CYBER ADVERSE SELECTION PHENOMENON IN THE INTERNET MARKET IN CHINA: MODEL AND CASE STUDY

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ABSTRACT

Adverse selection means the selection by the consumer when faced with the circumstance of asymmetric information. The 'cyber adverse selection' phenomenon in Internet market hinders the healthy development of Internet market. Based on the adverse selection model put forward by American economist George Akerlof , who is one of Nobel Economics Prize laureates in 2001, this paper set up a cyber adverse selection model in Internet market . This paper takes data from Taobao.com in China as samples and demonstratively analyzes the characteristics of cyber adverse selection problems in Chinese Internet market. The results showed that reputation mechanism can effectively reduce the appearance of adverse selection, as well as electronic intermediaries and business alliance can offset adverse selection problems. The results also reveal that the cyber adverse selection in Internet market not only exists but also occurs more serious, which affects the function of Internet market. Finally, this paper offers some strategic thought and encourages sellers and buyers to trade credibly.

Keywords: adverse selection, Internet market, reputation mechanism

INTRODUCTION

Adverse selection theory was suggested by the American economist George Akerlof (1970), who is one of Nobel Economics Prize laureates in 2001. With this model, Akerlof indeed explains many economic institutions and many important aspects of uncertainty. But the model studies the traditional markets (tangible markets), how about the Internet market? Based on Akerlof model, this paper builds up the adverse selection model in the Internet market, and demonstratively analyzes the characteristics of cyber adverse selection problem in Chinese Internet market and discuss the function of counteracting mechanism such as credit evaluation system , quality-intermediary and reputation. Finally, this paper probes into resolving approaches about the adverse selection in Internet market.

CYBER ADVERSE SELECTION PROBLEM IN THE INTERNET MARKET

Different from the tangible markets, all the market-attendees in Internet market have fair opportunities in the network where big companies have no more predominance than little ones. In the tangible markets the 'big' is a very effective market single, but in the Internet market the 'big' has nothing to do with the product quality, that is, the network has the lower enter-obstacle for the marketing. On the other hand, in the Internet markets we can

acquire information in lower cost or no cost by the automatic search and sort technology. So, compared with the traditional market, Internet market has more ways for acquiring information, higher efficiency and lower cost – this means there are more and higher perfectibility for acquiring information. In addition, the minimum or inexpensive payment in seeking for information result in lower transaction cost.

Although there are so many advantages, especially the high information efficiency, it not implies that there should be high marketing efficiency. In fact, in the Internet market the adverse selection problem resulting from asymmetry of quality information exist more seriously than in the traditional market. The reasons as below:

- The influence of 'information paradox'. Because the digital products mostly are experience goods, their quality is known clearly only after being used. However, once consumers acquaint oneself with its quality they unwillingly buy it – this is an insuperable barrier in producing the digital commodities. This attribute makes the manufacturers find no good methods to guarantee their products quality to customers. Despite a great deal of advertisements and product's news, the customers still not accept manufacturers' speaking and unlikely buy it.

- Unclear identity for online producers. In the Internet the cyber-store can be built in one day, and disappear simultaneously too. For this type of uncertainty, the marketing efficiency in Internet market will be extremely low. Unclear identity for online producers makes us not know well the products quality.

- The subjectivity of evaluation about online quality. There is no doubt that the personalized service in the Internet market enables customers more frequently and more convenient. However, the personalized services make it difficult to diffuse the reputation built in a customer to other customers, which strengthen the informational asymmetries about product quality.

- Alternating personality of producers in network. Unlike the tangible products, the online goods are produced and sold by the virtual persons, who exist in short time or numerously. All the users are the potential producers or vendor by the individual homepage or web server. Hence in the Internet market the adverse selection problem will be serious.

