Title:

An evaluation of the effectiveness of price discrimination in the ride-hailing industry.

Acknowledgements

Table of Contents

List of Figures

Abstract

The economy of ride-hailing companies has been escalating at a rapid pace and given the case studies of Uber and Lyft as a popular brand in the industry, their surge pricing model and price discrimination have received immense attention amongst the researcher presently. This particular study has undertaken comprehensive research on determining the major determinants of the supply and demand equilibrium behind the price discrimination in Uber fares. The research further emphasizes the correlation between the route-based pricing model and price discrimination by undertaking a credible research review of the existing literature. The critical review of the literature observes the effects of price discrimination on the drivers and riders of the ride-hailing companies specifically emphasizing the Uber and Lyft service models. In seeking to address the key concepts and associated research questions related to the surge pricing and price discrimination strategies enforced by the Ride-hailing companies, this research is anticipated to shed light on the demand and supply dynamics of the Uber services. In order to obtain empirical evidence in correlation to the secondary research review, the methodology of this research encompasses qualitative data collection by conducting face-to-face semi-structured interviews with the 2 sales planners of Uber and Lyft companies in the UK. On the contrary, this research study has undertaken secondary qualitative research derived from the literature findings which are further evaluated by conducting the thematic analysis. The analytical derivations are further discussed by means of critical interpretations of both the primary and secondary results. The resulting outcome thus obtained has indicated that surge pricing has a consistent effect on creating a balance between the supply and demand equilibrium during peak hours. On the other hand, the price discrimination strategy has created a lot of criticism and negative backlash from users. The price discrimination strategy by Uber/Lyft mainly targets users from high-income backgrounds and people who are willing to pay more and take rides to affluent metropolitan location destinations more often. Conversely, the findings have also revealed that price discrimination strategy also serves as the positive welfare for the users by reducing the prices who otherwise may not consider the services. The results have significantly identified the consistent impact of the "route-based" pricing model in relation to the integration of price discrimination that may expand the travel options for the riders and cater better services which are aligned with their preferences. However, the economic theories and empirical evidences thus obtained from this research have shown ambiguous findings on the welfare effects of the price discrimination strategy by the ride-hailing companies. However, it has been asserted that discriminatory fares charged to Uber/Lyft users have significant benefits to both the drivers and the users by means of expanding the travel options for the users and optimizing the utilization of driver

vehicles. The conclusion presents the overview of the research findings and proceeds by linking the results with the objectives respectively. Lastly, a set of actionable recommendations are framed on the basis of gaps identified in the research study followed by the highlights on the scope of future research.

Chapter 1: Introduction

1.1 Introduction

There has been a rapid rise in ride-hailing platforms with significant growth in industry demand. The ride-hailing platforms such as Uber, Lyft and DiDi are focused on improving transportation services by ensuring efficient matching of the demand for rides and supply of the drivers[1]. Specifically, the Uber platform has completed more than 10 billion trips by 2022 whereas Lyft and Didi have contributed to another 11.43 billion trips and this trend continues to accelerate with time. Such a platform does not hire any drivers, but instead, they follow a business model that operates as two-sided markets between the independent contractors (acting as drivers) and the riders. The price discrimination is one of the key tools used in ride-hailing platforms to facilitate a potential match between the drivers and riders[2]. The employment of surge pricing, using real-time price adjustments is crucial in maintaining a balance between the supply and demand of rides. The designing of pricing policy on such platforms is often challenging because the prices serve to play a dual role i.e. matching the supply and demand in *time* and *space*. According to Xu, Zhengtian, Yafeng Yin, and Jieping (2020), the majority of the focus is largely emphasized on the first role i.e. employment of dynamic pricing techniques in order to mitigate the impact of temporary demand fluctuations on the ride services, which will consequently have a significant effect on the profits at any given location[3]. However, the second role is equally important owing to the fact that such platforms serve the demand across the various interconnected network locations[4]. Most specifically, the price set by the ride-hailing platform at a particular location not only determines the service levels at that location but also affects the supply of drivers across all other locations. So that even in the absence of any temporary demand fluctuations, these platforms can get sufficient profits through the price discrimination across the various networks.

