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Do social ties matter for purchase frequency? The role of buyers' attitude towards social media marketing

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ABSTRACT

In social media marketing, it is common practices to leverage social ties to promote business. However, whether do social ties matter for buyers' purchase behavior? Combining the transaction utility theory with the motivations of social interaction, we conducted an empirical study by using the trading data of a large social media platform (i.e., WeChat). The following conclusions are reached: the buyers with strong social ties with sellers reveal higher purchase frequencies than those with weak social ties. However, such marketing effects of social ties can be attenuated by buyers' attitudes towards social media marketing, for buying higher-priced goods. Finally, we also provide suggestions for social media marketing practice and insights for future research.

1. Introduction

Social media marketing (SMM) refers to the commercial behavior initiated and accomplished via social media (Harvey, Stewart, & Ewing, 2011; Zhang & Daugherty, 2009). There are two typical types of SMM: user-generated content (UGC)-based SSM and social-based SMM (Mangold & Faulds, 2009; Chan & Guillet, 2011; Alves, Fernandes, & Raposo, 2016; Zeng & Wei, 2013). UGC-based SMM has been developed for several years and uses UGC platforms (e.g., Microblogs, Twitter, brand communities and online forums). Because UGC platforms are originally designed as informative medias and thus relatively easy to be integrated to commercial behaviors (Kaplan & Haenlein, 2010; (Goh, Heng & Lin, 2013)). Social-based SMM leverages instant communication social media (e.g., WeChat). It expands rapidly in recent years and becomes a popular shopping channel. For example, there are more than 12.57 million users participated in social-based SMM using WeChat, with a market share of 181.95 billion Yuan (Internet Society of China (ISC), 2016). Nevertheless, there are different attitudes toward social-based SMM in the public.

The social media used by social-based SMM is originally designed to foster social interactions among one's social network. For example, in the early time of WeChat, it only supports the interactions among close friends. As it becomes one of the most popular social medium in China, individuals and firms start to exploit it to derive transactions. People hence exhibit divergent attitudes toward the utilization of social-based SSM. Some people claim that social-based social media, such as WeChat, is a virtual social community to share news and express emotion. They are anxious about the intertwining of transactional relations and social ties and consequently reluctant to accept a seller's exploitation of acquaintance relations. In a survey conducted by *Blue Book of China's Society: Society of China Analysis and Forecast (2017)*, 33% of young respondents reported that they had to go shopping via WeChat due to the pressure from interpersonal relations. 26.7% of them expressed their "disliking or rejection of WeChat channels". On the contrary, the content sharing from sellers on a social-based social media could be beneficial. Some people hold a belief that a strong tie signifies trust. They are more inclined to make a purchase from the acquainted sellers. Thus, it is worthwhile to explore the effects of buyers' attitudes and social ties in social-based SMM.

The development of SMM has attracted much attention from scholars in the past years. The main body of existing literature principally interprets the effects of social interactions among buyers and sellers on purchase behaviors in the context of UGC-based SSM (Mangold & Faulds, 2009; Chan & Guillet, 2011; Vinerean, Cetina, Dumitrescu, & Tichindelean, 2013; Alves et al., 2016; Wang, Yu, & Wei, 2012; Wang & Chang, 2013; Kaplan & Haenlein, 2010; Zeng & Wei, 2013; Goh et al., 2013). However, the investigation of users' behavior in social-based SMM is lacking. The unique context of social-based SMM (e.g., strong social ties and differentiated attitudes) provide both opportunities and challenges. The strength of social ties between buyers and sellers can be

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intensified through daily social interaction. Thus, the buyers' expectation of relational utility from their social interaction can be swelled and then promote purchase frequency. However, buyers have different attitudes toward the business in social-based social media and may interfere with the effects of social ties. To explore the paradox of social ties and buyer attitude in social-based SMM, the current study combines the motivations theory of social interaction (Lin, 2002) with the transaction utility theory (Thaler, 1985). Specifically, this study attempts to investigate: (1) the effects of social ties strength on buyers' purchase frequency; (2) the moderating effect of buyer attitude on the relationship between tie strength and purchase frequency; And (3) the contingent effect of price segments.

The remainder of the paper is organized as follows: Section 2 states the theoretical background. Section 3 describes the research design related to the definition of variables and the empirical data used in the paper. In Section 4, the key results of the analyses are presented. Finally, Section 5 contains a summary of the main conclusions and suggestions for future lines of research.

2. Theoretical background and hypotheses

2.1. Relational utility in the context of social-based SMM

According to Thaler's (1985) transaction utility theory, the total utility acquired by a buyer from a transaction consists of acquisition utility and transaction utility. Acquisition utility is relatively objective to the commodity. A buyer's purchase behavior is thus mainly driven by the transaction utility (Camerer, Colin, George Loewenstein, and Matthew Rabin, & eds. Advances in behavioural economics. Princeton University Press, 2011; Wilkinson & Klaes, 2012), which is principally contingent on the buyer's expectation of the perceived value of a commodity (Lichtenstein, Ridgway, & Richard, 1993). In traditional offline-shopping scenario, the completion of a transaction process is in a face-to-face manner. Although social ties between them could influence a buyer's purchase behavior (Frenzen & Davis, 1990), the buyer's judgment on the perceived value of the commodity relies nearly on his or her cognitive evaluation, on-site commodity examination, and shopping around. However, with the prevalence of e-commerce (Bhatnagar and Ghose, 2004; Cheung, Chan, & Limayem, 2005; Hoffman, Novak, & Chatterjee, 1995; Peterson, Balasubramanian, & Bronnenberg, 1997), the interaction is disengaged and the fact-to-face's evaluation is unnecessary.

In the context of social-based SMM, the transaction occurs along with actors' daily social interactions. The social interaction is intertwined with commercial actions and may generate a new aspect of transaction utility: relational utility. According to Lin (2002), there are two basic motivations in social interactions: expressive motivation and instrumental motivation. Driven by different motivations, two forms of relational utilities may generated: intrinsically rewards and extrinsically rewards (Blau, 1964). The intrinsically reward stems from expressive interaction. Chinese *Renqing*, emotions, approval, supports, and gifts are the examples of intrinsically rewards. Intrinsically reward-dominated actors usually consider the social relationships as the goal. On the other hand, the extrinsically rewards derive from the instrumental interaction. Examples are commitments, priority, quality information disclosure, discounts, and commodity recommendations and so on. An actor with the domination of extrinsically rewards generally takes social interaction as a tool for some purposes.

Sellers of social-based SMM utilize social ties to breed a transaction. The interactions involves in both expressive and instrumental social interaction and generated additional utilities to buyers. Therefore, social ties may impact buyers' evaluation of a transaction through the two types of relational utilities. Furthermore, buyers have discrepant social ties with sellers and distinct attitudes towards social-based SMM. They thus may have different understandings of the seller's motivations and deviate the evaluations of relational utilities. With the combination of social capital theory (Lin, 2002) and attitude theory in marketing (e.g. Argyriou & Melewar, 2011), we argue that the relational utility of an interaction can be a function of social ties and buyers' attitude towards social-based SMM.

Therefore, in the context of social-based SMM, the total utility that affects buyers' purchase behavior contains three parts: acquisition utility, transaction utility, and relational utility. It is expected to enrich the transaction utility theory (Thaler, 1985) and explore the puzzle of buyer's purchase behavior in social-based SMM from the relational utility perspective.

2.2. The marketing effects of social ties in the context of social-based SMM

In the context of social-based SMM, the purchase behavior is governed by the acquisition utility, transaction utility and relational utility. The positive effects of the strength of social ties on buyers' purchase frequencies is defined as the marketing effects of social ties. The strength of social ties between one and his contacts can be classed into strong ties and weak ties given a period. **The strength of social ties here refers to the level of mutual understanding between actors via social-media-based daily interaction.** According to the embeddedness theory (Granovetter, 1985; Krackhardt, 1992), strong ties among actors can cultivate trust (Coleman, 1988; Moorman, Deshpande, & Zaltman, 1993) and realize the exchange of diversified and valuable resources (Luhmann, 1988; Akaka Archpru, Vargo, & Lusch, 2012). It is assumed that in daily social interaction, an actor shows a motivation of a mixture of instrumental and expressive interactions. That is, the actor expects to acquire intrinsically rewarding and extrinsically rewards, such as commodity quality information, careful selection of items, discount price, and commodity recommendations and so on.

