THE RELATIONSHIP BETWEEN INDIVIDUAL CUSTOMER SATISFACTION AND LOYALTY: THE MODERATING ROLE OF FIRM-LEVEL SIGNALS

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ABSTRACT

Although the moderators between customer-level satisfaction and loyalty have been a significant area of study within the field of marketing, scant research examines how firm-level signals may amplify the relationship. This study integrates signaling and social influence theories to gain a better understanding of how firm-level customer satisfaction, WOM intensity, and brand portfolios may serve as signals to affect the relationship between customer-level satisfaction and loyalty. We collected six-year longitudinal data from 125 firms in China and analyzed data using Hierarchical Linear Modeling (HLM) and floodlight moderation analyses. The results reveal that firm-level customer satisfaction magnitude and noise both positively moderate the customer-level satisfaction–loyalty relationship. We also find that negative WOM intensity weakens customer-level satisfaction and loyalty relationship, but only for firms using house-of-brands. These findings establish useful theoretical insights and managerial implications for customer retention.

INTRODUCTION

The customer satisfaction–loyalty relationship has been a prominent research topic in the marketing field (Aksoy et al., 2013; Chandrashekaran et al., 2007; Kamran-Disfani et al., 2017; Schirmer et al., 2018; Srivastava & Rai, 2013; Wangenheim, 2003). The literature finds customer satisfaction plays an important role in increasing customer loyalty (Chen, 2012; Kamran-Disfani et al., 2017; Mittal & Kamakura, 2001; Srivastava & Rai, 2013). A stream of literature focuses on examining moderators between customer satisfaction and loyalty. The moderators often include external factors that firms cannot control such as customer, situational, industry, and marketplace characteristics (e.g., Homburg & Giering, 2001; Schirmer et al., 2018; Seiders et al., 2005; Walsh et al., 2008). The research results offer reactive marketing strategies for firms to respond to customer and market changes. However, little attention has been paid to examining how signals sent out by firms may strengthen the customer satisfaction–loyalty relationship. It is meaningful to bridge the research gap because firms can take the initiative to communicate these signals and form proactive strategies to enhance customer loyalty. Consequently, firms can actively manage customer loyalty instead of passively responding to changes in the customer base or the overall market.

Notably, there is a distinction between customer satisfaction at the customer and firm levels (a single customer vs. multiple customers). At the customer level, customer satisfaction is transaction-specific which provides specific diagnostic information about a particular product or service encounter, and at the firm level, customer satisfaction is the cumulative customer experiences with the products and services over a time period, and it acts as a fundamental indicator of the firm's past, current, and future performance (Anderson et al., 1994). Firms can collect individual customer satisfaction data, and aggregate them into firm-level customer

satisfaction data. Firms can then use aggregate customer satisfaction to understand their customers. Furthermore, firms can use aggregate customer satisfaction information to signal vital information about the firm (Connelly et al., 2011; Spence, 2002) to reduce customer uncertainty and enhance customer loyalty. In this study, we aim to examine the impact of firm-level customer satisfaction signals on the customer satisfaction–loyalty relationship at the customer level. Therefore, we propose the first research question: *How does aggregate customer satisfaction at the firm level influence the relationship between customer satisfaction and loyalty at the customer level?*

Firms may incentivize satisfied customers to spread positive word-of-mouth (WOM) (Garnefeld et al., 2013), for example, by leaving positive product reviews (Naylor & Kleiser, 2000). Satisfied (dissatisfied) customers may also voluntarily spread positive (negative) WOM to their peers (Davidow, 2003). Similar to customer satisfaction, firms may aggregate individual transaction-specific WOM across multiple customers and products. Further, firms could send the aggregate WOM information to individual customers to actively manage customer loyalty. Consistent with customer level WOM literature (Davidow, 2003; Hennig-Thurau et al., 2015; Mudambi & Schuff, 2010; Wu, 2017), firm-level positive (negative) WOM may also strengthen (weaken) the customer satisfaction–loyalty relationship. In this study, we aim to identify the boundary condition in which firms' clear signals (either positive or negative WOM) become more or less effective to customers.

In particular, we draw from social influence theory and consider the potential signaling role of firms' brand portfolios. Social influence theory posits that perceived similarity between the influencer and the influenced party could affect the persuasiveness of an opinion (Cialdini & Goldstein, 2004; Kelman, 1958). In the context of this research, we posit that brand portfolios serve as a signal of the similarity among the customers. Unlike customer WOM, which is user generated content, brand portfolios are completely decided and managed by firms. We distinguish firms' brand portfolios based on whether firms use single brand names (e.g., LG) to endorse all products and reach all target customers, or they use a variety of brand names (e.g., Proctor & Gamble) to market products to targeted segments (Kotler & Keller, 2016). Thus, we propose the second research question: *How does the interplay between firm-level customer WOM and brand portfolios influence the relationship between customer satisfaction and loyalty at the customer level?*

By examining firm-level signals that may moderate the relationship between customer satisfaction and loyalty at the customer level, the study makes three important contributions to the extant literature. First, our study integrates signaling and social influence theories to explain how firm-initiated signals may influence individual customer loyalty. Signaling theory describes signals with consistent cues as "clear" and signals with inconsistent cues as "mixed" (Connelly et al., 2011). Overall, we find that clear, positive signals enhance the relationship between customer satisfaction and loyalty at the customer level. Further, when customers face mixed signals (e.g., a big variation of opinions in customer satisfaction among other customers), they may interpret the signals differently. We find a boundary condition for the effect of clear signals. When facing clear signals, according to social influence theory, customers likely perceive the signals as stronger if signals are sent from those who are similar to them.

Second, we reveal how firms should communicate aggregate customer satisfaction to individual customers to amplify customer loyalty. It is important to communicate firms' achievement in customer satisfaction. A high level of customer satisfaction (e.g., a high aggregate customer satisfaction score) among existing customers across multiple products serves as a clear and positive signal, which in turn strengthens the relationship between individual customer

satisfaction and loyalty. Further, firms should be aware of variations in customer satisfaction among customers because customers may perceive the variation as mixed signals. In the end, higher variation in customer satisfaction tends to shift the individual customer satisfaction-loyalty relationship in such a way that dissatisfied customers may exhibit an even lower customer loyalty whereas more satisfied customers remain loyal. This shift represents a significant increase in the marginal effect of customer satisfaction and offers the opportunity to improve customer retention for firms with high variations in customer satisfaction.

Third, firms should be cautious when communicating aggregate customer WOM information, and signals are subject to the firms' brand portfolios. Our results delineate the differential influence of customer WOM on individual customer loyalty behaviors for firms with different brand portfolios. Our findings suggest that when a significant number of negative WOM occur, it acts as a deterrent to customer loyalty. Firms that possess multiple brands are particularly susceptible to experiencing an influx of negative customer WOM. Interestingly, firms with single brands are less likely to be impacted by negative customer WOM.

The remainder of this article proceeds as follows: First, we conduct a literature review of the moderators between customer satisfaction and loyalty, signaling theory, and social influence theory. Second, we provide our conceptual model and propose our hypotheses. Third, we use six-year longitudinal data collected from 74,470 customers of 125 firms in China to test our hypotheses using hierarchical linear modeling (HLM) and floodlight moderation analyses (Spiller et al., 2013). Fourth, we describe our results. Last, we discuss the theoretical and managerial implications of our findings.