---

[1] Zuanxu, Chen. "Business Analysis of Didi Chuxing in the Chinese Ride-hailing Market." *Contemporary Social Sciences* 2020, no. 5 (2020): 5.

[2] Lu, Youshui, Yong Qi, Saiyu Qi, Yue Li, Hongyu Song, and Yuhao Liu. "Say no to price discrimination: decentralized and automated incentives for price auditing in ride-hailing services." *IEEE Transactions on Mobile Computing* 21, no. 2 (2020): 663-680.

[3] Xu, Zhengtian, Yafeng Yin, and Jieping Ye. "On the supply curve of ride-hailing systems." *Transportation Research Part B: Methodological* 132 (2020): 29-43.

[4] Xu, Zhengtian, Yafeng Yin, and Jieping Ye. "On the supply curve of ride-hailing systems." *Transportation Research Procedia* 38 (2019): 37-55.

1.1 Background

The price discrimination employed by the firms refers to the practice of charging consumers based on their demand and willingness to pay[5]. Such practice is common and legal given its welfare effects on the consumers which are often ambiguous. Generally, the riders are heterogeneous based on their preferences for destination and rate of willingness to take the services. Given the pricing scheme and compensation policy of these ride-hailing platforms, the drivers have the liberty to decide on which services to select in order to maximise the earnings on each ride. Consequently, ride-sharing companies tend to segment their market demands and match fares unlike taxi schemes which are not regulated[6]. Rather, the taxi industry is criticized for practising price discrimination which is mainly characterized as surge pricing during the time of excessive demand. However, there has been little attention given to price discrimination as a matter of policy and its impact on traveller welfare.

Uber is known as the largest ride-sharing brand in the world that set its fares, particularly in accordance with the duration of a trip, destination, and demand level at the origin[7]. However, Uber-X is known to be the most commonly used Uber service and has charged varying prices based on the traveller's destination, which is referred to as third-degree price discrimination. It has been observed that passengers face high price fare when Uber raise its base fare. This is not mechanical because the changes in price surge are able to completely undo the fare changes[8]. However, surging plays a noteworthy buffering role such as the demand for Uber tends to outperform the supply less often, as a result, the ride-sharing platform does not need to employ surge pricing much often in order to clear the market. For example, a 10 percent increase in Uber fare causes a sharp fall in the average surge rate by 12 percent.

Surge Pricing and welfare to consumers

According to Chen et al (2018), surge pricing facilitates allocative efficiencies that benefits the riders (consumers), because at the time of scarcity of cabs/drivers, the uniform pricing tends to allocate

[5] Yan, Chiwei, Helin Zhu, Nikita Korolko, and Dawn Woodard. "Dynamic pricing and matching in ride-hailing platforms." *Naval Research Logistics (NRL)* 67, no. 8 (2020): 705-724.

[6] Saxena, Nripsuta Ani, Wenbin Zhang, and Cyrus Shahabi. "Unveiling and Mitigating Bias in Ride-Hailing Pricing for Equitable Policy Making." *arXiv preprint arXiv:2301.03489* (2023).

[7] Chen, M. Keith, and Michael Sheldon. "Dynamic pricing in a labour market: Surge pricing and flexible work on the Uber platform." *Ec* 16 (2016): 455.

[8] Santos, Flavio Andrew do Nascimento, Verônica Feder Mayer, and Osiris Ricardo Bezerra Marques. "Dynamic pricing and price fairness perceptions: a study of the use of the Uber app in travels." *Turismo: Visão e Ação* 21 (2020): 239-264.

the trips randomly, hence only the riders which are near to the drivers, can get a trip[9]. However, with surge pricing, the trips are allocated to the riders who have high willingness to pay thereby increasing the rider surplus. Besides the better allocation of trips, the surge pricing increases the consumer welfare further due to the time-saving matching efficiencies where the riders are picked up faster and they have a less waiting time. The riders who request for trips are highly time-sensitive; hence the welfare gain from the time savings is significantly higher for the riders than for the drivers.

