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Pricing Strategies of Social Commerce Platform under Network Externalities

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Abstract

Although the theory of two-sided markets is popular nowadays, little attention was paid on self-network externalities and UGC (User Generated Content) produced by buyers which are the major features of social commerce two-sided markets. This article studies percentages of buyers who generated UGC, self-network externalities of buyers and cross-group externalities between two groups. The three factors influence the pricing strategy of social commerce platforms based on two-sided markets. With analyzing the special characteristics of social commerce, the study unveils that the optimal price of buyers charged by social commerce platform shows a negative correlation with self-network externalities and it also shows a negative correlation with the probability of UGC generated by buyers. The study also shows that the equilibrium price of buyers declines with the augment of cross-group externalities of buyers to sellers, and the equilibrium price of sellers declines with the augment of cross-group work externalities of sellers to buyers. The social commerce platforms on the basis of interest graph, lower UGC threshold and more interactive among customers gain the competitive advantages. Compared to other platforms, the two-sided social commerce platforms give consumers and retailers more subsidies.

Keywords: *Two-sided markets, social commerce platform, Network externality, User generated content*

1. Introduction

The theory of two-sided markets is a currently arisen hotpot in academic and industry areas related to industrial organization. It has several features. The first is that the two groups of agents can only trade through the platform. Second is that the utility enjoyed by one group depends on how well the platform does in attracting members in the other group, that means two groups have cross-group externalities. Finally, the change of the price structure of two groups on the platforms affects the transactions of the platform, namely non -neutral price structure [1].

Social commerce is a new emerging business mode in two-sided markets, buyers and sellers can only trade through the social commerce platform. It merges social network virtual community into the value chain of E-commerce. UGC (User

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Generated Content) such as following, retweeting, sharing and commenting influences significantly on purchasing motivation and decision making of buyers. For this reason, the larger quantities of buyers, the bigger influence on themselves with the interaction and comments mutually, In that case every buyer can acquire more utilities from other buyers, and it is the self-network externalities of social commerce platform. The bigger the quantities of buyers and the more attention was paid to the interaction among buyers ,which leads to more transaction opportunities the sellers can get and vice versa. One group's benefit from the platform depends on the size of the other group .So there are cross-group externalities existing in social commerce platform. Registration charges of buyers in social commerce platform are often free, sometimes even negative (affording subsidies). For the sellers, per-transaction charge is afforded to the platform. To sum up, social commerce platform is a typical two-sided markets, it not only possesses all characteristics of two-sided markets, but also has the features of the social network.

Although the discussions of two-sided markets in academic and industry areas always were enthusiastic, it focused mainly on the study of cross-group externalities in two-sided markets pricing. Researches on two-sided markets with characteristics of social commerce platform are seldom, especially in the aspects of self-network externalities of two-sided markets and UGC generated by buyers.

This article takes social commerce platforms as research objects, using the theory of network externalities to study the influence factors and pricing strategies mechanism of social commerce platforms. It emphasizes on UGC which is generated by buyers influencing pricing strategies in social commerce platforms.

2. Literature Review

2.1. Definition of Two-sided Markets

The definition of two-sided markets has been segmented into two theories. One is the network externality theory represented by Armstrong, while the other one is price structure theory which is stood for by Rochet and Tirole.

Rochet & Tirole [2] define two-sided markets as platforms that can make each group affect mutually and maintain one side agents through reasonable charges from another side agents, the characteristics are strong complementarities of the two parties and non-neutral price structure. The ultimate profits of markets which have network externalities derived from two group's interaction in the same platform. The famous Chicken & Eggs Problem reveals how to deal with relationship between bilateral groups in the platform. Which group should be launched in priority in order to enlarge the scale of the other group? Parker & Alstyne [3] think that Coase Theorem loses efficacy in the two-sided markets. When one group creates values for the other group in a platform, the influences of the transaction's effectiveness of properties, transaction cost and information symmetry are not significant. Armstrong [4] defines two-sided markets from the aspects of cross-group externalities. One group gains revenues from the platform depending on the scale of the other group. Chakravorit & Roson [5] define two-sided markets as platforms, which provide products and services for two different groups of participants, and also set prices for them in order to attract both sides of them into these platform.