LITERATURE REVIEW AND THEORETICAL BACKGROUND

Moderators between Customer Satisfaction and Customer Loyalty

At the customer level, customer satisfaction is transaction-specific (Anderson et al., 1994). Therefore, we define *customer satisfaction* as consumers' transaction-specific evaluation of whether the products/services have met customers' needs and expectations (Srivastava & Rai, 2013). Customer loyalty is a multidimensional construct that includes three distinct dimensions: behavioral, attitudinal, and composite loyalty (Taylor, 2012). For this study, we focus on the attitudinal perspective of repurchase intent and define *customer loyalty* as customers' intent to engage in repurchasing and recommendation of products/services in the future (Curtis et al., 2011). The literature consistently demonstrates a positive relationship between customer satisfaction and loyalty at the customer level: Customers who are comparatively more satisfied are less likely to defect or switch, and satisfied customers are more likely to exhibit loyalty by repurchasing and recommending the product to others (Chen, 2012; Kamran-Disfani et al., 2017; Mittal & Kamakura, 2001; Srivastava & Rai, 2013; Wangenheim 2003).

The literature identifies customer, situational, industry, and/or marketplace characteristics as moderators of the relationship between customer satisfaction and loyalty. For example, the positive relationship between customer satisfaction and loyalty is stronger for male, old, low-income, less involved, and less variety-seeking customers (Homburg & Giering, 2001). Walsh et al., (2008) find a consistent moderation effect of income. They also find that customers with less expertise or who experienced a successful service recovery enhance the positive relationship between customer satisfaction and loyalty. Further, education is the most effective factor to segment customers among customer (gender, age, income, education, family, size, and marital

status) and situational (purchase frequency, branded vs. no-frills) characteristics (Schirmer et al., 2018). High perceived importance, high purchase uncertainty, low switching cost, and long customer relationship are likely to strengthen the relationship between customer satisfaction and loyalty (Wangenheim, 2003). Seiders et al., (2005) find that relationship age, relationship program participation, and convenience enhances the relationship between customer satisfaction and loyalty, but competitive intensity weakens the link.

As mentioned, past studies focus on external factors that firms have no control over. However, little attention has been paid to how firm-initiated signals may moderate the relationship between customer satisfaction and loyalty. We argue firms can use aggregate customer satisfaction to signal product quality, value, and services (Day & Crask, 2000). These signals may moderate the relationship between customer satisfaction and loyalty.

Signaling Theory

Signaling theory focuses on how one party (i.e. the sender) provides information to another (i.e. the receiver) in an attempt to reduce information asymmetry (Connelly et al., 2011; Spence, 2002). Marketing relationships between firms and their customers are characterized by information asymmetry because firms possess more information about their products or services than their customers (Mishra et al., 1998). To reduce uncertainty, customers may rely on the signals that firms send out regarding their products and services to engage in repurchase (Del Río et al., 2001). For example, the use of premium packaging and pricing signals the product quality (Mishra et al., 1998), and the online product display also signals the product quality (Sun et al., 2022). Positive customer WOM signals the firms' trustworthiness (Hayes, 2022).

Therefore, it is important for firms to send out signals to enhance the relationship between customer satisfaction and loyalty. The salience of a signal (Lampel & Shamsie, 2000; Ramaswami et al., 2010) that a firm sends out is likely to influence the relationship between customer satisfaction and loyalty. When there is a single cue, customers tend to perceive the signal as clear. When there are multiple cues, customers tend to perceive consistent signals as clear and inconsistent signals as mixed (Connelly et al., 2011). When the signal is clear, customer loyalty is more likely to be enhanced by positive signals rather than negative signals. For example, customers may perceive an accumulated customer satisfaction score (4.80 out of 5.00) towards the firm across multiple customers and products as a clear positive signal, which may further increase customer loyalty. However, when the signals are mixed, customers may rely on additional cues to engage in repurchases.

Social Influence Theory

Social influence theory explains how individuals are influenced by people around them and the ways people adjust their behaviors to meet the demands of a social environment (Kelman, 1958). The social influence theory proposes a useful framework to explain why and how individuals are influenced by external influences in their decision-making and behaviors. Two relevant tenets of social influence theory are that individuals are motivated to comply or conform to others to maintain: (1) their self-esteem and (2) their sense of belonging (Cialdini & Goldstein, 2004).

In the context of WOM marketing, driven by the need to maintain self-esteem, customers are more likely to accept opinions, values, and norms that are consistent with their own beliefs (Cialdini & Goldstein, 2004; Nickerson, 1998). Driven by the need to gain social approval, customers are more likely to be influenced by those who are similar to them. Because people tend

to identify or affiliate themselves with others who share similar beliefs, if the customers identify themselves as members of a social group, their opinions and values are more likely to be influenced by members of the same social group (Sridhar & Srinivasan, 2012).

Conceptual Framework and Hypotheses Development

We integrate signaling and social influence theories to explain how firms' signals of customer satisfaction may moderate the relationship between customer satisfaction and loyalty at the customer level, and how firms' signals of aggregate customer WOM may interact with brand portfolios. Figure 1 displays the conceptual model, where we denote customer-level constructs in white boxes and firm-level constructs in grey boxes. Customer-level core constructs (i.e., customer satisfaction and loyalty) are formed from the transaction-specific perspective and firm-level signals (i.e., aggregate customer satisfaction and WOM) are from a cumulative perspective.

Figure 1. Conceptual Model
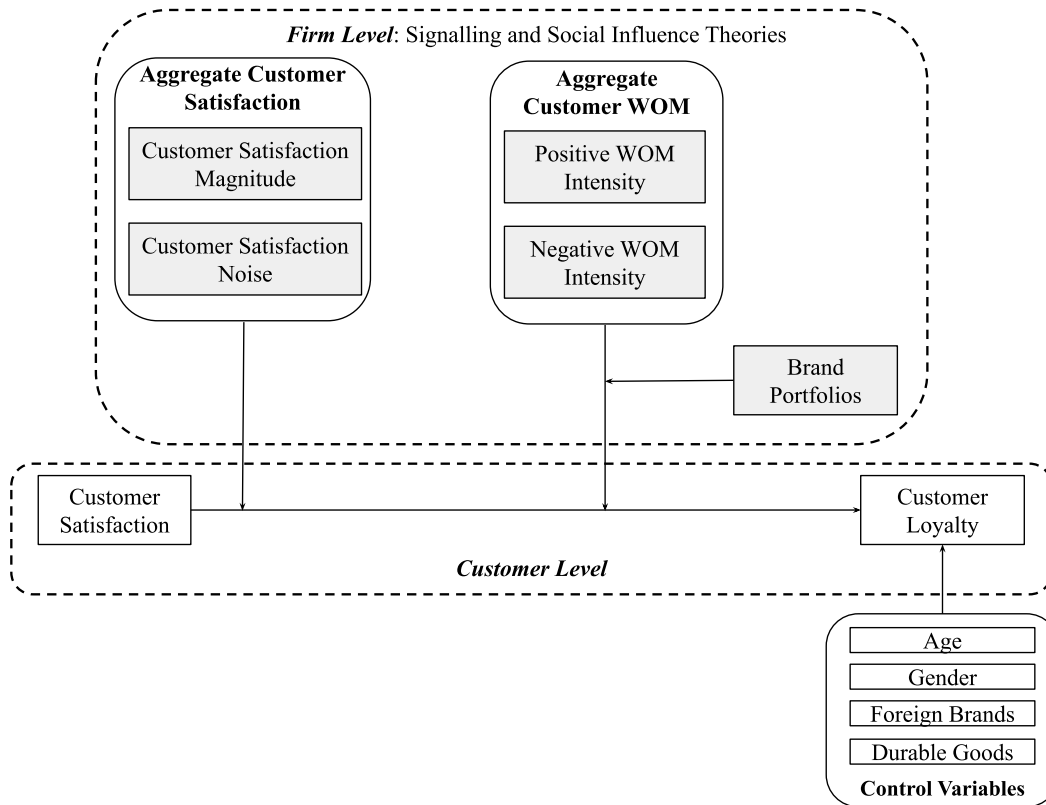
We propose that customers are more likely to rely on clear signals than mixed signals. A clear, positive (negative) signal may enhance (weaken) the relationship between customer satisfaction and loyalty. Further, the salience of the signal is likely to be moderated by social influence factors. When facing mixed signals, customers are more likely to interpret signals that are consistent with their beliefs. When facing clear signals, customers also are likely to perceive the signals as stronger if the senders are similar to them. We explain each hypothesis in detail in the following section.

