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Online Marketplace: A Belief Updating  
Perspective

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# Consumers' Repurchase Probability in Online Marketplace: A Belief Updating Perspective

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## ABSTRACT

It is commonly recognized that online transactions are “one-shot” transactions. However, a contemporary dataset from a dominant online marketplace in China reveals that averagely 24.3% transactions are repurchase transactions. Given that consumers already have purchase experience with a specific seller, their repurchase behavior may be influenced by both the seller's reputation and their perceived seller performance. A consequent research question is: Whether and how do these two streams of information jointly affect consumers' repurchase behavior? We adopt a belief update model, and also collect actual transaction data to examine this research question. Our findings include: (1) both seller reputation and consumers' perceived seller performance have positive effects on consumers' repurchase probability; (2) the effect of seller reputation is positively moderated by performance ambiguity; (3) consumers' perceived seller performance has stronger effects on their repurchase probability when the seller has low reputation (vs. high reputation).

## Keywords

Repurchase, online marketplace, belief updating, seller reputation, perceived performance, performance ambiguity

## INTRODUCTION

It is commonly recognized that online transactions are “one-shot” transactions, i.e., each pair of seller and consumer are totally strangers before their transaction, and they have little chance to transact again. For example, Resnick and Zeckhauser examined a dataset collected in 1999, and found that 89% of eBay transactions were one time interactions between a consumer and a seller (Resnick and Zeckhauser 2002). Based on this premise, existing studies commonly focused on merely the effect of seller reputation on transaction outcomes, and neglected the effect of consumers' purchase experience.

However, online marketplaces have rapidly developed in the last decade. In nowadays, the situation of “one-shot transaction” in online marketplace has been changed. We randomly collected transaction histories of more than 20 thousands online consumers from Taobao (the most dominant online marketplace in China), and found that about 25% of their transactions are repurchase transactions. We also randomly collected whole transaction histories of more than two thousands game card sellers, and found that as high as 42.5% of their transactions are transactions to “returned consumers”. Given that consumers already have purchase experience with a specific seller, their repurchase probability may be influenced not only by the seller's reputation, but also by their perceived seller performance in transactions. Consequently, a research question is, how do these two streams of information jointly influence consumers' repurchase behavior. This research question was seldom explicitly addressed in the literature.

There are two streams of research which are related to this research question. The first stream of research focuses on the effects of seller reputation on consumers' purchase behavior in online marketplace (Ba and Pavlou 2002; Dellarocas 2003; Josang, Ismail and Boyd 2007). The findings of this research stream indicate that a seller's reputation can enhance consumers' belief on the seller's trustworthiness, and thus have positive effects on transaction outcomes (for example, consumers' intention to purchase and willingness to pay) (Ba and Pavlou 2002). However, this stream of research presumes that consumer and seller are strangers before their transaction, and neglects the effect of consumers' perceived seller performance on consumers' belief on sellers' trustworthiness as well as transaction outcomes. The second stream of research focuses on consumer's loyalty in e-commerce context (e.g., loyalty on some specific website) (Casalo, Flavian and Guinaliu 2008; Flavian, Guinaliu and Gurra 2006; Lam, Shankar, Erramilli and Murthy 2004; Lin and Wang 2006). The findings of this research stream indicate that consumers' perceived seller performance have positive effect on their website loyalty and

repurchase intention. However, few studies in this research stream have considered the effect of seller reputation (i.e., website reputation). Does seller reputation have impact on consumers' repurchase behavior? Do the findings in the website loyalty studies still hold in online marketplace (where we consider loyalty to specific seller rather than to specific website)? How do seller reputation and consumers' perceived seller performance interact with each other in influencing consumers' repurchase behavior?