Given the fact that any social interactions consume time and efforts for participants, strong social ties could increase buyers' expected intrinsically rewarding and extrinsically rewards from a social interaction. Accordingly, the relational utility is expected to be high (Mauss, 1967; Simmel, 1971) and buyers are more likely to increase purchase frequencies. With a similar line of reasoning, the literature on relation marketing has also examined the positive effects of the (formal and informal) relationships between a firm and its customers on purchase behaviors (Frenzen & Davis, 1990; Iyengar, Han, & Gupta, 2009; Morgan & Hunt, 1994; Swaminathan, Lepkowska-White, & Rao, 1999; Verma, Sharma, & Sheth, 2016; Weitz & Bradford, 1999). Therefore, consistent with previous literature, the repeated propensity of a buyer to purchase from a seller in the context of social-based SMM is influenced by the strength of social ties among a buyer and a seller.

Therefore, we propose:

Hypothesis 1. Buyers holding strong social ties with sellers reveal higher purchase frequencies than those with weak social ties in the context of social-based SMM.

2.3. The attenuating effects of buyers' attitude towards social-based SMM on the marketing effects of social ties

A buyer's attitude is an evaluative judgment based on available information and decision-making. Such judgment is either traceable, constructible or a combination of both. In either way, information prudently enters evaluation in the form of pure cognitive believes or heuristics, spontaneous emotions or emotional responses, or general attitude and overall impression, and further results in the formation of a buyer's attitude (Argyriou & Melewar, 2011). In the literature, the evaluative judgment of a buyer on a range of marketing objects such as websites, UGC-based social media has a definite bearing on one's purchase behavior (e.g., Chen & Wells, 1999; De Vries, Gensler, & Leeflang, 2012; Malthouse et al., 2013). In this paper, the evaluative judgment of a buyer is not on a marketing object but on the sellers' exploitation of their

social ties to generate transaction. Buyers' attitude towards the social-based SMM reflects the trade-off between the expectation of extrinsically rewards and intrinsically rewarding from social interaction. Therefore, it can be theoretically conjectured that a buyer's attitude towards social-based SMM may moderate the effects of social ties on purchase behavior through the evaluation of transaction utilities.

Under the condition of mixed instrumental and expressive social interaction, a buyer expects to acquire intrinsically rewarding and extrinsically rewards from social interaction. A higher-level attitude towards social-based SMM implies the buyer is inwardly willing to shop via social media. He/she attaches more importance to the expected extrinsically rewards from social interaction and thus has a higher psychological discount rate of extrinsically rewards (i.e., a lower psychological discount rate of intrinsically rewarding). With the closer of social ties between a buyer and a seller, the buyer's ex-ante psychological discount rate of the expected extrinsically rewards declines relative to ex-post one, and then the expectation of extrinsically rewards exceeds the actual offered by the seller (i.e., the discount value of the extrinsically rewards received by the buyer). In other words, the buyer has taken the psychological depreciation of the same extrinsically rewards for granted.

Therefore, we propose:

Hypothesis 2. The marketing effects of social ties is attenuated by buyer's attitude toward social-based SMM.

Additionally, we argue that the attenuating effects of buyers' attitudes towards social-based SMM on the marketing effects of social ties depend on the segments of the price of commodities. The extant studies have shown that in the context of traditional offline shopping, there is a significant direct effect of the prices on the purchase behavior (Lichtenstein et al., 1993; Suri & Monroe, 2003). Although in the context of online shopping, prices of a commodity across online-shopping channels are nearly close to the same and do not significantly impact buyers' online purchase behavior (Bhatnagar & Ghose, 2004), we here use the segments of the price to differentiate commodities and investigate its indirect effects.

As discussed, the marketing effects of social ties is embedded in relational utility. The relational utility acquired via social interaction consists of intrinsically rewarding and extrinsically rewards. The balance of intrinsically rewarding and extrinsically rewards may depends on the prices of commodities. With respect to the intrinsically rewarding, it is originated from social ties. It is determined only by social ties but not to the price of a commodity. The extrinsically rewards may positively connect with both the price of a commodity and social ties. With the strengthening of social ties, both the expected intrinsically rewarding and extrinsically rewards increase. When purchasing a high-priced commodity, the extrinsically rewards expected by a buyer increases. Therefore, the relational utility expected by a buyer from purchasing a high-priced commodity is more than that from purchasing a low-priced commodity. It can be inferred that the gap between the expectation of relational utility and the discount value of the relational utility becomes larger when buying high-priced goods than buying a low-priced one, due to the enlarged psychological depreciation of the same extrinsically rewards with the increase in the strength of social ties.

Therefore, we propose:

Hypothesis 3. The attenuating effects of buyers' attitudes towards social-based SMM on the marketing effects of social ties is stronger when buying higher-priced good than buying lower-priced goods.

3. Method

3.1. Model specification

We specify the econometric model in equation (1) to examine the effect of social ties on one's purchase frequency in the context of social-based SMM.

$$Purchase\ \ frequency_{kj} = \beta_0 + \beta_A^{'} A_k + \beta_S^{'} S_{kj} + \beta_p^{'} p + \gamma_Z Z_k + \varepsilon_k \quad k = 1, 2, \ldots, N \tag{1}$$

Where.

k represents a buyer, N = 509; S_{kj} denotes the strength of social ties between buyer k and seller j; A_k stands for buyer k's attitude towards social-based SMM; p represents segments of the price of a commodity and Z_k represents control variables.

As the dependent variable purchase frequency in equation (1) is ordered variable, the ordered logistic model can be appropriate to estimate the parameters in equation (1).

3.2. Sample and data

Our unit of analysis is WeChat-based buyers. We collected the data from the perspective of WeChat-based sellers. To do so, it is beneficial to control the influence of the heterogeneity of a seller on his or her buyers' purchase behavior.

The data were collected in May 2017, over a period of approximately four weeks. The process of collecting data includes three steps. The first step is to get the confirmation of WeChat-based sellers who are willing to join in the project. We stochastically sent the invitation letters via WeChat to 20 sellers, 6 out of them offered positive responsiveness, whose commodities including foods, clothes, education, consumer electronics, cosmetics, and entertainment. The second step is to collect transaction data from the six sellers. Data indicators include a buyer's name, the unit price of a commodity, purchased quantities, purchased frequencies, date of a transaction, location of buyers, etc. The third step is to collect the characteristics data of buyers, identified by their name, by questionnaire with the help of the sellers. Data indicators include income, gender, education, etc. The distribution of buyers among the six sellers is shown in Table 1. The valid response rate is 19.88%.

Table 2 shows the key characteristic of buyers in the sample. Of the 509 respondents, 65.4% are female, 60.51% born in the 1990s, 82.32% with a bachelor's degree, 44.79% are the employee, and 49.12% less than 2000 Yuan a month. More details of the samples are shown in Table B2 of Appendix B. Additionally, the results of correlation show that there is no collinearity among variables (see Table B1 in Appendix B).

3.3. Measurement

3.3.1. Dependent variable

Purchase frequency. According to Forsythe and Shi (2003) and Li, Kuo, and Rusell (1999), we measure a buyer's purchase frequency by the following question: "*Your purchase frequency from this seller in the past six months*" (1 = never; 2 = 1–3 times; 3 = 4–6 times; 4 = 7–10 times; 5 = 11 times or above).

3.3.2. Independent variable

Strength of social ties. Frequencies of interaction between contacts

Table 1
The distribution of the sample.

Sellers	Buyers	
		N = 509/2561 (Responsive number/Total number)
N = 6/20 (Responsive number/Total number)	S1: Foods	113/500
	S2: Clothes	114/1000
	S3: Education	80/210
	S4: Consumer electronics	51/100
	S5: Cosmetics	121/661
	S6: Entertainments	30/90

Table 2
Key characteristic description of buyers in sample [a].