2.2. Two-sided Markets' Classification

Rochet & Tirole [6] divide two-sided markets into simple and complex ones respectively according to the size of each group. Evans [7] divide two-sided markets into three types: Market Maker, Audience Maker and Demand Coordinator.

Armstrong [4] thinks that there are three categories in two-sided markets: monopoly platform, single-homing and multi-homing competitive bottlenecks. Wright & Kaiser [8] allocate two-sided markets to intermediary market, card payment, search engine and yellow pages according to market function. Chen & Xu [9] construct Theoretical framework of two-sided markets.

2.3. Characteristics of Two-sided Markets

The difference between two-sided markets and traditional single markets can be summarized in three aspects. The first is Cross-group externalities. Complementary and mutual dependence are the second one and the last is non-neutralism of pricing structure.

Doganoglu & Wright [10] think that multi –homing platforms are popularly existing in two-sided markets through comparing multi-homing platforms and compatible platforms. Satoru & Akihisa [11] study the modes of multi-sided markets and summarize the modes through discrete convex analysis. Armstrong & Vickers [12] define two-sided markets from the perspective of cross-group externalities, considering that the net utilities of one group increase depending on the augment of scale of the other group. Rysman [13] believes that cross-group externalities are the most important ones in two-sided markets typical features. Tian, Zhan & Guan [14] establish a theoretical model of two-sided markets according to the ecosystem theory and the E-commerce market structure. The model is used to explain the structure-element identification, relationship analysis and formation mechanism analysis. P. Regibeau [15] points out two-sided markets are identified by three features: structure, externality and non-neutrality. Galeotti, Luis & Gonza [16] note the features of two-sided markets are two different groups of agencies and coordination of the two groups from the angle of two-sided markets constitution.

2.4. Pricing of Two-sided Markets

Currently the study of pricing of two-sided markets mainly focus on charging mode, price structure, influence factors and regulations as well as the impaction influencing platform's profit and consumer welfare. There are three kinds of pricing mode: registration fees, per-transaction fee and two-part tariffs. Registration fees are lump-sum, per-transaction fee is collected in the light of the transaction volume and the frequency of transactions, two-part tariffs mean affording registration fees first and then per-transaction fee.

Caillaud & Jullien [17] come up with their opinions that platform sets free or negative subscription charges in one group in order to attract the other group to take part in, the purpose is to maximize the platform's profits. Rochet & Tirole [2] elicit pricing formula of monopoly platform in two-sided markets. The results are similar to Lerner Index, and they further explore the relationship between price and elasticity of demand. Roson [18] considers the two-sided platforms and markets from environment scope. Two different groups of customers accept products or services, the revenue of each group increases with the augment of customer size of the other group. Armstrong [4] thinks about registration fees and two-part tariffs, the article constructs the pricing mode of monopoly and competitive platform on account of cross-group externalities based on Hotelling mode. The platform charges registration fees from two sided customers according to network externalities. The article explains why the platform charges free or negative of one group and puts forward the opinion that the larger differentiation of each group on the platforms, the higher price which platform gives to each group .Finally it explains asymmetry of pricing of the two-sided market. Armstrong [19] defines two-sided market as

