

# *The Impact of Price Discrimination on Customer Satisfaction in a Shared Transportation Market: The Case Analysis of Didi*

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**Abstract.** With the constant advancement of information technology, the platform economy has an increasing influence on China's economic development. Ride-hailing services, as the most successful application of sharing transportation, are gaining popularity worldwide. Compared with traditional taxis, ride-hailing platforms are favored by passengers owing to their flexibility, cost-effectiveness, and environmentally friendly. In the field of shared transportation, an increasing number of users select ride-hailing services instead of the traditional taxi, subway, and other travel methods. Taking the Didi platform as an example, Didi is known by the public as a platform with a wide range of travel businesses, which covers numerous business combinations involving taxis, private cars, express cars, ridesharing, and agent driving. Despite the convenience and popularity of the ride-hailing services, users of these platforms also revealed they have encountered several problems, such as personal information leakage and price discrimination. As the largest ride-hailing platform in China, Didi differentiated pricing based on users' personal information and data.

**Keywords:** price discrimination, customer satisfaction, Didi, China

## **1. Introduction**

Through our personal experience and investigation, we realized that a majority of people are not aware that they have experienced price discrimination by Didi ride-hailing. In fact, it is common for Didi's platform to utilize consumers' private information for price discrimination. The definition of price discrimination is that merchants charge distinct prices toward different consumers or consumer groups according to the characteristics or circumstances of users. Such differential pricing is not based on cost distinction, but on consumers' willingness to pay, purchase volume, timing of purchases, or other characteristics. The purpose of price discrimination is usually to maximize the profits of enterprises by completely exploiting the payment capabilities and the demand elasticity of various client groups [1]. Therefore, we designed a questionnaire on price discrimination to explore the relationship between customer satisfaction and awareness of price discrimination. Additionally, we calculated the desired solution and developed experiments to prove the feasibility of the solution.

This study aims to explore the relationship between customer satisfaction and awareness of price discrimination, as well as the feasible solutions to the negative consequences of price discrimination. To collect the research data, 120 users of the Didi platform were invited to participate in our survey. Through the data analysis, we found that the main factors of user satisfaction are the frequency of

using ride-hailing services and whether passengers are aware of price discrimination. The whole essay can be separated into four sections: It will firstly review and discuss previous studies which are concentrated on price discrimination and consumer perception. After that, the research questions and methodology will be presented in detail. The next section will analyze the data and interpret the research findings. Ultimately, it will mention some recommendations and make a conclusion.

## 2. Literature review

The maturation of sophisticated ways for accessing, storing, and analyzing consumer information on the Internet has considerably promoted the ability of merchants to discern a consumer's type or preferences by observing past behavior and setting prices accordingly at subsequent times [2]. Qiao also pointed out that the accumulation of network data enables large enterprises and commercial companies to fully collect the identity-related information of consumers and have their large-scale databases, which are convenient for their investigation and research [3]. Massive data provide support and provide sufficient data basis for discriminatory pricing. Discriminatory pricing for different users has generally become the maximum welfare of oligarchic enterprises. With the convenience brought by the new business model and its advantages, Didi has become the largest ride-hailing platform in China, accounting for 80% of the market share. However, as the personal transportation company with the largest market share, Didi discriminated against users based on known user data and differentiated pricing. To be specific, by observing the relevant characteristics of different customer groups, Didi drivers can infer the willingness to pay and affordable prices of users and use this as a benchmark to discriminate against distinct groups. In other words, Didi can utilize passenger information to segment market demand, analyze consumer preferences, and earn consumers' surplus value as much as possible [4].

E-commerce platforms that implement price discrimination typically have enormous digital power and a substantial user base, which enable them to store a large amount of historical behavior data of users. It can charge different prices to diverse consumers and set floating prices for individual users based on changes in consumer behavior [5]. According to the investigation of Yaraghi and Ravi, the driver can acquire the location of the passenger's workplace and residence based on historical data [6]. They can then infer the highest price that a particular passenger is willing to pay for a specific journey. Although this processed data can be used to make services more efficient, it can also be used for practices such as price discrimination towards certain passengers. For instance, the data analysis in the research report can determine the variation between iPhone users and the ordinary mobile phone user. The data demonstrates that Apple clients are more likely to be charged higher fares than regular users for the same ride on the Didi platform. In addition, price discrimination is also reflected in the number of ride-hailing discounts, with Apple users typically receiving fewer coupons than other users. It is evident that the Didi platform will distinguish users based on certain indicators for differentiated pricing [3]. In fact, the increasing number of consumers have noticed the phenomenon of price discrimination. According to a September 2022 survey of Chinese consumers, 50.04% of respondents said they had experienced price discrimination. 86.12% of respondents believe that price discrimination damages their rights. Moreover, numerous consumers have exposed and complained about the platform's price discrimination on social media, which triggered widespread public dissatisfaction and sparked social controversy [7].