Variables	Mean	Index	Percentage
Gender	0.346	0 = female	65.42%
		1 = male	34.58%
Age	2.297	1 = born in the 1970s	32.61%
		2 = born in the 1980s	6.88%
		3 = born in the 1990s	60.51%
Education level	1.914	1 = below college degree	13.16%
		2 = college or bachelor's degree	82.32%
		3 = Master's degree	4.52%
Identity	0.552	0 = workers	44.79%
		1 = school students	55.21%
Monthly income level (Yuan)[b]	1.929	1 = less than 2000	49.12%
		2 = 2001–4000	24.56%
		3 = 4001–6000	15.13%
		4 = 6001–8000	6.68%
		5 = above 8001	4.52%

Note.
[a] The detailed characteristics description in Appendix B.
[b] We here offer a minimum wage as a reference level. The highest level of the minimum wage is 2420 Yuan per month of Shanghai in China in 2018.

on WeChat can capture the level of mutual understanding and then the strength of their social ties. To this end, we utilize the question "*Your frequency of daily communications (not for a transaction) with this seller* via *WeChat during the past six months*" (1 = never; 2 = once or twice; 3 = once or twice per month; 4 = once or twice per week; 5 = daily). In addition, in consideration of content sharing on WeChat Moments is a routinized way of socializing. We also adopt the question "*Your frequency of giving a LIKE to the seller's Moments*" to proxy for the strength of social ties.

3.3.3. Moderating variables

Buyer's attitude towards social-based SMM. We exploit the scale from Cheng et al. (2006) to measure a buyer's attitude towards social-based SMM. The scale includes A1) "*I think shopping by WeChat is a nice choice*" ($\alpha = 0.611$); A2) "*I think shopping through the seller on WeChat is a nice choice*" ($\alpha = 0.837$); A3) "*I think shopping through the seller on WeChat is pleasant*" ($\alpha = 0.872$), and A4) "*I am willing to accept shopping through the seller on WeChat*" ($\alpha = 0.868$). According to the statistical results of the measurement model, including RMSEA ≤ 0.05, CFI = 0.997, TLI = 0.991, Chi-Square Test of Model Fit for the Baseline Model ($p = 0.0000$), and SRMR (Standardized Root Mean Square Residual) = 0.010, we can take the mean value of the scale as the measurement of buyer's attitude towards social-based SMM.

Segments of the price. According to *the Analysis Report on WeChat's Economic and Social Impacts* (2016), WeChat users with monthly spending of less than 100, 101–300, 301–500, 501–1,000, and above 1000 accounts for 31%, 19%, 14%, 13%, and 21% of the total user, respectively. In line with the segments of the income in the report, we classify commodities into the same five segments.

3.3.4. Control variables

Buyers' characteristics. With the aim of controlling the influence of buyer's characteristics on the purchase frequencies, we take the following variables gender, age, education level, monthly income level, daily WeChat use frequency, and past shopping experience into the econometric model.

Sellers' type. There are, in practice, three types of sellers: (1) Agents. (2) Sellers who sold the place characteristic product. (3) Professional buyers who overseas purchased for others.

Categories of goods. Categories of commodities can also influence one's propensity to the selection of shopping channels. We introduce dummy variables of product categories into the model.

Sources of promotion information. Promotion information sources probably affect a buyer's judgment on the reliability of information and trust related to a seller. Sources of promotion information include the source from real-life friends, from sellers' promotion and from WeChat contacts.

4. Results

4.1. The effects of the strength of WeChat-based social ties on purchase frequencies

Per Hypothesis 1, the results of model 1 in Table 3 illustrate that the strength of social ties on WeChat had a significantly positive effect on purchase frequencies of buyers ($\beta_S = 0.396$, $p < .01$) (see Table B3 of Appendix B for more details). Further, model 2 in Table 3 introduced interaction terms of buyer's past shopping experience and buyer's attitude and strength of social ties, respectively, to eliminate the difference caused by a buyer's past shopping experience via WeChat. Additionally, with due consideration of the robustness of the estimated results, we utilized two proxy variables of buyer's attitude and strength of social ties in model 3 and model 4 in Table 4, respectively, to estimate the model (seeTable B4 of Appendix B for more details). It can be found that all the results of model 1–4 in Table 3 point consistently to the conclusion that buyers demonstrating strong social ties with sellers on WeChat reveal higher frequencies of purchasing than those with weaker ties. Hence, Hypothesis 1 is verified.

4.2. The attenuating effects of buyer's attitude

With respect to Hypothesis 2, as shown by the results of model 1 in Table 4, the interactive effect of buyer's attitude and strength of social ties on buyers' purchase frequencies was negatively significant ($\beta_{SA} = -0.0719$, $p < .05$). We also used LIKE as a proxy variable for the strength of social ties in model 2, of which the results are similar, in a more significant way ($\beta_{SA}{}' = -0.208$, $p < .01$), to that of model 1 in Table 4. It can be inferred that a buyer with a higher-level attitude towards social-based SMM can attenuate the positive effect of social ties on the

Table 3
The ordered logistic estimated results of the effects of the strength of WeChat-based social ties on purchase frequencies [a].

Variables	Buyers' purchase frequency on WeChat			
	1[d]	2	3[b]	4[c]
Strength of social ties	0.396***	0.393***	0.429***	0.545***
	(0.0342)	(0.0341)	(0.0339)	(0.0387)
Buyer's attitude	0.538***	0.532***	0.116**	0.456***
	(0.0517)	(0.0526)	(0.0460)	(0.0540)
Segments of the price	−0.594***	−0.595***	−0.579***	−0.601***
	(0.0325)	(0.0325)	(0.0320)	(0.0327)
Control variables	YES	YES	YES	YES
Observations	2545	2545	2545	2545
Pseudo R-Squared	0.134	0.135	0.121	0.148
Log Lik	−3016	−3013	−3060	−2968
Wald Chi^2	776.6	786.2	701	893.3
Prob > Chi^{-2}	0.0000	0.0000	0.0000	0.0000

Note: Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
[a] The details are in Appendix B.
[b] "Blocking Moments" as a proxy for a buyer's attitude, which can be used to indirectly measure the buyer's attitude towards Social-based SMM. We use the following question to measure the degree of blocking a seller's moments: "your probable proportion of blocking sellers in the past six months (1 = all; 2 = the majority; 3 = blocking whom you dislike; 4 = do not care; 5 = pleased to browse)."
[c] By using "LIKE" as a proxy for the strength of social ties between a buyer and a seller on WeChat to measure social interaction in real life.
[d] In this model, we did not control the interaction terms: buyer's past shopping experience × strength of social ties and buyer's past shopping experience × buyer's attitude.

Table 4
The ordered logistic estimated results of the attenuating effect of buyers' attitude [a].

Variables	Buyers' purchase frequency on WeChat								
	1	2[b]	3[c]	4[d]	5	6	7	8	9
Strength of social ties	0.407***	0.607***	0.360***	0.460***	0.387***	0.353***	0.442***	0.528***	0.563***
	(0.0348)	(0.0398)	(0.0555)	(0.0464)	(0.0816)	(0.0771)	(0.0783)	(0.0896)	(0.0912)
Buyer's attitude	0.567***	0.556***	0.510***	0.620***	0.433***	0.607***	0.612***	0.684***	0.737***
	(0.0537)	(0.0565)	(0.0829)	(0.0744)	(0.125)	(0.113)	(0.113)	(0.141)	(0.163)
Segments of the price	−0.598***	−0.606***	_	_	_	_	_	_	_
	(0.0326)	(0.0327)							
Buyer's attitude × Strength of social ties	−0.0719**	−0.208***	0.00905	−0.145***	0.0599	−0.0352	−0.0732	−0.181**	−0.247**
	(0.0343)	(0.0364)	(0.0545)	(0.0471)	(0.0813)	(0.0735)	(0.0733)	(0.0862)	(0.0981)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2544	2545	1017	1527	509	509	509	509	509
Pseudo R-squared	0.136	0.153	0.0791	0.111	0.0769	0.0950	0.117	0.138	0.145
Log Lik	−3008	−2950	−1424	−1584	−718	−686.6	−609.9	−483	−405
Wald chi2	779.6	893.3	216.1	362.3	108.5	120.1	159	137	124.6
Prob > chi^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Robust standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
[a] The details in Appendix B.
[b] Using "LIKE" on WeChat as a proxy for the strength of social ties between a buyer and a seller.
[c] The results were estimated based on the "Low-priced goods" sample.
[d] The results were estimated based on the "High-priced goods" sample.

buyer's purchase frequencies than that with a lower-level attitude. Slope tests, as shown in Fig. 1, demonstrate that when buyers' attitude towards social-based SMM was high (1 s.d. above the mean), strength of social ties was less positively related to buyers' purchase frequencies than when buyers' attitude towards social-based SMM was low (1 s.d. below the mean). Hence, Hypothesis 2 is verified.