acquiring revenues through interaction between two agents in the platform. The profits which one agent achieves depend on the scale of the other agent, they influence mutually by means of cross-group externalities. Armstrong extends the monopoly mode, the higher price elasticity of demand and cross-group externalities in one agent, and then the lower pricing on the customers in this agent. Hagiu [20] studies the influence on pricing when platform provides price commitment to one side named purchaser. Research indicates in case of platform monopoly, adopting low-price strategy contributes to attract more customers. When platforms are competitive, low-price strategy decreases platforms' profits. Hagiu [21] has research on the relationships between differentiation of customer's diversity preference of productions and platform pricing when registration fees are charged. The results indicate that platforms tend to charge high with product provider if customer's diversity preferences were strong. In contrast platforms need to charge much to product purchaser. Gabszewicz & Wauthy [22] consider different types of participants have multi-registration through a vertical differentiation model. At the same time, the platform only charges registration fees of participants. Gaudeul & Jullien [23] illustrate that monopoly and perfect competition market are the basis of studying on two-sided markets. They are used to clarify the rationality and existence of disequilibrium pricing. Economides & Tag [24] discuss network neutral regulation of pricing of two-sided markets in Internet environment. Xu, Chen & Pan [25] analyze two-sided markets through two-stage model. Cao [26] has research on charging forms and selection preference of B2B platforms. The article holds a comparative study aiming at three charging forms such as registration fees, per-transaction fee and two-part tariffs. The results of the research find platforms' charging forms are closely connected to the unit service network strength ratio. The more quantity of the variable, the stronger tendency to select the registration fees will be. In addition, the article analyzes competitive strategy of the B2B platform based on three dimensions: accessing form (single-homing and multi-homing), ownership structure (neutral platform and independent platform) and competition mode (symmetric competition and asymmetric competition). The article also summarizes the impact on the platform competitive behavior from platform accessing form and ownership structure. Zhou [27] uses SCP paradigm of Industry organization and game theory to investigate the operation mechanism and pricing strategy of E-commerce platform industry. The article analyzes the market structure and studies strategy behavior of firms in the market competition. At last, it analyzes the social welfare and puts forward relevant strategy suggestions for E-commerce industry regulation. Wang [28] summarizes attributes of ownership and ownership structure of a mobile Internet platform from the aspects of different leadership models of mobile Internet models. It establishes platform revenue model of different ownership structure and conducts comparative study of platform revenue models of different leading modes and ownership structure. Furthermore, it develops existing platform revenue model of two-sided markets and forms revenue models of mobile Internet platform. Combining the characteristics of mobile Internet, it elicits multi-variables of platform revenue to construct revenue model of mobile Internet platform. Finally, it points out that platform differentiation, network externalities and market scales of two sides are the critical factors to enhance platform competitiveness, profits and social welfare. Lu & Chen [29] provide pricing strategies of eWOM virtual communities.

To sum up, two sided markets are constituted by a platform and two independent transaction groups. Cross-group externalities are formed through the connection of two sides by platform and the revenues of one group are influenced by the scale of the other group. Platform charges free or negative of one group to attract the participants of the other group .Two-sided markets are non -neutral price structure. These studies only

focused on the characteristic of cross-group externalities of two-sided markets. The research concerning on self-network externalities is little, especially the study of two-sided markets with features of social network.

3. Characteristics of Two-sided Markets in Social Commerce Platform

Making use of Internet thinking and features of the social network, the social commerce integrated UGC into purchasing motivation and decision making of consumers. There are three main modes of social commerce. The first one is traditional E-commerce website socialized, such as Loving Shopping of Taobao, which increases customer loyalty and stickiness by means of interaction between buyers and sellers. The second kind is comprehensiveness social network, such as Micro Mall of Sina Microblogging. These kinds of large-scale social network platforms use their powerful users' capital to attract online retailers. With the help of e-WOM formed by social networking realizes virus-like spreading in order to increase customer's purchasing experience. The third is third-party social commerce platform, such as Meilishuo and Douban. These kinds of platforms use interest graph to gather customers. Interest graph in social network is generated through UGC in order to satisfy personal customization and various needs of customers for the further purposes of increasing user stickiness and loyalty, finally it produces co-creation of value chain.

Feature analysis of social commerce platform based on two-sided markets has been done as below.

3.1. Platform and Heterogeneous Groups in Both Sides Existing

There are several platform operators in the social commerce platforms. They serve for two kinds of different users in the value chain of social commerce. One group is buyers who purchase products or services from social commerce platform. The other group is sellers who sell products or services through social commerce platform.

3.2. Non-neutral Price Structures

When pricing has been done by social commerce platforms to buyers, it influences both buyers and sellers' participant enthusiasm and levels of usage, and vice versa. Therefore, pricing of two groups in social commerce platforms influences participation and employment.

3.3. Needs Interdependence

Buyers want to acquire satisfying products and services to get utility through social commerce platforms. The precondition of it is plenty and high quality products or services in social commerce platforms. Sellers want to make profits by selling products or services through social commerce platforms, while the precondition of satisfying needs is high quantities of buyers. Two groups match satisfy needs through social commerce platform.

