ADVERSE SELECTION BEHAVIOR AND COUNTERACTING MECHANISMS IN E-COMMERCE MARKET: CASE STUDY FROM TAOBAO.COM（CHINA）

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ABSTRACT

Adverse selection refers to a market process in which undesired results occur when buyers and sellers have asymmetric information; the bad products or services are more likely to be selected by consumers. Compared to the traditional market, the e-commerce transaction still could not get rid of the adverse selection problems，which seriously affect network online consumer buying behavior and reduce the efficiency of the online transaction. Now in China some trading platforms such as Taobao.com（China）are seeking some counteracting mechanisms to reduce adverse selection problems. Widely used mechanisms are credit scoring mechanism and guarantee mechanism. This paper takes transaction data from *U* disk market in Taobao.com as samples and analyzes the role of credit scoring mechanism and guarantee mechanism in Chinese e-commerce market. The results showed that the credit scoring mechanism and guarantee mechanism can effectively offset the negative impact from the adverse selection problems. Although the credit scoring mechanism has a significant impact on transaction volume; guarantee mechanism has greater impact on the trading volume than the credit scoring mechanisms. In addition, relationship between the guarantee mechanism and credit scoring mechanism are not substitutes but complement for each other. In the case of the existence of the guarantee mechanism, online consumers' purchase for online goods options is still subject to the impact of the credit scoring mechanism. The paper proposes strategy recommendations to improve credit scoring mechanism and guarantee mechanisms to promote the efficiency of online transactions.

Keywords: credit scoring mechanism, guarantee mechanism, adverse selection

1. INTRODUCTION

Web-based e-commerce trading platform get more and more users of all ages because of its convenience and flexibility. But compared to the traditional market, Internet technology still can not get rid of a series of problems caused by asymmetric information[1]. The adverse selection problems caused by Information asymmetry threat to the credit system and are reducing the efficiency of network transactions[2]. Some trading platforms such as Taobao are seeking ways to reduce information asymmetry, which is widely used approach to credit scoring. The earliest use of the credit rating system is a famous American e-commerce site ebay. This mechanism of operating principle is: When buyers and sellers have completed a transaction , the buyer will make the evaluation to the seller's product quality and quality of service after getting the goods, the evaluation is displayed in the seller's shop in the form of scoring, future buyers purchasing goods buyers can check the seller's appraisal records by credit scoring systems. If the seller's credit record is good, more and more buyers will choose to transact with it; if the evaluation is not good, the buyers will interrupt the transaction. This can motivate businesses to take account of long-term interest of maintaining good credit history.The guarantee mechanism is actually a deposit system. If the seller participated in a guarantee mechanism and the merchandise are out of the corresponding problem, buyers can spend seller guarantees in advance, so that the interests of

buyers can get maximum protection. The process of these two system tell us that the Credit evaluation mechanism for the seller's fraud punishment is to reduce sellers' reputation show strength. For buyers have participated guarantee mechanism ,if the seller offers a low-quality product or receivable is not shipped, consumers will initiate complaints against trading platform providers such as Taobao and make payment requirements. If the seller is confirmed violations, the platform will be entitled to give the seller the appropriate punishment. Because of this guarantee mechanism is more severe punitive measures, it making the fraudulent sellers have to pay more dearly. Once the seller have participated guarantee mechanisms, they will be no incentive to deceive consumers regardless of their reputation level.

The design and effectiveness of online transactions credit mechanism has been the focus of attention of many scholars. Ba and Pavlou have proved that the seller's credit score can effectively reduce the network market information asymmetry[3].Dewally and Ederington find that businesses credit score has a significant positive impact on commodity prices, while negative feedback will result in the seller Recently lower commodity pricing [4]. Jie collected transaction records about ipod on the ebay auction and have reached similar conclusions using regression analysis methods [5].

levin draw the conclusion that seller's credit has significant enhance on the auction prices and the negative feedback has negative impact on the transaction price [6].Mikhail and Aim then improved auction model for eBay coins prices further and got the same results [7]. Zhou Lian and Zhang Weiying show that the credit scoring system has a significantly positive effect evaluation on credit transaction prices and auction success probability, credit scoring on commodity turnover (probability) and prices have a positive role in promoting [8].