Regarding Hypothesis 3, firstly, we classify the full sample into two sub-samples based on buyers' perception of the unit price of a commodity relative to buyers' income: low-priced goods (unit price is below 300 Yuan) and high-priced goods (unit price is above 301 Yuan). As shown by the results of model 3 (for the low-priced goods) and model 4 (for the high-priced goods)in Table 4, the negatively interactive effect of buyer's attitude and strength of social ties on buyers' purchase frequencies depends negatively upon segments of the price of a commodity ($\beta_{PSA} = -0.145$, $p < .01$).

The results of model 5–9 in Table 4 demonstrate that the negatively interactive effect of buyer's attitude and strength of social ties on buyers' purchase frequencies become more significant with the gradual increase in the segments of the price of a commodity. For example, for the commodity whose unit price is 501–1000 Yuan, a buyer with a higher-level attitude towards social-based SMM presented significant less frequencies of purchasing from a seller due to an increase in their social ties than the results of model 7, in which the segment of the price is 301–500 Yuan.

Fig. 2 and slope tests demonstrate that when buying higher-priced goods, with a higher-level attitude towards social-based SMM (1 s.d. above the mean), the strength of social ties was less negatively related to buyers' purchase frequencies than with lower-level attitude towards social-based SMM (1 s.d. below the mean). Hence, Hypothesis 3 is verified.

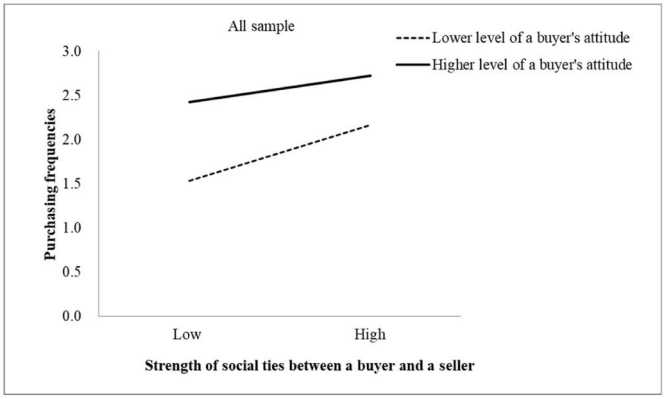

Fig. 1. The negative moderating effects of buyer's attitude.

4.3. Robustness tests

We offer the following explanations for the potential issues of endogeneity. In our model, the endogeneity could arise from the omitted variables that could affect not only the strength of social ties but also the purchase frequencies, leading to biased and inconsistent results (Greene, 2003). In reality, WeChat Moments has become a social virtual community. Content sharing on Moments by a seller will inevitably influence his or her contacts' attitude towards social-based SMM.

We cannot get the detail about the nature of the contents shared by a seller on WeChat. Nevertheless, we contrive to lessen the potential endogeneity by introducing a buyer's past shopping experience on WeChat into the model, which, to some extent, can influence his or her attitude towards social-based SMM. Moreover, we used the proxy variables for a buyer's attitude and social ties to examine the robustness of our results.

The parameters of the psychological discount function can be influenced by one's demographic factors, such as gender, age, education

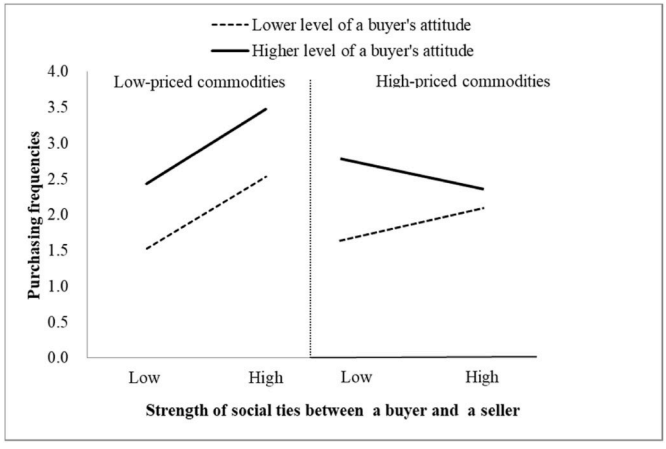

Fig. 2. The attenuating effect of a buyer's attitude contingent on segments of the price.

level, cognitive ability, personality, and cultural and environmental factors (Mulligan, 2007). Therefore, the buyer's characteristics were included in our model. Additionally, we also controlled categories of commodities, types of sellers and sources of goods promotion information. Finally, we adopt the jackknife and bootstrap method to conduct a robustness test, the results as shown in Table 5 and the details in Table B5 of Appendix B.

5. Discussion

With the increasing penetration of the Internet into consumers' shopping behavior and firms' value chain activities (e.g., Albors, Ramos, & Hervas, 2008; Chan & Guillet, 2011; Mangold & Faulds, 2009), the nature of linkages between buyers and sellers have been fundamentally changed. Among others, the striking evidence is the emerging of SMM. In practice, SMM involves in two forms: UGC- and social-based SMM. The essence of the latter lies in that a seller expects to spawn transactions through social ties on a social media, such as WeChat which as an instant communications tool has prevailed in the world.

In the context of social-based SMM, the strength of social ties between buyers and sellers can be intensified through daily social interaction. Thus, the buyers' expectation of relational utility from their social interaction can be swelled and then increases the purchase frequencies. In the practice, however, buyers have different attitudes toward the business in social-based social media and may interfere with the effects of social ties. To fill in the theoretically and practically divergence, we combined the motivations of social interaction (Lin, 2002) with the traditional transaction utility theory (Thaler, 1985) and investigated the role of a buyer's attitude towards social-based SMM in the effects of social ties on the buyer's purchase frequencies.

In the context of social-based SMM, total utility includes not only the traditional transaction utility but also the relational utility stemmed from social interaction via social media, extending the theory of traditional transaction utility theory (Thaler, 1985). Meanwhile, it is articulated that the underlying mechanism through which the relational utility can positively motivate a buyer's purchase behavior is the intrinsically rewarding and extrinsically rewards derived from social interaction. The marketing effects of social ties, which refers to positive effects of social tie strength on buyers' purchase frequency, is stemmed in the relational utility during social interactions. More importantly, the marketing effects of social ties is attenuated by buyer's attitude toward social-based SMM. The attenuating effects of buyers' attitudes towards social-based SMM on the marketing effects of social ties is contingent upon price segments. The attenuating effects is stronger for higher-priced good than buying lower-priced goods.

Table 5
The ordered logistic estimated results by using the Jackknife and Bootstrap method [a].

Variables	Buyers' purchase frequency on WeChat			
	Bootstrap sampling		Jackknife sampling	
	1	2	3	4
Strength of social ties	0.393***	0.407***	0.393***	0.407***
	(0.0344)	(0.0351)	(0.0359)	(0.0339)
Buyer's attitude	0.532***	0.567***	0.532***	0.567***
	(0.0531)	(0.0542)	(0.0518)	(0.0537)
Strength of social ties	0.393***	0.407***	0.393***	0.407***
	(0.0344)	(0.0351)	(0.0359)	(0.0339)
Segments of price	−0.595***	−0.598***	−0.595***	−0.598***
	(0.0328)	(0.0328)	(0.0343)	(0.0327)
Buyer's attitude ×	_	−0.0719**	_	−0.0719**
Strength of social ties	_	(0.0347)		(0.0359)
Control variables	YES	YES	YES	YES
Observations	2545	2545	2545	2545
Pseudo R-Squared	0.135	0.136	0.135	0.136
Log Lik	−3013	−3008	−3013	−3008
F	32.19	30.61	_	_
Wald Chi2	_	_	740.5	771.3
Prob > Chi^2	0.0000	0.0000	0.0000	0.0000

Note: Standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
[a] The details in Appendix B.