Previous studies have also compared the incomes of drivers on different platforms. The results point out that the Didi platform has an absolute advantage, with the income of current online ride-hailing drivers typically higher than that of taxi drivers. The advent of taxi software has greatly

enriched the travel choices of all passengers. Online car-hailing can effectively reduce the cost of taxi passengers with preferential subsidies. The tailored pricing behavior promotes the platform to enter various consumer classes, occupy a larger share of the market, improve the welfare of enterprises and workers, and lay a solid foundation for increasing the welfare of society. Although ride-hailing services bring passengers a more comfortable experience to a certain extent, price discrimination that has been exposed will bring certain negative effects to the platform [3]. Price discrimination can lead to negative perceptions among consumers. Both practice and literature show that the public is dissatisfied and complain about price discrimination on e-commerce platforms. When consumers realize that these platforms undermine their interests, they will breed negative emotions and frustration with the platforms. In this case, they will compare prices on different platforms to attain the best price [7]. Likewise, the study of Li revealed that the phenomenon of price discrimination damages the legitimate rights and interests of consumers, which not only leads to social inequity and unreasonable allocation of resources, but also impedes fair competition in the market and brings losses to consumers [8]. In addition, merchants set differentiated prices based on personal purchase history, which seriously infringes on consumers' privacy. Consumers believe that the Didi platform collects, stores and misuses their historical data, such as purchase history, IP address and browsing history, without their knowledge or consent. As a result, this unauthorized misuse of personal data raises privacy concerns and makes consumers feel insecure.

Customer satisfaction and trust are important prerequisites for loyalty consumers, when faced with many choices of products or services, are inclined to choose the brand or organization they are loyal to. Price discrimination reduces consumers' overall satisfaction with the platform because they feel being treated unfairly. When consumers believe that prices will keep rising as they spend more time and money on the platform, they lose their stable expectations and sense of control over prices [9]. Several empirical studies have proven that price discrimination can lead to customer complaints against E-commerce platforms and have a negative impact on their repurchase intention and demand for products or services. Consumers tend to resist discriminatory platforms and choose to stay with current "non-discriminatory" platforms, even if the former temporarily offers lower prices. This is because price discrimination will reduce consumer loyalty and cause consumers to switch to other e-commerce platforms. Given that oligopolies are highly competitive, customer loyalty is significant to them. Price discrimination results in lower perceptions of corporate social responsibility and lower perceptions of ethics. The shortage of corporate social responsibility and low ethics may lead to negative consequences, such as a reduction in organizational profits, damage to organizational reputation and brand image. To sum up, the enterprises that implement price discrimination abuse consumer information, pose a threat to consumer privacy and security, and extract more consumer surplus. Such behavior will not only lead to social inequity and unreasonable resource allocation, but also threaten the development of Didi merchants themselves [7].

### 3. Research questions and methodology

A majority of the previous studies focused on consumers' perception of price discrimination, while there were few studies focused on the relationship between customer satisfaction and awareness of price discrimination. Therefore, this study focuses on exploiting the impact of price discrimination on consumer experience, as well as the feasible solutions to the negative consequences of price discrimination. Based on the research purpose, two research questions are proposed: ①. What is the relationship between customer satisfaction and awareness of price discrimination? ②. What are the feasible solutions to price discrimination? In terms of research design, quantitative research methods are more suitable for processing and analyzing digital data, so as to explore the rules and trends of a

large number of data [10]. Hence this study selected the survey method in quantitative research to collect primary data and perform statistical regression analysis. We compiled a questionnaire to ask respondents a series of questions to collect their perceptions and satisfaction towards ride-hailing charging and price discrimination. To gain a more comprehensive understanding of the perception and evaluation of price discrimination by different consumer groups, we selected 120 participants who had experienced Didi ride-hailing service based on gender, age, occupation, and income.

#### 4. Data analysis and findings

After collecting all the valid data, we conducted frequency statistics, cross-analysis, Chi-square tests, and satisfaction regression analysis.

##### 4.1. Frequency statistics

As can be seen from Table 1, there are 75 participants have not heard of the concept of “price discrimination” or are not aware that they are facing its effects, accounting for 62.5% of the total respondents. This phenomenon may be attributed to the fact that price discrimination is not easy to detect in daily life. Even though some respondents are exposed to price discrimination, they are not aware of their situation due to a lack of awareness, which is something we need to explore further.