We try to address these research questions in this paper. We consider the belief updating process in a consumer's transaction with a specific seller. Before the consumer purchase from the seller, his/her belief on the seller is influenced merely by the seller's reputation. After the consumer receive and consume the goods, he/she learn a piece of new evidence on the seller's performance. This piece of new evidence will update the consumer's belief on the seller's performance, and then influence the consumer's repurchase probability from the seller. We adopt a belief update model (Hogarth and Einhorn 1992) to illustrate this process. Based on the model, we analyze the effects of seller reputation and consumers' perceived seller performance on consumers' updated belief and repurchase probability. Accordingly, several hypotheses are proposed. We verify these hypotheses using actual transaction data, and generate our conclusions.

The rest of this paper is organized as follows: In the next section, we review related theories, illustrate the belief update model, explain its specifications and propose several hypotheses. Following this theoretical section, we describe our dataset, variables and analysis methods. Afterwards, we present and explain our research results, and then conclude this paper by a discussion section.

## THE MODEL

Consider an online marketplace which has an affiliated reputation system. Each seller in the marketplace has a reputation score, which is calculated by accumulating the ratings from his/her consumers. A new consumer can learn the seller's performance merely through the reputation score before his/her very first transaction. After the first transaction (i.e. after the consumer receive and consume the goods), the consumer perceive the seller's performance as positive (+1), neutral (0) or negative (-1). The consumer is also encouraged to post his/her ratings on the seller's performance in the affiliated reputation system. This setting is prevalent and representative in contemporary online marketplace, such as eBay, Taobao and Yahoo! Kimo.

### Belief Update Model and Specifications

Suppose that there is a pair of seller and consumer who are totally strangers, and they are about to transact with each other. The seller's reputation score is  $N$ .

Before the transaction, the consumer's initial belief on the seller's performance is denoted by  $S_0$  ( $0 \leq S_0 \leq 1$ ), where the low bound 0 means the seller will definitely cheat (i.e., deliver low quality goods compared with goods description) in the transaction, and the up bound 1 means the seller will definitely cooperate (i.e., deliver high quality goods compared with goods description). As mentioned before,  $S_0$  is an function of the seller's reputation score,  $N$ . We denote the function by  $f(N)$ . According to the literature, the function  $f(N)$  has two properties. First,  $f(N)$  is an increase function of  $N$ . Researchers in reputation systems studies have revealed that a high reputation score indicates a high trustworthiness. For example, Jin and Kato (2006) found that reputation is effective in identifying "good-faith" seller. Second,  $N$  has a decreasing marginal effect on  $f(N)$ , as suggested by a number of empirical studies (Lei 2005; Livingston 2005; Resnick, Zeckhauser, Swanson and Lockwood 2006). For example, Livingston etc. (2005) reported in his study that the marginal returns to additional ratings are severely decreasing.

After the transaction and consumption, the consumer learns the true quality of the goods and the seller's services. We denote the consumer's perceived seller performance as  $s(x)$ . Then the consumer updates his/her belief on the seller's performance based on the piece of evidence learned. According to the belief update model from Hogarth and Einhorn (1992), the consumer's updated belief is

$$S = S_0 + w[s(x) - R], \quad (1)$$

where  $w$  = the adjustment weight for the consumer's evidence,

$s(x)$  = subjective evaluation of the evidence (different people may differently evaluate the same evidence), and

$R$  = the reference point or background against which the impact of the evidence is evaluated.

The basic idea of this model is to consider the belief updating process as an anchoring-and-adjustment process. The initial belief  $S_0$  is an anchoring point. After the new evidence arrives, the consumer adjusts the initial belief from the anchoring point. This model is easy to interpret, and can be used in the context when evidences come in a sequence. It is broadly adopted, and also has been used in modeling consumers' decision making in online shopping context (Cai and Xu 2008; Xu and Kim 2008).

Now we specify the model in the following two perspectives: how the evidence is encoded (i.e., what is  $R$ ), and the factors which may influence the weight  $w$ .