5.1. Theoretical implications

Our arguments primarily contribute to the literature on SMM (e.g. Alves et al., 2016) and on the theory of attitude theory in marketing research (Argyriou & Melewar, 2011). It is derived here that given the level of a buyer's attitude, enhancing the strength of social ties between buyers and sellers on WeChat can increase buyers' purchase frequency. Strong social ties signify the incremental expectation of the intrinsically rewarding and extrinsically rewards by buyers, increasing the purchase frequencies of buyers. The results is consistent with previous literature in the context of offline transaction (Frenzen and Davis, 1990) and UGC-based SMM (Verma et al., 2016; Iyengar et al., 2009; Akaka Archpru et al., 2012; Zeng & Wei, 2013; Goh et al., 2013).

Nevertheless, in the context of social-based SMM, the marketing effect of social ties does always matter for buyers' purchase frequencies. The reasons, as indicated by our findings, are that the marketing effects of social ties could be attenuated by buyers' attitudes towards social-based SMM, especially for the purchase of higher-priced goods. A buyer who is willing to purchase via a social media, with an increase in the strength of their social ties in daily interaction, psychologically depreciates the value of such an extrinsically rewards that the same as before, largely because the buyer has already taken the same rewards for granted. In this case, the incentive effect of the extrinsically rewards on the buyer's purchase behavior is attenuated, which further decreases the buyer's purchase frequencies from the seller, especially for the purchasing of higher-priced goods.

The extant literature mainly focuses on consumers' preferential responses to a range of marketing objects (e.g., Chen & Wells, 1999; De Vries et al., 2012; Grewal, Iyer, & Levy, 2004; Malthouse et al., 2013), but seldom touches upon consumers' attitude towards social media where social interaction between buyers and seller occurred simultaneously. Our arguments here are the extension of the attitude theory in marketing research (e.g., Argyriou & Melewar, 2011) by investigating the nature of buyers' attitudes in the social-based social media-marketing context.

5.2. Managerial implications

Our findings provide heuristic managerial implications for individual sellers.

First, a seller who intends to initiate SMM strategies should ponder two issues of a social media. One issue is to nurture tight social ties with potential buyers on social media. Another issue is to form a buyer's positive attitude towards SMM via content sharing. The strategic marketing implications of the argument for a seller, in the context of SMM, lie in attention should be paid to the "social media", which used to spawn social interaction. According to a survey report, which published by a Chinese website named 199it.com, a knowledgeable or informative recommendation of goods is more popular than a pure promotion or advertisement.

Second, sellers need to maintain the flexible strength of social ties with buyers based on the attitude of their customers. Specifically, the frequencies of social interaction with a potential buyer who is willing to purchase via social media, should be weighed. It could be helpful for sellers to avoid increasing expectations of rewarding from their customers. On the contrary, if a potential buyer is reluctant to trade via a social media, with whom frequencies of social interaction are necessary to be increased. In addition, sellers who are in high price segments should pay more attention to their customers' attitude. The marketing effects of social ties may be even reversed for the customers with high attitudes toward social-based SMM.

5.3. Limitations and directions for future research

Despite these interesting implications, this study has several limitations that also provide salient future research issues. First, we only focus on social ties between individual sellers and individual buyers. With the increasing prevalence of social media, the social-based SMM has received much attention from firms. For instance, 75.3% of firms in China have conducted social media such as WeChat for marketing. Accordingly, future research should identify the influence of social ties between buyers and firms on buyers' purchase behavior (Alves et al., 2016). Another potentially fruitful and interesting avenue for future research is worth to analyze the antecedents of buyer's attitude towards social-based SMM from the perspective of content sharing on social media (Akaka Archpru et al., 2012). Finally, future research should consider examining what is the ideal strength of social ties under the condition that the intrinsically rewarding and extrinsically rewards generated by social ties are complementary or a substitute.

CRediT authorship contribution statement

Rui Yang: Conceptualization, Methodology, Writing - original draft, Investigation. **Tong Che:** Conceptualization, Validation, Writing - review & editing.

Appendix A. The mathematical derivation

Based on the transaction utility theory and the motivations of social interaction, we used mathematical derivation in this appendix to demonstrate our research hypotheses.

1. Relational utility in the context of socialization-based SMM

Assume that an actor's motivation is a linear function of instrumental interaction and expressive interaction, denoted by,

$$R(\theta,\delta)=a\theta+b\delta, 0<a,b<1, a+b=1 \tag{1}$$

Where$\theta(t)>0$ and $\delta(t)>0$ respectively denotes instrumental interaction and expressive interaction of an actor in media-based social interaction.

Using $\gamma(\theta,\delta)=\frac{a\theta}{a\theta+b\delta}$ $(0<\gamma<1)$ to capture the orientation of interaction motivation of the actor, we can derive the following formulation of the change of the actor's motivation orientation over time:

$$\dot{\gamma}(\theta,\delta)=\gamma(1-\gamma)\left(\frac{\dot{\theta}}{\theta}-\frac{\dot{\delta}}{\delta}\right) \tag{2}$$

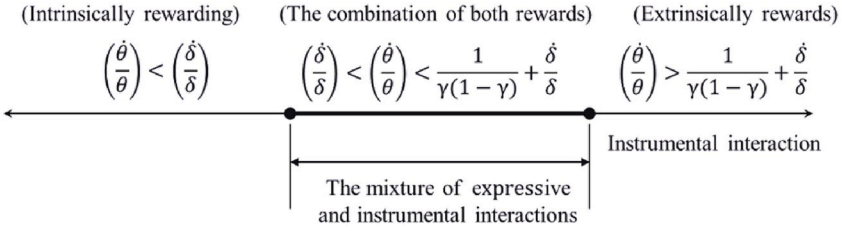

Fig. 1. The orientation of interaction motivations of an actor.

With the combination of the theory of social capital (Lin, 2002) and attitude theory in marketing (e.g. Argyriou & Melewar, 2011), we argue that the expected relational utility acquired from the interaction can be a function both of social ties and buyers' attitude towards socialization-based SMM. The orientation of interaction motivations of an actor is hown in (Fig. 1)

$$u\left(A_k,S_{kj}\right)=\omega A_k^{\dot{\gamma}}(t)S_{k,\ j}^{1-\dot{\gamma}}(t),\quad (0<\dot{\gamma}<1) \tag{3}$$

Where u denotes the expected relational utility; $A_k(t)$ and $S_{k,\ j}(t)$ denotes buyer k's attitude towards socialization-based SMM and the strength of social ties between buyer k and seller j on a social media respectively.

The discount value for the expected relational utility U, during a given period [t, t + s], can be formalized in the following equation.

$$U\left(t,s,\gamma:A_k,S_{kj}\right)=\sum_{t}^{t+s}D(t,s)u\left(A_k,S_{kj}\right) \tag{4}$$

In the social interaction between buyer k and seller j, the increment in the psychological discount value of the relational utility received by buyer k during a given period [t, t + s] is defined as the following equation:

$$\Delta U=p_iU_A+p_iU_S \tag{5}$$

Where $p_i=p(i)$ is the probability of buyer k continuing to make a purchase from the same seller j after i times of purchasing, and $p_i=\alpha i+\alpha_0$, in which α_0 represent the past shopping experience of buyer k, according to Ye et al., (2011) and Hahsler (2008).

Using $\left(\frac{\Delta U}{u}\right)$ to capture the ratio of the change in the discounted relational utility to the expected one. In the process of buyer k's repurchasing from seller j, the expectation of the perceived value of a commodity can be measured by the following equation:

$$E(p^e) = \left(\frac{\Delta U}{u}\right)p^v = D(t,s)\left(\dot{\gamma}\frac{1}{A_k} + (1-\dot{\gamma})\frac{1}{S_{k,j}}\right)p_i p^v \tag{6}$$

Substituting the equation into the equation $U = U_A + U_T = U_A + [E(p^e) - p^0]$.

It can be derived that the repurchasing behavior of buyer k, in the context of socialization-based SMM, depends on the total utility:

$$U^{'} = U_A + U_T + U_R \tag{7}$$

Where $U_R = \left(D(t,s)\left(\dot{\gamma}\frac{1}{A_k} + (1-\dot{\gamma})\frac{1}{S_{k,j}}\right)p_i - 1\right)p^v$, $U_T = (p^v - p^0)$.

