International Core Journal of Engineering Volume 6 Issue 1, 2020
ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

Research on Network Effect, Internet Platform Enterprise M & A and Social Welfare

Xianfeng Wu[1, a], Zhoumei Xie[2, b]

[1]School of Economics and Management, Chongqing University of Posts and Telecommunications, Chongqing, 400065, China;

[2] School of Economics and Management, Chongqing University of Posts and Telecommunications, Chongqing, 400065, China;

[a]1305179602@qq.com, [b]978601696@qq.com

Abstract

Based on bilateral market theory and cross-network externality theory, this article uses the hotelling m odel to study social welfare before and after horizontal mergers. The research results show that differences in consumer ownership behavior will affect the platform's pricing decision. On the platform, platform pricing depends on the cross-network externality and degree of differentiation; when consumers are mostly part of the platform, the platform is free for some multi-homed users and high-rate charges are charged for single-homed users; unlike traditional unilateral markets, Horizontal mergers. The social benefits of horizontal mergers of platform companies do not necessarily cause a reduction in social benefits. When the cross-network externalities meet certain conditions, the social benefits after horizontal mergers are greater than the social benefits before horizontal mergers. Governments can focus on cross-network externalities and the proportion of multi-homed users when conducting antitrust regulations.

Keywords

Network effect; horizontal merger; social welfare; bilateral market.

1. Introduction

The vigorous development of China's Internet industry has prompted a large number of platform companies in the market, such as e-commerce platforms represented by Taobao, JD.com and Vipshop, media communication platforms represented by Tencent Video, Mango TV, and iQiyi. Are you hungry? Group buying platforms represented by Meituan etc., as well as travel platforms represented by Didi Chuxing, Dadi Chuxing, and Shenzhou Taxi. These are typical bilateral platforms, and their common feature is that the platform itself does not provide any goods and services for both parties to the transaction, but rather uses the "platform" to attract the two sides of the transaction to promote transactions and interactions between bilateral users. In the platform-based business model, companies integrate stakeholders on the same platform. As the number of bilateral entities continues to increase, it will cause direct and indirect network effects, which will help create more network value. Therefore, expanding the scale of users will help Internet companies gain a competitive advantage. And through horizontal mergers and acquisitions, you can quickly expand the size of the company and occupy a favorable market position in the short term.

In addition to different business models from traditional markets, there is also a phenomenon of partial multi-ownership. The scale of users is the fundamental guarantee for the healthy development of Internet platform companies. In order to compete for user resources, fierce competition will be

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

launched between platform companies. Generally speaking, adopting exclusivity measures is one of the common methods of enterprises, which can limit the growth of user scale of competing enterprises. For example, will the take-out platform Sino-American Mission and Hungry require merchants to choose one of the two platforms? Taobao and JD.com in the e-commerce platform will also force merchants to join only one platform; the same is true in live broadcast platforms where the platform will require anchors Only one platform can be added for live broadcast and so on. Therefore, sellers can usually only join one platform, and consumers can join multiple platforms, because consumers choose to join multiple platforms with almost no cost (such as free registration of members, free download of apps, etc.). After horizontal mergers and acquisitions, most of the platforms still maintain the two platforms and continue to operate and remove the exclusive restrictions, such as Meituan and Volkswagen Reviews, Qunar and Ctrip.com, 58 Cities and Markets, etc., so the sellers will merge horizontally. Later, it will take to join multiple platforms to increase market share, and consumers will choose to join only one platform, because the two platforms will be the same for consumers in terms of pricing and benefits after the horizontal merger. In the long term, consumers will only join One platform for consumption. The belonging behavior of users will affect their own utility, thus affecting corporate pricing and ultimately social welfare.

Horizontal mergers between enterprises can expand the scale of users and promote the rapid development of enterprises on the one hand, and can strengthen market power on the other, which may cause market monopolies and adversely affect social welfare. For example, the merger of Meituan and Volkswagen Comments. Are you hungry? After the merger with Baidu Takeaway, the subsidies to users will be reduced, and the access fee will be increased or proportional to the merchants. The benefits of users may be damaged. Red envelope subsidies have been reduced for users; after the merger of Didi and Kuai, the subsidies for drivers and passengers have continued to decrease, which may cause losses to the welfare of users. Therefore, after the horizontal merger of Internet platform companies, the changes in social welfare deserve further study.

2. Literature review

Generally, in a unilateral market, if the M & A manufacturer fails to obtain cost savings, the result must be an increase in the equilibrium price of the market after M & A, and consumer welfare is impaired. If this price level is maintained for a long time after the M & A, it indicates that after the M & A Gain and use market power. However, this conclusion may not hold in bilateral markets: For example, Wu Hanhong[1]studied the welfare effects of horizontal mergers and acquisitions on bilateral platforms. The results show that horizontal mergers and acquisitions do not necessarily lead to a reduction in social welfare. In most bilateral markets, the market brought by horizontal mergers and acquisitions Increased concentration can increase total social welfare and welfare on at least one side of the market; Xie Yunbo's [2] research on Internet platform companies' horizontal mergers and acquisitions strategy found that there is always an incentive for Internet vendors to conduct business mergers to increase platform profits, depending on whether the company adopts merger and acquisition strategies. For cross network externalities. When the market is in equilibrium, consumer welfare after mergers will be less, but when cross-network externalities meet certain conditions, mergers and acquisitions will increase social welfare ; Zhang Xi[3] believes that the stronger Cross-network externalities can encourage mergers and acquisitions to reduce prices and increase consumer welfare. When cross-network externalities are weak, efficiency defense must be conducted. At this time, it is still possible that the efficiency of the manufacturer is greater than the reduction of consumer welfare.