Although most of the empirical research show that the seller's credit score has a significant positive effect on the transaction price and transaction probability, but there are still some economists doubt about its effectiveness and it cannot prevent fraud and online transactions effectively. Resnick have analyzed the credit evaluation system of eBay and found in the credit system, the accumulation of the seller's poor record, which have an impact on the future, buyers sellers that belongs to the type of the probability of honesty, so the seller have incentive to use credit scoring system for speculation and fraud. Resnick and Zeckanser found that, since the main trading online identity could not be identified and credit rating mechanism can not be supervised, credit the credibility of the evaluation results will be greatly reduced, and a small amount of bad review for credit scoring higher businesses will not be affected, so there are defects in insufficient punishment and incentive[9]. Wooders believes that, because of the credit evaluation system has certain distortion; those businesses with higher credit rating may not provide a high quality product or service [10]. Pan have made an empirical study of credit evaluation system from taobao.com and found that the credit evaluation system can play an important role to reduce the adverse selection phenomenon of lacking credit network market, but the distortion of Web information issuance will reduce the credit evaluation system of [11].Because of these problems of credit evaluation system, some scholars begin to study the certification service of credit system. Koreto verified that the third party security services can significantly increase the consumer's purchase intention with the mathematical model [12]. Lee put out that the introduction of third party security mechanism can effectively reduce the asymmetric information in network[13]. Dewally have validate the conclusion by using eBay data[14]. Heezena and Baetsbyc analyzed guarantee mechanism of the network platform in Holland's online flower market[15]. Choi, Stah and Whinston believe that short-term contract in the Internet exchange market can guarantee the integrity management[16]. Kim make the summary on the evolutionary way for Internet shopping platform and believed that the guarantee mechanism is effective to solve the problem of information asymmetry[17]. Pan have taken the network reputation as a guarantee mechanism and established a reputation

model using the principle of information economics[18]. Chen believes that the certification as a guarantee mechanism can reduce the generated fraud[19]. Zhou and Lu questionnaire for the role of third party trust mechanism and consider the supervision and guarantee measures have important effect[20].

Based on the literature review above, the focus of this paper is: In Chinese e-commerce market, guarantee mechanism is more effective than the credit rating mechanism? Credit scoring mechanism still has a significant effect on transaction under the guarantee mechanism? In the presence of guarantee mechanism under the conditions of credit scoring, whether the seller of goods turnover is still a significant effect, which is an alternative or complementary one? How to improve the two mechanisms? There is an alternative or complementary one? How to improve the utility of these two mechanisms?

2. EMPIRICAL ANALYSIS: BASED ON THE DATA FROM TAOBAO

3.

3.1 Taobao.com credit scoring mechanism and guarantee mechanism

Taobao (www.taobao.com) was founded in 2003 by Alibaba Company. Taobao has exceeded eBay and become China's largest C2C online trading platform in 2005. In order to reduce the negative effect of adverse selection of virtual transactions, taobao.com has established a set of credit scoring mechanism, records each user's evaluation acquired in the past transactions, these evaluation has been changed into a total reputation score in a certain way. Compared with eBay, taobao.com design the credit scoring system that is different from the eBay, with local characteristics of certain: first, the price is not competitive sales, the credit evaluation got by the seller and the buyer has calculated separately. On each month, the evaluation score between buyers and sellers are less than 6 points, the evaluation scoring beyond the scope will not score; Secondly, scoring system is dynamic. After successful transactions in the Taobao online buyers, buyers can evaluate the seller with four indicators (whether conform to, baby and describe the attitude of the seller, the seller's delivery speed and logistics services company), scoring is divided in 1-5; Third, buyers can take goods after evaluation, but evaluation is published after the mutual assessment in order to avoid revenge.