Table 2 witness a moderate overall satisfaction and a more even frequency distribution of various types of satisfaction. Most respondents of the survey expressed Somewhat dissatisfied, Indifferent, or Somewhat satisfied with their online ride-sharing experience. In terms of specific comparisons, about 48% of the respondents selected relative satisfaction (Somewhat satisfied and very satisfied) with their online car rental experience, which is slightly higher than that of respondents who expressed Somewhat dissatisfied and very dissatisfied (aggregate 34%). In general, respondents' satisfaction with their online car rental experience is at a moderately high level.

Table 1. Frequency statistics of perceived price discrimination

perception	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	45	37.5	37.5	37.5
No	75	62.5	62.5	100.0
Total	120	100.0	100.0	

Table 2. Frequency statistics of satisfaction with online rental car experience

satisfaction	Frequency	Percent	Valid Percent	Cumulative Percent
Very dissatisfied	10	8.3	8.3	8.3
Somewhat dissatisfied	24	20.0	20.0	28.3
Indifferent	38	31.7	31.7	60.0
Somewhat satisfied	32	26.7	26.7	86.7
Very satisfied	16	13.3	13.3	100.0
Total	120	100.0	100.0	

## 4.2. Cross-analysis

This study examines the correlation between perceptions of price discrimination and satisfaction with online ride-hailing services. From the cross-analysis, 17.8% of participants who have known, or consciously experienced price discrimination showed extreme dissatisfaction for online ride-hailing services, and another 37.8% expressed stronger dissatisfaction, which aggregated for 55.6% of the total respondents. The data indicate that more than half of the users in this category give a negative evaluation of the ride-hailing service. On the contrary, the distribution of satisfaction degrees is quite different for those who have not heard of the concept of price discrimination or are not aware of such treatment. 16.0% of the respondents in this category expressed very satisfied and 34.7% of them said they were somewhat satisfied. The proportion of these two groups accumulated to 50.7%, which means that approximately half of the users who were not affected by the perception of price discrimination held a positive or relatively satisfactory attitude towards online ride-hailing services. Figure 1 further supports the above analysis in the form of a visual chart.

Table 3. Cross-tabulation of perceived price discrimination and satisfaction with online car rental experience

perception * satisfaction Cross-tabulation							
		satisfaction-Very dissatisfied	satisfaction- Somewhat dissatisfied	satisfaction- Indifferent	satisfaction- Somewhat satisfied	satisfaction- Very satisfied	Total
perception -Yes	Count	8	17	10	6	4	45
	Expected Count	3.8	9.0	14.3	12.0	6.0	45.0
	% within perception	17.8%	37.8%	22.2%	13.3%	8.9%	100.0%
perception -No	Count	2	7	28	26	12	75
	Expected Count	6.3	15.0	23.8	20.0	10.0	75.0
	% within perception	2.7%	9.3%	37.3%	34.7%	16.0%	100.0%
Total	Count	10	24	38	32	16	120
	Expected Count	10.0	24.0	38.0	32.0	16.0	120.0
	% within perception	8.3%	20.0%	31.7%	26.7%	13.3%	100.0%

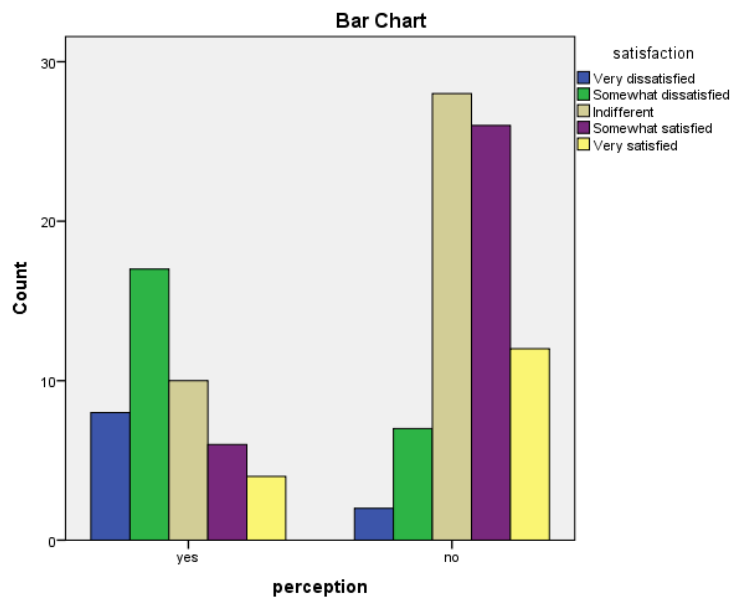


Figure 1. Cross-tabulation analysis of perceived price discrimination and satisfaction with online car rental experience

### 4.3. Chi-square tests

In order to delve deeper into the potential link between perceived price discrimination and satisfaction with online ride-sharing services, we further implemented a chi-square test to verify whether the two are independent of each other or significantly correlated. In Table 4, it is evidently that there are 1 cell (10.0% of the total cells) with expected frequencies lower than 5. The finding suggests that we need to pay attention to the results of Fisher's exact test to assess the significance. Furthermore, we found that the Exact Sig.(2-sided) is 0.000, which is less than 0.05. The relationship between the perception of price discrimination and online ride-sharing satisfaction significantly passes the chi-square test at 0.05 level of significance, which means that price discrimination perception and online car rental experience satisfaction are influence each other rather than independent.