At present, there is not much empirical research literature on horizontal mergers and acquisitions of Internet platform enterprises, and more lies in media platforms that study typical bilateral market characteristics, such as newspapers and televisions. Cheng Guisun[4] researched the merger benefits analysis of television communication platform and found that, unlike in the unilateral market, corporate profits have been lost. Mergers are always beneficial, whether from the television media platform or the advertiser, but it is possible Damage to social welfare. Chandra and Collard-Wexler

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

[5]studied the merger of the two newspapers, arguing that the merger does not necessarily result in higher pricing for either side of the user. Li Xinyi[6] research found that mergers in China's online media industry are always beneficial at this stage, and horizontal mergers have significantly improved the welfare of the merger sponsor. Yun Xin [7] based on the Youku and Tudou merger case, using event research method and financial index analysis method. The research shows that horizontal mergers and acquisitions create positive value for stockholders in the short term, and also contribute to the steady rise of corporate performance in the long term . Internet platform enterprises also have economic characteristics of different user ownership structures. Xie Yunbo research found that the existence of multi-ownership users is beneficial to the improvement of total social welfare; the more multi-homed users are, the more it is conducive to the improvement of total social welfare after horizontal merger of enterprises. Li Zhiwen[8] research found that strong cross-network externality platforms can provide high-quality services to compete more strongly for single-homed user resources, thereby widening the revenue gap between weak cross-network externality platforms and strong cross-network externalities. It can improve the level of consumer surplus and social welfare to a greater extent. Wu Xuliang[9] studied how platform companies set prices under different ownership structures and their impact on corporate profits. The results show that when both participants are single-owned, the platform's profit is the highest; when both participants are partially multi-owned, the platform The lowest profit.

In summary, the current research on horizontal mergers and acquisitions of Internet platform companies has two shortcomings. On the one hand, Internet platform companies have both indirect network externalities and economic characteristics such as different ownership structures for different users. Most existing literature only considers cross-network externalities. And purely multi- or single-homing situations without comprehensive consideration of these economic characteristics. On the other hand, horizontal mergers and acquisitions are frequent in the Internet industry, and more literature focuses on various corporate behaviors such as corporate pricing and changes in corporate profits, while less discussion of changes in social welfare before and after horizontal mergers. Most scholars use the cross-network externality model proposed by Armstrong[10] to measure, and Armstrong uses the hotelling model to analyze the pricing of platform companies by considering only single user bilateral ownership and indirect network externalities. This article refers to a large number of Chinese and foreign literature based on Armstrong To comprehensively consider the changes in social welfare research on the horizontal merger of Internet platform companies by comprehensively considering indirect network externalities and user ownership, and try to put forward antitrust recommendations for enterprises and relevant regulatory agencies.

3. Model construction

Assume that there are two competitive platforms 1 and 2 at each end of the linear city. There are two groups of participants on the platform, one is the buyer (B), and the other is the seller (S). The number of participants in the two groups is equal, standardized to 1, and evenly distributed on the Hotelling model. At the same time, both types of users need to access Internet companies (platforms 1 and 2) to complete transactions. The basic benefit of participants joining the platform is: It is assumed to be large enough that all participants will register for transactions on at least one platform. Both groups of participants have indirect network externalities, and the cross-network externality is α. The difference between platforms is measured by the transportation cost t. The transportation cost of the buyer or seller joining platform 1 is t and the transportation cost of joining platform 2 is t (1-x), where x is the distance from platform 1 and ≥0. If a participant accesses two platforms at the same time, his transportation cost is t.

It is assumed that the platform adopts the registration fee method; therefore, referring to Armstrong's model, the utility of participants joining the platform is as follows:

$$U_{i,\,k} = V_0 + \alpha N_{i,\,k} - P_{i,\,k} - tx \text{ , } i=1,2,\ k=B,S$$

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

3.1 Buyer order vesting, seller order vesting

When all participants belong to single ownership, the distribution of buyers and sellers is as follows: $n_B^{\ 1} + n_B^{\ 2} = 1, n_s^{\ 1} + n_s^{\ 2} = 1$, Which $n_B^{\ 1}$ indicates the number of buyer users who only joined platform 1, $n_B^{\ 2}$ the number of buyers who only joined platform 2, $n_s^{\ 1}$ the number of seller users who only joined platform 1, and $n_s^{\ 2}$ the number of seller users who only joined platform 2.

