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Research Article

Price Dispersion, Bargaining Power, and Consumers' Online Shopping Experience in e-Commerce: Evidence from Online Transactions

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With the development of artificial intelligence and machine learning technology, online shopping is increasingly becoming the mainstream shopping method. It is challenging to investigate the correlation between price dispersion and bargaining. In accordance with the assimilation-contrast theory, this study theorizes about the influence of price dispersion on consumers' bargaining power and it aims to analyze the moderating role of online shopping experience of consumers. Therefore, this paper develops a discrete price model to measure the dispersion of product prices in the marketplace. Cluster analysis was subsequently conducted to preliminary explore the association between price dispersion and bargaining. With the construction of a multiple regression model, the phenomena found by the cluster analysis are further analyzed. The results indicate that the bargaining power of consumers increases with the increase of the price dispersion level. At high levels of the price dispersion, high-experienced consumers exhibit greater bargaining power than low-experienced consumers. At low levels of price dispersion, low-experienced consumers have higher bargaining power than high-experienced consumers. Finally, we demonstrate the validity and robustness of the study results by grouping regressions and replacing four measures of price dispersion.

1. Introduction

During the global COVID-19 pandemic, the retail trade suffered a huge impact and the subsequent flourishing of online shopping and its gradual emergence as the main choice of home-based consumers [1]. The bargaining behavior that is common in retail has also gradually shifted from offline to online, and the online bargaining model has been adopted by numerous firms, especially on platforms (e.g., eBay and Alibaba) [2]. Moreover, with the development of artificial intelligence and machine learning technologies, some platforms have also adopted robotic agent bargaining [3]. In addition, price dispersion is ubiquitous, in corporate purchasing, retailer selling, and online stores [4]. In spite of the fact that the development of information technology can reduce information asymmetry in the online environment, the price dispersion still remains [5] and is found to be more widespread online than offline [6]. Bargaining is defined as one of the actions of negotiation in which buyers and sellers dispute the price of a product or service and eventually reach an agreement [7]. Price dispersion is the distribution of prices among sellers for products with the same measurement characteristics [5]. Numerous studies have shown that consumers bargain and the price dispersion phenomenon are prevalent in e-commerce, and the link between them has been previously investigated. However, current studies have focused on offline contexts, such as in the live hog markets [8], the real estate markets [9], and the bilateral transaction market [10], where studies point out that bargaining power leads to different degrees of price dispersion. Therefore, this study investigates how price dispersion affects consumers' bargaining power when shopping online, with e-commerce as the research context.

Consumers will accumulate the information of product prices to construct their own price reference system during the online shopping process, and the products in the market will also form a price dispersion range. In accordance with the assimilation-contrast theory, when the difference between their own perceived price range and the discrete range of prices in the market is large, the contrast effect will emerge and consumers will reject the current price of the product and bargain with the merchant. The assimilation effect arises if the difference between one's own perceived price range and the discrete range of prices in the market is small and the consumer will accept the current price of the product, which is not conducive to the improvement of bargaining power. Then, how does the price dispersion in the marketplace affect the bargaining power of consumers? Can it bring more benefits to consumers? In addition, buyer characteristics appear to be more important than seller characteristics for explaining changes in bargaining outcomes [11]. Consumer online shopping experience is an important characteristic of buyers' online shopping process. Moreover, experienced buyers can bargain for a lower final price [11]. Buyers with different shopping experiences also exhibit different purchase decisions under price dispersion on time series [4]. Therefore, we propose the following: in the context of fixed price dispersion, how does consumer shopping experience affect bargaining power? How does the bargaining power of consumers with different consumer shopping experiences change in the context of different price dispersions? In order to address these questions, we focus on the online marketplace and construct a model between price dispersion and consumer bargaining behavior. After comparing different analysis approaches and optimizing the results, we find that an increase in price dispersion in the marketplace drives the improvement of consumers' bargaining power. Furthermore, consumers' online shopping experience plays a moderating role in this process.

The contributions of this paper are as follows: (1) it investigates the correlation between price dispersion and bargaining in e-commerce and also introduces the moderating effect of the consumer shopping experience; (2) it presents preliminary evidence of price dispersion in the marketplace and heterogeneity in consumer bargaining power through cluster analysis; (3) it tests the results of the study with multiple measurements of price dispersion. The rest of this study is structured as follows. Section 2 reviews the previous literature on bargaining, price dispersion, and assimilation-contrast theory; Section 3 formulates a series of hypotheses regarding the bargaining power of consumers at different levels of price dispersion and the moderating role of the consumer shopping experience; Section 4 demonstrates the data collection and definition process; Section 5 performs the cluster analysis and conducts the empirical analysis; Section 6 presents the conclusions of this paper.