3.4. Cross-group Externalities

The utility acquired by one group was influenced by the scale of the other group in social commerce platforms. Higher quantities one group has, bigger utilities the other group can acquire. More products or better services of sellers will attract more buyers to take part in. It leads to more potential buyers for sellers, finally more sellers appeal to the platforms.

3.5. The Special Properties of Self-network Externalities in Social Commerce Platforms

Self-network externalities mean that buyers can benefit from themselves. Every buyer acquires more utilities when the scale of buyers is bigger. Self-network externalities of social commerce platforms come from the generation of UGC by buyers, In consequence self-network externalities of buyers are related to numbers of buyers who publish UGC, and it means they are positive correlation. The buyers have social needs in the social commerce virtual community. For this reason, not only retailers' scale but also the number of the buyers and the UGC generated by buyers influence the utilities of buyers. The UGC generated by buyers also affect volume of transaction of sellers. Both cross-group externalities and self-network externalities exist in the two-sided markets of social commerce. In order to meet user's preferences, the UGC shared by buyers forwardly have the advantages of high reliability, low costs of transmission and favorite modes of public push, sharing and forwarding. Harris & Dennis [30] have the research findings that trust of hierarchical structure that come from both real friends and comments in websites are positive correlation to intention of online purchasing. Liang, Ho & Li [31] provide the opinion that customers share shopping experience and products when they have interacted with real or virtual friends through social commerce platform, they also ask for advice and give help mutually. Customers pay more attention to shopping advice from social network than advertisements and promotions. Chen, Fay& Wang [32] believe customers can share shopping experiences with real or virtual friends through social network platforms. They also compare products' performance and prices in these platforms. It provides customers with convenience for finding new products, decreasing costs of searching and increasing purchasing efficiency and effectiveness. Zhang [33] indicates through empirical research that users' trust of online shopping is positive correlation with recommendation from real friends and virtual friends of social network, transaction information of retailers, professionalism of friends and users' trust level of social network. The trust level of recommendation from friends of weak ties is higher than strong ties friends.

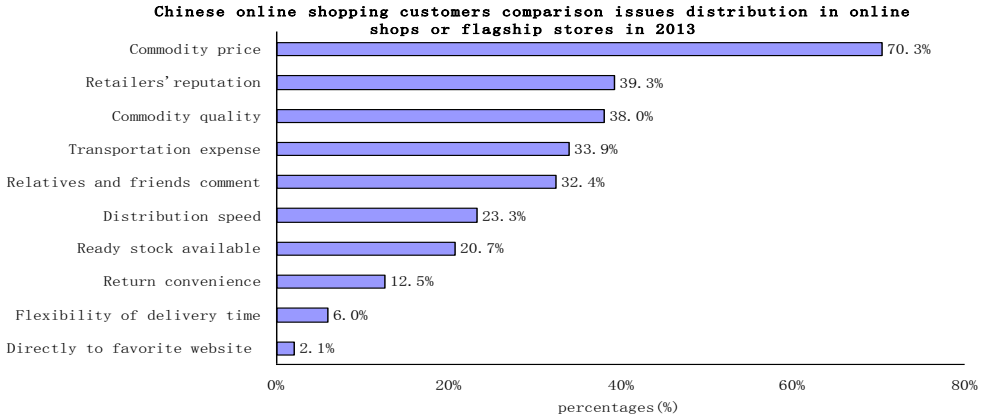

Figure 1. Chinese Online Shopping Customers' Comparison Issues Distribution in Online Shops or Flagship Stores in 2013 (Resources: www. Iresearch.cn)