For the buyer, the buyer chooses to join only the utility of platform 1:

$$U_{1,\ B} = V_0 + \alpha n_S^{\ 1} - P_{1,B} - tx$$

The buyer chooses to join only the user utility of platform 2:

$$U_{2,\ B} = V_0 + \alpha n_S^{\ 2} - P_{2,B} - t(1-x)$$

The buyer chooses whether to join platform 1 or platform 2： $U_{1,B} = U_{2,B}$,

$V_0 + \alpha n_S^{\ 1} - P_{1,B} - tx = V_0 + \alpha n_S^{\ 2} - P_{2,B} - t(1-x)$, Since the buyer's order belongs, there is no difference x,

$n_B^{\ 1} = \frac{1}{2} + \frac{\alpha (n_s^{\ 1} - n_s^{\ 2}) - p_{1,B} + p_{2,B}}{2t}$, $n_B^{\ 2} = 1 - n_B^{\ 1}$.

For the seller, the buyer chooses to join only the utility of platform 1:

$$U_{1,\ s} = V_0 + \alpha n_B^{\ 1} - P_{1,S} - ty$$

The seller chooses to join only the user utility of platform 2:

$$U_{2,S} = V_0 + \alpha n_B^{\ 2} - P_{2,S} - t(1-y)$$

The seller chooses whether to join platform 1 or platform 2

$$V_0 + \alpha n_B^{\ 1} - P_{1,S} - ty = V_0 + \alpha n_B^{\ 2} - P_{2,S} - t(1-y)$$

Similarly, the seller's order belongs, and there is no difference in utility y. $n_s^{\ 1} = \frac{1}{2} + \frac{\alpha (n_B^{\ 1} - n_B^{\ 2}) - p_{1,s} + p_{2,s}}{2t}$, $n_s^{\ 2} = 1 - n_s^{\ 1}$, Simultaneous $n_B^{\ 1}, n_B^{\ 2}$, Construct a matrix equation and bring it into MATLAB to calculate the relationship $n_B^{\ 1}, n_B^{\ 2}$ about p, t, α, specifically:

$$n_B^{\ 1} = \frac{-\alpha(p_{1,s} - p_{2,s}) - (p_{1,B} - p_{2,B})t - a^2 + t^2}{2*(-a^2 + t^2)}$$

$$n_s^{\ 1} = \frac{-\alpha(p_{1,B} - p_{2,B}) - (p_{1,s} - p_{2,s})t - a^2 + t^2}{2*(-a^2 + t^2)}$$

Assuming that the marginal cost of an Internet company is 0, $\pi = p_{i,B} n_B^{\ i} + p_{i,s} n_s^{\ i}, i = 1,2$ the first-order condition is $\frac{\partial \pi}{\partial p_{1,k}} = \frac{\partial \pi}{\partial p_{2,k}} = 0, k = B, s$ to solve the four equations simultaneously:

$$p_{1,B} = p_{2,B} = -\alpha + t, p_{1,s} = p_{2,s} = -\alpha + t, n_B^{\ 1} = n_B^{\ 2} = \frac{1}{2}, n_s^{\ 1} = n_s^{\ 2} = \frac{1}{2},$$

Platform profit $\pi_1 = -2\alpha + 2t$,

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

Buyer user benefits $= \int_0^{1/2} V_0 + \alpha n_S^{\ 1} - P_{1,B} - txdx + \int_{1/2}^{1} V_0 + \alpha n_S^{\ 2} - P_{2,B} - t(1-x)dx = V_0 + \frac{3\alpha}{2} - \frac{5t}{4}$, Seller user benefits $\int_0^{1/2} V_0 + \alpha n_B^{\ 1} - P_{1,S} - tydy + \int_{1/2}^{1} V_0 + \alpha n_B^{\ 2} - P_{2,S} - t(1-y)dy = V_0 + \frac{3\alpha}{2} - \frac{5t}{4}$, Therefore, social welfare is equal to the sum of platform profits, buyer user benefits, and seller user benefits, and the result is $2V_0 + \alpha - \frac{t}{2}$

Proposition 1: There is a unique Nash equilibrium in the market, and its pricing depends on the cross-network externality α and the degree of differentiation t; social welfare and the degree of differentiation t show a negative linear relationship with the basic utility, the cross-network externality α shows positive Directional linear relationship.

3.2 The buyer has multiple attributions and the seller single attribution

When the buyer has multiple attributions and the seller single vests, the distribution of the buyers and sellers is as follows:

$N_B^{\ 1} + N_B^{\ 2} + N_{多} = 1, n_s^{\ 1} + n_s^{\ 2} = 1$ Which $N_B^{\ 1}$ indicates that the buyer only joins the number of buyer users on platform 1, $N_B^{\ 2}$ the number of buyers that the buyer only joins on platform 2, $N_{多}$ the number of users that the buyer joins both platforms at the same time, $n_s^{\ 1}$ the number of sellers that the seller only joins platform 1, and $n_s^{\ 2}$ the seller that only joins platform 2 The number of seller users.