1.2 Research Problem

The literature studies strongly suggest that surge pricing increases consumer welfare, however, the distribution and magnitude of welfare gains are still largely ambiguous. Even the critics suggest that surge pricing can negatively impact riders in the form of price discrimination. Alternatively, there are major indications stating the surge prices can hurt the drivers thereby leading to low earnings. Price discrimination is often referred to as the price fixing in the ongoing litigations in the UK and the US as a result of some major ride-hailing companies have voluntarily banned the concept of surge pricing[10]. For example, DiDi- the largest ride-hailing platform in China has stopped using the dynamic pricing rather they have adopted the potentially inefficient queue mechanisms[11]. Hence, it is crucial to determine that a complete ban on surge pricing will actually benefit the drivers and riders will require a robust understanding of the effects of surge pricing on consumer welfare, as the evidence in the literature is significantly limited.

The fluctuations in Uber fares have a persistent and real effect on the market; hence it is empirically evident that the ride-sharing industry has multiple complex equilibria where the supply crosses the actual demand, as a result of which the pricing choices of the individual platforms are consequential. In order to explore the welfare implications of different equilibria, it has been observed that the drivers generally prefer high-price/low utilization equilibria whereas the passengers prefer the exact

---

[9] Chen, Mengjing, Weiran Shen, Pingzhong Tang, and Song Zuo. "Optimal vehicle dispatching for ride-sharing platforms via dynamic pricing." In *Companion Proceedings of The Web Conference 2018*, pp. 51-52. 2018.

[10] Banerjee, Siddhartha, Ramesh Johari, and Carlos Riquelme. "Pricing in ride-sharing platforms: A queueing-theoretic approach." In *Proceedings of the Sixteenth ACM Conference on Economics and Computation*, pp. 639-639. 2015.

[11] Yan, Chiwei, Helin Zhu, Nikita Korolko, and Dawn Woodard. "Dynamic pricing and matching in ride-hailing platforms." *Naval Research Logistics (NRL)* 67, no. 8 (2020): 705-724.

reverse[12]. However, in sufficiently high fare equilibrium both the drivers and passengers want a fair cut, whereas at sufficiently low price equilibrium, both the riders and drivers wants a fare increase. However, despite the possibilities for aligned and mutual interests between the passengers and drivers on fare increase, the empirical results of existing research indicate the changes in fare or price discrimination are not processed based on Pareto improving range, hence the fare increase tends to have the better implications on the drivers and negative implications on the passengers.

The process of re-equilibrium is elaborated in the research study for a better evaluation of the price discrimination in Uber fares. If Uber offers a better deal to the drivers, they tend to work more hours, hence more number of drivers are chasing fewer potential trips[13]. Such an approach will lower driver utilization while increasing their hourly rate of earnings. The decline in passenger demand due to high fare prices leads to certain offset by the improvement in wait times enabled by the lower utilization of drivers. Hence, this process tends to run in reverse if driving with Uber becomes a temporary poor deal due to the fare cuts.

1.3 Research Aim

This research aims at evaluating the effectiveness of price discrimination in Ride-haling transportation platforms to determine the determinants of mobility.

1.4 Research Objectives

The following set of research objectives will be focussed on categorizing the broader topic in sequence in order to evaluate the research aim.

- To determine the major determinants of supply and demand behind the price discrimination in Uber fares
- To identify the correlation between waiting time and price discrimination through surge price
- To observe the effects of price discrimination on the drivers and riders of Uber

---

[12] Wang, Jianfu, Geoffrey A. Chua, Arvind Sainathan, and Akshay Vijayendiran. "Equilibrium queueing analysis in a ride-hailing service with sharing option." *Journal of the Operational Research Society* (2022): 1-20.

[13] Brown, Anne E. "Prevalence and mechanisms of discrimination: Evidence from the ride-hail and taxi industries." *Journal of Planning Education and Research* (2019): 0739456X19871687.