Firms can disclose two types of aggregate customer satisfaction information: customer satisfaction magnitude and customer satisfaction noise. Previous marketing literature used the mean-variance model to examine the relationship between customer satisfaction and loyalty at both the customer (e.g., Chandrashekaran et al., 2007) and firm (e.g., Grewal et al., 2010) levels.

The Moderating Effect of Customer Satisfaction Magnitude

We define *customer satisfaction magnitude* as the aggregate customer satisfaction achieved across all customer segments and products owned by a firm (Grewal et al., 2010). For example, according to a survey, Chewy's customer satisfaction magnitude is 85 in 2023, ranked as the highest among online retailers (The American Customer Satisfaction Index, 2023). The score signals Chewy's strong ability to satisfy customers across different products/services and channels, which may positively affect customer loyalty.

Since customer satisfaction magnitude is a point assessment, which is a single cue, it sends a clear signal to customers about the products and services owned by a firm from multiple markets. We reason that high customer satisfaction magnitude sends out a clear and positive signal to customers that firms' products/services meet or exceed most customers' expectations. This signal reduces uncertainty in product quality, value, and services (Day & Crask, 2000), and thus strengthens the relationship between customer satisfaction and loyalty. Thus, we hypothesize:

H1: *Customer satisfaction magnitude enhances the positive relationship between consumer satisfaction and loyalty.*

HYPOTHESES

The Moderating Effect of Customer Satisfaction Noise

We define *customer satisfaction noise* as the dispersion among customer segments who evaluate firms' products and services (Chandrashekaran et al., 2007; Grewal et al., 2010). When such noise is small, customers are unlikely to notice because it indicates consistency in customer satisfaction of the firm. Large customer satisfaction noises, however, indicate a greater variation in opinions among customers regarding the firms' products and services. Grewal et al. (2010) conjectured the dual role of the variation of customer satisfaction in the context of the stock market. In this study, we draw a parallel in conceptualizing customer satisfaction noise as mixed signals subject to different interpretations by customers. This variation in customer satisfaction could signal either inconsistent product quality or diverse customer preferences (He & Bond, 2015). As customer satisfaction noise encompasses a range of assessments from different customers across various products and services, it becomes mixed signals. Consequently, customers may seek additional cues to make repurchase decisions.

According to social influence theory, we posit that customers are likely to accept the values and opinions of other customers that are consistent with their own beliefs and thereby maintain a positive self-assessment (Cialdini & Goldstein, 2004; Sridhar & Srinivasan, 2012). As such, less satisfied customers who hold negative evaluations about products and services are more inclined to interpret large customer satisfaction noise as a negative signal (i.e., inconsistent product quality). This interpretation prompts negative evaluations and attitudes toward firms' products/services, resulting in diminished customer loyalty. By contrast, highly satisfied customers, who have positive evaluations of the products and services, may perceive large customer satisfaction noise

as a neutral signal (i.e., diverse customer preferences). They may protect their self-esteem about the assessment of the product quality by interpreting the customer satisfaction noise as firms targeting a broad customer base with diverse preferences. Consequently, their loyalty remains intact. When facing substantial customer satisfaction noise, highly satisfied customers are less likely to be influenced, leading to a lower likelihood of decreasing customer loyalty.

For example, if the average difference in customer loyalty between dissatisfied and satisfied customers at the customer level is three. The difference might become five due to high customer satisfaction noise causing dissatisfied customers' loyalty to further dip down two points while satisfied customers' loyalty remains the same, resulting in a higher marginal effect for customer satisfaction on customer loyalty. Thus, we propose that the difference between customer loyalty of low vs high customer satisfaction is more substantial when customer satisfaction noise is high:

> **H2:** *Customer satisfaction noise enhances the positive relationship between satisfaction and loyalty.*

The Interplay of Aggregate Customer WOM and Brand Portfolios

Aggregate Customer WOM. Firms can also collect customer transaction-specific WOM because WOM serves as a signal of product popularity (Wu, 2017). Furthermore, firms can send the signals of the aggregate customer WOM information to manage the relationship between customer satisfaction and loyalty at the customer level. We examine the two most common aggregate customer WOM, positive and negative WOMs. We define *positive WOM intensity* as the extent to which a firm's products and brands have been positively promoted by its customers to other customers (Naylor and Kleiser 2000). In contrast, *negative WOM intensity* is defined as the extent to which a firm's products and brands have been criticized by its customers to their peers (Khare et al., 2011). Therefore, similar to customer satisfaction magnitude and noise, WOM intensity represents the customer evaluations of products/services owned by a firm.

Brand Portfolios. We propose that brand portfolios, specifically *umbrella brands* vs. *house-of-brands*, can potentially serve as a signal of customer similarity. An umbrella brand strategy uses a single brand name (e.g., LG) to endorse products and services; in contrast, a house-of-brands strategy separates the corporate name (e.g., Proctor & Gamble) from the products and services by employing multiple brand names (e.g., Pampers, Tide, Crest) to market to specific segments (Kotler & Keller, 2016). Firms with umbrella brands are more likely to reach heterogeneous customer groups because their single brands mass-target all potential customers encompassing a wide range of needs and preferences, while firms adopting house-of-brands strategies to ensure customers are more likely to be homogenous within each sub-brand (Aaker & Joachimsthaler, 2000; Dacin et al., 2002). Therefore, we propose that an umbrella brand signals dissimilar customers within the universal brand, while a house-of-brands signals similar customers within each sub-brand.