For the buyer, the buyer chooses to join only the utility of platform 1:

$U_{1,\ B} = V_0 + \alpha n_S^{\ 1} - P_{1,B} - tx$

The buyer chooses to join only the user utility of platform 2:

$U_{2,\ B} = V_0 + \alpha n_S^{\ 2} - P_{2,B} - t(1-y)$

The buyer joins two platforms at the same time, which is the effect of multi-attribution:

$U_{多} = V_0 + \alpha - P_{1,B} - P_{2,B} - t$

Buyer chooses to join platform 1： $U_{1,B} = U_{多}$, $N_B^{\ 1} = 1 + \frac{\alpha(n_s^{\ 1} - 1) + p_{2,B}}{t}$, There is no difference in the effectiveness of the buyer's choice to join platform 2: $N_B^{\ 2} = 1 - y = 1 + \frac{\alpha(n_s^{\ 2} - 1) + p_{1,B}}{t}$, $n_s^{\ 1} + n_s^{\ 2} = 1$

For the seller, the seller chooses to join only the user utility of platform 1:

$U_{1,S} = V_0 + \alpha(1 - N_B^{\ 2}) - P_{1,S} - ty$

Buyer chooses to join only the utility of platform 1:

$U_{2,\ s} = V_0 + \alpha(1 - N_B^{\ 1}) - P_{2,S} - t(1-y)$

The seller chooses whether to join platform 1 or platform 2

$V_0 + \alpha(1 - N_B^{\ 2}) - P_{1,S} - ty = V_0 + \alpha(1 - N_B^{\ 1}) - P_{2,S} - t(1-y)$

The seller chooses to join platform 1 and platform 2. There is no difference in the utility y:

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

$n_s^1 = \frac{1}{2} + \frac{\alpha\ (n_B^1 - n_B^2) - p_{1,s} + p_{2,s}}{2t}$, The constructed N_B^1, N_B^2, n_s^1 matrix equation is brought into MATLAB to calculate the relationship between user size and p, t, α. Assuming that the marginal cost of the Internet company is 0, then $\pi = p_{i,B}(1 - N_B^i) + p_{i,s} n_s^i, i = 1,2$, First-order condition is $\frac{\partial \pi}{\partial p_{1,k}} = \frac{\partial \pi}{\partial p_{2,k}} = 0, k = B, s$, Solve the four equations simultaneously: $p_{1,B} = p_{2,B} = 0, p_{1,s} = p_{2,s} = \frac{-a^2 + t^2}{t}, N_B^1 = N_B^2 = \frac{-\alpha + 2t}{t}, n_s^1 = n_s^2 = \frac{1}{2}$, Platform profit $\pi = p_{1,B}(1 - N_B^2) + p_{1,s} ns1 + p_{2,\ B}(1 - N_B^1) + p_{2,s} ns2 = \frac{-a^2 + t^2}{t}$, Buyer user benefits $Ux = \int_0^{1/2} V_0 + \alpha n_S^1 - P_{1,B} - tx dx + \int_{1/2}^{1} V_0 + \alpha(1 - N_B^1) - P_{2,S} - t(1 - y) dy + \int_x^y V_0 + \alpha - P_{1,B} - P_{2,B} - t dx = \frac{a^2 t + 4V_0 t^2}{4t^2}$, Seller user benefits

$U_s = \int_0^{1/2} V_0 + \alpha\ (1 - N_B^2) - P_{1,S} - ty dy + \int_{1/2}^{1} V_0 + \alpha(1 - N_B^1) - P_{2,S} - t(1 - y) dy = \frac{4V_0 t + 6a^2 - 5t^2}{4t}$, Therefore, the social benefits in this case are: $\frac{8V_0 t + 3a^2 - t^2}{4t}$

Proposition 2: There is a unique Nash equilibrium in the market, which is free for multi-homed users and charged a high price for single-homed users. The pricing depends on the network externalities β, cross-network externalities α and the degree of differentiation t in each group; social welfare and The network externalities β and cross-network externalities α in the group show a nonlinear relationship.

3.3 Buyer's Single Vesting

After the horizontal merger of the two platforms, most of them still maintain the two platforms to continue to operate in the market, such as the merger of Volkswagen Reviews and Meituan, and the same city and 58 cities. When the platforms are merged, in order to expand the scale of the impact, the platform will cancel exclusive measures for merchants, so that merchants can access the two platforms, thereby reaching more consumer users. For consumers, from a long-term perspective, consumers often only access one of the platforms for consumption. For the platform, after the platform is merged, the platform will choose to increase the basic services to increase ΔV the scale of users, which is reflected in the model as the increase in the basic income of joining the platform, $V = V_0 + \Delta V$,After the horizontal merger, the group will choose to increase the market positioning difference between the two companies based on its strategic positioning, such as Meituan and Volkswagen Reviews. Prior to the horizontal merger, the group buying website was known to the public. After the horizontal merger, the group positioned Volkswagen Reviews as " Discover Quality Life ", significantly enhancing the user experience of quality, personalization and convenience. Meituan is positioned to focus on group purchases and flash benefits, and build a one-stop platform that integrates eating, drinking, traveling, travelling, purchasing and entertainment. Another example is the merger of Youku and Tudou Video. After the merger, the group positions Youku in the mainstream, atmosphere and dreams, and tends to be the big and all-round mainstream direction; it positions Tudou in youth, personality and fun, and tends to the vertical direction of young avant-garde. After the acquisition of Baidu Takeaway by Hungry, the acquisition of Baidu Takeaway by Hungry, the Group implemented a dual-brand strategy, and Baidu Takeaway is positioned as a high-end takeaway market, which will gradually open up the degree of differentiation from Hungry. Therefore, it is reflected in the model that the degree of differentiation t increases Δt , so the degree $t' = t + \Delta t$ of differentiation after horizontal merger. Since the platform changes the related positioning after horizontal merger, it provides more accurate, convenient and fast services without