1.5 Research Questions

What are the major determinants of supply and demand behind the price discrimination in fares of ride-hailing platforms such as Uber, Lyft and DiDi?

Hypotheses

Hypothesis 1: The high price will lower the demand and increase the supply while pushing the market out of equilibrium

Hypothesis 2: There is a correlation between waiting time and price discrimination through surge price

Hypothesis 3: Price discrimination has a negative effect on the drivers and riders of Uber

Hypothesis 4: The welfare effects of Uber's price discrimination are a myth

1.6 Research Rationale

The rationale of this research study aims to investigate the price discrimination in Uber following the fluctuations in the price index in order to identify the effects of fare on the market equilibrium. Specific assumptions are required by the inferences in the base fare pricing scheme of Uber that are conditioned based on market attributes to be observed in this research. Furthermore, the research would emphasize the potential factors such as local economic conditions, climatic conditions and market share of the competitor brands in the ride-sharing services. The major contribution of this research will emphasize on the correlation between waiting time and price discrimination through the surge price dynamics. This is to present a comprehensive understanding of how the ride-sharing markets function along with the role of pricing scheme in the platforms that determines the equilibrium. This study highlights the market usefulness of an unutilized time in the Uber platforms because this particular time enables the drivers to companies to deliver higher service quality in the form of short waiting time. The productivity limit within this ride-hailing market industry if stands at 100% utilized which means fully productive drivers – is indicated as a marketplace disaster[14]. Such a trend of price and quality trade-off has not been focussed in the existing literature; however, this part has been emphasized as practically significant in designing the ride-hailing platforms.

---

[14] Chen, Mengjing, Weiran Shen, Pingzhong Tang, and Song Zuo. "Optimal vehicle dispatching for ride-sharing platforms via dynamic pricing." In *Companion Proceedings of The Web Conference 2018*, pp. 51-52. 2018.

The re-equilibrium process is directly observed owing to its computerized systems platforms that efficiently determine its market dynamics[15]. Even though the equilibrium process has been highlighted in the research studies, it could be rarely seen in practice mainly due to the direct and immediate effect of certain policy changes that can deliver diverse effect of the market adjustments. Initially, the increase in fares has the direct anticipated effects – that enabled the drivers to earn more money, whereas the passengers had to pay high prices for the same services[16]. However, with time, a new equilibrium model has been developed following the trend where both the drivers and passengers can make different decisions in response to the new fare schemes based on price discrimination. Hence, the advancement in the equilibrium model will be discussed to critically evaluate price discrimination in Ride-hailing platforms.

1.7 Research Structure

This portion of the dissertation will discuss the five key divisions of the research study into individual chapters. Each of these chapters helps in sequentially undertaking the research following the detailed perspectives of the topic.

First Chapter: Introduction

The first chapter introduces the topic and theme of the research by framing the aims, objectives, research problem, and rationale of the research and outline of the research structure. The initial chapter of the research enables the reader to understand and acknowledge the overall study comprehensively.

Second Chapter: Literature Review

This chapter reviews the existing studies relevant to the topic by the critical evaluation of theories and frameworks that serves in guiding the primary research study. The researcher attempts to select the most credible and peer-reviewed literature sources to evaluate the topic in a more standardized manner.

---

[15] Brown, Anne E. "Prevalence and mechanisms of discrimination: Evidence from the ride-hail and taxi industries." *Journal of Planning Education and Research* (2019): 0739456X19871687.

[16] Balseiro, Santiago R., David B. Brown, and Chen Chen. "Dynamic pricing of relocating resources in large networks." *ACM SIGMETRICS Performance Evaluation Review* 47, no. 1 (2019): 29-30.

Third Chapter: Research Methodology

The methodology section explores the research approach to this study and elaborately explains the selection of various research tools such as the research philosophies, methods, data collection techniques, data analysis, sampling technique, sample size and ethical concerns in the overall research process. The choices made for the research tools are explained by the application of appropriate justifications in order to ensure the selection of the most suitable tools that eventually help the researcher in a better analysis of the topic.