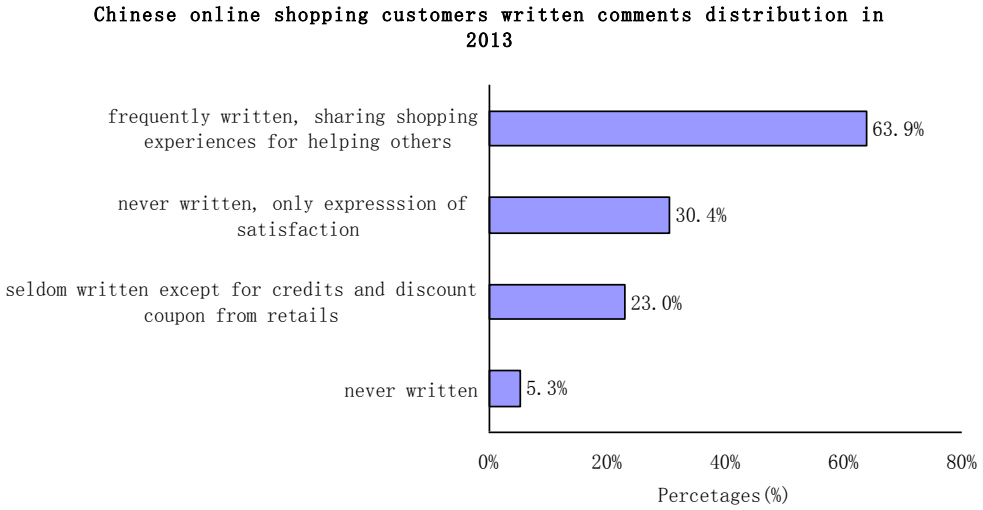

Figure 2. Chinese Online Shopping Customers' Written Comments Distribution in 2013 (Resources: www. Iresearch.cn)

According to *China Online Shoppers Behavior Report in 2014* from Iresearch [34], customers considered the prices of products most frequently when shopping online in 2013. They took account of sellers' reputation and products' quality were 39.3% and 38% respectively. There were 32.4% of buyers thinking about the comments of other users including relatives and friends. There were probably 63.9% users, in accord with the second graph, wrote comments about the products they had bought.

In order to decrease negative effect brought by information asymmetry between buyers and sellers, buyers will search and read UGC generated by other customers, then make purchase decision according to it. The buyers will generate some UGC from their purchasing experience in order to help other customers. In the light of Figure 1 and Figure 2, commodity comments make higher influence on purchasing decision of buyers. This article sets the probability of UGC generated by buyers as ω . In the two-sided markets of social commerce platforms, buyers' self-network externalities are related with ω . The more customers generated UGC, the higher utilities each buyer can acquire, then the products will gain more public popularity. Afterwards, more sellers will be attracted into the platforms, leading to more various commodities. Finally more buyers will take part in the platforms, which will increase the profits of the platforms and effectiveness of both groups therein. Consequently, an optimum increasing social commerce ecosphere will be formed.

4. Pricing Strategies of Social Commerce Platforms

4.1. Illustration of Business Mode

Social commerce platforms such as Renren, Microblogging and Micro-letter join up third-party applications through API (Application Programming Interface). The two sides of social commerce platforms are online customers and online retailers respectively. The platforms levy lump-sum from buyers (online customers) and per-transaction fee from sellers (online retailers). The profits of social commerce platforms come from registration fees, per-transaction fee and advertising revenues, as well as acquire effectiveness from UGC which is generated and diffused by buyers. Figure 3 is the revenue model of platforms.

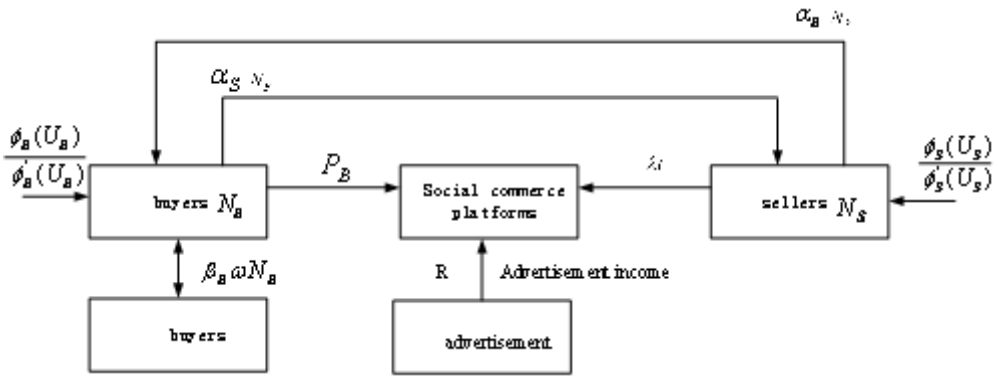

Figure 3. Revenue Model of Social Commerce Platforms

4.2 Platforms' Pricing and Profit Models

Supposing a monopoly social commerce platform connects two-sided customers. One group is buyers and the other group is sellers. Utilities of buyers are related with scales of sellers and scales of buyers themselves. Utilities of sellers are related with the scales of buyers.

