market share of the first phase. Different from the result of the traditional market, the impact of BBPD on the platform’s profit depends on the size of the network externalities. The profit of BBPD is decreasing when the network externalities is big, while the profit of BBPD depends on the size of network externalities and asymmetry when the network externalities is small.

Keywords: asymmetric platform competition; behavior based price discrimination; cross network externality.

1. INTRODUCTION

The price competition strategy of platform enterprises in two-sided marketshas long been the focus of researchers. The recent phenomenon has attracted wide attention from all walks of life that the development of big data technology provides an access for enterprises to the personal information of consumers(Carroni, 2016; Luo, 2016; Yuan et al., 2014). On the one hand, concerns are raised about the privacy of consumers(Xiao, 2015; Zhao et al., 2015); on the other hand, companies implement the practice of price discrimination according to the consumer preferences that are reflected from their personal information. A common way is to poach new users from rival companies at lower charge. Until now, behavior based price discrimination (BBPD) has been popularized in two-sided bilateral markets. For instance, from 1995 to 1996, several toll-call operators in the United States offered new users an additional amount of bonus money (Dong and Ren, 2012); new registers of the food delivery service at Meituan.com can get ¥10 off their first order; iQiyi, a Chinese online video platform, charges a 5 yuan monthly fee for the first-time purchase of its golden monthly plan while still charging non-first-time users the original monthly fee of 19 yuan.

The existing studies on price discrimination for competition platforms in two-sided markets (Elias 2015; Bi and Shu, 2016) are based on the assumption that the competition platform is symmetric. Symmetry means that competing firms exhibit the same incentives to simultaneously attract competitors' users and maintain their own users. Accordingly, the acquisition rate is equal to the churn rate on the subscriber basis. Actually, platform enterprises are often asymmetric in employing price discrimination. In many cases, part of those companies have the edge over the rest, such as monopolizing the market and benefiting from the brand effect of their branch products in other fields.
Specifically speaking, Baidu gains the advantage of brand in the domain of portal search, and thus creates an incentive for Baidu map and other products to be promoted. Similarly, the rapid popularization of Wechat is not independent of the role played by massive QQ users (QQ and Wechat are both developed by Tencent). Therefore, it is of great practical significance to study the impact of discriminatory pricing on the profit levels and price levels between asymmetric competition platforms.

Most of the existing researches on discriminatory pricing of asymmetric enterprises are conducted in unilateral market. Liu and Serfes (Liu and Serfes, 2008) proposed that if the strategy of price discrimination is not implemented for free, only firms with market advantages will purchase the products and carry out price discrimination, while inferior companies prefer uniform pricing. According to the research findings of Chen (Chen 2007; Gehrig et al., 2012) in relation to price discrimination in multi-phase market competition, consumers will benefit from price discrimination if the latter one is not a contributing factor of the exit of inferior companies from the market, and vice versa. Gehrig (Gehrig et al., 2012) undertook social welfare analysis of discriminatory pricing of asymmetric competitive firms. Elias Carroni (Carroni, 2016) studied the price discrimination of asymmetric firms in two-stage market competition, and found that compared to uniform pricing, discriminatory pricing will weaken price competition on the premise that consumers are more concerned about immediate benefits. These conclusions enriched the conclusion that discriminatory pricing of symmetric enterprises will reduce corporate profits and increase consumer surplus (Chen and Zhang, 2009; Chen, 1997; Fudenberg and Tirole, 2000; Esteve, 2010; Colombo, 2015).

It can be seen that previous documents of price discrimination mostly target traditional unilateral enterprises or symmetric platforms, but exclude asymmetric platforms. Nevertheless, the phenomenon of competition between asymmetric platforms is universal in real life. Such being the case, we established a two-stage competition model of asymmetric platforms on the foundation of Hotelling model, with which the effect of price discrimination between asymmetric platforms on their prices and profits was analyzed in this paper. The conclusions provided scientific basis and strategic suggestion for platform enterprises in effectively implementing price strategy.