There are two methods to encode the evidence: relative to a variable or constant background. In other words,  $R$  can either be a variable or a constant. We assume consumers evaluate their perceived seller performance compare with the seller's reputation (i.e.,  $R = S_0$ ). Researchers found that consumers recognize a seller reputation as an expectation of the seller's performance (Qu, Yang, Tang and Zhou 2005; Shapiro 1982), and their satisfaction is influenced by comparing their perceived seller performance with the seller's reputation (Bhattacharjee 2001; Bhattacharjee and Premkumar 2004).

We define  $w = (1 - \alpha)(1 - S_0)$ .  $\alpha$  is an indicator of the ambiguity of the consumers' perceived seller performance on the goods quality and the seller's service (Selnes 1993), and  $0 \leq \alpha \leq 1$ .  $\alpha$  equals to 0 when the consumer can perfectly judge the seller performance, and  $\alpha$  equals to 1 when the consumer can not judge the seller performance at all. For some types of goods, it is quite easy to identify the goods quality as well as related seller services. However, for some other types of goods, it may require a long term consumption or specialized knowledge to verify the goods quality and related seller's services. The ambiguity of consumer's perceived seller performance may influence its effect on the consumer's updated belief and repurchase probability. For example, previous study has revealed that "the ambiguity in the intrinsic quality of the product or service is expected to work as a moderator on the effect between satisfaction and loyalty" (Selnes 1993). Therefore, we assume the effect of evidence will be moderated by performance ambiguity. The second part of the weight is  $1 - S_0$ , which indicates that the evidence has stronger impacts on consumers' belief of the seller's performance when the seller has low reputation (vs. high reputation). This specification is consistent with common knowledge that solid belief is difficult to be changed.

Substitute the variables in (1), the updated belief can be computed as

$$S = f(N) + (1 - \alpha)[1 - f(N)][s(x) - f(N)] \quad (2)$$

Rearrange the model to arrive at

$$S = \alpha f(N) + (1 - \alpha)s(x) - (1 - \alpha)f(N)s(x) + (1 - \alpha)[f(N)]^2 \quad (3)$$

Now we consider the effect of updated belief on the consumer's repurchase probability  $P$ . Define the probability of repurchase as an increase function of  $S$  as well as a combination of other factors  $u$  (for example, the length of time duration after the first purchase). We define a dichotomous variable  $Y$ :  $Y = 1$ , if the consumer actually repurchase from the seller, or  $Y = 0$  if not. The consumer's repurchase probability is

$$P = E(Y = 1 | S, u) = g(S, u) \quad (4)$$

### Variables and Function Specifications

To interpret and verify the model, we need to further specify  $f(N)$ ,  $s(x)$  and  $g(S, u)$ .

As we described before,  $f(N)$  is an increase function of  $N$ , and  $N$  has a diminishing marginal effect on  $f(N)$ . Because the logarithm transformation of  $N$  possesses both of these two properties, we define  $f(N) = \beta \ln N$ , where  $\beta$  is a coefficient, and  $\beta > 0$ . Also, researchers frequently adopted a logarithm transformation of reputation score in their models (Ba and Pavlou 2002; Bajari and Hortacsu 2003; Houser and Wooders 2006; Zhang 2006).

We simply define  $s(x) = \gamma x$ , where  $x$  is consumer's rating on sellers' performance;  $\gamma$  is a coefficient, and  $\gamma > 0$ .

We adopted a logit regression model to calculate the effect of updated belief on the consumer's repurchase probability:

$P = g(S, u) = E(Y = 1 | S, u) = \frac{1}{1 + e^{-(kS+u)}}$ , where  $k$  is a coefficient, and  $k > 0$ .