Supposing the platform attracts N_B buyers and N_S sellers.

The utilities of buyers and sellers are respectively

$$U_B = \alpha_B N_S + \beta_B \omega N_B - P_B \quad (1)$$

$$U_S = \alpha_S N_B - \lambda t \quad (2)$$

In the equations, the parameter α_B measures the benefit buyers enjoy from interacting with each seller and α_S is the parameter which sellers enjoy from each buyer. β_B is parameter of self-network externalities. Assuming $\alpha_B \in [0,1]$, $\alpha_S \in [0,1]$, $\beta_B \in [0,1]$. ω is the buyers' proportion who generates UGC, $\omega \in [0,1]$. P_B is the platform's price charged of buyers. λ is the per-transaction fee of sellers while t is the transaction frequency of sellers. Supposing each customer's fit factor of the other customer in the other side of the platform is θ, and the fit factor of two sides are the same, $\theta \in [0,1]$.Therefore, transaction frequency of each customer of sellers is t=θN_B.

Assuming the numbers of each side who take part in the platform are:

$$N_B = \phi(U_B); N_S = \varphi(U_S)$$

For increasing functions $\phi_B(U_B)$ and $\varphi(U_S)$.

Because of the large scales of two sides, the initial construction and operation cost of platform will be ignored. Assuming the platform's cost for both sides are zero.

The revenue of cooperation between social commerce platforms and advertisers are calculated with the flow or click rates which are generated by buyers. Suppose the advertising revenue which is generated by buyers when they click the advertisement every time is R.

The platform's revenues are

$$\pi = R\theta N_B N_S + N_B P_B + \lambda\theta N_B N_S \quad (3)$$

Let expression (1) and expression (2) substitute expression (3) and consider the platform's profits to be offering utilities $\{U_B, U_S\}$ rather than prices $\{P_B, \lambda\}$.

$$\pi(U_B, U_S) = R\theta\phi(U_B)\varphi(U_S) + \alpha_B\phi(U_B)\varphi(U_S) + \ldots$$
$$\beta_B\omega\phi^2(U_B) - U_B\phi(U_B) + \alpha_S\phi(U_B)\varphi(U_S) - U_S\varphi(U_S) \quad (4)$$

By solving the model employs optimization theory, derives the equilibrium price structure when platform's profits maximize.

$$P_B^* = \frac{N_B}{\phi_B'(U_B)} - R\theta N_S - \beta_B\omega N_B - \alpha_S N_S \quad (5)$$

$$\lambda^* = \frac{N_S}{\theta N_B\varphi_S'(U_S)} - \frac{\alpha_B}{\theta} - R \quad (6)$$

At that time, the platform's profits are

$$\pi = \frac{N^2{}_B}{\phi'(U_B)} + \frac{N^2{}_S}{\varphi'(U_S)} - \beta_B\omega N^2{}_B - R\theta N_B N_S - (\alpha_B + \alpha_S)N_B N_S \quad (7)$$

4.3. Optimal Price for Buyers in Social Commerce Platform

From expression (5), in the condition of satisfying hypothesis, the optimal price for buyers equals $\phi_B(U_B)/\phi_B'(U_B)$ adjusted downward by the cross-group externalities $\alpha_S N_S$ and self-network externalities within buyers $\beta_B\omega N_B$, after that deducted advertising revenues $R\theta N_S$ as well. If buyers generated UGC in the social commerce virtual community, it would bring β_B utilities for buyers. The more buyers interacted with other buyers to generate UGC, the bigger utilities of UGC were, and then the bigger self-network externalities were. Therefore platform would decrease cost of registering of buyers. The bigger cross-group externalities that an extra buyer brings to sellers were, the more influence would be done to sellers. Social commerce platform attracted more customers to join it to increase utilities through the method of decreasing charges of both sides so far as to afford free of charging or giving subsidies.

Proposition 1. In social commerce virtual community, the prices are likely to be negative in both sides. With the larger scale of buyers who generated UGC, the stronger the self-network externalities of buyers are. The optimal price of buyers which is set by platform is negative correlation with self-network externalities of buyers and cross-group externalities that an extra buyer brings to sellers. Platform's profits are negative correlation with cross-group externalities.