High positive WOM intensity sends clear and positive signals to customers. It increases customer loyalty and repurchases (Lang & Hyde, 2013). High negative WOM intensity also sends clear and negative signals to customers. It can harm a brand's overall reputation and image, and damage the brand's perceived value, leading to decreased loyalty (Davidow, 2003; Taylor et al., 2006). According to social influence theory, we posit that customers are more likely to be influenced by clear signals sent from those who are similar to them because customers tend to conform to the opinions and behaviors of those who are similar to them (Cialdini & Goldstein,

2004; Sridhar & Srinivasan, 2012). The perceived similarity between the signal sender and the receiver plays a significant role in the influence of customer WOM (Guo & Zhou, 2017; Sridhar & Srinivasan, 2012; Taylor et al., 2006). Firms with umbrella brands signal dissimilar customers, and firms with house-of-brands signal relatively similar customers within each sub-brand. Therefore, we expect firms with house-of-brands to signal a higher perceived similarity than firms with umbrella brands. We predict both positive and negative WOM intensity to have a greater influence on customers when firms utilize house-of-brands rather than umbrella brands. Therefore:

> **H3** *Positive WOM intensity reinforces the positive relationship between customer satisfaction and loyalty, and this reinforcing effect is stronger for firms with house-of-brands.*

> **H4:** *Negative WOM intensity attenuates the positive relationship between customer satisfaction and loyalty, and this attenuation effect is stronger for firms with house-of-brands.*

METHODOLOGY AND RESULTS

Data

We obtained a comprehensive data set from the sponsors of the Chinese Customer Satisfaction Index (CCSI). The CCSI is an ongoing project managed by the China National Institute of Standardization and Tsinghua University (CNISTU). We obtained a six-year longitudinal dataset from 2010 to 2015. There is a lag in data collection because the CNISTU collected the data and further spent three years documenting the data. For example, the data collected in 2015 will be documented and available in 2019. The respondents were randomly selected nationwide from 50 major metropolitan areas in China via a computer-aided telephone interview (CATI) system. CNISTU randomly selected 200 to 300 respondents from each metropolitan area. To qualify for inclusion, respondents must be an adult (age 18+) who had recently purchased and/or used at least one focal product. The CNISTU additionally collected data about each respondent's purchase and user experience and demographic information such as gender and age.

The dataset includes 10 product categories and 125 firms resulting in 74,470 observations over six years. Eight products (AC, camera, cellphone, desktop, laptop, refrigerator, TV, and washer) are durable goods, and two (shampoo and toothpaste) are non-durable goods. Our data exhibit a hierarchical structure because an individual respondent (i.e., a customer) is nested within a firm, and a firm is nested within a year, resulting in three levels: customer, firm, and year.

Measures

Dependent Variable. The dependent variable *customer loyalty* (Chandrashekaran et al., 2007; Khan et al., 2012) was measured with a two-item 10-point Likert scale (Cronbach's alpha =.71) anchored from "not likely at all" to "very likely" ("If you were to buy another [name of product], how likely are you to buy the current brand?", and "How likely are you to recommend [name of product and brand] to others?"). We averaged the two items to create the customer loyalty score for each customer.

Independent Variables. First, *customer satisfaction* (Fornell et al., 1996) was measured with a four-item 10-point Likert scale (Cronbach's alpha =.91) anchored from "not satisfied at all"

to "very satisfied" ("Overall (e.g., taking the product, service, price, etc. into account), to what extent are you satisfied with [name of product and brand]?"; "Relative to what you expected to get, to what extent are you satisfied with [name of product and brand]?"; "Of [name of product] brands that you know of, relative to other product brands, how would you rate [name of product and brand]?"; and "Imagine what the ideal [name of product] you'd like to own would look like. If your rating for your ideal [name of product] is 10, then what would be your rating for [name of product and brand]"). We averaged the four items to create the customer satisfaction score for each customer.

Second, *customer satisfaction magnitude* was measured by computing the aggregate mean of customer satisfaction accumulated from products and brands a firm owned in a given year. *Customer satisfaction noise* was measured by the standard deviation of customer satisfaction accumulated from products and brands a firm owned in a given year. For each firm, we first derive customer satisfaction scores for each customer using the items described above. We then calculate the customer satisfaction magnitude and noise at the firm level. For example, Firm A owns two products under one brand. 567 customers have purchased from firm A and responded to the satisfaction survey in 2011. Customer satisfaction magnitude for firm A was computed as the average customer satisfaction across the 567 customer ratings. Similarly, customer satisfaction noise for firm A is the calculated standard deviation of the 567 customer ratings.

Third, *positive (negative) WOM intensity* was measured as the number of respondents who recommended (complained) the products and brands of a given firm to others in a given year.

Fourth, for *brand portfolios*, we coded firms using umbrella brands as 0, and those using house-of-brands as 1.

Last, we controlled for several variables that were likely to affect customer loyalty or the customer satisfaction–loyalty relationship. Specifically, we controlled for customer characteristics such as gender and age (Schirmer et al., 2018; Seiders et al., 2005), whether a firm was headquartered outside of China (i.e. foreign brand) (Godey et al., 2012), and whether the product was a durable good. Table 1 described the measures of all variables and denoted whether the measure was at the customer or firm level.

Sample Profile

Table 2 described the individual customer characteristics. Overall, 57.53% of the respondents were women, and 81.94% were younger than 45 years of age. Of the 125 firms in our sample, 62 used house-of-brands; 49 firms were headquartered outside China, and 88 sold durable goods.

Table 3 showed the descriptive statistics and correlations of the variables: most of the correlation values were less than 0.40, indicating little multicollinearity concerns (Leeflang & Wittink, 2000). We group mean-centered customer satisfaction at the customer level by subtracting customer satisfaction magnitude for the hypotheses tests. The group mean-center technique not only controlled for the multilinearly between the customer and firm levels of customer satisfaction related constructs, but also improved the interpretation of the results. The coefficients of customer satisfaction captured the within-firm effects, while the coefficients of aggregate customer satisfaction captured the cross-firm effects (Wooldridge, 2010)

Model Specification

Our data exhibited a hierarchical structure because an individual respondent (i.e., a customer) was nested within a firm, and a firm was nested within a year, resulting in three levels:

customer, firm, and year. In multiple linear regression, all cases are assumed to be independent of each other. In our study, HLM is more suitable than multiple linear regression because it can accommodate the nested data structure; and it can also handle longitudinal data from 2010 to 2015 (Wooldridge, 2010).

Table 1 Construct Measures

Construct	Measures	Measurement Level
Customer Loyalty (Chandrashekaran et al., 2007; Khan et al., 2012)	Two-item 10-point Likert scale anchored from "not likely at all" to "very likely": 1. If you were to buy another [name of product], how likely are you to buy the current brand? 2. How likely are you to recommend [name of product and brand] to others?	Customer
Customer Satisfaction (Fornell et al., 1996)	Four-item 10-point Likert scale (Cronbach's alpha =.91) anchored from "not satisfied at all" to "very satisfied" 1. Overall (e.g., taking the product, service, price, etc. into account), to what extent are you satisfied with [name of product and brand]? 2. Relative to what you expected to get, to what extent are you satisfied with [name of product and brand]? 3. Of [name of product] brands that you know of, relative to other product brands, how would you rate [name of product and brand]? 4. Imagine what the ideal [name of product] you'd like to own would look like. If your rating for your ideal [name of product] is 10, then what would be your rating for [name of product and brand].	Customer
Customer Satisfaction Magnitude	Aggregate mean of customer satisfaction of a firm for a given year	Firm
Customer Satisfaction Noise	Standard deviation of aggregate customer satisfaction of a firm for a given year	Firm
Positive WOM Intensity	The volume of recommendations received by a firm in a given year.	Firm
Negative WOM Intensity	The volume of negative word of mouth received by a firm in a given year.	Firm
Brand Portfolios	Umbrella brands: 1, a house-of-brands: 0	Firm
Foreign Brands	Foreign brands: 1, non-foreign brands: 0	Firm
Durable Goods	Durable goods: 1, non-durable goods: 0	Firm
Gender	Female: 1, male: 0	Customer

| Age | 10 categories:18~24; 25~29; 30~34; 35~39; 40~45; 45~49; 50~54; 55~59; 60~64; $>=65$ | Customer |