Define  $L = \ln\left(\frac{P}{1-P}\right) = kS + u$ , and substitutes the variables and functions:

$$L = k\alpha\beta \ln N + k(1-\alpha)\gamma x - k(1-\alpha)\beta\gamma x \ln N + k(1-\alpha)\beta^2 (\ln N)^2 + u$$

Rename the coefficients:

$$L = c_1 \ln N + c_2 x + c_3 x \ln N + c_4 (\ln N)^2 + u, \quad (5)$$

This is a simple logit regression model. Before we estimate the model using empirical data, we discuss the properties of the model, and propose several hypotheses.

### Model Interpretations and Hypotheses

First, the coefficient of  $\ln N$  is  $c_1 = k\alpha\beta$ , which is positive. This indicates a positive main effect of seller reputation on consumers' repurchase probability. Furthermore, notice that the coefficient of  $\ln N$  is positively correlated with performance ambiguity,  $\alpha$ . Interpretively, seller reputation has stronger effect on consumers' repurchase probability when performance ambiguity is high (vs. low). Therefore, we propose the following two hypotheses:

Hypothesis 1: There is a positive relationship between seller reputation and consumers' repurchase probability.

Hypothesis 2: The relationship between seller reputation and consumers' repurchase probability is stronger when performance ambiguity is high (vs. low).

Second, the coefficient of  $x$  is  $c_2 = k(1-\alpha)\gamma$ . Since  $\alpha$  is defined between 0 and 1, the coefficient is also positive, which indicates a positive main effect of consumers' perceived seller performance on consumers' repurchase probability. However, different from the coefficient of  $\ln N$ , the coefficient of  $x$  is negatively correlated with  $\alpha$ , which means that consumers' perceived seller performance have stronger effect on their repurchase probability when performance ambiguity is low (vs. high). Thus we propose:

Hypothesis 3: There is a positive relationship between consumers' perceived seller performance and their repurchase probability.

Hypothesis 4: The relationship between consumers' perceived seller performance and their repurchase probability is stronger when performance ambiguity is low (vs. high).

Third, the coefficient of the interaction term  $x \ln N$  is  $c_3 = -k(1-\alpha)\beta\gamma$ , which is negative. This negative coefficient indicates a negative moderating effect of seller reputation on the relationship between consumers' perceived seller performance and their repurchase probability. In the other words, consumer's perceived seller performance has stronger effects on their repurchase probability when the seller has low reputation (vs. high reputation). Therefore, we hypothesize:

Hypothesis 5: The relationship between consumers' perceived seller performance and their repurchase probability will be stronger when the specified seller has low reputation (vs. high reputation).

Forth, the coefficient of the squared term  $(\ln N)^2$  is  $c_4 = k(1-\alpha)\beta^2$ , which is positive. This indicates that  $L$  is a convex function of  $\ln N$ . Furthermore, it is noticeable that the coefficient of the interaction term  $x \ln N$  is positively correlated with performance ambiguity  $\alpha$ , and the coefficient of the squared term  $(\ln N)^2$  is negatively correlated with performance ambiguity  $\alpha$ . These model properties are too complex to be discussed in this short paper. We do not propose any hypothesis based on these model properties, but we will verify these model properties using empirical data.

## METHODOLOGY

### Data Collection

We use field data collected from Taobao to verify the hypotheses and model properties. Taobao is the most dominant online marketplace and the second largest marketplace (including conventional marketplace) in China. It has more than 80 million registered users, and its annual revenue in 2007(RMB43.3 billion) overran the revenue summation of local Carrefour and Walmart. The online transaction platform and the reputation system of Taobao are similar to other prevalent online marketplaces, such as eBay. These representative characteristics of Taobao make our findings easy to be implied and generalized.

We randomly collected full transaction history of sellers from the Taobao website, and then we picked out all the “first time” transactions between each pair of seller and consumer. We collected detailed transaction data, including the consumers rating on the seller's performance,  $x$ , and the total value of the goods,  $V$ . We calculated the seller's reputation score  $N$  based on the seller's previous transaction history and Taobao rules of reputation score calculation. Then we searched all the transactions after the “first” transaction to find out whether the consumer has repurchased. We let  $Y = 1$  if the consumer has repurchased, and  $Y = 0$  if the consumer has not repurchased. We also calculated the length of the duration  $T$  between the “first” transaction and the seller's latest transaction.