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

changing related fields, so t is far greater than the added value Δt and V far greater than the increased basic utility ΔV .Since the platform changes the related positioning after horizontal merger, it provides more accurate, convenient and fast services without changing related fields, so t is far greater than the added value and far greater than the increased basic utility.

When the buyer single vests and the seller mostly vests, the distribution of the buyer and seller is as follows

$n_B^{\ 1} + n_B^{\ 2} = 1, N_S^{\ 1} + N_S^{\ 2} + N_{多} = 1$ Which $n_B^{\ 1}$ indicates that the buyer only joins the number of buyer users on platform 1, $n_B^{\ 2}$ indicates that the buyer only joins the number of buyers on platform 2, and $N_S^{\ 1}$ that the seller only joins the number of seller users on platform 1, which $N_S^{\ 2}$ indicates that the seller only joins the number of seller users on platform 2, and tha $N_{多}$ t the seller joins two The number of users on the platform.

For the buyer, the buyer chooses to join only the utility of platform 1:

$U_{1,\ B} = V_0 + \alpha(1 - N_S^{\ 2}) - P_{1,B} - t'x$

The buyer chooses to join only the user utility of platform 2:

$U_{2,\ B} = V_0 + \alpha(1 - N_S^{\ 1}) - P_{2,B} - t'(1 - x)$

The buyer chooses whether to join platform 1 or platform 2: $U_{1,B} = U_{2,B}$

$V_0 + \alpha(1 - N_S^{\ 2}) - \beta_1 n_B^{\ 1} - P_{1,B} - t'x = V_0 + \alpha(1 - N_S^{\ 1}) - P_{2,B} - t'(1 - x)$,Since the buyer's order belongs, there is no difference x, $n_B^{\ 1} = \frac{1}{2} + \frac{\alpha\ (N_s^{\ 1} - N_s^{\ 2}) - p_{1,B} + p_{2,B}}{2t'}$, $n_B^{\ 2} = 1 - n_B^{\ 1}$

For the seller, the buyer chooses to join only the utility of platform 1:

$U_{1,\ s} = V_0 + \alpha n_B^{\ 1} - P_{1,S} - t'x$

The seller chooses to join only the user utility of platform 2:

$U_{2,S} = V_0 + \alpha n_B^{\ 2} - P_{2,S} - t'(1 - y)$

The seller joins two platforms at the same time, which is the utility of multi-homing:

$U_{多} = V_0 + \alpha - P_{1,s} - P_{2,s} - t'$

The seller chooses whether to join platform 1 or platform 2

$V_0 + \alpha n_B^{\ 1} - P_{1,S} - t'y = V_0 + \alpha - P_{1,S} - P_{2,S} - t'$

The difference between the effectiveness of the seller joining platform 1 x: $N_s^{\ 1} = 1 + \frac{\alpha\ (n_B^{\ 1} - 1) + p_{2,s}}{t'}$

There is no difference in the utility of the seller joining platform 2: $N_S^{\ 2} = 1 - y = 1 + \frac{\alpha\ (n_B^{\ 2} - 1) + p_{1,S}}{t'}$, $n_B^{\ 1} + n_B^{\ 2} = 1$,Simultaneously, construct the matrix equation $N_S^{\ 1}, N_S^{\ 2}, n_B^{\ 1}$ and bring it into MATLAB to calculate the relational expressions about p, t, α. Assuming that the marginal cost of the Internet company is 0, $\pi = p_{i,B} n_B^{\ i} + p_{i,s}(1 - N_s^{\ i}), i = 1,2$, the first-order condition is $\frac{\partial \pi}{\partial p_{1,k}} = \frac{\partial \pi}{\partial p_{2,k}} = 0, k = B, s$ to solve the four equations simultaneously:

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

$p_{1,B} = p_{2,B} = \frac{-a^2 + t'^2}{t'}, p_{1,s} = p_{2,s} = 0, N_s^{\ 1} = N_s^{\ 2} = \frac{-\alpha + 2t'}{2t'}, n_B^{\ 1} = n_B^{\ 2} = \frac{1}{2}$,Platform profit