Therefore, in the context of socialization-based SMM, according to equation (7), the total utility ($U^{'}$) that affect buyers' purchase behavior contains three parts: acquisition utility (U_A), transaction utility (U_T), and relational utility (U_R).

2. The marketing effects of social ties in the context of socialization-based SMM

The propensity (Λ_{kj}) of the buyer k to purchase from the seller j in the context of socialization-based SMM is contingent upon the following probability conditions:

$$\Lambda_{kj} = Pr(U^{'} - \tilde{U} > 0) = 1 - Pr\left\{ i > \frac{(p^1 - p^0 + p^v)}{D(t,s)\alpha p^v\left(\dot{\gamma}\frac{1}{A_k} + (1-\dot{\gamma})\frac{1}{S_{kj}}\right)} - \frac{\alpha_0}{\alpha} \right\}. \tag{8}$$

Where i denotes the buyer's repurchase frequency during a given period, i obeys the power-law distribution. The distribution function of i is

$$F(i) = \left(i + \frac{\alpha_0}{\alpha}\right)^{-\rho} F(1) \tag{9}$$

Where $F(1) = p_0(1-p_0)^{\frac{1}{\alpha\rho}\frac{N}{\alpha\rho}}$, ρ represents the power-law index; and the repurchasing behavior of the buyer from different types of sellers has the same power-law index according to Ye, Wang, Bao and Chen (2011); N represents the number of (potential) buyers during a given period. Therefore,

$$\Lambda_{kj} = 1 - \left(\frac{p^1 - p^0 + p^v}{D(t,s)\alpha p^v}\right)^{-\rho}\left(\dot{\gamma}\frac{1}{A_k} + (1-\dot{\gamma})\frac{1}{S_{kj}}\right)^{\rho} F(1) \tag{10}$$

With the social interaction with buyers on a social media, the seller j harbours the expectation of the repeating purchase by most of the N buyers. The number of those repurchasing i times is

$$y_{kj}(y_{kj} = i) = \Lambda_{kj}N = N - \left(\frac{p^1 - p^0 + p^v}{D(t,s)\alpha p^v}\right)^{-\rho}\left(\dot{\gamma}\frac{1}{A_k} + (1-\dot{\gamma})\frac{1}{S_{kj}}\right)^{\rho} F(1)N \tag{11}$$

Taking the partial derivative w.r.t. the strength of social ties $S(t)$ in equation (12):

$$\frac{\partial y_{kj}}{\partial S_{kj}} = (1-\dot{\gamma})\rho\left(\frac{1}{S_{kj}}\right)^2\left(\frac{p^1 - p^0 + p^v}{D(t,s)\alpha p^v}\right)^{-\rho}\left(\dot{\gamma}\frac{1}{A_k} + (1-\dot{\gamma})\frac{1}{S_{kj}}\right)^{\rho-1} F(1)N \tag{12}$$

Given $\left(\frac{\dot{\delta}}{\delta}\right) < \left(\frac{\theta}{\theta}\right) < \left(\frac{1}{r(1-r)} + \frac{\dot{\delta}}{\delta}\right)$, $0 < \dot{\gamma} < 1$, then,

$$\frac{\partial y_{kj}}{\partial S_{kj}} > 0$$

Hence, the Hypothesis 1 can be derived from the above partial derivative expression.

Taking the partial derivative w.r.t. a buyer's attitude $A(t)$ in equation (12):

$$\frac{\partial y}{\partial S_{kj}}\left(\frac{\partial}{\partial A_k}\right) = -\dot{\gamma}(1-\dot{\gamma})\rho(\rho-1)\left(\frac{1}{A_k S_{kj}}\right)^2\left(\frac{p^1 - p^0 + p^v}{D(t,s)\alpha p^v}\right)^{-\rho}\left(\dot{\gamma}\frac{1}{A_k} + (1-\dot{\gamma})\frac{1}{S_{kj}}\right)^{\rho-2} F(1)N \tag{13}$$

Given $\rho > 1$ (see Appendix A), $\left(\frac{\dot{\delta}}{\delta}\right) < \left(\frac{\theta}{\theta}\right) < \left(\frac{1}{r(1-r)} + \frac{\dot{\delta}}{\delta}\right)$, and $0 < \dot{\gamma} < 1$, then,

$$\frac{\partial y}{\partial S_{kj}}\left(\frac{\partial}{\partial A_k}\right) < 0$$

Hence, the Hypothesis 2 can be derived from the above partial derivative expression.

The relational utility acquired via social interaction consists of intrinsically rewarding $U_I(\theta,\delta)$ and extrinsically rewards $U_O(\theta,\delta)$, as shown in equation (14).

$$U(\theta,\delta) = U_I(\theta,\delta) + U_O(\theta,\delta) \tag{14}$$

The intrinsically rewarding is originated from social ties in themselves. It is related only to social ties but not to the price of a commodity. The extrinsically rewards positively connect with the price of a commodity and social ties. With the strengthening of social ties, both the expected

intrinsically rewarding and extrinsically rewards increases, i.e., $\frac{\partial U_I(\theta,\delta)}{\partial S_{kj}} > 0$ and $\frac{\partial U_O(\theta,\delta)}{\partial S_{kj}} > 0$.

When purchasing a high-priced commodity, only the extrinsically rewards expected by buyer k through social interaction increases, that is $\frac{\partial U_O(\theta,\delta)}{\partial p^H} > 0$ and $\frac{U_I^L(\theta,\delta)}{\partial p^L} = 0$.

Therefore, the relational utility expected by a buyer from purchasing a high-priced commodity is greater more than that from purchasing a low-priced commodity.

$$U^H(\theta,\delta) \,/\, \partial p^H > \partial U^L(\theta,\delta) \,/\, \partial p^L$$

Hence, the Hypothesis 3 can be derived from the above partial derivative expression.

Appendix B

Table. B1
Correlation between main variables (N = 509).

Variables	1	2	3	4	5	6	7	8	9	10
1 Purchase frequencies	–									
2 Gender	0.028	–								
3 Age	−0.179	−0.099	–							
4 Education level	−0.122	0.012	0.270	–						
5 Past shopping experience	0.118	0.023	−0.103	−0.024	–					
6 Monthly income level	0.140	0.171	−0.656	0.100	0.085	–				
7 Daily WeChat use frequency	0.086	−0.097	0.047	0.096	−0.034	0.062	–			
8 Buyer's attitude	0.287	−0.107	−0.110	−0.020	0.329	0.148	0.155	–		
9 Strength of social ties	0.312	−0.018	−0.181	−0.198	0.064	0.035	0.053	0.188	–	
10 Segments of price	−0.320	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	–

Table. B2
The description of sample (N = 509).

Variable	Mean	Index	Percentage
Buyers' characteristics			
Gender	0.346	0 = female	65.42%
		1 = male	34.58%
Age	2.297	1 = born in the 1970s	32.61%
		2 = born in the 1980s	6.88%
		3 = born in the 1990s	60.51%
Education level	1.914	1 = below College degree	13.16%
		2 = College or Bachelor degree	82.32%
		3 = Master degree	4.52%
Identity	0.552	0 = workers	44.79%
		1 = school students	55.21%
Monthly income level (RMB) *	1.929	1 = less than 2000	49.12%
		2 = 2001–4000	24.56%
		3 = 4001–6000	15.13%
		4 = 6001–8000	6.68%
		5 = above 8001	4.52%
Daily WeChat use frequency	2.12	1 = occasionally	27.50%
		2 = once every 2 h	33.01%
		3 = once per hour	39.49%
Buyers' past shopping experience	2.648	1 = very significant difference	10.01%
		2 = slight difference	31.63%
		3 = no difference to some extent	43.81%
		4 = no difference to a very large extent	12.57%
		5 = completely no difference	1.96%
Categories of goods	0.446	Foods	44.60%
	0.538	Clothes	53.83%
	0.269	Education	26.92%
	0.124	Cosmetics	12.38%
	0.328	Consumer Electronics	32.81%
	0.096	Entertainment Services	9.63%
Sellers' type	0.621	Agents	62.08%
	0.440	General We-business sellers who are in charge of the sales of own-made local goods	44.01%
	0.485	Overseas procurement agents	48.53%
Sources of promotion information	0.705	Other friends in real life	70.53%
	0.259	Sellers Promotion	25.93%
	0.578	WeChat friends	57.76%

Table. B3
Results of the effects of the strength of WeChat-based social ties on purchase frequencies.