2. INTRODUCTION TO THE MODEL

In the market is a pair of asymmetric competition platforms S and W. Supposing that platform 1 has market advantage and that platform 2 has market disadvantage. They are located at each end of a unit line [0, 1]. Platform \(i = (A, B)\) connects their own users A and B, \(V_i\) is the evaluation result of cardinal utility of the products (or services) provided by the platform \(i\), with A and B as the evaluators. \(V_A > V_B\). To simplify calculation, we assume that both the cost and marginal cost of services provided by S and W are zero.

Platform \(i\) for the pursuit of profit maximization of the price of the user to the side, which represents the number of stages, the table from left to right in turn on behalf of the platform number, type of user (no special instructions below, the subscripts are used Species meaning). The second stage, the platform on the edge of the new user price, loyalty to the user side price. Two-phase, the user based on the principle of maximizing the choice to join the platform.

In the first stage of dynamic competition, the price of platform \(i\) for k-side users is determined as \(p_{1,k}\), in order to maximize profit, in which the superscript represents the stage, and the subscripts indicate platform number and user type from left to right (similarly hereinafter). In the second stage of dynamic competition, the prices of platform \(i\) for respective k-side new users and k-side regular users are determined as \(p_{2,n,k}\) and
In both the two stages, the acquisition and loss of users are in accordance with the principle of maximization of utility.

Customers who purchase both platform products (or services) are evenly distributed on the line segment of \([0, 1]\), represented by \(k\) and \(m\), \(k, m = A, B\). The number of \(A\) and \(B\) is normalized as 1. The network externality coefficients of \(k\) and \(m\) are \(\alpha\). The unit cost for a user to be transported to the platform is 1. To be consistent with the said documents, it is assumed that only one unit of product (or service) is purchased per user at each stage, and that the second-stage preference is independent of the first-stage preference. For the sake of generality, we suppose that both sides of the users are singly attributed.

In the first stage, the utility obtained by the \(k\)-side user of \(x_{1k}^i\) to select platform \(i\) is

\[
U^{1}_{i,k} = V_i + an_{i,m}^1 - p_{i,k}^1 - x_{1k}^i
\]

Where \(n_{i,m}^T\) indicates the number of \(m\)-side users of platform 1 at stage \(T\).

In the second stage, price discrimination is applied to new users and non-new users. After entering the second stage, the first-stage \(k\)-line users of platform \(S\) will be repositioned to both the two platforms. The renewed utility of them in platform \(S\) and in platform \(M\) is

\[
\begin{align*}
U^{2}_{S/S,k} & = V_s + an_{s,m}^2 - p_{s,k}^2 - x_{2k}^1 \\
U^{2}_{S/W,k} & = V_w + an_{w,m}^2 - p_{w,k}^2 - (1-x_{2k}^1)
\end{align*}
\]

Similarly, for the first-stage \(k\)-side users of platform \(W\), the renewed utility of them in platform \(S\) and in platform \(W\) is

\[
\begin{align*}
U^{2}_{W/S,k} & = V_s + an_{s,m}^2 - p_{s,k}^2 - y_{2k}^1 \\
U^{2}_{W/W,k} & = V_w + an_{w,m}^2 - p_{w,k}^2 - (1-y_{2k}^1)
\end{align*}
\]

From the perspective of platform, the first-stage gross profit is the sum of the first-stage profit and the second-stage profit, i.e. \(\Pi_{i,k} = \Pi^{1}_{i,k} + \Pi^{2}_{i,k}\). To ensure that the platform profit function is concave function, it is necessary that \(a \in (0, 1/2)\).

3. EQUILIBRIUM ANALYSIS

3.1 BBPD model

When the asymmetric platforms implement the strategy of price discrimination (i.e. \(p_{i,k}^{2n} \neq p_{i,k}^{1n}\)), the second-stage prices for new users and non-new users are decided according to the price levels and conditions of market distribution in the first stage. We find the solutions to Nash equilibrium of the subgame by using inverse induction method. The second-stage Nash equilibrium is analyzed firstly.