$\pi = p_{1,B} n_B^{\ 1} + p_{1,s}(1 - N_s^{\ 2}) + p_{2,\ B} n_B^{\ 1} + p_{2,s}(1 - N_s^{\ 1}) = \frac{-a^2 + t'^2}{t'}$,Buyer user benefits

$= \int_0^x (V + a(1 - N_S^{\ 2}) - p_{1,B} - t'x)dx + \int_x^1 (V + a(1 - N_S^{\ 1}) - p_{2,B} - t'(1 - x)dx = \frac{4Vt' + 6a^2 - 5t^2}{4t'}$,Social benefits for seller users

$= \int_0^x (V + an_b^{\ 1} - p_{1,S} - t'x)dx + \int_y^1 (V + an_b^{\ 2} - p_{2,S} - t'(1 - y))dy + \int_x^y (V + a - p_{1,S} - p_{2,S} - t')\ dx = \frac{a^2 + 4Vt'}{4t'}$,Social welfare S3 is: $\frac{3\alpha^2 - t'^2 + 8Vt'}{4t'}$.

4. Comparative analysis

Social welfare differences after horizontal merger $\Delta S_1 = S_3 - S_1 = \frac{3\alpha^2 - 4t'\alpha - t'^2 + 8Vt' - 8V_0 t' + 2tt'}{4t'}$ is a univariate quadratic function on the externality of the cross network, which $\Delta = b^2 - 4ac = \frac{t + 2\Delta t - 24\Delta V}{4t'}$,so $-24\Delta V + 2\Delta t + t \geq 0$, which is $0 < \Delta t < 12\Delta V - \frac{t}{2}$, $\Delta > 0$ It shows that the social welfare after horizontal merger intersects with the social welfare function before horizontal merger, and there are two intersection points.Since it is t much larger than Δt , Δt ΔV as a small amount of change,So $\Delta t < 12\Delta V - \frac{t}{2}$ was established.Under the premis $\alpha > 0$ e, suppose that the intersection point 1 is α_1 , and the intersection point 2 is α_2 , then $0 < \alpha < \alpha_1 \text{or} \alpha > \alpha_2$ the social welfare after horizontal merger is greater than the social welfare before horizontal merger. At that time, $\alpha_1 < \alpha < \alpha_2$ the social welfare before the horizontal merger is greater than the social welfare after the horizontal merger.

4.1 Multi-attribution of the buyer before the horizontal merger

The social welfare difference after horizontal merger $\Delta S_2 = S_3 - S_2 = \frac{-3\alpha^2 \Delta t - tt_1 \Delta t + 8tt_1 \Delta V}{4tt_1}$ is a univariate quadratic function about the externality of the cross-network. $\Delta = b^2 - 4ac = 4\Delta t * t * t_1 * (8\Delta V - \Delta t)$ It can be obtained by the same reasoning, $\Delta t < 8\Delta V$ and it is constant. Under the premise of the assumption $0 < \alpha < \frac{t}{2}$, the intersection point 1 is α_1 , and the intersection point 2 is α_2 , $0 < \alpha < \alpha_1 \text{or} \alpha > \alpha_2$ then the social welfare after horizontal merger is greater than the social welfare before horizontal merger. At that time, $\alpha_1 < \alpha < \alpha_2$ the social welfare before the horizontal merger is greater than the social welfare after the horizontal merger.

Proposition 3: Horizontal mergers do not necessarily harm social welfare. When certain conditions are met, horizontal mergers can help improve social welfare.

4.2 Analysis of Examples

Due to the many parameter settings and the complicated function relationship, the accuracy of the proposition is verified by using assignment and simulation methods.

When both the consumer and the supplier are single-owned, the basic utility obtained by the consumer joining a platform $V_0 = 8$,transportation cost is the degree of differentiation $t = 0.5$,After horizontal

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

merger, the basic utility of consumers joining the platform improves $\Delta V = 0.25$,The group readjusted the positioning between platforms according to the organizational strategy, resulting in an increase $\Delta t = 0.1$ in the degree of differentiation between platforms.So the social welfare before the horizontal merger $S_1 = \alpha + \frac{63}{4}$,Social welfare after horizontal merger $S_3 = \frac{15\alpha^2}{4} + \frac{327}{20}$,It is verified that Proposition 1 shows a linear relationship between social welfare and cross-network externalities, and it also verifies that after Proposition 3 merges horizontally, social welfare and cross-network externalities exhibit a nonlinear relationship. The results shown in Figure 4.1 were obtained. When the consumer part is multi-owned and the supplier is single-owned, social welfare $S_2 = \frac{3\alpha}{2} + \frac{127}{8}$,It verified Proposition 2 and got the result shown in Figure 4.2.