But the taobao.com found some problems, such as a large number of online credit speculation phenomenon, some platform brush platform "fake sales" credit score. Although the taobao.com uses some severe blow to this kind of behavior, the credit the phenomenon still exists. The main reason is that this credit-brush simulate real transaction which is difficult to be detected. In addition, there are some distortion behavior such as behavior of malicious evaluation and credit manipulation. Therefore, credit scoring system is difficult to curb Internet fraud effectively.In this case the three party guarantee mechanisms emerge.Taobao.com pushed out third party guarantee mechanism based on the "consumer protection plan" in 2007 and encourage qualified Taobao buyers to join the mechanism. In the guarantee mechanism the sellers can choose faith deposit to pay a certain amount to the taobao.com. If the product quality problems arise in after the success of the transaction within 14 days, buyers can initiated payment application in advance form taobao.com. If buyers suffered disputes or losses and the seller refused to pay, Taobao will use the deposit stored in the Taobao from the seller to pay the buyer.

3.2 The data and explanatory variable

This paper selects U disk (model: DT101 8G) from taobao.com as the research object, use data capture program provided by taobao.com server to get relevant data 1242 entries.The research object of this paper is mainly the influence of credit scoring mechanism and guarantee mechanism for network transaction efficiency, so the explanatory variable is the volume of transactions recently 30 days (sales). Explanatory variables are

credit scoring index and guarantee mechanism index. Credit scoring index include seller credit score (score) and the seller received rate (ratio).

The guarantee mechanism is set as a dummy variable index. We use five indicators from Taobao's guarantee system as explanatory variables: *D*1 presents whether or not to join the "consumer protection service", *D*2 presents whether or not to join the "seven days to return" service, *D*3 presents whether or not to support the "false one compensate three", *D*4 presents whether or not to join "24 hours delivery", *D*5 presents whether or not to join "30 days to repair". Price appears in the model as a control variable.

Table 1. Variable definition

Type	Name	Meaning	The expected sign
The dependent variable	sales	volume of transactions in 30 days	
Variables	score	Seller's credit	+
	price	Commodity prices	-
	ratio	Praise rate of seller	+
	*D*1	consumer protection service	+
	*D*2	seven days to return	+
	*D*3	false one compensate three	+
	*D*4	24 hours delivery	+
	*D*5	30 days to repair	+

Table 2. Descriptive statistics of U disk (N=762)

	The average	Median	maximum value	minimum value	Standard deviation
sales	2.36	0	275	0	13.21
score	302	219	92456	0	793.87
ratio	92.90%	100%	100%	0%	16.86%
price	47.54	46	54	43	3.62
*D*1	0.5467	1	1	0	0.51
*D*2	0.2746	0	1	0	0.46
*D*3	0.0069	0	1	0	0.08
*D*4	0.0472	0	1	0	0.22
*D*5	0.0568	0	1	0	0.25

3.3 Model

The specific model we built is as follows:

$$\ln(sales+1) = \beta_0 + \beta_1 \ln(price) + \beta_2 \ln(1+score) + \beta_3 lm(1+ratio) + \beta_4 D1 + \beta_5 D2 + \beta_6 D3 + \beta_7 D4 + \beta_8 D5 + \varepsilon$$

Among them, *D*1-*D*5 is a dummy variable. Sales, score, ratio and price are taken the natural logarithm form. Because the sample variables have different, the logarithm is designed to eliminate the heteroscedasticity

that may exist in regression. Because most logarithm value of the observations are less than 0, therefore the variables are plus 1 and then take the natural logarithm.