THE CYBER ADVERSE SELECTION MODEL IN THE INTERNET MARKET

We hypothesize that there are many potential vendees and venders, who are risk neuters. The vender knows the average quality θ of his products for sale. The vendee don't know θ but he can know the distribution function $f(\theta)$ by the guess or experience. And we hypothesize that vendee's valuation for the product's quality is $v(\theta)$, whereas vender's valuation is $u(\theta)$, obviously $\partial v/\partial \theta > 0$, $\partial u/\partial \theta > 0$. If the vendee 'bid for the product is p and bargain on this price, thus the vendee 's utility is $\pi_B = v(\theta) - p$, and the vender's utility is $\pi_S = p - u(\theta)$. As it is well known to us , the bargain lie on approbatory degree for the same product's quality, so we define a coefficient for the quality : $\varepsilon = v(\theta)/u(\theta)$. For simpleness, we order $u(\theta) = \theta$, thus $v(\theta) = \varepsilon \theta$ ($\varepsilon \geq 1$).

We hypothesize that the quality distribute well-proportioned in [a ,b] ,thus the density function is $f(\theta) = 1/(b-a)$. We use the demand cure **D** shows the relation between the prices that the vendee would like to pay and the average quality of the product for sale in network, and use the supply cure **S** shows the relation between the average quality and price. So, the demand cure **D** is:

$$p(\bar{\theta}) = \varepsilon\,\bar{\theta} \qquad (1)$$

The supply cure **S** is :

$$\bar{\theta} = \frac{\frac{1}{b-a}\int_a^p \theta d\theta}{\frac{1}{b-a}\int_a^p d\theta} = \frac{p+a}{2} \qquad (2)$$

Resolving the above simultaneous equations (1) and (2), the solution is ($\dfrac{a}{2-\varepsilon}$,

$\dfrac{a\varepsilon}{2-\varepsilon}$) .

The relation between the demand cure **D** and the supply cure **S** is as Figure 1.

In the Figure 1, the supply cure **S** is a line segment. From the chart we can see that the point of intersection between the supply cure and the demand cure (i.e. equilibrium price and equilibrium quality) are increment function of ε. Therefore the marketing efficiency in the Internet business lies on the big or small of ε.
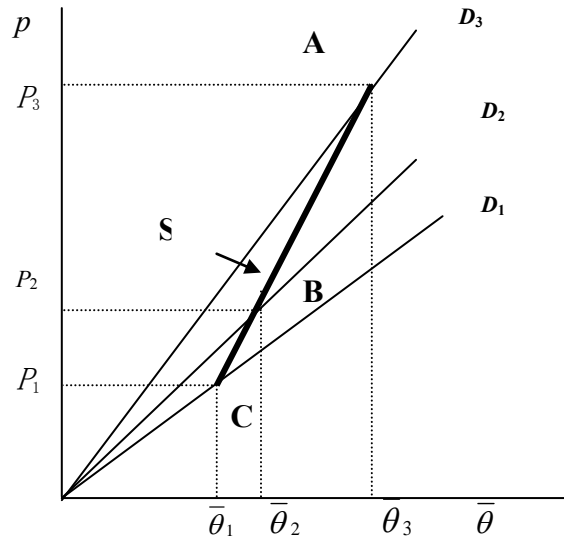

Figure 1. Intersection between S and D

- Under the first case, the point of intersection ($\bar{\theta}_3$, p_3) between S and D_3 correspond to $\varepsilon > 1$,the social net benefit is: $\pi_n = \pi_B + \pi_S = (v(\theta) - p) + (p - u(\theta)) = (\varepsilon - 1)\,\theta$

>0, the price and the quality for exchange are tiptop ,the quantity of exchange is bigger, but the 'adverse selection' leave all the products($\theta > \dfrac{a\varepsilon}{2-\varepsilon}$) for the vendors.

- Under the second case, the point of intersection（$\bar{\theta}_0$, p_0）between S and D_0 correspond to $\varepsilon =1$, the social net benefit is : $\pi_n = \pi_B + \pi_S = $ 〔v（θ）- p〕 + 〔$p-u$（θ）〕 = （ε-1）θ = 0，the price and the quality for exchange are lowest, the quantity of exchange is minimum.
- Under the third case, there is no the point of intersection between S and D_2, i.e. there is no trade between the vendee and the vender, here $\varepsilon <1$, the social net benefit is: $\pi_n = \pi_B + \pi_S = $（$\varepsilon$-1）$\theta < 0$.

As the ε shows the approbatory difference for the same product, which virtually indicates the informational asymmetry for the quality, so under the third case the market efficiency is the lowest − it is the condition that we have to confront in the Internet market.