3.1.1 The second-stage equilibrium

We suppose that the market share of the \(k\)-side users of platform \(i\) is \(n_{i,m}^1\), that the number of \(k\)-side users is \(x_{1k}^i\) whose first-stage platform and second-stage platform are both \(S\), and that the number of \(k\)-side users is \((n_{i,k}^1 - x_{1k}^i)\) whose first-stage platform and
second-stage platform are respective S and W. Therefore, the indifferent point \( x_k^2 \) satisfies the condition of
\[
V_s + an_{s,m}^2 - p_{s,k}^1 - x_k^2 = V_w + an_{w,m}^2 - p_{w,k}^2 - (1-x_k^2)
\]  
(4)

Similarly, we let the number of k-side users be \((n_{s,k}^1 - y_k^2)\) whose first-stage platform and second-stage platform are respectively W and S, and the number of k-side users be \((1-y_k^2)\) whose first-stage platform and second-stage platform are both W. Therefore, the indifferent point \( y_k^2 \) satisfies the condition of
\[
V_s + an_{s,m}^2 - p_{s,k}^2 - y_k^2 = V_w + an_{w,m}^2 - p_{w,k}^2 - (1-y_k^2)
\]  
(5)

Accordingly, the market shares of the second-stage A-side users in respective platform S and platform W are
\[
n_{s,k}^2 = x_k^2 + y_k^2 - n_{s,k}^1
\]
\[
n_{w,k}^2 = n_{s,k}^1 - x_k^2 + 1 - y_k^2
\]  
(6)

The profit functions in respective platform S and platform W are
\[
\Pi_s^2 = \sum_{k=A}^{B} [x_k^2 p_{s,k} + (y_k^2 - n_{s,k}^1) p_{s,k}^2]
\]
\[
\Pi_w^2 = \sum_{k=A}^{B} [(n_{s,k}^1 - x_k^2) p_{w,k}^2 + (1-y_k^2) p_{w,k}^2]
\]  
(7)

Each platform maximize its second-stage profit by price competition. According to (4) (5) (6) (7), with the use of mathematic software, we find the first-order optimization conditions of profit to price. Furthermore, we obtain the optimal price strategy of the pair of platforms in the second stage.

Proposition 1: When implementing price discrimination, the optimal pricing strategy for both sides of second-stage users is
\[
\begin{align*}
p_{s,k}^2 &= \frac{1}{3} \left( 1 - 3a + 2n_{s,k}^1 + \Delta \right) \\
p_{w,k}^2 &= \frac{1}{3} \left( 1 - 3a + 2n_{w,k}^1 - \Delta \right) \\
p_{s,k}^{2n} &= \frac{1}{3} \left( 3 - 3a - 4n_{s,k}^1 + \Delta \right) \\
p_{w,k}^{2n} &= \frac{1}{3} \left( 3 - 3a - 4n_{w,k}^1 - \Delta \right)
\end{align*}
\]  
(8)

Where \( \Delta = V_s - V_w \). There is \( \frac{1+3a+\Delta}{4} < n_{s,k}^1 < \frac{3-3a+\Delta}{4} \), because \( p_{s,k}^{2n} < 0 \) when \( n_{s,k}^1 > \frac{3-3a+\Delta}{4} \), which means that if the platform with market advantages gains large market share in the first stage, it will attract the users of the rivals in the second stage at a cost lower than the
marginal cost; \( p_{s,k}^2 \) when \( n_{s,k}^1 < \frac{1+3a+\Delta}{4} \), which means that if the platform with market advantages gains small market share in the first stage, it is the platform with inferior market performance that will attract the users of the rivals in the second stage at a cost lower than the marginal cost.