We chose sellers in three goods categories to examine the moderating effect of performance ambiguity. The three goods categories are *game cards*, *clothes*, and *cell phones*. Each of these three categories of goods is one of the most popular goods categories in Taobao (iResearch 2008). *Game cards* are actually game fee recharging service. The game fee will be recharged to a consumer's online game account after the consumer delivers the payment. It is easy to judge whether the seller has delivered goods as described, and no additional service is needed. However, to judge the performance of *clothes sellers*, consumers may have to try the clothes, listen to peers' comments, and wash to check whether the clothes will fade or shrink. It is even more difficult for consumers to judge the performance of *cell phone sellers*. Consumers have to use the cell phone for a long time to see whether its functions are workable, and whether it has stable quality. It may also require consumers to possess some special knowledge to judge whether the cell phone is refurbished or faked. The services related to a cell phone are also more complex than game cards and clothes. Therefore, we expect performance ambiguity of *cell phone sellers* is higher than that of *clothes sellers*, and then higher than that of *game card sellers*. To verify our design, we asked 26 online consumers to sort the three goods categories according to their perceived performance ambiguity in the intrinsic goods quality and seller service after they receive and consume the goods. All of the 26 consumers recognized game cards sellers as having the lowest performance ambiguity, and 19 out of 26 consumers recognized clothes sellers as having lower performance ambiguity than cell phone sellers. We calculated the average orders of *clothes sellers* (2.260) and *cell phone sellers* (2.741). A T-test between these two average orders shows that these two orders are significantly different ( $t = 3.961$ ,  $df = 52$ ,  $p < 0.001$ ). This survey confirmed our expectation on the performance ambiguity of these three types of sellers.

The variables and description are listed in Table 1.

### Analysis Method

To verify the main effects and the interaction effects, we directly estimated equation (5). Since the goods value  $V$  and the time duration variable  $T$  may influence consumers' repurchase probability, we also included these two variables in our regression as control variables. We used maximum likelihood method (quadratic hill climbing) to estimate the logit regression model.

To verify the moderating effects of performance ambiguity  $\alpha$ , we tested the differences of the regression coefficients across different groups (i.e., *game cards sellers*, *clothes sellers* and *cell phones sellers*). We used *clothes sellers* as the benchmark, and added two dummy variables  $D_{card}$  and  $D_{phone}$  into the regression model. The regression model is:

$$\begin{aligned}
 L = & c'_0 + c''_0 D_{card} + c'''_0 D_{phone} + \omega T + \theta V \\
 & + c'_1 \ln N + c''_1 D_{card} \ln N + c'''_1 D_{phone} \ln N \\
 & + c'_2 x + c''_2 D_{card} x + c'''_2 D_{phone} x \\
 & + c'_3 x \ln N + c''_3 D_{card} x \ln N + c'''_3 D_{phone} x \ln N \\
 & + c'_4 (\ln N)^2 + c''_4 D_{card} (\ln N)^2 + c'''_4 D_{phone} (\ln N)^2
 \end{aligned} \tag{6}$$

Any significant  $c_i''$  ( $i = 0, \dots, 4$ ) indicates that the regression coefficient of the *game cards sellers* group is significantly different from the regression coefficient of the *clothes sellers* group. Similarly, any significant  $c_i'''$  ( $i = 0, \dots, 4$ ) indicates that the regression coefficient of the *cell phones sellers* group is significantly different from the regression coefficient of the *clothes sellers* group.