Fourth Chapter: Data Findings, analysis and Interpretations

Based on data collection, the researchers attempt to analyse the sources in order to generate accurate results. This section presents the primary data findings, based on which the researcher opts to critically analyze the findings in reference to the literature theories and demonstrate to what extent the research objectives are achieved.

Fifth Chapter: Conclusion and Recommendations

The final chapter concludes the overall study by drawing on the literature, research methods, and results together in order to conclude the research objectives. The research finally closes with a set of recommendations presented in accordance with the gaps identified in the study along with the implications of future scope.

Chapter 2: Literature Review

2.1 Dynamic Pricing

The concept of dynamic pricing was mainly limited to the hotels and airlines industry almost a decade before. The advancement in technology has led to rapid changes where companies and users can now make use of Smartphones and the Internet to communicate prices instantaneously while the integration of big data in the industry has created better pricing algorithms[17]. Hence, large number of companies is using the tool of dynamic pricing specifically to bring a significant shift to increase welfare through flexible prices and efficiency gains. The ride-sharing companies segment the market demand mainly due to the fact that they do not regulate the fares unlike taxis, hence these companies have been criticized for their price discrimination practices which are mainly characterized by "surge pricing" during the phase of excessive demand.

2.2 Surge Pricing

The ride-hailing platforms set a regular price for their consumer market, however depending on the typical supply and demand conditions; the current price at a specific location tends to be higher than the regular price which is referred to as the surge price[18]To implement surge pricing, the consumer market is split into multiple zones based on which the platform keeps updating the current price across each of the zones periodically. The consumers check the current price in their zone and connect to the platform to request a service. Surge pricing is employed by the majority of Ride-hailing platforms such as Uber, Lyft, Handy, DiDi, Postmates, and Instacart. The ride-hailing platforms such as Uber and Lyft have become the prominent adopters of dynamic pricing or often known as surge pricing. These platforms adjust their pricing strategy in response to the demand and supply in real-time to ensure the smooth functioning of the market. In other words, Uber as the largest ride-sharing brand in this industry, generally set the fares typically based on the duration, trip distance and demand level at the origin[19]. In criticism, Chevalier, Judith and Anil (2019) have indicated that surge pricing is a form of price discrimination that can be disadvantageous for riders and drivers alike that needs proper planning of actions around the surge pricing. According to

[17] Chen, M. Keith, and Michael Sheldon. "Dynamic pricing in a labour market: Surge pricing and flexible work on the Uber platform." *Ec* 16 (2016): 455.

[18] Hu, Bin, Ming Hu, and Han Zhu. "Surge pricing and two-sided temporal responses in ride-hailing." *Manufacturing & Service Operations Management* 24, no. 1 (2022): 91-109.

[19] Sun, Zhongmiao, Qi Xu, and Baoli Shi. "Dynamic pricing of ride-hailing platforms considering service quality and supply capacity under demand fluctuation." *Mathematical Problems in Engineering* 2020 (2020): 1-26.

Castillo et al (2017), surge pricing is fairly prevalent across Uber's platform[20]. He stated the percentage of time surge pricing deployed across the four major cities of the U.S are as follows: 17% in Los Angeles, 28% in Chicago, 14% in New York, and 25% in San Francisco, whereas Harish and Upender (2019) found that the surge pricing in Uber is used 14% of the time in the Midtown Manhattan and 57% of the time in the downtown of San Francisco[21].

The traditional strategies of these ride-hailing platforms are straightforward. The reports by () agree that the surge pricing tool is useful for maintaining a balance between the supply and demand across the market zones specifically when there is a shortage of drivers to meet the rising demand. Surge pricing is anticipated to function in two different strategies, Firstly, it introduces price discrimination for the consumers who have a low willingness to pay, hence a surge pricing scheme will efficiently allocate the limited supply of drivers to the riders who value the service the most[22]. Secondly, surge pricing increases the compensation for drivers in a particular zone and reduces the extent of supply shortage. Hence, surge pricing is to be deployed in the zones where the demand for cars exceeds the supply range.