Variables	Buyers' purchase frequencies on WeChat			
	1	2	3	4
Strength of social ties	0.396***	0.393***	0.429***	0.545***
	−0.0342	−0.0341	−0.0339	(0.0387)
Buyer's attitude	0.538***	0.532***	0.116**	0.456***
	−0.0517	−0.0526	−0.046	(0.0540)
Segments of the price	−0.594***	−0.595***	−0.579***	−0.601***
	−0.0325	−0.0325	−0.032	(0.0327)
Buyers' characteristics				
Gender	0.185*	0.194*	0.131	0.136
	−0.102	−0.102	−0.1	(0.100)
Age	−0.264***	−0.262***	−0.191**	−0.271***
	−0.0909	−0.0914	−0.0916	(0.0957)
Education level	−0.298***	−0.305***	−0.349***	−0.347***
	−0.107	−0.107	−0.109	(0.110)
Identity	−0.279	−0.287	−0.143	−0.391**
	−0.181	−0.181	−0.182	(0.190)
Buyers' past shopping experience	0.109**	0.129***	0.216***	0.105**
	−0.0462	−0.0475	−0.0513	(0.0472)
Monthly income level	0.141**	0.148**	0.172***	0.158***
	−0.0586	−0.0589	−0.0578	(0.0602)
Daily WeChat use frequency	0.120**	0.127**	0.197***	0.113**
	−0.0513	−0.0508	−0.0504	(0.0508)
Categories of goods				
Foods	0.128	0.134	0.121	0.124
	−0.0887	−0.0884	−0.0883	(0.0891)
Clothes	0.117	0.122	0.143	0.0966
	−0.0882	−0.0878	−0.0882	(0.0886)
Education	−0.163	−0.176*	−0.139	−0.150
	−0.101	−0.101	−0.101	(0.101)
Consumer Electronics	0.421***	0.420***	0.455***	0.440***
	−0.131	−0.131	−0.133	(0.131)
Cosmetics	0.195**	0.191*	0.258***	0.125
	−0.0987	−0.0989	−0.0989	(0.102)
Entertainments	−0.0162	−0.0247	−0.236	−0.0550
	−0.163	−0.162	−0.161	(0.161)
Sellers' type				
Agents	0.104	0.0816	0.156	0.0244
	−0.0977	−0.0971	−0.0975	(0.0985)
Sellers who sold the place characteristic product	0.180**	0.161*	0.131	0.189**
	−0.091	−0.0917	−0.0914	(0.0924)
Professional buyers who overseas purchased for others	0.0976	0.126	0.112	0.144
	−0.0957	−0.0972	−0.0971	(0.0979)
Sources of promotion information				
Real life friends	0.132	0.127	0.202**	0.0884
	−0.0951	−0.0946	−0.0943	(0.0960)
Sellers' promotion	0.0686	0.0568	0.125	0.0841
	−0.0909	−0.0909	−0.0917	(0.0920)
WeChat friends	0.00473	−0.0102	0.0332	0.0283
	−0.0853	−0.0852	−0.0852	(0.0864)
Interaction terms				
Buyers' past shopping experience × Buyer's attitude		−0.115**	−0.167***	−0.0244
		−0.0573	−0.0474	(0.0582)
Buyers' past shopping experience × Strength of social ties		0.0497	0.0102	−0.0309
		−0.0407	−0.0371	(0.0444)
Constant Cut1	0.483	0.473	0.0704	0.0256
	−0.479	−0.486	−0.501	(0.500)
Constant Cut2	1.659***	1.652***	1.214**	1.239**
	−0.481	−0.487	−0.502	(0.500)
Constant Cut3	2.677***	2.671***	2.206***	2.288***
	−0.484	−0.49	−0.505	(0.502)
Constant Cut4	4.268***	4.261***	3.765***	3.915***
	−0.49	−0.495	−0.509	(0.506)
Observations	2545	2545	2545	2545
Pseudo R-Squared	0.134	0.135	0.121	0.148
Log Lik	−3016	−3013	−3060	−2968
Wald Chi2	776.6	786.2	701	900.3
Prob > Chiˆ2	0.0000	0.0000	0.0000	0.0000

Note: Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

Table. B4
The moderating effects of buyer's attitude on the influence of strength of social ties on purchase frequencies.

