



Effect of e-commerce sellers' evaluation on consumers' perceived trust-Case of taobao.com

Guan Hongjun^{1,2} and Zhao Aiwu^{3*}

¹Central University of Finance and Economic, Beijing, China

²Shandong University of Finance and Economic, Jinan, China

³Jiangsu university, Zhenjiang, China

ABSTRACT

Perceived trust is one of the most important prerequisites for consumers to make trading decisions. Taobao.com provides an evaluation system for sellers to judge a seller's degree of trust in terms of its historical transaction. However, according to prospect theory, consumers' judgment was warped in some cases. Taking the evaluation system of taobao.com in China as an example, it analyzed decision makers' psychological activities when they facing positive and negative evaluations. Meanwhile, in order to quantitatively evaluate consumers' perceived trust, it recalculated consumers' perceived probability about sellers' positive evaluation and negative evaluation based on prospect theory. The result shows, consumers' perceived negative evaluations are not the same as the negative evaluations listed on website. In fact, consumers usually overstate sellers' negative evaluation, and adjust their perceived trust. E-commerce sellers should be vigilant even if their negative evaluation probability were quite low.

Key words: Perceived trust, evaluation, e-commerce, prospect theory

INTRODUCTION

Trust is the life of businesses, consumers won't trade with sellers lack of trust. Compared with traditional business, both parties in e-commerce usually don't communicate face to face. Considering on "seeing is believing", as limited rational consumers, they have many worries about such "never meeting" transactions. At the same time, the information of e-commerce transaction is asymmetry or even missing, buyers often make their cognitive and judgment just depend on their experience and intuition, the recommendation of friends, online communication, and so on. All of these affect consumers' confidence in online transactions. Such lack of perceived trust is the biggest obstacle to e-commerce transactions (Hoffman et al. 1999[1], Pavlou et al. 2007[2]). In fact, perceived trust is one of the most important prerequisites for consumers to make trading decisions (Gefen et al. 2003[3], Pavlou and Gefen 2004[4]). For the protection of personal privacy and security considerations, even if the price is lower than traditional market, consumers will not trade with their distrust online sellers. Taobao.com invented evaluation system based on their real trading history in 2003, and it has greatly promoted the development of the transaction of China's C2C e-commerce [5]. The main function of this system is convenient for buyers to judge sellers' degree of trust in terms of their cumulative evaluation based on historical transactions and form their own perceived trust about each seller. Consumers can make their decisions based on their own trust judgment. The system currently has become the actual standard of network retail industry in China. Many e-commerce platforms use such mechanism, such as eBay, PaiPai, and so on. Through the evaluation system, consumers can clearly know the probability of each occurrence of sellers' trust rating, and judge their trust probability of future transactions according to their historical cumulative probability. However, as risk trading decision makers, consumers' psychological feeling is different when they facing positive evaluation and negative evaluation. In order to reveal the real effect of e-commerce sellers' evaluation on consumers' perceived trust, we first analyzed consumers' psychological activities and their behavior characteristics. Then, thinking for prospect

theory[6-7], we recalculated the perceived probabilities about the positive and negative evaluation. At last ,we described the actual impact of e-commerce sellers' accumulated trust rating on the consumer's perceived trust.

THEORY AND METHOD OF PERCEIVED PROBABILITIES OF TRUST EVALUATION

We assumed that the evaluation level are divided into n grades, and level $1, 2, \dots, h (h \leq n)$ are positive evaluations, while level $h+1, h+2, \dots, n$ are negative evaluations. The historical cumulative probability of each evaluation level is $P_j (j = 1, 2, \dots, N)$. According to the idea of prospect theory, the real judgment of the probability of some evaluation levels are not equal to the statistic data. Decision makers usually adjust the statistic data and replace them with their perceived data. So, according to prospect theory, the perceived weight of each evaluation levels are recalculated as follows:

Sort P_1, P_2, \dots, P_n from big to small, we get a set of $P_1 \geq \dots \geq P_h \geq 0 \geq P_{h+1} \geq P_n$. Obviously, if $j \leq h$, then $P_j \geq 0$, else $P_j \leq 0$. According to prospect theory, the perceived probability of evaluation level j is:

$$\pi_j = \begin{cases} \omega^+ \left(\sum_{i=1}^j p_i \right) - \omega^+ \left(\sum_{i=1}^{j-1} p_i \right), & j = 1, 2, \dots, h \\ \omega^- \left(\sum_{i=j}^n p_i \right) - \omega^- \left(\sum_{i=j+1}^n p_i \right), & j = h+1, h+2, \dots, n \end{cases} \quad (1)$$

In formula(1), function $\omega^+(\cdot)$ and $\omega^-(\cdot)$ are nonlinear weight function for positive evaluation and negative evaluation. According to reference[6,7], function $\omega^+(\cdot)$ and $\omega^-(\cdot)$ can be expressed as:

$$\omega^+(p) = \frac{p^x}{p^x + (1-p)^{1/x}} \quad (2-1)$$

$$\omega^-(p) = \frac{p^\delta}{p^\delta + (1-p)^{1/\delta}} \quad (2-2)$$

In above formula, $x=0.61$, $\delta=0.69$.