Table 2 Distribution of Customer Gender and Age

Variable	Code	Frequency	Percent (%)
Gender	Male	41,119	42.47
	Female	30,351	57.53
Age	18~24	15,352	21.48
	25~29	15,475	21.65
	30~34	12,863	18
	35~39	7,970	11.15
	40~44	6,903	9.66
	45~49	4,719	6.6
	50~54	3,416	4.78
	55~59	2,256	3.16
	60~64	1,492	2.09
	$>=65$	1,024	1.43

As shown in Table 4, Model 1 tested the effect of customer satisfaction on customer loyalty at the customer level by accounting for the control variables. Model 2 incrementally examined the moderating effects of customer satisfaction magnitude and noise on the relationship between customer satisfaction and loyalty. Therefore, Model 2 tested H1 and H2. Model 3 additionally examined how the interplay between WOM intensity and brand portfolios influences the relationship between customer satisfaction and loyalty. The full model tested H1–H4 simultaneously. We ran all models using the R ImerTest package.

Model Fit and Results

We compared model fit using alternative approaches such as Akaike information criterion (AIC), log-likelihood ratio tests, and chi-squared tests. Since the three models are nested, the decreasing AIC values, and increasing negative log-likelihood values indicate better model fit. The significant Chi-Square tests confirm a better model fit (Wooldridge, 2016). These tests consistently showed that Model 3 achieved the best fit, so we adopted it as our final model.

As Table 4 Model 3 showed, consistent with the previous literature, customer satisfaction (B=0.49, SE=0.13, $p < 0.001$) had a positive effect on customer loyalty. Further, customer satisfaction magnitude (B =0.06, SE=0.01, $p < 0.001$) and customer satisfaction noise (B =0.10, SE=0.03, $p < 0.001$) both had positive interactions with customer satisfaction to influence customer loyalty, providing preliminary support for both H1 and H2. To further interpret the results, we adopted the R interactions package to conduct floodlight analyses and create the Johnson-Neyman plots (Spiller et al., 2013).

Table 3 Descriptive Statistics and Correlation Matrix

	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
1	Customer Loyalty	6.69	2.31	1										
2	Customer Satisfaction	7.70	1.50	0.72	1									
3	Customer Satisfaction Magnitude	7.70	0.35	0.18	0.23	1								
4	Customer Satisfaction Noise	1.49	0.16	-0.11	-0.12	-0.51	1							
5	Positive WOM Intensity	0.46	0.97	0.01	0.03	0.15	-0.24	1						
6	Negative WOM Intensity	1.04	0.79	0.00	0.00	0.02	0.09	-0.30	1					
7	Brand Portfolios	n/a	n/a	-0.06	-0.03	-0.13	0.14	-0.04	0.07	1				
8	Gender	n/a	n/a	0.01	0.01	0.03	-0.03	0.01	-0.01	-0.01	1			
9	Age	n/a	n/a	0.08	0.11	0.11	-0.03	0.03	-0.01	-0.01	-0.06	1		
10	Foreign Brand	n/a	n/a	-0.03	-0.05	-0.22	-0.10	-0.04	0.05	-0.07	0.04	-0.09	1	
11	Durable Good	n/a	n/a	0.03	0.09	0.39	-0.04	0.24	-0.04	0.13	-0.02	-0.02	-0.24	1

Notes: M: mean, SD: standard deviation, n/a: it is a categorical variable, so the mean and SD are not applicable.

Table 4 Hypotheses Testing Results

	Variable	Model 1 Estimate		SE	Model 2 Estimate		SE	Model 3 Estimate		SE
	Intercept	6.31	***	0.10	-3.03	**	0.50	-3.06	***	0.50
	Customer Satisfaction	1.08	***	0.00	0.49	**	0.13	0.49	***	0.13
	Customer Satisfaction Magnitude				1.26	**	0.06	1.26	***	0.06
	Customer Satisfaction Noise				0.01		0.09	0.01		0.09
	Positive WOM Intensity							-0.03		0.03
	Negative WOM Intensity							-0.02		0.02
	Brand Portfolios (A House-of-Brands =1)							-0.07		0.05
H1	Customer Satisfaction × Customer Satisfaction Magnitude				0.06	**	0.01	0.06	***	0.01
H2	Customer Satisfaction × Customer Satisfaction Noise				0.10	**	0.03	0.10	***	0.03
	Customer Satisfaction × Positive WOM Intensity							-0.02		0.01
	Customer Satisfaction × Negative WOM Intensity							0.00	***	0.01
	Customer Satisfaction × Brand Portfolios							0.02		0.02
	Positive WOM Intensity × Brand Portfolios							-0.00		0.04
	Negative WOM Intensity × Brand Portfolios							0.02		0.03
H3	Customer Satisfaction × Positive WOM Intensity× Brand Portfolios							0.03	***	0.01
H4	Customer Satisfaction × Negative WOM Intensity × Brand Portfolios							-0.03	**	0.01
	Control Variables									
	Foreign Brand (=1)	0.11	*	0.07	0.04		0.04	0.04		0.04
	Durable Goods (=1)	0.17	***	0.07	-0.13	***	0.05	-0.11	**	0.05

	Estimate	Sig	SE	Estimate	Sig	SE	Estimate	Sig	SE
Gender (Female =1)	0.04		0.01	0.04	***	0.01	0.04	***	0.01
Age (25~29)	-0.01		0.02	-0.02		0.02	-0.02		0.02
Age (30~34)	0.02	***	0.02	0.02		0.02	0.02		0.02
Age (35~39)	0.10		0.02	0.10	***	0.02	0.10	***	0.02
Age (40~44)	0.04	***	0.02	0.03		0.02	0.04		0.02
Age (45~49)	0.08	**	0.03	0.08	***	0.03	0.08	***	0.03
Age (50~54)	0.07		0.03	0.06	**	0.03	0.07	**	0.03
Age (55~59)	0.00		0.04	0.00		0.04	0.00		0.04
Age (60~64)	-0.02		0.04	-0.04		0.04	-0.04		0.04
Age (> = 65)	-0.08		0.05	-0.10		0.05	-0.10		0.05

Model Fit

AIC	268,640			268,201			268,173		
Log-likelihood	134,303			-134,079			-134,056		
Chi-square statistic				447***			48***		

Notes: SE = standard error; AIC: Akaike information criterion, N = 71,740.
***Significant at <0.001, **Significant at < 0.01; *Significant at < 0

Figure 2 illustrates the interaction effect of customer satisfaction magnitude and customer satisfaction on customer loyalty. The horizontal axis showed that the observed value of customer satisfaction magnitude ranged from 3.62 to 9.88. The vertical axis was the effect size of customer satisfaction on customer loyalty, contingent on customer satisfaction magnitude. The blue (red) highlighted area showed the significant (insignificant) marginal effect of customer satisfaction on customer loyalty. Figure 2 showed when customer satisfaction magnitude increased, the effect size of customer satisfaction on customer loyalty increased from 0.83 to 1.20 ($z = 6.35$, $p < 0.05$). On average, the positive impact of customer satisfaction on customer loyalty increased by 5.75% with a one-standard-deviation increase in customer satisfaction magnitude. Therefore, H1 was supported.