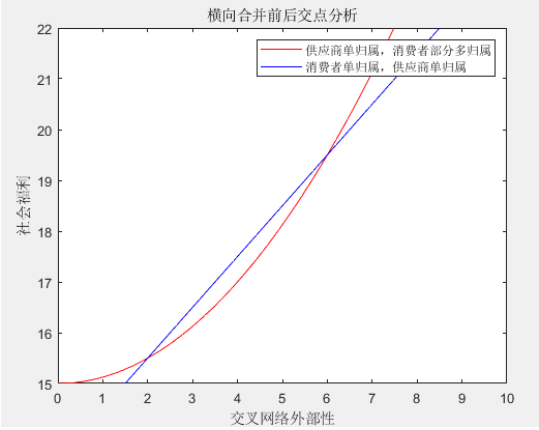


Fig 4.1 Bilateral single attribution

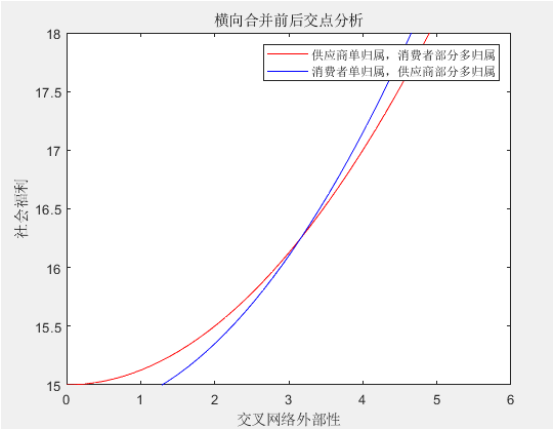


Fig 4.2 Partial multi-attribution scenario

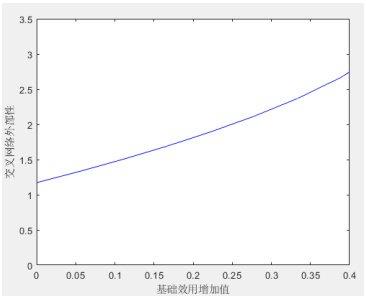
The intersection point α_1 in the range [0,1] in Figure 4.1 α_2 is the intersection point, $0<\alpha<\alpha_1 \text{or} \alpha>\alpha_2$ The social welfare after horizontal merger is greater than the social welfare before horizontal merger. The relevant regulatory agencies should encourage mergers and acquisitions at this time. At the time, $\alpha_1<\alpha<\alpha_2$,the social benefits after horizontal mergers and acquisitions were smaller than the social benefits before horizontal mergers and acquisitions. At this time, mergers and acquisitions should be prevented. If α_2 greater than t / 2, the value is invalidIn the same way, the intersection α_3 in Figure 4.2 is that at that time, $0<\alpha<\alpha_3$ mergers and acquisitions should be encouraged, and on the contrary, mergers and acquisitions should be prevented.

② Explore the influencing factors of social welfare intersections before and after horizontal merger

According to the equality of social welfare before and after the horizontal merger, the related functional relationship is obtained. Then, the following discusses how each factor affects the changes. ① V_0 relationship with α .It is found by assigning values to other factors that α is a constant and has nothing to do with V_0 .② ΔV relationship with α .The functional relationship for case one is $\alpha = 4 - 4\sqrt{\frac{1}{2} - \Delta V}$, The functional relationship of case two is $\alpha = \sqrt{80\Delta V - 10}$,The function image simulation diagrams are shown in Figure 4.3 and Figure 4.4. The results show that after the horizontal merger, the group attracted users by providing high-quality services. As the basic utility increases, the user's stickiness increases, and the externalities of the cross-network will increase. In other words, strong cross-network externalities will lead to an increase in social welfare, which will increase the value of the social welfare balance point of horizontal mergers and acquisitions, and make horizontal

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

mergers more difficult to approve.③ t relationship with α .The relation of case one is $\alpha = \frac{t}{3} + \frac{1}{3}$,The relation of case two is $\alpha = \frac{\sqrt{3t(t+1)}}{3}$ The function simulation images are shown in Figure 4.5 and Figure 4.6. The results show that the degree of differentiation t has a positive relationship with the externality of the cross network. When the degree of differentiation is higher, the externality of the cross network is greater. M & A Difficulty. Conversely, if the initial degree of differentiation is low, it will result in small externalities in the cross-network, which is conducive to horizontal mergers.④ Δt relationship with α ,.The relation of case one is $\alpha = \frac{2(\Delta t + 5)}{3}\sqrt{\frac{7\Delta t - 1}{4(\Delta t + 5)}} + 1$,The relation of case two is $\alpha = \sqrt{\frac{-5\Delta t^2 - 15\Delta t + 50}{3\Delta t}}$,The function simulation images are shown in Figure 4.7 and Figure 4.8. The results show that after the horizontal merger, when the group repositions the platform according to the group's strategy, the degree of differentiation increases, and the externality of the cross network increases first and then decreases. The increase in the degree of differentiation between platforms will stimulate users' multi-homing behavior; when differentiated After the degree is increased to a certain value, as the degree of differentiation increases, the externalness of the cross-network begins to decrease, it begins to show the uniqueness of each platform, and its social welfare intersection moves to the left, which is more conducive to the horizontal mergers and acquisitions.