4.4. Optimal Price for Sellers in Social Commerce Platform

From expression (6), the stronger self-network externalities are, the more sellers will be attracted with the UGC generated by buyers. The enlarging of the size of sellers increases the revenues of buyers. The bigger the cross-group externalities that an extra seller brings to the buyers are, the lower equilibrium price of per-transaction of sellers derived from platform is.

Proposition 2. In social commerce virtual community, the optimal price of sellers which is set by platform is negative correlation with cross-group externalities that an extra seller brings to buyers.

4.5. Mathematical Simulation and Discussion

MATLAB is used to simulate the model above, the simulation conditions are shown in Table 1.

Table 1. Simulation Conditions of Social Commerce Platform Model

Parameters or Variables	Value or value range
Number of users of buyers in platform (N_B)	[100000,1000000]
Number of users of sellers in platform (N_S)	[10000,100000]
Cross-group externalities parameter buyers enjoying from sellers (α_B)	[0,1]
Cross-group externalities parameter sellers enjoying from buyers (α_S)	[0,1]
Fitting factor (θ)	0.01
Self-network externalities of buyers (β_B)	[0,1]
Probability of UGC generated by buyers (ω)	[0,1]
profits produced from clicking advertisements by buyers (R)	3

4.5.1. Optimal Price's Simulation Result based on Cross-group Externalities in Platform: Simulating with MATLAB gains the relation curves of platform pricing and user scale of both sides. The relation curves of platform pricing and cross-group externalities are also shown. The simulation results are shown in Figure 4.

The conclusion will be made by analyzing the simulation curves, the optimal price of one side in platform declines with the augment of user scale, as well as the augment of cross-group externalities of the other side, even it is negative. It agrees with analysis results which were given by mathematic model. When the cross-network externalities of buyers to sellers is bigger than 0.2, register prices which platform charges from buyers appear negative, it means the platform offers subsidies. When the user scale of buyers is smaller than 200,000, the declining scope of per-transaction fee of sellers is large. Conversely the declining scope slows down. When the cross-group externality of sellers to buyers is more than 0.1, the per-transaction fee of sellers which is charged from platform is negative.

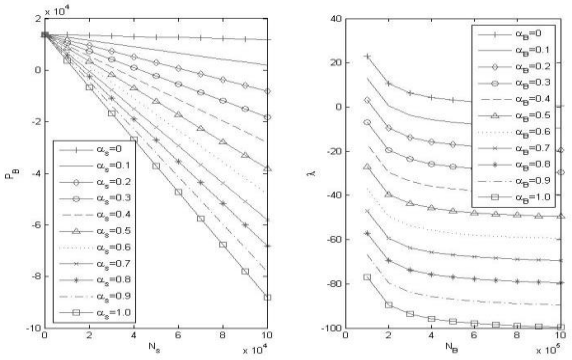

Figure 4. Optimal Price Simulation Curves based on Cross-group Externalities in Social Commerce Platform

4.5.2. Optimal Price's Simulation Results based on Self-network Externalities in Platform: Simulating with MATLAB obtains the relation curves of platform pricing and user scale of buyers. The relation curves of platform pricing and self-network externalities as well as relation curves of platform pricing and probability of UGC are also described below. The simulation results are shown in Figure 5.

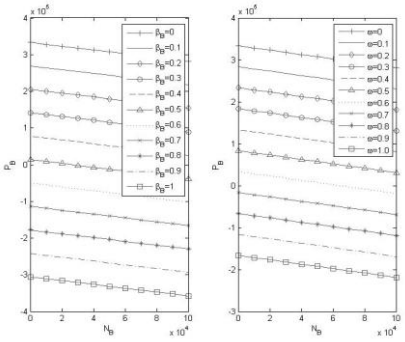

Figure 5. Optimal Price Simulation Curves based on Self-network Externalities in Social Commerce Platform

The conclusion will be made by analyzing the simulation curves, optimal price of buyers declines with the augment of buyers' scale and probability of UGC generating, as well as the augment self-network externalities of buyers, even it is negative. It agrees with analysis results which were given by mathematic model. When the self-network externalities of buyers is bigger than 0.5 and probability of UGC generating is larger than 0.6, the registration fees which platform charges from buyers are negative, it means the platform offers subsidies.