Figure 2. The Moderating Role of Customer Satisfaction Magnitude on Customer-level Satisfaction-Loyalty Relationship
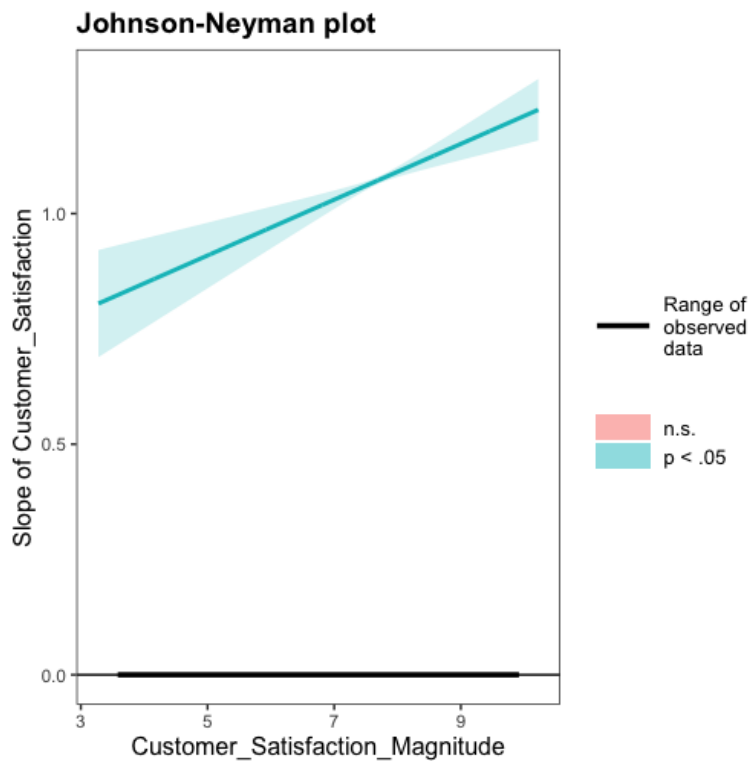
Note: The observed range of customer satisfaction magnitude is 3.62 to 9.88.

Figure 3 illustrated the effect size of customer satisfaction on customer loyalty, contingent on customer satisfaction noise. The observed value of customer satisfaction noise ranged from 0 to 3.64. When customer satisfaction noise increased, the effect size of customer satisfaction on customer loyalty increased from 0.92 to 1.29 ($z = 5.13$ $p < 0.05$). The positive impact of customer satisfaction on customer loyalty increased by 9.46% with a one-standard-deviation increase in customer satisfaction noise. Thus, H2 was supported.

Figure 3. The Moderating Role of Customer Satisfaction Noise on Customer-level Satisfaction-Loyalty Relationship
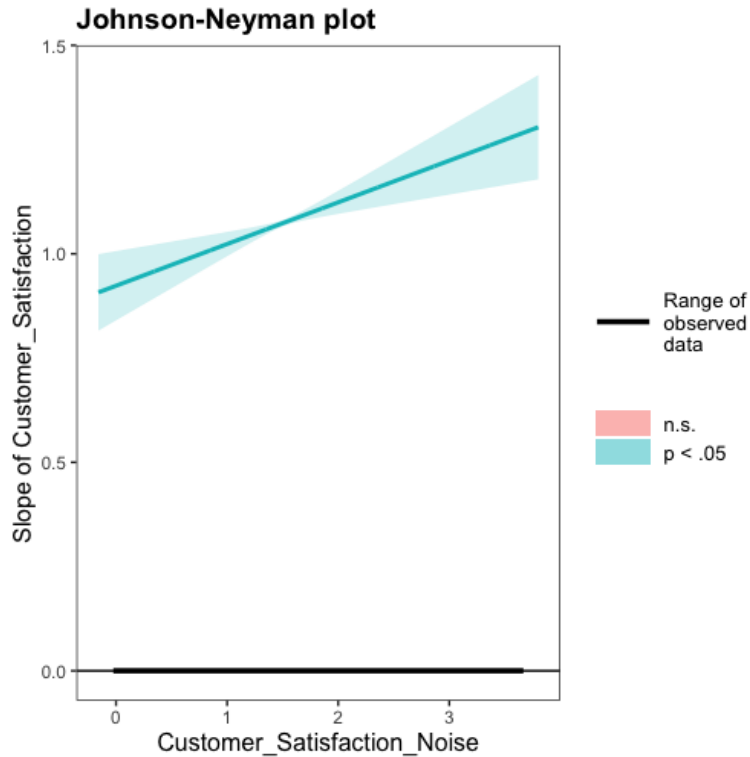

Note: The observed value of dispersion in customer satisfaction is from 0 to 3.64.

Model 3 in Table 4 showed that both positive WOM intensity (B =0.03, SE=0.01 $p < .001$) and negative WOM intensity (B =-0.03, SE=0.01 $p < .001$) significantly moderate the customer satisfaction–loyalty relationship, depending on brand portfolios, which provided preliminary support for H3 and H4. Figures 4 and 5 illustrated the three-way interactions between positive/negative WOM intensity, brand portfolio, and customer satisfaction.

In detail, as Figure 4 showed, for firms that used house-of-brands, the effect size of customer satisfaction on customer loyalty decreased from 1.07 to 1.06, but the decreasing effect was not significant ($z = .45$, n.s.) when positive WOM intensity increased. Therefore, positive WOM intensity did not moderate the relationship between customer satisfaction and loyalty firms using house-of-brands. For firms that used umbrella brands, the effect size of customer satisfaction on customer loyalty decreased from 1.10 to 1.00 ($z = -3.16$, $p < .05$) with increases in positive WOM intensity. Therefore, positive WOM intensity attenuated the relationship for the firms that used umbrella brands. This result was contrary to our prediction in H3.

Figure 4: The Moderating Roles of Positive WOM Intensity and Brand Portfolios on Customer-level Satisfaction-Loyalty Relationship
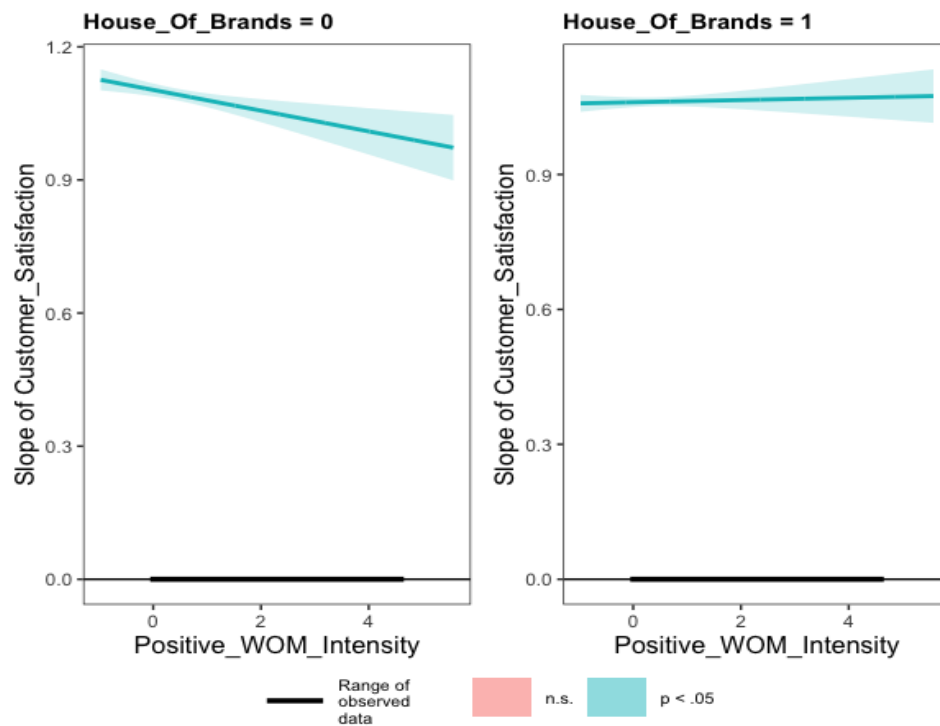
Notes: The observed range of positive WOM intensity is 0 to 4.60. The left side is for firms using umbrella brands and the right side is for firms using house-of-brands.