2. Literature Review

Hovland et al. [12] proposed the assimilation-contrast theory, suggesting that consumers' perception of novelty involves an acceptance and rejection dimension. The assimilation-contrast model is built in accordance with the difference between an external stimulus and an internal reference standard [12]. Assimilation effects are generated under the relatively small difference between the stimulus and the reference standard, e.g., when the difference in the acceptance range slightly conflicts with the reference standard. On the other hand, contrast effects occur when the difference between the irritation and the reference standard is significant, and when people are surprised or discomforted [13, 14]. Similar to assimilation-contrast theory are adaptation-level theory [15] and prospect theory [16]. The adaptation-level theory is often used to explore the link between comparative reference prices and price judgments [17]. Prospect theory can be used in risk analysis [18] and political decision-making [19]. It is noteworthy that the assimilation-contrast theory is useful in investigating the range of price acceptance that consumers employ to identify the price of a product [20]. A considerable number of scholars have applied the assimilation-contrast theory to markets with the price dispersion to observe consumers' responses to price perceptions [20, 21].

Bargaining is the process of gaming between buyers and sellers, a social exchange process of direct communication and interaction between the two parties [22]. It is defined as "buying or providing an item cheaper than the usual or expected sale." The primary goal is to seek for greater value [23]. Bargaining is normal in a considerable number of markets [24], and it is common in consumer marketing as well as among producers, wholesalers, and retailers. Bargaining behavior is gradually becoming apparent in e-commerce with the rapid advances in Internet technology and the increasing proportion of online shopping [23, 25]. An extensive amount of research has been conducted on the drivers of consumer bargaining behavior [26], nonpecuniary motivations [27], gender differences [28], and cultural differences [29]. The bargaining behavior of customers has potential positive and negative effects on sellers. On the positive aspect, a favorable relationship with customers can be developed by responding to consumers' bargaining requests, so as to enhance their loyalty. In addition, strategically increasing the response time can increase the cost of bargaining, thus positively affecting the customer's willingness to buy [30, 31]. On the negative aspect, service efficiency can be reduced if employees spend too much time bargaining with customers. From the merchant's perspective, bargaining is also a flexible pricing mechanism. Whether a merchant adopts a bargaining mechanism is related to the cost of haggling for consumers is correlated with factors (e.g., experience, income, and time constraints) [24]. Vukina and Zheng [8] indicated in their study that bargaining between customers and sellers are capable of causing price dispersion in the market. In the opposite direction, prices of items converge to dispersion as the Internet grows and competition among sellers in the market becomes more intense [32]. Furthermore, the fierce competition among sellers can prompt the bargaining of consumers [23].

Price dispersion refers to the disparity in prices set by different vendors of the same commodity [33]. Stigler [34]

claimed that "price dispersion is a form of performance. In fact, it is a measure of ignorance in the marketplace." As the Internet has advanced, a plethora of online price comparison engines have arisen (e.g., PriceWatch.com, Shopper.com, and PriceScan.com). Moreover, the price dispersion does not disappear over time even in e-commerce markets [35]. Numerous studies have been conducted on price dispersion. The above-given studies have examined various issues (e.g., the effect of the number of sellers [32], the effect on online group buying [36], and the information search cost of online prices [37]). For consumers, the price dispersion creates a variety of choices and affects consumers' price perceptions, thus having a certain effect on purchase decision-making. For sellers, it is the result of a game of chance in terms of pricing strategy. For the market, the lower the price dispersion, the more efficient the market and the more transparent the information. Conversely, markets are inefficient and information is not transparent [5].

Consumers' online behavior is constantly changing, primarily because of the differences in the experiences they gain during the shopping process. Consumers' shopping experiences include both direct ones (e.g., information search, evaluation, purchase, and product consumption) and indirect ones (e.g., observation of others' consumption) [38]. Consumer experience is a vital source of self-efficacy [39] and increases with shopping experience. The enhanced self-efficacy is capable of strengthening consumers' confidence in online shopping. In addition, consumer shopping experience frequently affects customers' attitudes, purchasing behaviors, and behavioral intentions [40] to further influence their decision-making [40, 41]. Since their capacities to understand and represent information are shaped and conditioned by their experiences. Depending on the degree of customer experience, different decisions and consequences are reached.