As can be seen from Equation (8), \( \frac{\partial p_{s,k}^1}{\partial a} < 0 \), i.e. The network externality accelerates the second-stage price competition. \( \frac{\partial p_{s,k}^1}{\partial \Delta} > 0 \), \( \frac{\partial p_{w,k}^1}{\partial \Delta} < 0 \), \( \frac{\partial p_{s,k}^2}{\partial n_{s,k}^1} > 0 \), \( \frac{\partial p_{w,k}^2}{\partial n_{w,k}^1} < 0 \). Therefore, we draw the following conclusions:

**Conclusion 1:** The second-stage price of products in the platform with market advantages increases with the enlargement of the asymmetry between the two platforms; whilst the second-stage price of products in the platform with market disadvantages decreases with the enlargement of the asymmetry between the two platforms.

**Conclusion 2:** The second-stage price for non-new users increases with the rise in the first-stage market share; while the second-stage price for new users declines with the rise in the first-stage market share.

**Conclusion 2** shows that when the asymmetry of the competition platform is large, the platform with market advantage obtains a larger market share in the first stage, which further increases its competitive advantage. Therefore, the pricing for both the new and non-new customers in the second stage will rise. Similarly, the second-stage price of products in the platform with market disadvantages decreases with the enlargement of the asymmetry.

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3.1.1 The first-stage equilibrium

For the first-stage k-side users, the indifferent point \( x_{k}^1 \) between the choice of the two platforms should satisfy the condition of

\[
V_s + an_{s,m}^1 - p_{s,k}^1 - x_{k}^1 = V_m + an_{w,m}^1 - p_{w,k}^1 - (1-x_{k}^1)
\]

(9)

The first-stage gross profit of platform i is the sum of the first-stage profit and the second-stage profit, i.e.

\[
\Pi_i = \Pi_i^1 + \Pi_i^2 = p_{i,A}^1 n_{i,A}^1 + p_{i,B}^1 n_{i,B}^1 + \Pi_i^2
\]

(10)
We combine (6) with (7), and thus calculate the symmetric equilibrium solution of the two platforms at the first stage:

\[
\begin{align*}
 p^{1}_{s,k} &= \frac{7-52a+99a^2-54a^3+v-11av+18a^2v}{7-45a+54a^2} \\
 p^{1}_{w,k} &= \frac{7-52a+99a^2-54a^3-v+11av-18a^2v}{7-45a+54a^2}
\end{align*}
\]

By substituting (11) into (10), we obtain the respective first-stage profit and two-stage gross profit of platform i as

\[
\begin{align*}
 \Pi^{1}_{i} &= \frac{1}{(7-45a+54a^2)^2} \left( \Phi + (42\Delta - 508a\Delta + 2106a^2\Delta - 3456a^3\Delta + 1944a^4\Delta) \right) \\
 \Pi^{1}_{w} &= \frac{1}{(7-45a+54a^2)^2} \left( \Phi - (42\Delta - 508a\Delta + 2106a^2\Delta - 3456a^3\Delta + 1944a^4\Delta) \right) \\
 \Pi^{2}_{i} &= \frac{2}{9(7-45a+54a^2)^2} \left[ (336\Delta - 4176a\Delta + 17820a^2\Delta - 30132a^3\Delta + 17496a^4\Delta) \right] \\
 \Pi^{2}_{w} &= \frac{2}{9(7-45a+54a^2)^2} \left[ (336\Delta - 4176a\Delta + 17820a^2\Delta - 30132a^3\Delta + 17496a^4\Delta) \right]
\end{align*}
\]

Among them, \( \Phi = 49 - 679a + 3411a^2 - 7641a^3 + 7776a^4 - 2916a^5 + 5\Delta^2 - 73a\Delta^2 + 288a^2\Delta^2 - 324a^3\Delta^2 \), \( \Omega = 343 - 4851a + 25137a^2 - 59049a^3 + 64152a^4 - 26244a^5 + 992^2 - 1017a\Delta^2 + 324a^2\Delta^2 - 2916a^3\Delta^2 \). In the condition of equilibrium, we substitute (11) into (7) and (8), generating proposition 1 as follows.