Variables	Buyers' purchase frequencies on WeChat								
	1	2	3	4	5	6	7	8	9
Buyer's attitude	0.567***	0.556***	0.510***	0.620***	0.433***	0.607***	0.612***	0.684***	0.737***
	−0.0537	−0.0565	−0.0829	−0.0744	−0.125	−0.113	−0.113	−0.141	−0.163
Strength of social ties	0.407***	0.607***	0.360***	0.460***	0.387***	0.353***	0.442***	0.528***	0.563***
	−0.0348	−0.0398	−0.0555	−0.0464	−0.0816	−0.0771	−0.0783	−0.0896	−0.0912
Segments of the price	−0.598***	−0.606***							
	−0.0326	−0.0327							
Buyer's attitude × Strength of social ties	−0.0719**	−0.208***	0.00905	−0.145***	0.0599	−0.0352	−0.0732	−0.181**	−0.247**
	−0.0343	−0.0364	−0.0545	−0.0471	−0.0813	−0.0735	−0.0733	−0.0862	−0.0981
Buyers' characteristics									
Gender	0.197*	0.126	−0.00231	0.357**	−0.0368	0.0256	0.245	0.309	0.598**
	−0.102	−0.101	−0.151	−0.139	−0.211	−0.22	−0.227	−0.256	−0.274
Age	−0.261***	−0.255***	−0.14	−0.372***	−0.0289	−0.248	−0.341	−0.407*	−0.481*
	−0.0912	−0.0956	−0.127	−0.132	−0.197	−0.176	−0.211	−0.232	−0.273
Education level	−0.337***	−0.440***	−0.372**	−0.285*	−0.351	−0.391*	−0.276	−0.394	−0.254
	−0.109	−0.11	−0.165	−0.151	−0.243	−0.231	−0.239	−0.272	−0.311
Identity	−0.305*	−0.446**	−0.342	−0.266	−0.145	−0.521	−0.647	−0.135	−0.00983
	−0.181	−0.192	−0.259	−0.257	−0.411	−0.341	−0.415	−0.455	−0.526
Buyers' past shopping experience	0.114**	0.0353	0.166**	0.0828	0.116	0.232**	0.0634	0.202	−0.0162
	−0.0484	−0.0486	−0.0743	−0.0679	−0.107	−0.107	−0.104	−0.131	−0.154
Monthly income level	0.155***	0.194***	0.192**	0.11	0.148	0.237*	0.290**	0.0445	−0.00264
	−0.0589	−0.0605	−0.0916	−0.0771	−0.138	−0.125	−0.123	−0.138	−0.149
Daily WeChat use frequency	0.128**	0.106**	0.0779	0.154**	0.00744	0.153	0.134	0.153	0.278*
	−0.0509	−0.0509	−0.0771	−0.0706	−0.109	−0.11	−0.11	−0.137	−0.15
Categories of goods									
Foods	0.1300	0.1030	0.299**	0.0107	0.377*	0.2230	−0.0753	0.0175	0.169
	−0.0887	−0.0898	−0.138	−0.122	−0.193	−0.198	−0.202	−0.224	−0.244
Clothes	0.131	0.133	−0.0386	0.309**	−0.155	0.0903	0.366*	0.231	0.367
	−0.0885	−0.0905	−0.13	−0.126	−0.187	−0.186	−0.202	−0.237	−0.255
Education	−0.179*	−0.143	−0.137	−0.237*	0.0091	−0.319	−0.481**	−0.114	−0.0872
	−0.102	−0.101	−0.163	−0.139	−0.222	−0.244	−0.219	−0.25	−0.296
Consumer Electronics	0.411***	0.426***	0.196	0.604***	0.202	0.219	0.675**	0.821**	0.455
	−0.131	−0.132	−0.197	−0.178	−0.282	−0.280	−0.302	−0.320	−0.348
Cosmetics	0.179*	0.0789	0.288*	0.0964	0.229	0.361*	0.391*	−0.0337	−0.139
	−0.099	−0.104	−0.154	−0.137	−0.232	−0.212	−0.215	−0.251	−0.292
Entertainments	−0.0118	−0.042	0.0438	−0.0351	0.0748	−0.0448	−0.202	−0.0398	0.325
	−0.164	−0.165	−0.273	−0.223	−0.361	−0.406	−0.379	−0.405	−0.429
Sellers' type									
Agents	0.0799	−0.0141	0.360**	−0.152	0.499**	0.223	0.0739	−0.24	−0.388
	−0.098	−0.101	−0.15	−0.133	−0.213	−0.213	−0.212	−0.25	−0.263
Sellers who sold the place characteristic product	0.167*	0.216**	0.441***	−0.0707	0.482**	0.419*	0.0977	−0.13	−0.275
	−0.0926	−0.0944	−0.15	−0.124	−0.21	−0.215	−0.197	−0.22	−0.243
Professional buyers who overseas purchased for others	0.112	0.117	0.153	0.0675	0.264	0.0429	0.0394	0.129	−0.00627
	−0.0981	−0.0997	−0.151	−0.136	−0.218	−0.215	−0.213	−0.253	−0.276
Sources of promotion information									
Real life friends	0.127	0.0739	0.025	0.194	−0.0124	0.0486	0.0516	0.357	0.37
	−0.0949	−0.0972	−0.138	−0.136	−0.195	−0.199	−0.205	−0.256	−0.3
Sellers' promotion	0.0459	0.0673	−0.0896	0.183	0.0211	−0.212	0.117	0.345	0.173
	−0.0911	−0.0933	−0.142	−0.125	−0.21	−0.196	−0.198	−0.231	−0.254
WeChat friends	−0.00225	0.0622	−0.0664	0.0511	−0.0379	−0.102	−0.0526	0.0422	0.282
	−0.0861	−0.0876	−0.131	−0.119	−0.192	−0.182	−0.197	−0.212	−0.243
Interaction terms									
Buyers' past shopping experience × Buyer's attitude	−0.118**	−0.0062	−0.175*	−0.0933	−0.205	−0.157	−0.109	−0.231*	0.0486
	−0.057	−0.0569	−0.1	−0.0695	−0.143	−0.136	−0.114	−0.129	−0.135
Buyers' past shopping experience × Strength of social ties	0.0659	−0.00608	0.0944	0.0373	0.127	0.069	0.0258	0.0102	0.0961
	−0.0402	−0.0421	−0.0692	−0.0507	−0.103	−0.0927	−0.0878	−0.0884	−0.096
Constant cut1	0.48	0.0287	1.371**	2.911***	1.605	1.297	1.797	3.653***	4.462***
	−0.488	−0.503	−0.695	−0.688	−1.071	−0.952	−1.158	−1.212	−1.361
Constant cut2	1.663***	1.254**	2.615***	4.019***	2.728**	2.702***	3.189***	4.823***	5.404***
	−0.489	−0.504	−0.702	−0.69	−1.077	−0.967	−1.172	−1.209	−1.353
Constant cut3	2.680***	2.304***	3.650***	4.979***	3.533***	4.020***	4.455***	5.687***	6.139***
	−0.492	−0.506	−0.71	−0.693	−1.084	−0.985	−1.181	−1.213	−1.362
Constant cut4	4.267***	3.931***	5.651***	6.014***	5.523***	6.137***	6.118***	6.491***	6.841***
	−0.496	−0.508	−0.714	−0.704	−1.077	−1.025	−1.226	−1.216	−1.384
Observations	2544	2545	1017	1527	508	509	509	509	509
Pseudo R-squared	0.136	0.153	0.0791	0.111	0.0769	0.095	0.117	0.138	0.145
Log Lik	−3008	−2950	−1424	−1584	−718	−686.6	−609.9	−483	−405
Wald chi2	779.6	893.3	216.1	362.3	108.5	120.1	159	137	124.6
Prob > chiˆ2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table. B5
Robustness tests by using the Jackknife and Bootstrap methods.

Variables	Buyers' purchase frequencies on WeChat			
	Bootstrap sampling		Jackknife sampling	
	1	2	3	4
Buyer's attitude	0.532***	0.543***	0.532***	0.543***
	−0.0531	−0.0538	−0.0518	−0.0537
Strength of social ties	0.393***	0.393***	0.393***	0.393***
	−0.0344	−0.0345	−0.0359	−0.0349
Segments of the price	−0.595***	−0.602***	−0.595***	−0.602***
	−0.0328	−0.0333	−0.0343	−0.0335
Segments of the price × Buyer's attitude		0.0536		0.0536
		−0.0378		−0.0376
Buyers' characteristics				
Gender	0.194*	0.195*	0.194*	0.195*
	−0.103	−0.103	−0.106	−0.102
Age	−0.262***	−0.260***	−0.262***	−0.260***
	−0.0922	−0.0924	−0.0915	−0.0891
Education level	−0.305***	−0.307***	−0.305***	−0.307***
	−0.108	−0.109	−0.116	−0.116
Identity	−0.287	−0.285	−0.287	−0.285
	−0.183	−0.183	−0.178	−0.184
Buyers' past shopping experience	0.129***	0.133***	0.129***	0.133***
	−0.0479	−0.0482	−0.048	−0.0489
Monthly income level	0.148**	0.148**	0.148**	0.148**
	−0.0595	−0.0596	−0.0616	−0.0616
Daily WeChat use frequency	0.127**	0.126**	0.127**	0.126**
	−0.0512	−0.0513	−0.0521	−0.053
Categories of goods				
Foods	0.134	0.137	0.134	0.137
	−0.0891	−0.0893	−0.0851	−0.0844
Clothes	0.122	0.121	0.122	0.121
	−0.0885	−0.0886	−0.0894	−0.0915
Education	−0.176*	−0.177*	−0.176	−0.177*
	−0.102	−0.103	−0.107	−0.105
Consumer Electronics	0.420***	0.420***	0.420***	0.420***
	−0.132	−0.132	−0.132	−0.13
Cosmetics	0.191*	0.196*	0.191*	0.196**
	−0.0998	(0.1000)	−0.105	−0.099
Entertainments	−0.0247	−0.0261	−0.0247	−0.0261
	−0.164	−0.164	−0.171	−0.156
Sellers' type				
Agents	0.0816	0.0813	0.0816	0.0813
	−0.0979	−0.098	−0.0997	−0.0947
Sellers who sold the place characteristic product	0.161*	0.161*	0.161*	0.161*
	−0.0925	−0.0926	−0.0967	−0.0912
Professional buyers who overseas purchased for others	0.126	0.124	0.126	0.124
	−0.098	−0.0981	−0.098	−0.0948
Sources of promotion information	0.127	0.126	0.127	0.126
Real life friends	−0.0954	−0.0957	−0.0967	−0.102
	0.0568	0.0563	0.0568	0.0563
Sellers' promotion	−0.0916	−0.0918	−0.0947	−0.0901
	−0.0102	−0.0129	−0.0102	−0.0129
	−0.0859	−0.086	−0.0843	−0.092
Interaction terms				
Buyers' past shopping experience × Buyer's attitude	−0.115**	−0.121**	−0.115*	−0.121**
	−0.0578	−0.0583	−0.0586	−0.0613
Buyers' past shopping experience × Strength of social ties	0.0497	0.0492	0.0497	0.0492
	−0.0411	−0.0413	−0.0409	−0.0437
Constant Cut1	0.473	0.506	0.473	0.506
	−0.49	−0.489	−0.462	−0.499
Constant Cut2	1.652***	1.686***	1.652***	1.686***
	−0.492	−0.49	−0.462	−0.5
Constant Cut3	2.671***	2.702***	2.671***	2.702***
	−0.495	−0.493	−0.468	−0.506
Constant Cut4	4.261***	4.284***	4.261***	4.284***
	−0.499	−0.498	−0.466	−0.51
Observations	2545	2545	2545	2545
Pseudo R-Squared	0.135	0.135	0.135	0.135
Log Lik	−3013	−3012	−3013	−3012
F	32.19	30.7		
Wald Chi2			740.5	840.5
Prob > Chiˆ2	0.0000	0.0000	0.0000	0.0000

Note: Robust standard errors are in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

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Appendix C. Supplementary data

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