3. Research Hypothesis

Consumers set their reference prices based on price information from past shopping experiences. In addition, it will develop an acceptable price range. When price dispersion is at high levels, the trading uncertainty increases in the market. Since consumers generally are skeptical of overpriced or underpriced products, fearing that their purchases will not meet their expectations [42]. Consumers will consider that the price cannot indicate the true value of the product. The assimilation-contrast theory states that the comparison effect is intense and consumers will reject items that fall outside the acceptable price range [12]. Consumers expect to find a cheaper shop when faced with a significant level of price dispersion [34]. Besides, the bargaining behavior of consumers is to seek lower prices. As a result, the bargaining power of consumers is enhanced at high levels of price dispersion. When price dispersion is at a low level, because of the transparency of market information [5], the consumer's valuation of the product is concentrated and the range of acceptable prices formed will not differ significantly from the level of price dispersion. Consumers will consider that the product price can indicate the value of the goods. The assimilation effect is generated when consumers feel that the price falls in a reasonable range [12]. The consumer will accept this price in accordance with the assimilation-contrast theory, thus reducing the consumer's desire and capacity to bargain. The specific impact path is shown in Figure 1. Thus, we posit the following:

> H1: the higher the degree of price dispersion, the stronger the bargaining power of consumers.

There are many uncertainties correlated with high levels of price dispersion (e.g., the perceived risk of the transaction [43] and the difficulties in perceiving the price [44]). Nevertheless, high-experienced consumers are more likely to perceive risky transactions and more thoroughly understand prices in the market [4]. Accordingly, at high levels of dispersion, consumers perceive low price fairness [36]. It is known from the assimilation-contrast theory that the contrast effect is stronger for high-experienced consumers at this time. Consequently, consumers will go through bargaining to achieve inner price fairness [45]. For low-experienced consumers are more easily attracted by low-price signals and price promotions [4]. Hence, the contrast effect is not significant for low-experienced consumers, and they prefer lower-priced items of the same products and thus neglect bargaining. Thus, we posit the following:

> H2: when price dispersion is on the high level, the bargaining power of the high-experienced consumers is stronger than the low-experienced consumers.

Since high-experienced consumers are more aware of price information [4], the valuation of product prices is more concentrated under the low price dispersion. At this point, sellers prefer adopting list-price sales rather than bargaining mechanisms. Consumers' acceptable price range is relatively within the price dispersion range. Consequently, high-experienced consumers generate a strong assimilation impact since they are more willing to accept the existing pricing. Nevertheless, low-experienced have less market understanding [4]. Customers with less experience consider the information offered by customers more reliable than the price information provided by sellers in online shopping [46]. Moreover, they will use more available information in the consumer purchase process [47]. Low-experienced consumers will be more dependent on their own purchase intentions to value consumers, thus forming their own reference prices. This will vary from the range of price dispersion, at which point the assimilation effect of consumers is not significant. Consumers will also not easily accept the current price and may further bargain with the merchant. This leads to our third hypothesis:

> H3: when price dispersion is on the low level, the bargaining power of the low-experienced consumers is stronger than the high-experienced consumers.

4. Experimental Data

In this study, we gather consumer online transaction data rigorously and clean and filter the data scientifically.

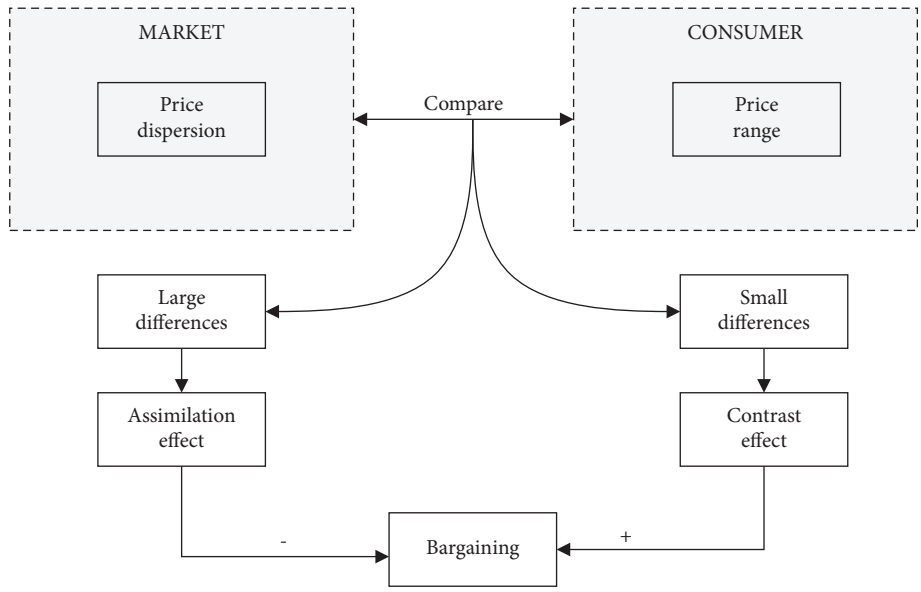

Figure 1: Assimilation-contrast effect path diagram.