POSSIBLE RESOLVING APPROACH

In order to resolve the 'lemon' problem, we should tell the consumers the quality of the product — whether in the Internet market or in the tangible market. However, the cyber 'lemon ' problem have different characters in the two types of markets，so we should find the possible resolving approaches in the Internet market that different from the tangible market. The quality-intermediary may play a very important role than other methods in the Internet market. Because they profit by evaluating product quality in the network they need supplying credible information to preserve their reputation. It is the mechanism 'information overflow' that impels the middleman not selling the products from the immoral producers, and spurring manufacturers to maintain high quality.

We continue the anterior model to illustrate the condition that the quality-intermediary in existence. We hypothesize to join a third party in the model, i.e. the quality middleman, which earns commission m_1 and m_2 from vendee and vender. And we suppose that the cost of the middleman is, thus middleman's utility is:

$$\pi_m = m_1 + m_2 - c \qquad (3)$$

The vendee's utility is:

$$\pi_B = v（\theta）- p - m_1 \qquad (4)$$

The vender's utility is:

$$\pi_S = p - u（\theta）- m_2 \qquad (5)$$

Thus， the social net benefit is the sum of (3), (4) and (5):

$$\pi_n = \pi_m + \pi_B + \pi_S$$
$$= 〔v（\theta）- p - m_1〕 + 〔p - u（\theta）- m_2〕 + 〔m_1 + m_2 - c〕$$
$$= （\varepsilon-1）\theta - c \qquad (6)$$

This result shows that whole social welfare will be improved if only the expenditure c can increase ε to certain degree, i.e. $\pi_n > 0$.

Consequently, although the transaction cost in Internet market increase with the participation of the middleman, the marketing efficiency enhanced simultaneously as well as. We can confirm that the quality intermediates is an efficient approach to resolve cyber adverse selection problem in present e-market.

EMPIRICAL ANALYSIS: BASED ON THE DATA FROM TAOBAO IN CHINA

The Choice of Samples and Data

We chose perfume trading market as study object. The reason we chose the perfume market is that it has a lot of trading volume, multiple mass distributions and there is the possibility to reduce the uncertainty relying on the information. Time span is three months (2010.6-2010.9).Perfume as a typical experience goods, their quality standards are not unified, the quality identification for the level not easy to be carry out. Unless there is a wealth of experience, it is difficult to identify their true quality and grade for the buyers after receiving merchandise. Thus, the buyer in the purchase of such products are most likely to take a negative attitude to deal with possible risk, that is, to choose low-price goods and refused to choose high-price goods. In other words, such commodities trading activities contain asymmetric information that is prone to result in adverse selection phenomenon. The data are widely distributed.

Explanatory variable

As a quality-intermediary in electronic market in China, Taobao is not responsible for identifying the quality of products, but Taobao provides a credit evaluation system. We mainly use four major credit value indicators from Taobao's credit evaluation system as explanatory variables: commodity price (*lnprice*), the seller's reputation rate (*lnrate*), whether the goods purchased is consistent with the description (*wfit*), The e-seller's attitude(*service*), the e-seller's delivery speed(*logistic*), whether to join the business union (*wjoin*), number of negative feedback (*lnneg*), whether selling perfume specially(*wspec*).

Data analysis

The seller's reputation can offset the negative effects of adverse selection. All data are taken the logarithmic form. Regression results are as follows:

$$\ln price = 0.1407366253 * \ln rate - 0.1337836875 * \ln neg$$
$$t \qquad （2.891375） \qquad （-2.448714）$$
$$+ 3.136100414 * \ln wfit - 1.221497979 * \ln ser - 0.6665400228 * \ln spd - 2.058656567 \quad （7）$$
$$（2.002442） \qquad （-0.400940） \qquad （-0.271456） \qquad （-0.298712）$$
$$R^2 = 0.361056 ， \quad DW = 0.781414$$

From the above regression results we can see that the seller's reputation rate (*rate*) has a significant positive impact for the commodity price, while negative feedback (*neg*) also has a significant negative impact for the commodity price. The third indicator (*wfit*) also has a significant positive price effects. However, the latter two indicators e-seller's attitude (*ser*) and the e-seller's delivery speed (*spd*) are negative, but not significant. This may be due to multicollinearity reason. In order to eliminate the impact of multicollinearity, we

merger these indicators and then take multiple regression analysis as follows:

$$\ln price = 0.1537225691*\ln rate - 0.1319816649*\ln neg + 2.205280463*wall - 6.888245541 \quad （8）$$
$$t \quad （3.319734） \quad （-2.426717） \quad （1.749006） \quad （-1.117748）$$