As Figure 5 showed, for firms using house-of-brands, the effect size of customer satisfaction on customer loyalty decreased from 1.09 to 0.42 (z = -3.19, *p* < .05) when negative WOM intensity increased from 0 to 28.60. This effect became insignificant after negative WOM intensity reached 28.60. The positive effect of customer satisfaction on customer loyalty also decreased by 2.53% with a one-standard-deviation increase in negative WOM intensity. In contrast, for firms using umbrella brands, although the effect size of customer satisfaction decreased from 1.16 to 1.09, the decreasing effect was not significant (z = .30, n.s.), regardless of increases in negative WOM intensity. Therefore, for umbrella brands, negative WOM intensity did not significantly influence the relationship between customer satisfaction and loyalty. Taken together, these results supported H4.

DISCUSSION

Conclusion

The association between customer satisfaction and loyalty has garnered significant attention in the field of marketing. Although research has explored various moderators of this relationship, many of these moderators focus on external factors beyond firms' control, such as customer, situational, and industry characteristics (e.g., Homburg & Giering, 2001; Schirmer et al., 2018; Seiders et al., 2005; Walsh et al., 2008). This study addresses this research gap by examining firms' customer satisfaction, WOM intensity, and brand portfolios through the lens of

signaling theory and social influence theory. The goal is to gain a deeper understanding of how these firms controlled and initiated signals collectively impact the relationship between customer-level satisfaction and loyalty.

Figure 5: The Moderating Roles of Positive WOM Intensity and Brand Portfolios on Customer-level Satisfaction-Loyalty Relationship
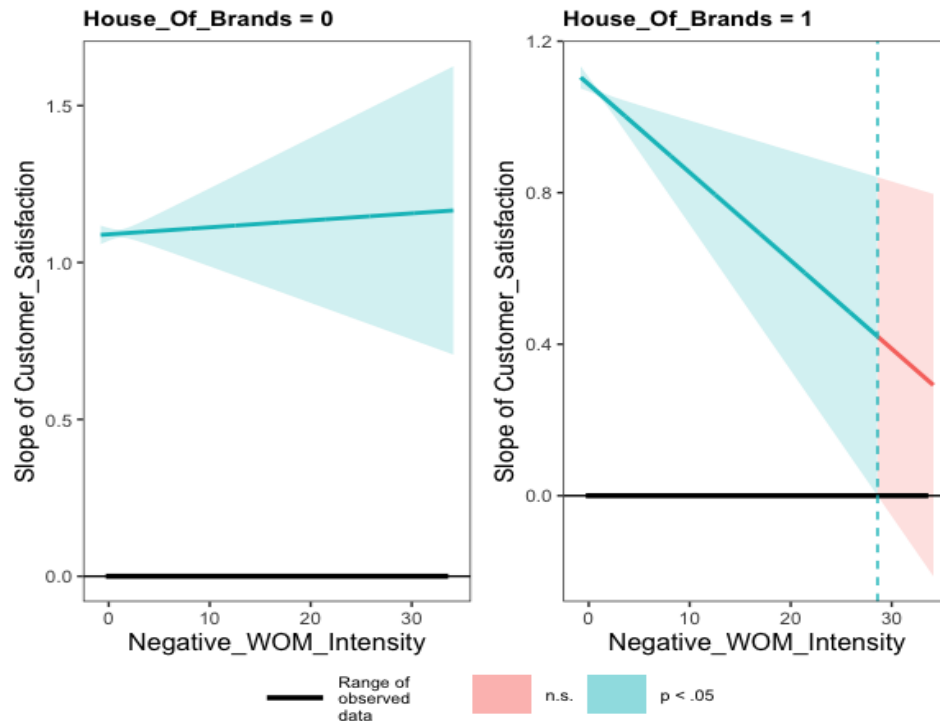
Notes: The observed range of negative WOM intensity is 0 to 33.3. The left side is for firms using umbrella brands and the right side is for firms using house-of-brands.

We conceptually distinguish customer-level satisfaction as a transaction-specific construct that reflects customer experience about a specific product purchase or service encounter and firm-level customer satisfaction, magnitude and noise, as constructs that reflect accumulative experiences and indicators of firms' past, current, and future performance to affect customer loyalty. Similarly, we propose firm-level WOM intensity could signal firms' popularity and hence affect customer loyalty. Through HLM analysis, we find that firm-level customer satisfaction magnitude positively moderates the customer-level satisfaction–loyalty relationship. Notably, our findings indicate that customer satisfaction noise has an impact on the relationship between customer satisfaction and loyalty. Specifically, dissatisfied customers tend to display even lower levels of loyalty, while highly satisfied customers maintain their loyalty. These findings suggest that high dispersion tends to steepen the satisfaction–loyalty relationship and results in a higher marginal effect of customer satisfaction on loyalty.

Integrating signaling and social influence theories, we predict the varying impact of WOM intensity on the customer-level satisfaction-loyalty relationship, depending on the brand portfolios of firms. Our findings provide evidence to support such prediction. We find that negative WOM

intensity significantly reduces the strength of customer-level satisfaction and loyalty relationship, but only for firms using house-of-brands. These findings establish several useful theoretical insights and managerial implications for customer retention.

THEORETICAL IMPLICATIONS

Firm-level Customer Satisfaction Magnitude and Noise as Signals.

This study integrates the mean-variance model (Chandrashekaran et al., 2007; Grewal et al., 2010) with signaling theory to further conceptualize firm-level customer satisfaction signals such as customer satisfaction magnitude and customer satisfaction noise. Prior research has emphasized the information asymmetry problem exists in marketing relationships (Mishra et al. 1998) and that customer satisfaction is a valuable market asset (Grewal et al. 2010), but studies that examine the signaling role of firm-level customer satisfaction, magnitude and noise, to reduce information asymmetry and enhance customer loyalty are scarce.

Our results support that customer satisfaction magnitude is a clear signal whereas customer satisfaction noise is mixed signals. Our findings show that both customer satisfaction magnitude and noise strengthen the customer satisfaction-loyalty relationship at the customer level. Further, our findings provide evidence to support decomposing customer satisfaction according to mean and standard deviation (Chandrashekaran et al., 2007; Grewal et al., 2010). Our conceptualization of customer satisfaction noise as mixed signals subject to customers' interpretation parallels Grewal et al. (2010)'s findings about the dual role of customer satisfaction noise in the context of the stock market.