4.1. Data Collection. First, data are acquired from Taobao.com, one of the most active e-commerce platforms in China where merchants can provide an extensive range of products to customers. Taobao.com, which is based on Web services, enables online merchants to display information about their products on its website and provides channels for consumers to bargain while helping sellers fulfill transactions. Second, we track consumer orders in which we select the increasingly popular products for online shopping (e.g., digital accessories, clothing accessories, travel accessories, mother and child supplies, and mobile phone packages) to ensure the generalizability of the study results. In addition, we estimate the price dispersion variables according to the list price of the product web page. Second, in order to measure consumers' bargaining power, we collect price data (including product price, product discount, and actual price paid for the product) during consumers' online shopping process. We also collect consumers' account registration dates for measuring consumers' online shopping experience. Last but not least, some basic data about consumers and merchants are gathered. In total, we gather 193,468 transactions.

4.2. Variables Explanation. Thereafter, we list the variables involved in the study and explain the meaning and the measurement of them:

(1) *Price Dispersion*. This variable represents the price distribution of the product in the online market. The percentage price difference is adopted to measure the price dispersion. We assume that the possible price of a product in the market is $p_1, p_2, p_3, \ldots, p_n$, and the price dispersion is defined as follows:

$$\text{price dispersion} = \frac{p^{\max} - p^{\min}}{\overline{p}}, \quad (1)$$

where $p^{\max}$ and $p^{\min}$ denote the maximum and minimum transaction prices, respectively, and $\overline{p}$ represents $(\sum_{i=1}^{n} p_i/n)$

(2) *Bargaining (Yuan).* This variable indicates the ability of the consumer to bargain online. It indicates the adjusted price of the final consumer transaction, which is the differential of the auction price and the actual price paid for the product, with the price change excluded due to discount promotions.

(3) *Consumer Experience (Day).* This variable represents the time spent by consumers using Taobao for shopping. The temporal distance between the consumer's account registration time and order completion time is used to measure.

(4) *Taoke*. It means social medial advertising, the sharing of products by consumers in social media, and increasing sales for the merchant while earning a commission. A value of 1 is taken when sellers adopt the social medial advertising and a value of 0 when they do not.

(5) *p4p*. It means paid search advertising, i.e., the merchant pays for the advertising of products recommended in search engines by consumers. A value of 1 is taken when sellers adopt the paid search advertising and a value of 0 when they do not.

(6) *Seller Platform.* This variable indicates the platform on which the product is selling (1 = Tmall, 0 = Taobao). To be specific, Tmall is explained as a B2C model, with the company as the main business entity. Taobao is a C2C model, with an individual as the main business entity.

(7) *Seller Registration Time (Day).* This variable means the time when the merchant's online store was established. The temporal distance between the time

of store registration and the time of data collection is used as a measure.

(8) *Device*. This variable shows the device used by the consumer during the online shopping process (0 = Android, 1 = iOS).

(9) *Age (Year)*. This variable indicates the actual age of the consumer.

(10) *Gender*. This variable expresses the consumer's real gender (1 = female, 2 = male).

4.3. Dataset Explanation. For the reliability and validity of the study results, some missing data of gender and age were included in the data sample, which were excluded. Table 1 demonstrates the descriptive statistical analysis of the variables in the study. During the bargaining process, the mean value of the adjustment fee is 1.177, indicating a certain degree of bargaining behavior in this sample data. However, the wide disparity in consumer bargaining power is reflected in the adjustment costs, which range from 0 to 1650. The study takes the natural logarithm of the independent variable plus one, in which the average value price dispersion is 22.37. It indicates the presence of price dispersion in this sample. Stores have a high rate of participation in Taoke and p4p while having been open for a long time, thus suggesting that sellers adopt the marketing strategy actively in this study.

5. Methodology

5.1. Cluster Analysis. Before the beginning of the study, a cluster analysis was conducted for both price dispersion and bargaining variables. The data sample included both consumers who bargained successfully and obtained benefits, as well as those who bargained unsuccessfully and did not participate in bargaining. In order to accurately reflect the results of the clustering between price dispersion and bargaining, only data in which consumers participated in bargaining and received some benefit were selected for cluster analysis. Secondly, since the magnitudes of both are different, it is normalized according to equation (2). In particular, X_{new} denotes the new variable generated by normalization, X denotes the original data, $X_{\max}$ denotes the maximum value in the variable, and $X_{\min}$ min denotes the minimum value in the variable.

$$X_{\text{new}} = \frac{X - X_{\min}}{X_{\max} - X_{\min}}. \tag{2}$$

The results of the clustering analysis are shown in Figure 2, K is divided into 8 categories, where the k-means contour coefficient is 0.83 and the clustering effect is relatively effective. Horizontally, price dispersion is classified into roughly five dimensions, which correspond to our five product types, indicating that there are differences in the degree of price dispersion in the market for different types of products. Vertically, for one of the products, the bargaining power of consumers is segmented into four dimensions for the same degree of price dispersion. This may be linked to consumers' online shopping experience; therefore, we construct the model to investigate the reasons for this situation accordingly.