This paper uses the Tobit model to ensure the consistency and unbiased estimation. Specific form as follows:

$$\ln(sales+1) = \beta_0 + \beta_1 \ln(price) + \beta_2 \ln(1+score) + \beta_3 lm(1+ratio) + \beta_4 D1^*(1+score) + \beta_5 D2^*(1+score) + \varepsilon$$

3.4 Data analysis

According to the discussion above, we have designed a credit score on sales, the guarantee mechanism of effect on sales, two kinds of trust mechanism on sales and the effects of interaction between two mechanisms. The price in each model is control variables. The four models under the Eviews5.0 operation results are summarized as follows:

Table 3. Analysis results

	Variables $\ln(sales+1)$			
Variables	Model 1	Model 2	Model 3	Model 3
$\ln(price)$	-5.79***	-5.62***	-5.54***	-5.37***
$\ln(1+score)$	0.18***	—	0.14***	0.28**
$\ln(1+ratio)$	0.12*	—	0.11*	0.07
$D1$	—	1.22***	0.35**	0.29**
$D2$	—	0.98***	0.37***	0.31**
$D3$	—	-0.63	-0.43	—
$D4$	—	0.23*	0.16	—
$D5$	—	0.36	0.21*	—
$D1^*\ln(1+score)$	—	—	—	-0.05
$D2^*\ln(1+score)$	—	—	—	-0.22**
C	38.61***	42.53***	36.75***	35.93***
R^2	0.58	0.74	0.86	0.85
Hierarchical F-test			20.35***	24.52***
Durbin-Watson stat			1. 81	1.87

* = significance at 10% level

** = significance at 5% level

*** = significance at 1% level

From this analysis we can found:

• Prices in the four models of on the impact of explanatory variables are significant and the coefficient is negative, which indicates that, the higher the price of goods more difficult to sell. Because the buyer fails to identify the quality, only the high quality goods receiving low price -- this is characteristics of adverse selection. The results show that e-consumers in the China e-commerce more concerned about prices. The results also indicate that Chinese e-consumers is more sensitive to price.

• Credit scoring in this model is also significantly affects on the explained variable even in the presence of guarantee mechanism. This shows that negative effect on taobao.com credit scoring system with local characteristics can be largely reduced the network by reverse choice. This shows that credit scoring system with local characteristics weaken the negative effect of adverse selection on taobao.com. The results validate the

analysis on taobao.com[22]. This result also reflects the defects of credit scoring mechanism: when the seller's credit score high enough, the seller still may engage in Internet fraud, Because little review does not significantly influence the positive rate. This situation will lead to favorable rate fuzzy and lose their effectiveness. On the other hand , it also result in one-sided pursuit of credit points from sellers.

- The guarantee mechanism of variables, D1 and D2 had a significant effect on sales. The results show that, ‘the consumer protection service’ and‘ returned 7 days service’ in several models have significant influence on the sales of goods. It also indicate that the sellers who have joined ‘the consumer protection service’ and ‘ returned 7 days service’ can reduce the risk of online shopping yourself.
- The guarantee mechanism of the variables, *D*3 and *D*4 had a small significant effect on sales. The reason of the effect is: sellers to join the security services are too few, the use of this service businesses is less than 1%. In addition, if the buyers buy fake and appeal, this mechanism requires many businesses to provide products and expected costs is higher. The service guarantees such as the 24 hour delivery and 30 days of repair is not significant, which mainly due to buyers' focus on the quality of the goods first. Also the 24 hours delivery this guarantee service has some alternative, dynamic scoring system has few significant roles.
- We compare the effect of credit scoring mechanism and guarantee mechanism on trading volume. By calculation we found: when the credit score increase from the 302 to 604, seller only sale more than 1.2 U disks in 30 days; Sellers joined the consumer protection plan can sell more 4.8 U disk than not to join the 30 day; Sellers joined the 7 days return plan can sell more 4.8 U disk than not to join the 30 day. Through the above analysis, we can conclude that although credit score has significant influence on turnover, guarantee service greater impact on turnover than the credit score.
- The correlation between credit scoring mechanism and guarantee mechanism. By the model results, the $D1*\ln(1+score)$ coefficient is negative but not significant, it indicating that whether the seller join the consumer protection service, credit scoring has impact on turnover and there is little difference significant. Even if sellers joined the consumer protection service, credit scoring still has remarkable effect on the volume, also that buyers pay more attention to credit scoring. $D2*\ln(1+score)$ coefficient is negative and more significantly, it shows that comparing with adding 7 days return service buyers, credit scoring effect on the volume has less significantly than the not to join the service. In addition, the F test results show that: the sum of three variable coefficient $\ln(1+score)$, $D1*\ln(1+score)$, $D2*\ln(1+score)$ (t = 0.10) are no significant difference from zero. It shows that, for the sellers joined the seven day return service, credit scoring system have no significant impact on turnover. Buyers don't need take the credit score system as a reference.