Variables	Descriptions	Descriptive Statistics
$Y$	A dichotomous variable which indicates whether a consumer has repurchased from a seller in the duration from the date of their very first transaction to the date of the seller's latest transaction.	Min.=0 Max.=1 Mean=0.15 S.D.=0.357
$x$	Consumer's rating on a seller's performance in their transaction. The value could be 1 (positive), 0 (neutral) and -1 (negative).	Min.=-1 Max.=1 Mean=0.512 S.D.=0.699
$N$	Seller's reputation score. The value is calculated based on the full history of each seller.	Min.=-1 Max.=299248 Mean=14111.967 S.D.=35314.769
$\alpha$	Indicator of performance ambiguity.	
$V$	Value of goods in the transaction.	Min.=0 Max.=1266970 Mean=338.025 S.D.=5526.015
$T$	Time period from the date of a consumer's very first transaction from a seller to the date of the seller's latest transaction.	Min.=0 Max.=1868 Mean=314.867 S.D.=285.47
$D_{card}$	Dummy variable. Equals to 1 when the seller is a game card seller.	Min.=0 Max.=1 Mean=0.357 S.D.=0.479
$D_{cloth}$	Dummy variable. Equals to 1 when the seller is a clothes seller.	Min.=0 Max.=1 Mean=0.294 S.D.=0.456
$D_{phone}$	Dummy variable. Equals to 1 when the seller is a cell phone & accessories seller.	Min.=0 Max.=1 Mean=0.349 S.D.=0.477

**Table 1. Variable Descriptions and Descriptive Analysis**

## RESULTS

The estimation results are illustrated in table 2. We firstly estimated the regression equation (5) to verify the main effects, and then estimated the regression equation (6) to verify the moderating effects of performance ambiguity. We find a significantly positive coefficient ( $c_1 = 0.400$ ,  $p < 0.01$ ) of seller reputation in equation (5), which indicates the seller reputation has a positive main effect on consumers' repurchase probability. Therefore, hypothesis 1 is supported. The coefficient of seller reputation is larger in the *cell phones* group than in the *clothes* group ( $c_1''' = 0.145$ ,  $p < 0.01$ ), and is larger in the *clothes* group than in the *game cards* group ( $c_1'' = -0.318$ ,  $p < 0.01$ ). Therefore, seller reputation has stronger effects on consumers repurchase probability when performance ambiguity is high (vs. low), i.e., hypothesis 2 is also supported.

The coefficient of consumers' perceived seller performance  $x$  is also significantly positive ( $c_2 = 0.901$ ,  $p < 0.01$ ), which indicates a significantly positive effect of perceived seller performance on consumers' repurchase probability. Hypothesis 3 is supported. However, the differences among different groups are not quite obvious. The effect of perceived seller performance on consumer's repurchase probability in the *game cards* group is indifferent with the *clothes* group ( $c_2'' = 0.072$ , n.s.), and the

coefficients in the *clothes* group and the *cell phones* group are also statistically indifferent ( $c_2''' = 0.021$ , n.s.). Therefore, hypothesis 4 is not supported. The indifferences may be caused by the measure of consumers' perceived seller performance. We used consumers' rating score on sellers' performance as the measurement of their perceived seller performance. However, consumers may have already considered performance ambiguity when they post their rating score. This adjustment may cause the insignificant differences among the regression coefficient of  $x$  in different groups.

Variables	Equation (5)		Equation (6)	
	Coefficients	Estimation	Coefficients	Estimation
$c$	$c_0$	-2.401***	$c'_0$	-2.599***
$D_{card}$			$c''_0$	0.600***
$D_{phone}$			$c'''_0$	0.065
$T$		0.183***		0.180***
$V$		0.058***		0.064***
$\ln N$	$c_1$	0.400***	$c'_1$	0.412***
$D_{card} \ln N$			$c''_1$	-0.318***
$D_{phone} \ln N$			$c'''_1$	0.145***
$x$	$c_2$	0.901***	$c'_2$	0.760***
$D_{card} x$			$c''_2$	0.072
$D_{phone} x$			$c'''_2$	0.021
$x \ln N$	$c_3$	-0.289***	$c'_3$	-0.227***
$D_{card} x \ln N$			$c''_3$	0.147***
$D_{phone} x \ln N$			$c'''_3$	-0.142***
$(\ln N)^2$	$c_4$	0.059***	$c'_4$	0.040**
$D_{card} (\ln N)^2$			$c''_4$	-0.035*
$D_{phone} (\ln N)^2$			$c'''_4$	0.057**
McFaddenR <sup>2</sup>		0.045		0.058
LR statistic		3190.540***		4054.920***