5.2. Empirical Analysis. The empirical model is specified in (3). In the above-given theoretical analysis, how the price dispersion affects the bargaining power of consumers is evaluated. The empirical model is built as follows:

$$\begin{aligned}\text{bargaining} = {} & \alpha_0 + \alpha_1 \log(1 + \text{price dispersion}) + \alpha_2 \text{consumer experience} \\ & + \alpha_3 \text{price dispersion} \times \text{consumer experience} + \gamma \sum control + \varepsilon.\end{aligned} \tag{3}$$

The above-given model is built to determine the impact of price dispersion on bargaining. The independent variable is expressed as log (1 + price di spersion). The dependent variable is the bargain. Moreover, consumer experience is considered a moderating factor. Furthermore, price di spersion × consumer experience is the interaction effect between price dispersion and consumer experience. $\sum$control denotes the control variable, which contains device age, seller registration time, seller platform, Taoke, p4p, and gender.ε implies a random perturbation term.

Table 2 lists the regression analysis for the bargaining stage using the ordinary least square method. Column (1) of Table 2 indicates that the price dispersion ($\beta = 2.228$, $p < 0.01$) significantly affects bargaining, thus suggesting that consumers exhibit stronger bargaining power at the higher degree of price dispersion. The reason for the above finding is that highly dispersed prices increase purchase unpredictability, and the poor overlap between product price ranges in the market and consumers' own product perceptions leads to a contrast effect. As a result, consumers are less willing to accept current product prices. The expectation is to obtain a price satisfying anticipation through bargaining. Thus, hypothesis H1 is verified.

In column (2) of Table 2, the interaction term ($\beta = 0.787$, $p < 0.01$) between price dispersion and consumer experience, reveals an increase in the bargaining power of high-experienced consumers over low-experienced consumers for high levels of price dispersion. Since high-experienced consumers in a high level of price dispersion market more easily perceive the transaction risk, they are more aware of the market situation and they are adequately informed about the price distribution. Accordingly, with high price dispersion, consumers perceive price unfairness and have a significant contrast effect, such that high-experienced consumers will bargain to achieve their own internal price

Table 1: Descriptive statistics.

Variable	Description	Mean	SD	Min	Max
Bargain	Adjust fee for purchases	1.177	19.00	0	1650
Price dispersion	Percentage price difference	22.37	5.705	0	35.03
Consumer experience	Consumer experience	7.006	0.834	4.078	8.355
Seller platform	1 = Tmall, 0 = Taobao	0.452	0.498	0	1
Seller registration time	Seller registration time	6.688	0.738	4.710	8.351
Device	1 = iOS, 0 = Android	0.419	0.493	0	1
Taoke	Social advertising	0.822	0.382	0	1
p4p	Paid search advertising	0.904	0.294	0	1
Age	Consumer age	29.61	7.874	16	84
Gender	1 = female, 2 = male	0.385	0.487	0	1

Note. The total number of transactions $N = 129605$.

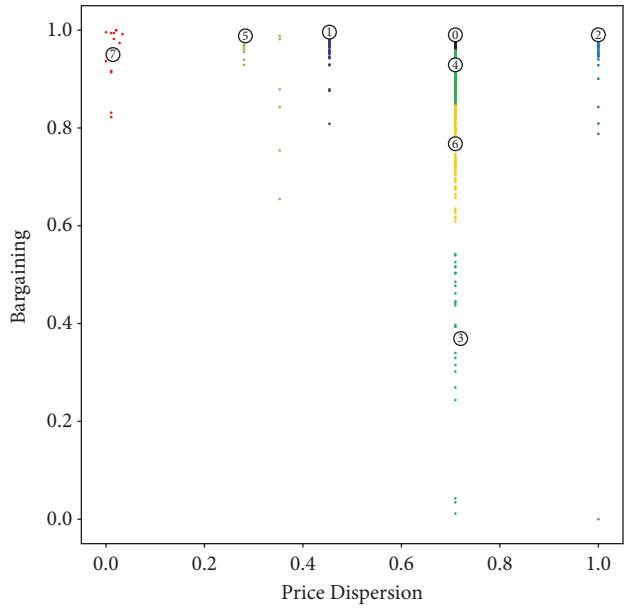

Figure 2: Cluster analysis results.

fairness. In addition, low-experienced consumers have a significant assimilation effect at this time since there has been rare knowledge regarding the price distribution. Consumers are more likely to accept prices and hence neglect bargaining. Hypothesis H2 is supported.