Proposition 2: In the second stage, the price and profit of k-side users in platform i are separately

\[
\begin{align*}
 p^{2}_{s,k} &= \frac{14-111a+243a^2-162a^3+12\Delta-63a\Delta+54a^2\Delta}{3(7-45a+54a^2)} \\
 p^{2}_{w,k} &= \frac{14-111a+243a^2-162a^3-12\Delta+63a\Delta-54a^2\Delta}{3(7-45a+54a^2)} \\
 \Pi^{2}_{i} &= \frac{1}{9(7-45a+54a^2)^2} \left[ \Psi + (294\Delta - 3780a\Delta + 16686a^2\Delta - 29160a^3\Delta + 17496a^4\Delta) \right] \\
 \Pi^{2}_{w} &= \frac{1}{9(7-45a+54a^2)^2} \left[ \Psi - (294\Delta - 3780a\Delta + 16686a^2\Delta - 29160a^3\Delta + 17496a^4\Delta) \right]
\end{align*}
\]

Among them, \( \Psi = 245 - 3591a + 19575a^2 - 49329a^3 + 58320a^4 - 26244a^5 + 153\Delta^2 - 1377a\Delta^2 + 3888a^2\Delta^2 - 2916a^3\Delta^2 \)

3.2 Uniform Pricing Model

3.2.1 The second-stage equilibrium
When the platform provides uniform pricing (i.e., \( p_{i,k}^2 = p_{i,k}^2 \)) for new and non-new users, by refer to Section 3.1.1, the following condition should be satisfied in selecting the indifferent position \( x_k^2o \) between the two platforms (\( o \) represents non-discriminatory pricing, similarly hereinafter):

\[
V + an_{s,m}^2 - p_{s,k}^2 - x_k^2 = V + an_{w,m}^2 - p_{w,k}^2 - (1-x_k^2) \tag{14}
\]

According to formula (14), we calculate the number of second-stage k-side users in platform \( i \):

\[
\begin{align*}
n_{s,k}^2 &= \frac{1-a^2 - p_{s,k}^2 - ap_{s,m}^2 + p_{w,k}^2 + ap_{w,m}^2 + \Delta + a\Delta}{2(1-a^2)} \\
n_{w,k}^2 &= \frac{1-a^2 + p_{s,k}^2 + ap_{s,m}^2 - p_{w,k}^2 - ap_{w,m}^2 - \Delta - a\Delta}{2(1-a^2)}
\end{align*}
\tag{15}
\]

Therefore, the profit function of platform \( i \) in the second stage is

\[
\Pi^2_i = \sum_{i=1}^{b} n_{s,k}^2 p_{i,k}^2
\tag{16}
\]

By substituting (15) into (16), we determine the first-order optimal condition of the profit function to \( p_{s,k}^2 \) and \( p_{w,k}^2 \), and further find the equilibrium solution.

Preposition 3: when the platform determines the uniform price for both new and non-new users, the second-stage optimal pricing strategy for them is:

\[
p_{s,k}^2 = \frac{1}{3}(3-3a+\Delta) \quad p_{w,k}^2 = \frac{1}{3}(3-3a-\Delta) \tag{17}
\]

According to (17), when \( \Delta < 3 - 3a \), the price of platform \( i \) for k-side users is positive. Preposition 3 indicates that the second-stage uniform pricing is independent of the first-stage competition.