**Table 2, Logit Regression Results**

Notes:

The sample size is 83311.  $Y=1$  in 12488 observations, and 0 in 70824 observations.

$T$ ,  $V$  and  $\ln N$  are standardized to avoid the influence of value magnitude.

\*\*\* means significance at  $p < 0.01$  level, \*\* means significance at  $p < 0.05$  level, and \* means significance at  $p < 0.1$  level (double-tailed).



The regression coefficient of the interaction term  $x \ln N$  is significantly negative. In the other words, the effect of perceived seller performance on consumer's repurchase probability is stronger when seller reputation is low (vs. high). Therefore, hypothesis 5 is supported. This also confirms our assumption that solid belief is not easy to be changed. We also find the magnitude of the coefficient of the interaction term is smaller in the game cards group ( $c_3'' = 0.147, p < 0.01$ ), and larger in the cell phones group ( $c_3''' = -0.142, p < 0.01$ ). This is consistent with our model predictions.

We find that the regression coefficient of the squared term  $(\ln N)^2$  is significantly positive. Moreover, the regression coefficient of the *cell phones* group is larger than that of the *clothes* group ( $c_4'' = 0.057, p < 0.05$ ), and then is larger than of the *game cards* group ( $c_4''' = -0.035, p < 0.1$ ). These findings are also consistent with the model properties.

We summarize all of our findings in table 3.

	Model Predictions	Findings	Supported
Hypothesis 1	$c_1 > 0$	$c_1 = 0.400 > 0$ ( $p < 0.01$ )	Yes
Hypothesis 2	$c_1'' < 0$ and $c_1''' > 0$	$c_1'' = -0.318 < 0$ ( $p < 0.01$ ) and $c_1''' = 0.145 > 0$ ( $p < 0.01$ )	Yes
Hypothesis 3	$c_2 > 0$	$c_2 = 0.901 > 0$ ( $p < 0.01$ )	Yes
Hypothesis 4	$c_2'' > 0$ and $c_2''' < 0$	$c_2'' = 0.072 > 0$ ( <i>n.s.</i> ) and $c_2''' = 0.021$ ( <i>n.s.</i> )	No
Hypothesis 5	$c_3 < 0$	$c_3 = -0.289 < 0$ ( $p < 0.01$ )	Yes
Model property	$c_3'' > 0$ and $c_3''' < 0$	$c_3'' = 0.147 > 0$ ( $p < 0.01$ ) and $c_3''' = -0.142 < 0$ ( $p < 0.01$ )	Yes
Model property	$c_4 > 0$	$c_4 = 0.059 > 0$ ( $p < 0.01$ )	Yes
Model property	$c_4'' < 0$ and $c_4''' > 0$	$c_4'' = -0.035 < 0$ ( $p < 0.1$ ) and $c_4''' = 0.057 > 0$ ( $p < 0.05$ )	Yes

**Table 3, Summary of Research Findings**

## DISCUSSIONS

We mainly have three findings in this study. First, seller reputation has positive impacts on consumers' repurchase probability, and the effect magnitude is positively moderated by performance ambiguity. Second, consumers' perceived seller performance also has positive effects on consumer's repurchase probability. Third, the effect of consumers' perceived seller performance on consumers' repurchase probability is weaker when seller has high reputation.