Furthermore, signaling theory has been applied in the study of customer-firm relationship (Mishra et al. 1998) whereas social influence theory has been utilized in research of online review helpfulness (e.g. Yin et al., 2016). However, scarce research integrates the two. Our research integrates signaling and social influence theories to explain the effect of customer satisfaction noise. Customers may not possess perfect knowledge about a firm's product quality or its customer base and may rely on external cues. However, when external cues such as customer satisfaction noise is high, it sends mixed signals, and customers may interpret the signals differently depending on their own transactional experience by calling upon their individual satisfaction with the transaction.

Firm-Level Positive and Negative WOM Intensity as Signals.

Our research has enriched the customer satisfaction literature by investigating whether customer WOM interferes with firms' brand portfolios. Firms can choose to send out positive or negative WOM intensity signals to customers. However, customer WOM, including positive and negative WOMs, represents customer initiatives that firms do not have complete control over. Brand portfolio, on the other hand, is a managerial decision that firms can make to strategically respond to heterogeneity in customer preferences.

From a signaling perspective, we highlight the relevance of investigating the interplay between customer WOM and firms' brand portfolios. Consistent with our prediction, we discovered that high negative WOM intensity acts as a deterrent to customer loyalty, particularly for firms with house-of-brands. Interestingly, firms with umbrella brands are less susceptible to the negative effects of customer WOM. This finding provides empirical evidence that customer WOM and the firm's brand portfolio are potent external cues of the firms' product and service quality and customers may rely on these cues for decision-making.

Conversely, we observed that positive WOM intensity did not significantly influence the positive relationship between customer satisfaction and loyalty for firms employing house-of-brands strategies. However, positive WOM intensity unexpectedly weakens the relationship for firms utilizing umbrella brands. A possible explanation is due to customers' needs for uniqueness (Abosag et al., 2020; Irmak et al., 2010). In China, our research context, the cultural value of preserving face (Geng et al., 2019), along with customers' tendencies to experience a sense of power (Zou et al., 2014), may drive customers to seek product uniqueness. These customers are less likely to follow the crowd when facing the high positive WOM intensity of firms with umbrella brands. They likely deliberate more on their differences from others and refrain from purchasing the same brands as others. While the finding might be unique to our research context, it provides preliminary empirical evidence that in some cases, an overwhelming number of customer WOMs may make customers feel like they are just part of a crowd and a loss of individuality.

MANAGERIAL IMPLICATIONS

Understanding the relationship between customer satisfaction and loyalty is crucial for businesses seeking to enhance customer retention. Marketing managers generally are encouraged to use and keep track of customer satisfaction to enhance loyalty (Gupta & Zeithaml, 2006). This study offers new insights that marketing managers can apply.

Strategic Use of Customer Satisfaction Information.

The findings reveal that managers should keep track of the customer satisfaction magnitude and customer satisfaction noise, because they significantly affect not only firm performance (Grewal et al., 2010) but also customer loyalty beyond the customer's transactional experience. The observable effects of firm-level customer satisfaction suggest some new strategies firms can use to manage the relationship between customer satisfaction and loyalty.

While customer-level satisfaction plays a role in fostering loyalty, it is amplified when customers learn about the high satisfaction magnitude across the entire customer base of the firm. One takeaway for marketing managers is to actively share firm-level customer satisfaction information with customers, to reduce uncertainty about their products and enhance customer loyalty. Firms can share their achievement in customer satisfaction magnitude through newsletters, email campaigns, and press releases. This direct communication allows companies to showcase their dedication to customer satisfaction, assure customers of the quality and values associated with products and services, and better retain customers.

Although high customer satisfaction magnitude can enhance the relationship between customer satisfaction and loyalty, large customer satisfaction noise is not necessarily problematic. The increased marginal effect of customer satisfaction on loyalty due to high customer satisfaction noise presents a noteworthy opportunity for companies with substantial variations in customer satisfaction to enhance customer loyalty. Because of the significantly increased positive marginal effect of customer satisfaction on loyalty, firms experiencing high customer satisfaction noise may benefit from a greater return on customer retention for the same amount of increase in customer satisfaction, compared to firms with lower customer satisfaction noise. As a result, even a modest increase in customer satisfaction can lead to a significantly higher impact on customer loyalty for firms burdened with high customer satisfaction noise.

Furthermore, marketing managers can take the initiative to educate less satisfied customers that high variation in opinions about customer satisfaction may be caused by different customer preferences. For example, marketing managers can openly communicate with customers about the

concept of customer preferences and how they can vary from person to person. Further, marketing managers could also illustrate the role of individual preferences in shaping individual customer satisfaction by sharing case studies or testimonials that showcase how different customers with diverse preferences found satisfaction in different aspects of the products or services. Such interventions may reduce customer turnover.

Managing Customer WOM Intensity and Brand Portfolios.
      Managers should also be acutely aware of their brand portfolios in their efforts to manage customer WOM intensity. Our research findings highlight the need for caution when communicating WOM intensity, as the effectiveness of these signals can vary depending on the brand portfolios of firms. Therefore, the focus of customer WOM management for firms with house-of-brands should differ from the focus for firms with umbrella brands in their brand portfolios. Our unexpected findings reveal that high positive WOM intensity may prompt customers to form a negative association with umbrella brands, suggesting that overly promoting high positive WOM intensity may not necessarily benefit firms' customer retention.
      Further, firms that own house-of-brands should prioritize managing negative WOM intensity over positive WOM intensity. Our research suggests that these firms are more vulnerable to negative WOM intensity because it attenuates the positive relationship between customer satisfaction and loyalty and may even suppress it. While firms with umbrella brands could prioritize enhancing transactional customer satisfaction by consistently meeting or exceeding customer expectations at each transactional level, firms with a multi-brand portfolio should go beyond mere transactional satisfaction. They should emphasize actively listening to customer concerns in order to prevent the spread of negative word-of-mouth (WOM) among their peers. For example, firms can open multiple platforms (e.g., social media such as Twitter, Facebook Instagram, etc.) to encourage customers to seek out customer service help, rather than venting to their peers. It is vital to prioritize mitigating negative WOM and direct them to firms, particularly for firms with the house-of-brands.

LIMITATIONS AND FUTURE RESEARCH

      We acknowledge several limitations of this research that suggest some further research questions. First, we examine three major firm-level signals that moderate the customer satisfaction–loyalty relationship. Additional research could incorporate other relevant firm-level signals that can enhance the positive customer satisfaction–loyalty relationship. For example, it would be worthwhile to examine the potential contingent factors of customer satisfaction magnitude and noises, as well as additional contingent factors of positive/negative WOM intensity.
      Second, our research unexpectedly reveals that positive WOM intensity hinders the translation of customer satisfaction into loyalty for firms that operate under umbrella brands. To comprehend the underlying mechanisms behind this suppression effect, further research is warranted. This research avenue holds potential as firms allocate substantial resources towards referral programs and incentives aimed at fostering positive customer WOM. Gaining deeper insights into this area could lead to cost savings or increased profits for these firms.
      Last, our data contain ten product categories, which limits the generalizability of our results. Continued research could expand our findings by adding other product categories, such as services or experiential goods. It will be meaningful to investigate whether the signaling effects are robust across different product types.

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