The above results also tell us, credit scoring and guarantee mechanism has a complementary relationship. For the sellers joined consumer protection services, credit scoring for buyers still has a significant positive effect, so the consumer protection service cannot completely replace the credit scoring function.By the a random sampling of 80 and credit evaluation record in 30 days , we found that nearly 15% sellers have received negative feedback in the comments. The complaint is small flaws or service.If the buyer request compensation, they must collect relevant evidence such as the seller chats, the pictures of goods, according to the consumer protection service process. It will spend some time and energy, buyers have to wait for about 30 days before applying for reimbursement success. If some quality problems is not too serious, buyers may not apply for compensation because of the high cost, he may choose to give bad review or comment to warn the seller, which still needs credit scoring mechanism to compensate for the loss.

4. CONCLUSION

Through the empirical analysis, we can find that, credit scoring mechanism and guarantee mechanism are conducive to reduce negative effects brought by the adverse selection. While credit scoring mechanism has significant influence on transaction volume, the influence of guarantee mechanism on trading volume was much higher than that of credit scoring mechanism. But guarantee mechanism can not completely replace the credit scoring function, it is a complementary relationship. In the presence of guarantee mechanism, consumers are still subject to credit scoring mechanism.

In order to make good use of two mechanisms to counteract the adverse selection when, following aspects should be improved:

• The threshold of the seller for guarantee mechanism should be reduced. We should improve the cognitive on the guarantee mechanism, guarantee mechanism and simplify application process for sellers to join guarantee mechanism. We should weaken display function of credit score in search page and stores home. New seller should be equal to get competition opportunity with the old seller under the guarantee mechanism.

• We should cancel forced credit score rule or automatically processing system when the buyer does not score. We should allow the buyer make voluntary score after completion of the transaction. The relationship between guarantee mechanism and credit scoring mechanism are complementing each other.

• Credit scoring mechanism need to be improved and revised to promote guarantee mechanism operate better. Although Taobao's information-gathering and transmission of credit evaluation system is carried out by the auto-complete, but this information is made by the traders of their own. This will cause the ‘speculation’ of credit with false transactions, or buyers and sellers flatter or even revenge each other. Therefore, to prevent the seller using false transactions to ‘speculate’ credit is very important. Although Taobao has recognized this problem and take relevant measures, such as stipulating evaluation points between buyers and sellers not more than 6 points each natural months, adopting the real-name and increase punishment (or even the concealing ID) and other measures, but the effect is still not ideal. In my opinion, in order to regulate the behavior of network transactions and avoid credit speculation and credit fraud, we must explore non-market solutions. With the e-commerce policy and regulations gradually become clear and mature, we will solve or diminish the cyber ‘lemon’ problem for more options.

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REFERENCES

[1] AKERLOF G., (1970). The market for‘lemon’: qualitative uncertainty and the market mechanism. Quarterly Journal of Economics, 84(4): 488-500.

[2] Yong Pan, (2005).Cyber ‘Lemon’ Problem and E-Consumer’s Behavior Model, The Seventh Wuhan International Conference on e-business，Vols 1-4-Unlocking the Full Potential of Global Technology, Alfred University Press, 2519-2524, 2008(5) ,ISBN 978-0-9800510-0-1

[3] Ba S, PAVLOU A, Paul A. (2002). Evidence of the Effect of Trust Building Technology in Electronic Markets: Price Premiums and Buyer Behavior. MIS Quarterly, 26(3):243-68.