## Implications

Our findings have several implications. First, we find that repurchase (from the same seller) transactions are increasing in online marketplace in recent years, and consumers' purchase experience (perceived seller performance) has significant impact on their repurchase behavior. Our findings show that consumers' purchase experience is an important factor of consumers' belief on sellers' trustworthiness and transaction outcomes. Future studies may take consumers' purchase experience into consideration when verify the effect of reputation system on transaction outcomes.

Second, we find that seller reputation is an important predictor of consumers' repurchase behavior. When previous website loyalty studies focus on satisfaction and merely consider seller reputation (Casalo, Flavian and Guinaliu 2008; Flavian, Guinaliu and Gurra 2006; Lam, Shankar, Erramilli and Murthy 2004; Lin and Wang 2006), our study suggests that they

should also consider the effect of seller reputation on consumers' repurchase intention and behavior. We also find a moderating effect of seller reputation on the relationship between consumers' perceived seller performance and repurchase behavior. Our findings deepen our understanding on the factors influencing consumers' repurchase behavior.

Third, our study verifies the moderating effect of performance ambiguity on the relationship between seller reputation, consumers' perceived seller performance and consumers' repurchase behavior. This moderator was previously discussed in consumer learning studies. It was used to examine the effects of advertising, brand reputation and product performance on consumers' belief and repurchase behavior (Hoch and Deighton 1989; Hoch and Ha 1986; Selnes 1993). However, the moderator was seldom examined in online marketplace. Our findings confirm that performance ambiguity also has significant moderating effects in online marketplace. Moreover, interestingly, the moderating effect of performance ambiguity is positive on the relationship between seller reputation and consumers' repurchase probability, but is not obvious on the relationship between consumers' perceived seller performance and consumers' repurchase probability.

Our findings also have a number of practical implications. We find that when performance ambiguity increases, the effect of seller reputation on consumers' repurchase probability increases, but the effect of consumers' perceived seller performance on consumers' repurchase probability is relatively stable. Our findings suggest that online sellers who sell high performance ambiguity goods (for example, cell phones) should pay more attention to their reputation, and online sellers who sell low performance ambiguity goods (for example, game cards) should pay more attention to goods quality and services they deliver. Furthermore, for those new sellers whose reputation is not established yet, their consumers' repurchase probability is more easily influenced by the consumers' purchase experience. This suggests that new sellers should pay more attention to their transactions than sellers with established reputation.

### Limitations

Our study has several limitations. First, although we have modeled consumers' belief updating process, we can not collect data on consumers' belief from objective transaction dataset. Limited by the dataset, we only examine the effect of seller reputation and consumers' perceived seller performance on consumers' repurchase probability. Studies in the future may collect first-hand data on consumers' belief updating to verify the model directly.

Second, when a consumer decides whether to repurchase from a seller, the seller's reputation score at that time point may have been updated. We can not observe the updated seller reputation (although we can observe the seller reputation when a consumer repurchase, but we have no chance to observe if the consumer revisit the seller's shop but do not repurchase). However, since reputation score in Taobao is relatively stable (it takes quite a long time for a seller to establish his/her reputation), our findings are still meaningful to explain the effect of seller reputation on repurchase probability. Future research should consider the "updated reputation" problem carefully.

### Future Research

Our study adopted the belief update model to illustrate the belief updating process after a consumer's first transaction with a specific seller. However, the belief updating process may continue in the second, third time repurchases. Future study can extend the model to consider the time serious process. The extended model can be used in estimating the probability of consumers' repurchase probability, which will benefit to consumer relationship management.

Consumers' belief can also be influenced by some other factors, such as advertisement and connections between sellers and consumers (connections through IT mechanism, such as IM tools, e-mail systems and social networks). Consumers' repurchase behavior also can be influenced by some other factors, such as consumer surplus and goods scarcity. Examining the impacts of these factors will also be meaningful in understanding consumers' repurchase behavior in online marketplace.

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