4.5.3. Optimal Profits' Simulation Curve in Platform: Simulating with MATLAB gains the relation curves of platform profits and user scale of both sides. The simulation results are shown in Figure 6.

Known from simulation curves, platform's profits are negative correlation with cross-group externalities and sellers' scale. The profits are positive correlation with buyers' scale.

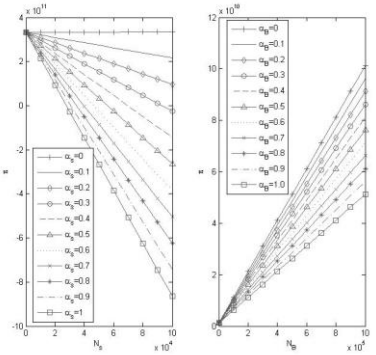

Figure 6. Optimal Profits' Simulation Curves in Social Commerce Platform

5. Discussion

The article discusses social commerce platforms based on two-sided markets. It establishes and expands parts of mathematical models from Armstrong (2006) for reference. In view of characteristics of social commerce platforms, self-network externalities and cross-group externalities were used in the model. Probability of buyers who generate UGC were emphasized on the article for the study of participating in co-creation by buyers and social network features of social commerce two-sided platforms. The optimal prices of two sides in social commerce platforms are negative correlation with self-network externalities, cross-group externalities that one group enjoys from interacting with the other group and

probability of buyers who generate UGC. The optimal prices are likely to be free, even negative which means subsidies are given.

The policy suggestions has been given as below. Because of the weakness of customer basement, the sellers should attract more buyers to entry the platform. Sellers often use market entry strategy of free of services for buyers in the social commerce marketing. The platforms even sometimes offer subsidies to both groups. For the social network features, buyers generate UGC when they interact with other buyers such as following, retweeting, sharing and commenting. The higher level buyers interact, the more potential buyers and sellers will be attracted into the platforms. The self-network externalities and UGC generated by buyers make them join the process of co-creation of value chain and create value for every segment of value chain. That is why social network platforms often charge free or negative for buyers. When self-network externalities, cross-group externalities and the user scale are established, the platforms make profits in the methods of per-transaction charge from sellers and advertising income according to buyers' clicks and attention. Social commerce platforms should aggregate users by the means of interesting driven. Interest graph based third-party social commerce platforms are successful because of strong competitive advantages in marketing. It is highly appreciated by customers and retailers. Better user experience and more frequency of interaction by buyers can increase revenues for social commerce platforms and then benefit both sides of the platforms.

6. Conclusion

On account of theoretical analysis and simulation analysis, social commerce platform is a typical two-sided market. The article aims at social commerce platform and introduces the parameters of cross-group externalities, self-network externalities and probability of UGC generated by buyers to discuss in optimal equilibrium pricing of both sides in social commerce platform. The conclusions were drawn as below: Pricing on both sides in the platform are likely to be negative; optimal price of buyers charged by platform is negative correlation with self-network externalities and probability of UGC of buyers; optimal prices of both sides are negative correlation with the cross-group externalities.

7. Limitation and Future Work

For the further study, there are several aspects will be discussed. For the first one, from the social commerce characteristics of two-sided markets, the article considers the probability of UGC which influences platform's optimal pricing. The quality of the UGC as well as the positive and negative effect of UGC are not mentioned. In fact, the quality of UGC affects customers' psychology and behavior, and then influences the recommendation, purchasing decision and satisfaction of customers. So segmenting quality of UGC as well as negative and positive of UGC of the two-sided markets pricing mathematic model are the further direction. Second, the article only studies monopoly model of social commerce platform based on two-sided markets, the aspects of two-sided markets model of dual-platform competitive model of social commerce should be discussed later. Third, the mechanism of transmission of marketing information plays an important role on social commerce platform, integrating the viral marketing models into two-sided markets model to analyze the special aspects of social commerce two-sided platform should be considered. Last but not least, the existing studies are short of the empirical research of two-sided platforms. In the future work, large amount of data should be collected from the realities to discuss the pricing strategies and suggestions.

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