By substituting (17) into (16), we obtain the second-stage profit of platform \( i \):

\[
\begin{align*}
\Pi^2_i &= \frac{(3a-3-\Delta)^2}{9(1-a)} \\
\Pi^2_w &= \frac{(3a-3+\Delta)^2}{9(1-a)}
\end{align*}
\tag{18}
\]

### 3.2.2 The first-stage equilibrium

By referring to 3.1.2, we find that the following condition should be satisfied for first-stage k-side users to select the indifferent point \( x_k^{1o} \) between the two platforms,
\[ V_s + am_{m,i}^o - p_{i,k}^o - x_k^o = V_m + am_{m,m}^o - p_{w,k}^o - (1 - x_k^o) \]

Assuming the discount coefficient of the second stage profit of the platform is 1. Therefore, the total profit of the platform i is the sum of the profit of the first stage and the profit of the second stage,

\[
\Pi_i^o = \Pi_i^1 + \Pi_i^2 = p_{i,k}^1 n_{i,k}^o + p_{i,k}^2 n_{i,k}^o + \Pi_i^2
\]

By referring to 3.2.1, we determine symmetric equilibrium price of the first stage, the first-stage profit, and the two-stage total profit.

Proposition 4: When the platform determines the uniform price for both the new and non-new users, the first-stage optimal price, first-stage profit and two-stage gross profit are:

\[
\begin{align*}
p_{i,k}^o &= \frac{1}{3}(3 - 3a + \Delta) \quad p_{w,k}^o = \frac{1}{3}(3 - 3a - \Delta) \\
\Pi_i^1 &= \frac{(3a - 3 - \Delta)^2}{9(1-a)} \quad \Pi_w^1 = \frac{(3a - 3 + \Delta)^2}{9(1-a)} \\
\Pi_i^2 &= \frac{2(3a - 3 - \Delta)^2}{9(1-a)} \quad \Pi_w^2 = \frac{2(3a - 3 + \Delta)^2}{9(1-a)}
\end{align*}
\]

By comparing the first-stage pricing with the second-stage pricing for the uniform pricing model, it can be obtained that

\[
p_{i,k}^1 = p_{i,k}^2 \quad \Pi_i^1 = \Pi_i^2
\]

With which we continue forward to conclusion 3:

Conclusion 3: in the uniform pricing model, the second-stage pricing is independent of the first-stage market competition. Meanwhile, the pricing for users and platform profit are consistent in the two stages.

4. Comparison and Analysis of the Models

In this part, through the contrast between the aforementioned two models, we discuss the effect of price discrimination on pricing and profit of asymmetric competition platforms in the two stages. To meet the demand that the pricing for both the new and non-new users is positive, i.e. \( \frac{1 + 3a + \Delta}{4} < n_{s,k}^1 < \frac{3 - 3a + \Delta}{4} \), it is required that \( 0 < a < \frac{1}{36}(15 - \sqrt{57}) \) and \( 0 < \Delta < \phi \) or \( \frac{7 - 45a + 54a^2}{3(1 + 6a)} \). Such being the case, we divided our discussion into two situations: minor network externality \( (0 < a < \frac{1}{36}(15 - \sqrt{57})) \) and major network externality \( (\frac{7}{36}(15 - \sqrt{57}) < a < 1/3) \).

4.1 Major Network Externality

As can be seen from the comparison result between asymmetric platform discriminatory pricing and the model of uniform pricing, when the network externality is relatively huge, the first-stage pricing satisfies the relationship \( p_{s,k}^1 < p_{s,k}^2 \), \( p_{w,k}^1 < p_{w,k}^2 \), while the second-
stage pricing presents the relation of \( p_{1,k}^2 < p_{1,k}^1, \ p_{1,k}^2 < p_{2,k}^1 \). The first-stage profit \( \Pi_i^1 > \Pi_i^1 \), and the second-stage profit \( \Pi_i^2 > \Pi_i^1 \).

Therefore, we come to conclusion 4: when the network externality is relatively large, the two-stage profit obtained at the implementation of discriminatory pricing in asymmetric platforms is lower than that of the uniform pricing model.

This conclusion indicates that under major network externality, the strategy of pricing discrimination actually reduces the profit of competition platforms. This result is the same as the conclusion in unilateral market.