We further normalize each perceived evaluation level above, that is $\sum_{j=1}^n p_j = 1$, then we get the standard perceived probability of each evaluation level.

$$\bar{\pi}_j = \pi_j / \sum_{i=1}^n \pi_i \quad (3)$$

ANALYSIS OF CHANGING OF PERCEIVED PROBABILITY ACCORDING TO STATISTIC PROBABILITY

From formula (2), we can calculate consumers' perceived probability according to the existent statistic probability. In order to compare the changing trend of perceived probability according to statistic probability, we assumed that there are only two numerical statistic probabilities. That is, we sum all of the positive evaluation levels to a positive evaluation probability, and all of the negative evaluation levels to a negative evaluation probability, then we have:

$$P_+ = \sum_{j=1}^h P_j \quad (4-1)$$

$$P_- = \sum_{j=h+1}^n P_j \quad (4-2)$$

The perceived probability of positive evaluation and negative evaluation are:

$$\pi_+ = \frac{p_+^{0.61}}{p_+^{0.61} + (1-p_+)^{1/0.61}} \quad (5-1)$$

$$\pi_- = \frac{p_-^{0.69}}{p_-^{0.69} + (1-p_-)^{1/0.69}} \quad (5-2)$$

$$\bar{\pi}_+ = \pi_+ / (\pi_+ + \pi_-) \quad (5-3)$$

$$\bar{\pi}_- = \pi_- / (\pi_+ + \pi_-) \quad (5-4)$$

Now, $\bar{\pi}_+$ is the perceived probability of positive evaluation, and $\bar{\pi}_-$ is the perceived probability of negative evaluation. To analyze the trend of perceived probabilities, first of all, we calculate the derivatives of formula (5-1) and formula(5-2). The results are:

$$\frac{\partial \pi_+}{\partial p_+} = 0.61 p_+^{0.39} (1-p_+)^{1.64} + 1.64 p_+^{0.61} (1-p_+)^{0.64} \quad (6-1)$$

$$\frac{\partial \pi_-}{\partial p_-} = 0.69 p_-^{0.31} (1-p_-)^{1.45} + 1.45 p_-^{0.69} (1-p_-)^{0.45} \quad (6-2)$$

Using formula(6-1) and formula(6-2), we can calculate the changing trend of perceived probabilities according to the positive probabilities changing from 10% to 90%. Because of the perceived probability is not related to positive evaluation, but also related to negative evaluation, when the positive evaluation changes from 10% to 90%, the negative evaluation changes from 90% to 10% accordingly, as listed in table 1.

Tab.1: Changing of positive perceived probability according to statistic probability

Statistic positive evaluation probability p_+	Changing rate of perceived probability according to statistic probability			Changing trend of perceived positive evaluation
	Effect of positive evaluation	Effect of negative evaluation		
	$\frac{\partial \pi_+}{\partial p_+}$	$\frac{\partial \pi_-}{\partial p_-}$		
0.1	0.585390	0.502100		0.083290
0.2	0.758499	0.664926		0.093573
0.3	0.838758	0.767272		0.071487
0.4	0.860895	0.830847		0.030048
0.5	0.838897	0.861673		-0.02278
0.6	0.779310	0.859923		-0.08061
0.7	0.684224	0.821352		-0.13713
0.8	0.550884	0.735129		-0.18425
0.9	0.365727	0.572412		-0.20668

From table 1, we found that when the statistic probability of positive evaluation is low, the effect of positive evaluation is overstated. On the other hand, when the statistic probability of positive evaluation is high, it is understated compared with the original statistic probability. Because negative evaluation equals to 1-positive evaluation, it is the changing trend of perceived negative probability from bottom to top in the above table. That is, when the statistic negative probability is low, its perceived negative probability is overstated, and the same reason, the perceived negative probability is understated when the statistic data is high. When the statistic probability equals to 0.45 or so, the perceived probability is almost equals to the statistic probability. Meanwhile, we can found from table 1 that the overstating effect of negative evaluation is more significant than positive evaluation. This explained the phenomenon that when facing negative evaluation, consumers feel worse than what the statistic data means. This is even more obvious when the negative evaluation probability is quite low. We can clearly observe the changing trend of perceived probability from fig 1.