Surprisingly, after incorporating the interaction between price dispersion and consumer experience, the coefficient of price dispersion has switched signs. This indicates that the high-experienced consumers have lower bargaining power than the low-experienced consumers with a low level of dispersion. Thus, hypothesis H3 is verified. However, if the level of dispersion is sufficiently large, the bargaining power of high-experienced consumers is stronger than low-experienced ones. At the same time, the consumer experience coefficient also changes. This indicates that for low-experienced consumers who face high dispersion level products their bargaining power is weaker than those with low price dispersion level. However, when consumer experience is sufficiently high, consumers have higher bargaining power for products with high levels of dispersion than those with low levels of dispersion.

From Figure 3, it is observed that at high levels of price dispersion high-experienced consumers are more powerful in bargaining than low-experienced consumers and hypothesis H2 is supported; at low levels of price dispersion, low-experienced consumers have stronger bargaining power than high-experienced consumers and hypothesis H3 is supported.

5.3. Robustness Test. Immediately afterward, the robustness of the above findings is verified through group regression. Initially, the data are grouped according to the median of the consumer experience, with those above the median being "high-experienced" and those below the median being "low-experienced." Therefore, the data are divided into two groups, and regression is conducted separately. The regression results are shown in Table 3. Column (1) of Table 3 suggests that when experience serves as the basis for grouped regressions, it plays a positively significant role in bargaining power at the high price dispersion. Accordingly, hypothesis H2 is supported.

Table 2: Main effects regression results and consumer experience moderated effects regression results.

Variable	Bargain	
	(1)	(2)
Price dispersion	2.228***	−3.418*
	(0.193)	(1.772)
Consumer experience	0.416***	−2.059***
	(0.067)	(0.775)
Device	0.452***	0.457***
	(0.113)	(0.113)
Age	0.032***	0.034***
	(0.007)	(0.007)
Seller registration time	0.516***	0.513***
	(0.081)	(0.081)
Seller platform	−1.452***	−1.447***
	(0.125)	(0.125)
Taoke	−1.412***	−1.409***
	(0.161)	(0.161)
p4p	−1.761***	−1.771***
	(0.209)	(0.209)
Gender	−0.446***	−0.451***
	(0.115)	(0.115)
Price dispersion × consumer experience		0.787***
		(0.245)
_cons	−9.661***	8.099
	(0.995)	(5.629)
N	124798.000	124798.000
R^2	0.006	0.006

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$

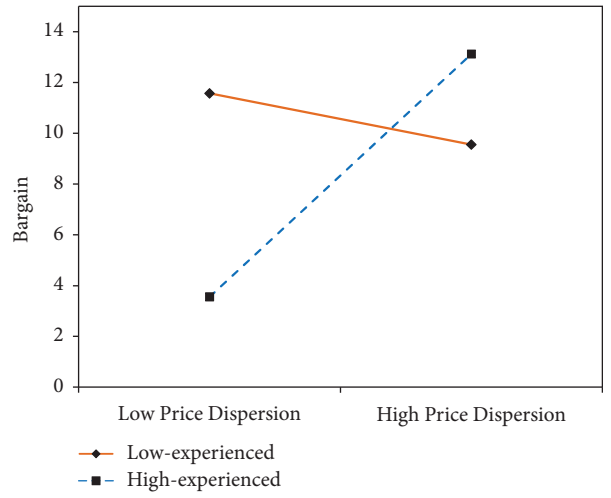

Figure 3: Consumer experience moderating between price dispersion and bargain.

Table 3: Group regression for consumer experience.

Variable	(1) Bargain High-experienced	(2) Bargain Low-experienced
Price dispersion	2.134***	0.220
	(0.194)	(0.320)
Device	0.541***	0.119
	(0.113)	(0.162)
Age	0.036***	0.011
	(0.007)	(0.008)
Seller registration time	0.546***	−0.060
	(0.081)	(0.105)
Seller platform	−1.453***	−0.459***
	(0.126)	(0.170)
Taoke	−1.443***	0.194
	(0.162)	(0.225)
p4p	−1.779***	0.177
	(0.210)	(0.282)
Gender	−0.419***	0.127
	(0.116)	(0.189)
_cons	−6.772***	−0.639
	(0.885)	(1.290)
N	123911.000	916.000
R^2	0.006	0.011

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$

Table 4: Descriptive statistics of price dispersion.