α and ΔV

Figure 4.3 Bilateral Single Attribution

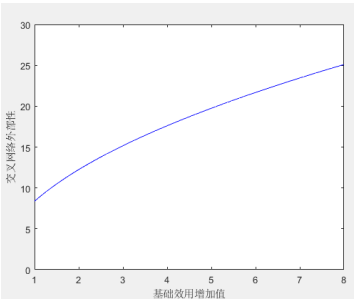
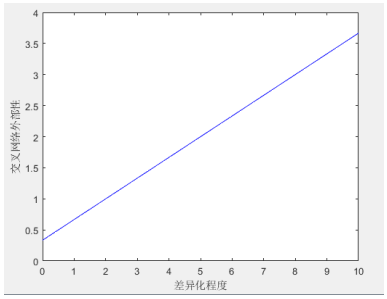
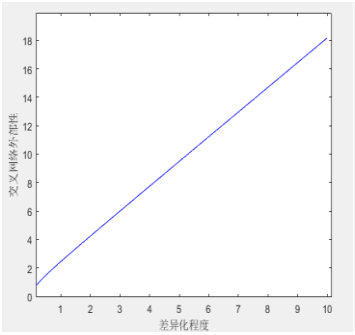


Figure 4.4 Consumers Part Multi-Attribution



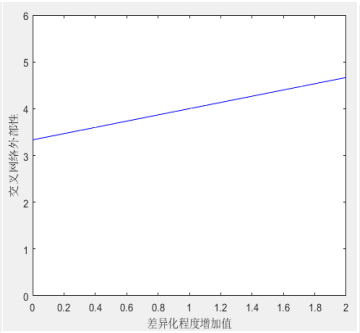
α and t

Figure 4.5 Bilateral Single Attribution



α and t

Figure 4.6 Consumer Part Single Attribution



α and Δt

Figure 4.7 Bilateral Single Attribution

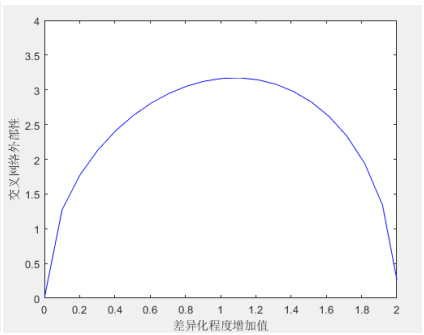


Figure 4.8 Consumer Part Multiple Attribution

5. Conclusion and inspiration

This paper selects the hotelling model to explore the social welfare research of horizontal mergers and acquisitions under different ownership behaviors, and considers the impact of network externalities on social welfare. Research shows that (1) under the condition that both buyers and

ISSN: 2414-1895 DOI: 10.6919/ICJE.202001_6(1).0020

sellers are single-owned, the cross-network effect and social welfare show a linear relationship; when the buyer is partially multi-owned and the seller is single-owned, the two show a non-linear relationship. (2) horizontal merger is not necessary Damage to social welfare; When the externalities of the cross-network meet certain conditions, horizontal mergers are conducive to the improvement of social welfare. (3) Before and after the horizontal merger, the degree of differentiation of the enterprise increases, and the externalities of the cross network increase first and then decrease.

References

[1] Wu Hanhong. Zhou Xiao, Welfare effect of horizontal mergers and acquisitions on bilateral platforms: a literature-based review [J]. Journal of Renmin University of China, 2017 (2): 146-153.
[2] Xie Yunbo. Chen Hongmin, Research on the Mode of Horizontal Merger of Internet Platform Enterprises [J]. Soft Science, 2016, 30 (09): 104-107.
[3] Zhang Xi, Study on the Welfare Effect of Horizontal Mergers in Bilateral Markets [J]. Business Research, 2016 (03): 52-58.
[4] Cheng Guisun. Chen Hongmin, TV media platform competition model with bilateral market characteristics [J]. Journal of System Management, 2009 (1): 1-6.
[5] Chandra A. Collard-Wexler A. Mergers in Two-sided Markets: An Application to the Canadian Newspaper Industry [J]. Journal of Economics & Management Strategy, 2009, 18 (4): 1045-1070.
[6] Li Xinyi. Wang Haohan, Research on Pricing and Welfare of Horizontal Mergers in Bilateral Markets——Taking China's Internet Media Industry as an Example [J]. Finance and Economics Research, 2010 (1): 27-32.
[7] Yun Xin. Xin Ling. Liu Ying et al. Case study of Youku Tudou M & A—based on event analysis and accounting index analysis [J] Management Review, 2015, 27 (9): 231-240.
[8] Li Zhiwen. Han Qiran. Xiong Qiang, A Comparative Study of Discriminatory Pricing Strategies Under the Horizontal Merger of Platform Enterprises [J] Business Research, 2018 (5): 133-141.
[9] Wu Xuliang. Liu Yatian. Network externalities, partial multi-homing and O2O competitive platform pricing strategy [J] Industry Economic Review, 2016 (04): 5-16.
[10] Armstrong, M. Competition in Two-sided Markets [J]. RAND Journal of Economics, 2006, 37 (3): 668-691.