Table 4. Table of chi-square test for perception and satisfaction

Chi-Square Tests						
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	26.979 <sup>a</sup>	4	0.000	0.000		
Likelihood Ratio	27.111	4	0.000	0.000		
Fisher's Exact Test	25.961			0.000		
Linear-by-Linear Association	18.966 <sup>b</sup>	1	0.000	0.000	0.000	0.000
N of Valid Cases	120					

a. 1 cells (10.0%) have an expected count of less than 5. The minimum expected count is 3.75.  
b. The standardized statistic is 4.355.

#### 4.4. Satisfaction regression analysis

In Table 5, the dependent variable is the impact of price discrimination on the taxi experience. We assign values to the variable, 1 to 5 from dissatisfied to satisfied, the higher the more satisfied. The independent variables include the awareness of price discrimination, using frequency, age, and gender. The regression results show that people who are aware of price discrimination are less satisfied with the ride-hailing experience. Thus, our regression function can be expressed as: the main factors affecting user satisfaction are generally the frequency of using online ride-hailing services and whether users are aware that they are experiencing price discrimination. To be specific, low frequency will reduce satisfaction, meanwhile awareness of price discrimination will reduce satisfaction.

Table 5. Table of regression analysis for satisfaction

	m1	m3	m2	m4
VARIABLES	satisf	satisf	satisf	satisf
discriminated		-0.9637*** (-4.6079)		-0.9254*** (-4.5908)
frequency			0.4431** (3.4146)	0.4118** (2.4146)
gender	-0.1447 (-0.4748)	0.0109 (0.0421)	-0.4188 (-1.1256)	-0.1644 (-0.6252)
age	-0.0081 (-0.0628)	-0.0151 (-0.1287)	-0.026 (-0.2084)	-0.0412 (-0.2746)
Constant	4.1219*** (7.7666)	4.4924*** (8.6500)	2.4045*** (4.4904)	4.5972*** (6.0158)
Observations	120	120	120	120
R-squared	0.002	0.178	0.092	0.36

Note: t-statistics in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

$$satisfy = \alpha_0 + \alpha_1 discrimination + \alpha_2 frequent + \alpha_3 gender + \alpha_4 age$$

#### 5. Recommendation and conclusion

The research shows that more than half of Didi users have not heard of the concept of price discrimination or unaware that they have experienced price discrimination. Passengers who were not affected by the awareness of price discrimination held a positive or relatively satisfactory attitude toward online ride-hailing services. Price discrimination is mainly reflected in distinct treatment based on the user's smartphone brand and markup during extreme weather or peak periods. Moreover, our survey confirmed that the main factors affecting user satisfaction are using frequency of ride-hailing services and the awareness of price discrimination. Both the low frequency and awareness of price discrimination will reduce satisfaction.

Based on the negative impact of price discrimination, we proposed two preconceived solutions in the questionnaire: promising to protect consumers' private information and offering more coupons or



discounts. These two solutions can retain some customers who transfer to other platforms to some extent. Therefore, sharing transportation platforms can encourage users to continuously choose their services by offering coupons, rewards, and discounts. What's more, the Didi platform needs to improve fairness and transparency. For instance, ride-hailing platforms can set a cap on dynamic pricing to protect users from excessive price increases during extreme weather or peak periods. Meanwhile, the platform should disclose the pricing algorithm so that users can understand the process of price formulation, which can enhance users' understanding and acceptance of price fluctuations [11]. For diverse customer groups, the shared transportation platform can provide a variety of service options, such as economy, comfort and luxury, which can meet the needs of various users and the ability to pay. Additionally, the shared transportation platform can cooperate with local governments and other transportation modes (eg:bus and subway) to participate in urban transportation planning, optimize services and provide users with more choices [12]. Moreover, the government and platforms should strengthen supervision and norms to ensure transparent and fair pricing. The government should facilitate comprehensive regulations and establish relevant supervision mechanisms to protect users' privacy and security [9].

The application of price discrimination in shared transportation has complex effects on consumer experience and behavior. On the one hand, it can improve the availability and efficiency of services through dynamic pricing. On the other hand, price discrimination will affect users' trust and satisfaction with the platform, prompting them to choose other travel modes, such as taxi, bus and subway. Sharing transportation platforms need to find a balance between pricing strategies and user satisfaction to ensure a fair and transparent service that enhances the user experience.

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