Variable	Mean	SD	Min	Max
Price variance	166727	116927	0	250095
Price standard deviation (yuan)	347.6	214.3	0	500.1
Price range (yuan)	6372	3971	0	9199
Price coefficient of variation	1.235	0.248	0	2.527

Note. The total number of transactions $N = 126933$.

Table 5: Effect of different price dispersion measurements on bargaining.

	Bargain							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Device	0.501***	0.509***	0.501***	0.509***	0.494***	0.502***	0.472***	0.475***
	−0.11	−0.11	−0.11	−0.11	−0.11	−0.11	−0.11	−0.11
Age	0.025***	0.026***	0.025***	0.026***	0.027***	0.029***	0.030***	0.031***
	−0.007	−0.007	−0.007	−0.007	−0.007	−0.007	−0.007	−0.007
Seller registration time	0.584***	0.587***	0.583***	0.586***	0.546***	0.552***	0.488***	0.487***
	−0.08	−0.08	−0.08	−0.08	−0.08	−0.08	−0.079	−0.079
Seller platform	−1.427***	−1.436***	−1.426***	−1.434***	−1.390***	−1.398***	−1.418***	−1.427***
	−0.121	−0.121	−0.121	−0.121	−0.122	−0.122	−0.122	−0.122
Taoke	−1.340***	−1.322***	−1.341***	−1.323***	−1.364***	−1.349***	−1.254***	−1.237***
	−0.157	−0.157	−0.157	−0.157	−0.157	−0.158	−0.157	−0.157
p4p	−1.711***	−1.699***	−1.712***	−1.699***	−1.725***	−1.713***	−1.720***	−1.707***
	−0.201	−0.201	−0.201	−0.201	−0.201	−0.201	−0.202	−0.202
Gender	−0.161	−0.149	−0.164	−0.151	−0.277**	−0.261**	−0.443***	−0.443***
	−0.117	−0.117	−0.117	−0.117	−0.115	−0.115	−0.113	−0.113

Table 5: Continued.

	Bargain							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Consumer experience	0.411***	−0.654**	0.410***	−0.662**	0.390***	−0.969***	0.385***	−0.503*
	−0.065	−0.267	−0.065	−0.269	−0.065	−0.322	−0.065	−0.276
Price variance	0.285***	−0.400**						
	−0.022	−0.168						
Price variance ∗ consumer experience		0.098***						
		−0.024						
Price standard deviation			0.572***	−0.806**				
			−0.043	−0.338				
Price standard deviation ∗ consumer experience				0.197***				
				−0.048				
Price range					0.412***	−0.733***		
					−0.035	−0.268		
Price range ∗ consumer experience						0.164***		
						−0.038		
Price coefficient of variation							2.006***	−3.069**
							−0.187	−1.547
Price coefficient of variation ∗ consumer experience								0.720***
								−0.218
_cons	−6.205***	1.187	−6.208***	1.237	−6.155***	3.223	−4.890***	1.326
	−0.77	−1.958	−0.771	−1.968	−0.787	−2.312	−0.752	−2.025
N	127389	127389	127389	127389	127389	127389	127389	127389
R^2	0.007	0.007	0.007	0.007	0.006	0.007	0.006	0.006

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$

There are many measures of price dispersion by previous researchers. In accordance with Pan [48], we utilize four additional measures of price dispersion: (1) price variance; (2) price standard deviation (yuan); (3) price range (yuan); and (4) price coefficient of variation. We assume that the possible price of a product in the market is $p_1, p_2, p_3, \ldots p_n$, and the price dispersion is defined as follows:

$$\begin{aligned}
\text{price variance} &= \frac{\sum_{i=1}^{n} (\overline{p} - p_i)^2}{n-1}, \\
\text{price standard deviation} &= \sqrt{\frac{\sum_{i=1}^{n} (\overline{p} - p_i)^2}{n-1}}, \\
\text{price range} &= p^{\max} - p^{\min} \\
\text{price coefficient of variation} &= \sqrt{\frac{\sum_{i=1}^{n} (\overline{p} - p_i)^2}{n-1}} / \overline{p}.
\end{aligned} \tag{4}$$

The descriptive statistical analysis of the four measurements is shown in Table 4. We test the robustness of the regression results by replacing the dependent variable price dispersion, and the results are shown in Table 5. According to Table 5, we can observe that the regression results of the model remain the same when the price dispersion is measured in four different manners, which demonstrates the robustness of the main and moderating effects again.