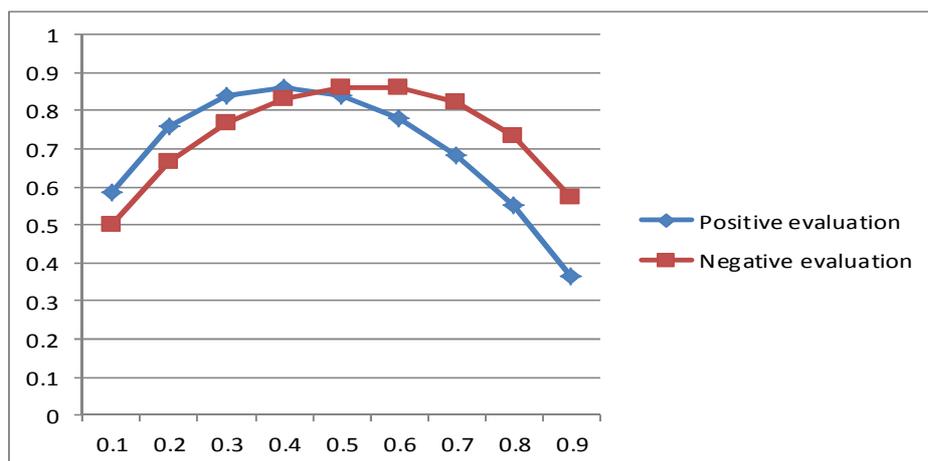


Fig .1: Perceived probability changing trend according to statistic probability

EXAMPLE AND ANALYSIS

There are four levels of evaluation in Taobao.com-excellent, fine, medium and bad. We assume that excellent and fine are positive evaluation, and medium and bad are negative evaluation. The statistic trust evaluation probabilities of one seller are 70%, 20%, 9% and 1%. Then, according to the idea described above, the actual perceived probabilities and statistic probabilities list in table 2 and figure 2.

Tab.2: Perceived probabilities and statistic probabilities of each trust evaluation level

Level	Trust evaluation	Statistic probability	Perceived probability	Overstating rate of perceived probability
1	Excellent	70%	72.99%	4.27%
2	Fine	20%	10.56%	-47.19%
3	Medium	9%	12.97%	44.15%
4	Bad	1%	3.47%	247.37%

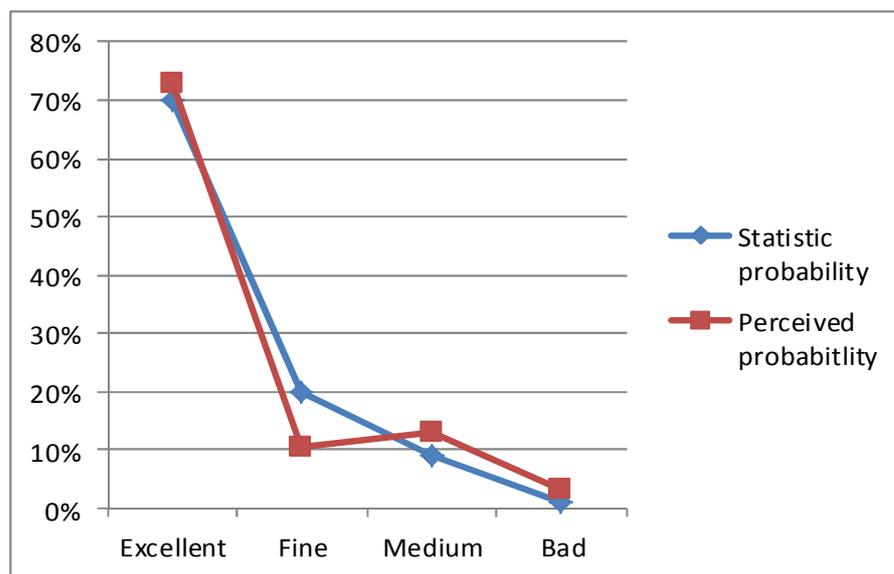


Fig .2: Comparing curves of statistic probabilities and perceived probabilities

Table 2 and figure 2 clearly showed that the perceived probability of negative evaluation is overstated, especially for the worst negative evaluation of "bad", the perceived probability is 3.47 times the original statistic probability, and overstated by 247.37%. It means that from the actual psychological feeling, the effect of negative evaluation is overstated by times.

CONCLUSION

Perceived trust evaluation is the quantification for consumers to express their real feeling about sellers' trust level. Because of the limited rationality of consumers, they often overstate sellers' negative evaluation probabilities. This point was also verified in the actual study. Because of asymmetric information and the lack of communication with each other face to face, new consumers always overstate and distort the negative evaluations of historical transactions. This put forward higher requirements for e-commerce operators, and asks sellers pay more attention on the details of marketing and consumers' experiences. It is the key for sustained and healthy development of e-business enterprises.

Acknowledgments

This work is supported by national natural science foundation of china(71272234,71171099), Doctoral Program Foundation of Institutions of Higher Education of China(20123227110011), Fund of Ministry of education of Humanities and Social Sciences(14YJAZH025), China Postdoctoral Science Foundation(2013M530862, 2014M551525), Natural Science Foundation of Shandong Province 2013ZRB01432), Jiangsu postdoctoral research grants program(1302056C). The authors are grateful to the anonymous referee for a careful checking of the details and for helpful comments that improved this paper.

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