[4] Dewally M, Ederington, Reputation L. (2006). Certification, Warranties , and Information as Remedies for Seller and Buyer Information Asymmetries : Lessons from the Online Comic Book Market. Journal of Business, 2006(12):324-337.

[5] ZHANG J. (2006). The roles of players and reputation：Evidence from eBay online auctions .Decision Support System，2006(42):1800—1818.

[6] Levin D. (2005). Demand Reduction in Multi-Unit Auctions: Evidence from a Sportscard Field Experiment: Comment [J].American Economic Review, 95(1):467-471.

[7] Melnik I,Mikhail，Aim J．(2005). Seller Reputation, Information Signals, and Prices for Heterogeneous Coins on eBay[J].Southern Economic Journal , 72(2): 305-328.

[8] Zhou Lian, Zhang Weiying, Gu Quanlin, Shen Yi. (.2006).The value of reputation: an example. Economic Research. (12): 82-92+125(in Chinese).

[9] Resnick. (2002). The Value of Reputation on eBay: A Controlled Experiment. KSGWorking Paper,2002,No.RWP03-007.

[10] Resnick P,Zeckhauser R,Friedman E,etal . (2004). Reputation systems .Communications of the ACM , 2000,43(12): 45-48.

[11] Wooders J. (2006). Reputation in auctions: theory and evidence from eBay. Journal of Economics &Management Strategy, 2006, 15(2):146-161

[12] Yong Pan, (2009). 'Lemon' Problem and Counteracting Mechanism in Chinese E-Commerce Market: Based on the Data from Taobao.com,The Eighth Wuhan International Conference on e-business，Vols 1-4-Unlocking the Full Potential of Global Technology, Alfred University Press, 1982-1989, ,ISBN 978-0-9800510-0-1

[13] Koreto R. (1997). In CPAs we trust [J]. Journal of Accountancy, 1997(6):62-64

[14] LEE. (2009). Pre-Bonding Method using Self-Alignment Effect for Multichip Packaging. International Symposium on Assembly and Manufacturing, (8):347-263.

[15] Dewally M, Ederington L. DEWALLY. (2006). Reputation, Certification, Warranties, and Information as Remedies for Seller and Buyer Information Asymmetries: Lessons from the Online Comic Book Market. Journal of Business, 79(2):693-730.

[16] Heezena J, Baetsbyc W．(1996). Case study the impact of electronic markets：the case of the Dutch Rower Auctions．Journal of Strategic Information Systems,(5):587-596.

[17] Choi,Stahl,Whinston. (1997)..Intermediation,Contracts and Micro payments in Electronic Commerce．Electronic Markets Newsletter,1997,(4):208-231.

[18] CHANGSU K，et al． Evolution of Web-Based Shopping Systems： Characteristics and Strategies．Journal of Electronic Commerce in Organizations, 2007, 5(4):70-87.

[19] Yong Pan, (2011).Eliminating the cyber 'lemons' problem with the e-reputation in e-commerce market: theoretical model and practice．International Journal of Networking and Virtual Organisations, Vol. 8, Nos.3/4,pp.182 – 191

[20] Chen Xudong. (2006). On the certification and accreditation under the conditions of market economy to eliminate market failure, Maintain the market stability and the role of the. China testing technology, 32(1):71-73. (in Chinese)

[21] Zhou Tao, Lu Yaobin. (2008). An empirical analysis on the role of third party trust mechanism of C2C transactions in the [. industrial engineering and management, (3):104-110. (in Chinese)

[22] Yong Pan, (2011). Channel Conflicts and Market Segments between E-Commerce Market and Traditional Market: Based on the Adverse Selection Perspective. International Journal of Networking and Virtual Organizations, 2012 - Vol.11, Nos.3/4, pp.305–314.