### 4.2 minor network externality

When the network externality is relatively small, the first-stage pricing satisfies the relationship \( p_{i,t,k}^1 < p_{i,t,k}^2 \), while the second-stage pricing presents the relation \( p_{i,t,k}^2 > p_{i,t,k}^1 \). When \( 0 < a < 1/18 \) and \( 0 < \sigma \) or \( 1/18 < a < \frac{1}{36} (15 - \sqrt{57}) \) and \( 0 < \Delta < \Phi \), we have \( p_{i,t,k}^2 > p_{i,t,k}^1 \). When \( 0 < a < 1/18 \) and \( 0 < \Delta < \Phi \), we have \( p_{i,t,k}^2 > p_{i,t,k}^1 \), \( p_{i,t,k}^2 > p_{i,t,k}^1 \). The first-stage profit \( \Pi_i^1 > \Pi_i^1 \), while the second-stage profit is not as simple: when \( 0 < a < 0.056 \) and \( \xi < \Delta \), \( \Pi_i^1 > \Pi_i^1 \), or otherwise \( \Pi_i^1 > \Pi_i^1 \), \( \sigma = \frac{-7+45a-5a^2}{5+18a} \), \( \xi = \sqrt[3]{\frac{-49+679a-3411a^2+7641a^3-7776a^4+2916a^5}{26+225a-621a^2+486a^3}} \). Therefore,

Conclusion 5: When the network externality is small, the profit of the first-stage discrimination pricing model is higher than that of the unified pricing model. The profit of the second stage rests on the network externality and the platform asymmetry.

Conclusion 5 shows that when the network externality is small, in terms of the first-stage market competition under price discrimination, platforms with market advantage gain the large amount of market share by reducing price, resulting in the rise in the first-stage profit; as a comparison, platforms with market disadvantage increase their profit by lifting price.

The impact of discrimination pricing on the profits of the second stage is ambiguous. On the one hand, it can be seen from the conclusion 2 that in order to acquire new users, high cost is demanded for the platform with a larger amount of first-stage market share; in some cases, it can only acquire new users at a price lower than the marginal cost. On the other hand, for platforms with market edge, the pricing at a premium is helpful for the attraction of new users with low cost in the second stage. Therefore, with the two edges of the sword, the profit of the second stage rests on the network externality and the platform asymmetry.

### 5. CONCLUSION

As a common economic phenomenon, discriminatory pricing plays an important role in determining platform pricing strategy and in profit earning. Nevertheless, most of existing studies on discriminatory pricing are conducted in symmetric competition platforms. By establishing a two-stage pricing model of asymmetric competitive platform, we compare the uniform pricing model with the pricing discrimination model. An analysis is undertaken on the effect of pricing discrimination on the pricing and profit of asymmetric platforms. Accordingly, we draw the following conclusions:
(1) The discriminatory prices of platform with market advantages will increase with the increase of asymmetry between platforms; while the discriminatory prices of platform with market disadvantages will decrease with the increase of asymmetry between platforms.

(2) The second-stage price for non-new users increases with the rise in the first-stage market share; while the second-stage price for new users declines with the rise in the first-stage market share.

(3) This conclusion is different from the one that the discriminatory pricing of asymmetric companies will lower down profits in traditional unilateral market: When the network externality is relatively large, the two-stage profit obtained at the implementation of discriminatory pricing in asymmetric platforms is lower than that of the uniform pricing model. When the network externality is small, the profit of the first-stage discrimination pricing model is higher than that of the unified pricing model. The profit of the second stage rests on the network externality and the platform asymmetry.

The above conclusion is of great significance to managing profit-maximization-driven platforms. In formulating the measures of discriminatory pricing, the platforms should conduct sufficient market survey on the strength of network externality and their asymmetric structures. For major network externality, the platform incentive should be uniform pricing; for minor network externality as well as high-degree platform asymmetry, the platform incentive is supposed as pricing discrimination.

In this paper, we simplified our research presumptions by excluding the effect of some follow-up research points such as full market coverage and mobility cost. In addition, our study is conducted on the premise of single-platform users, which can be extended to the basis of multi-platform users for future study.

6. REFERENCES