By the integration we can see that the impact on prices has been very significant.
Joining the business union has a positive effect on prices and can reduce the adverse selection phenomenon. We use Probit model, modeling is as follows:

$$wabo = \beta wjoin + \delta \ln rate + \varepsilon$$

wabo is a dummy variable, which indicate that if the price is higher than the general price. wjoin is also the dummy variable. Joining the business is 1 and 0 otherwise. We use the binary choice regression model as follows:

$$wabo = 1.061147 wjoin + 0.326624 \ln rate - 3.228768 \quad （9）$$
$$t \quad （1.925430） \quad （2.367242） \quad （-2.833055）$$
$$R^2 = 0.391304 , \quad DW=0.762321$$

The regression results shows that the variable *wjoin* has more significant impact on the *wabo*. Cyber adverse selection phenomenon not only exists, but also is strengthening. When we observe the Table 2, we also found Internet market price significantly lower than traditional perfume market. The results indicate that the adverse selection phenomenon still exists in Taobao's perfume market. In addition, we can see that the variance of Internet market perfume prices is higher than traditional markets, which further illustrates that the perfume on the mass distribution in Internet market is very uneven. This result shows when buyers browse a favorite seller's products, they tend to believe the information about evaluation and make their own decisions in accordance with the favorable number. These phenomena indicate that along with the Internet strategy counteracting the cyber 'lemon' problem, there may be a force that likely to strengthen consumers' distrust on the network environment. It may results in 'vicious circle' in dealing with the cyber adverse selection problem.

Table 1. Comparison of price and variance in two perfume markets

Market Category	Price		Variance
	Average (median)	Maximum (minimum)	
Internet Market	152.4 （162.6）	213 （104）	2113.6
Tangible Market	368 （356）	470 （235）	1549

CONCLUSION

From this analysis above we can get the following conclusions:

- Taobao reputation evaluation systems and business alliance system with the local characteristics can reduce the adverse selection problem in Internet market in china .It play a particularly important role. Taobao as a successful Internet site introduced a reputation evaluation system can eliminate negative adverse selection effect, although it is not responsible for product quality identification.

- Cyber adverse selection problem not only exists, but has certain continuity, which cause vicious cycle in solving the adverse selection problem and affects effect of the implementation of the reputation evaluation system. The main reason come from malicious credit speculation in China such as brush drill, praised each other or attacking each other, the phenomenon of revenge.

- Reputation evaluation model needs to be improved and amended to encourage buyers and sellers needs to disclose the true quality of the transaction to obtain an honest reputation degree so that the reputation mechanism can effectively solve the problem of adverse selection. For example, pure virtual products should been given smaller weights and physical goods may be given a higher weight; strengthening the weight of recent and weakening the weight of future date; reputation evaluation should link the commodity price and so on.

DISCUSSION

It is no doubt that all the method in Internet is likely confronted with the failure in effect. When the economic system generally occur the 'adverse selection' resulting from the asymmetric information, the marketing can not get the optimal Pareto efficiency, and unluckily, we only get sub-optimal Pareto efficiency.

Grossman and Stiglitz（1980）have proved and put forward the 'Grossman - Stiglitz paradox'. This paradox consists of two contradictory conclusions: (1) if the information in the market is transferred adequately, the market equilibrium is inexistent; (2) if achieving information need paying out cost, there is no the equilibrium in the original significance. This 'equilibrium' paradox drastically negates the connotative presupposition that the information is complete in traditional economics .It illustrates that complete information can not availably enhance market efficiency, contrarily, it possibly obstructs exert of market efficiency. Hence extreme high or low information efficiency all hinders the improvement of market efficiency. Although the information economy don't tell us what the information efficiency should be, it is certain that the asymmetric or incomplete information realistic, inevitable and necessary. It is vital that we should make the best of the update technology to reduce the cyber adverse selection problem in Internet market.

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