6. Conclusion

In e-commerce, price dispersion is a vital feature and bargaining serves as a critical pricing mechanism. In this study, the degree of price dispersion in online marketplaces is evaluated using the percentage price difference, and the bargaining power of consumers is quantified utilizing adjustment fees for purchases. Meanwhile, we also consider the role of consumers' online shopping experience. We use transaction data from Taobao.com, an online trading platform from China, to validate the model results. It is found that the online environment exhibits significant price dispersion. Moreover, the bargaining power of consumers will increase with the increase of the price dispersion. This is because of the fact that consumers create their own pricing ranges for products during the purchasing process. When price dispersion is significant, this causes a contrast effect that leads consumers to reject products based on their price ranges. In addition, consumers will choose to bargain with the merchant to seek the price that satisfies their expectations, which to a certain extent enhances the bargaining power of consumers. It also indicates that at the high price dispersion, high-experienced consumers have stronger bargaining power than low-experienced consumers. This is because high-experienced consumers develop a more precise range of product prices and the contrast effect on prices is more intense when price dispersion is at a high level, which means that high-experienced consumers are more willing to use bargaining to obtain a lower transaction price. Lastly, an interesting phenomenon is identified in this study. Under low price dispersion, low-experienced consumers have higher

bargaining power than high-experienced consumers. On the one hand, the possible reason for this result is the concentrated distribution of product prices, which overlaps with the expected prices of high-experienced consumers, at which point an assimilation effect is generated and the development of bargaining power is discouraged. On the other hand, low-experienced consumers may bargain with sellers for pleasure, at which point consumers focus on nonmonetary motivations for bargaining.

6.1. Theoretical Implications. This research supports a small but growing body of empirical literature on price dispersion and consumer bargaining. Previous research on price dispersion has focused on comparing price dispersion in both online and offline settings and examined the contributing variables. This study enriches the research on price dispersion in electronic commerce. The study on bargaining focuses on the phenomenological investigation since bargaining is primarily a verbal communication between sellers and consumers, in which data are difficult to obtain. With the development of information technology, bargaining is becoming prevalent in e-commerce. Buyers and sellers can bargain through online platforms and record the bargaining process. Therefore, this paper adopts the transaction data from online shopping platforms to empirically analyze the influence of price dispersion on bargaining. However, research on the correlation between price dispersion and bargaining has been more focused on the offline market, and this study enriches the research of bargaining and price dispersion in the B2C market. At the same time, the study also identifies the moderating effect of consumer experience, demonstrating that consumers with different shopping experiences have differences in their online bargaining power and varying attitudes in the face of price dispersion in the marketplace. Finally, this paper also enriches the application of assimilation-contrast theory in the area of marketing and provides a theoretical basis for future applications of the theory.

6.2. Practical Implications. On the one hand, sellers should control the level of price dispersion. To be specific, in the marketplace, sellers should control the pricing range of products to prevent consumers from perceiving unfair prices and bargaining with sellers. Traders should cooperate with each other instead of creating unbalanced markets through pricing battles. Meanwhile, sellers should implement a bargaining mechanism for consumers with different shopping experiences to reduce the cost of bargaining based on satisfying their willingness to bargain to increase sales to a certain extent. On the other hand, consumers need to take heed of the price information of products during online shopping and understand the price dispersion, such that they can defend their interests by bargaining with sellers when facing unfair prices. It is beneficial for consumers for rational purchase decision-making. At the same time, consumers should focus on the accumulation of shopping experience during the online shopping process so that consumers can flexibly face the changes in prices in the market that leads to changes in bargaining strategies. Furthermore, bargaining is a flexible pricing strategy, which makes it easier for sellers to succeed in the bargaining process based on a complete understanding of the factors that influence consumers' bargaining power. It gives consumers maximum bargaining satisfaction on the basis of guaranteed profitability.

6.3. Limitations and Future Research. Similar to most existing research, this study also has limitations despite its contribution to some noteworthy findings. The primary restriction of this study is that the transaction data from Taobao in China are only employed. Although Taobao is the major place for online shopping, there are also other shopping software (e.g., Jd.com, eBay, and Amazon) and examining data from different shopping platforms can enhance the generalizability of the findings. Furthermore, an examination of the degree of price dispersion across product types and the effect on consumer bargaining power could be conducted in future studies (e.g., hedonic and utilitarian products).

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Zongwei Li contributed to data collection, article structure, and concept design. LR contributed to article structure design and manuscript drafting. JC and Zhenyu Li contributed to data empirical analysis and cluster analysis. XT and YZ contributed to the article concept design, revision, and proposal.

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