2.3 Uber surge pricing

Uber has employed two different strategies for maximising the consumers' willingness to spend on the ride i.e. by either capturing excessive or unattainable consumer surplus. In fact, Uber has stopped highlighting the surge pricing information on App, rather the Uber App now shows "Fares are higher due to increased demand". Price discrimination/surge pricing is a classic supply and demand problem; however, it has been considered a strategic initiative to get more numbers of cars on road during the busiest hours to ensure the service reliability[23]. When the road has enough availability of cars, the prices levels down to normal. Uber encourage more drivers to get on the road to stabilize the supply by increasing the price. However, Uber is criticized for this approach owing to the protests against the exploitation of riders during holidays or emergencies. It has been observed

---

[20] Castillo, Juan Camilo, Dan Knoepfle, and Glen Weyl. "Surge pricing solves the wild goose chase." In *Proceedings of the 2017 ACM Conference on Economics and Computation*, pp. 241-242. 2017.

[21] Guda, Harish, and Upender Subramanian. "Your Uber is arriving: Managing on-demand workers through surge pricing, forecast communication, and worker incentives." *Management Science* 65, no. 5 (2019): 1995-2014.

[22] Hu, Bin, Ming Hu, and Han Zhu. "Surge pricing and two-sided temporal responses in ride-hailing." *Manufacturing & Service Operations Management* 24, no. 1 (2022): 91-109.

[23] Hoffman, David Lynn, Nina Radojevich-Kelley, and Debora J. Gilliard. "UBER: A Great Disrupter or Not?." *Journal of Marketing Development and Competitiveness* 15, no. 2 (2021): 50-76.

that passengers face high price when Uber raise the base fare. This is not entirely mechanical because the changes in surge pricing can completely undo the fare changes. Hoffman et al (2021) opine that a 10% increase in fare can lead to an average surge rate fall of 2%[24].

Uber has received immense criticism for its pricing policy which is primarily intended to profit maximising by targeting affluent passengers who mostly travel across expensive metropolitan destinations. Alternatively, the price discrimination by Uber tends to have positive welfare effects by the mechanism of reducing the fare costs to attract price-sensitive travellers who might not otherwise take the services[25]. In addition, Uber often reward travellers with a discount on fares for taking Uber ride in less popular areas/markets.

2.4 Price discrimination

Price discrimination is a pricing strategy whereby the firms sell the same product/services at varying prices to different consumers. Song et al (2020) opined that price discrimination results in higher revenue for the firm[26]. However, the concept of price discrimination is different across diverse industries. For instance, airline tickets, hotel rooms and professional services render different pricing schemes for different target customers. For example, while paying for a seat in the airline, the price will vary based on the type of seat across various locations[27]. This is mainly because the customers are willing to pay more, hence the airlines tap the consumer surplus by charging them more cost on slight variations of the services.

The economic literature defines three major categories of price discrimination:

(1) **First-degree price discrimination** – this approach of price discrimination approach where the individual customers are charged in accordance with his/her full willingness to make

---

[24] Hoffman, David Lynn, Nina Radojevich-Kelley, and Debora J. Gilliard. "UBER: A Great Disrupter or Not?." *Journal of Marketing Development and Competitiveness* 15, no. 2 (2021): 50-76.

[25] Liu, Yang, and Connor Greene. "The Dark Side of Big Data: Personal Privacy, Data Security, and Price Discrimination." *Digital Transformation in Business and Society: Theory and Cases* (2020): 145-153.

[26] Song, Jaein, Yun Ji Cho, Min-Hee Kang, and Kee Yeon Hwang. "An application of reinforced learning-based dynamic pricing for improvement of ridesharing platform service in Seoul." *Electronics* 9, no. 11 (2020): 1818.

[27] Banerjee, Siddhartha, Ramesh Johari, and Carlos Riquelme. "Dynamic pricing in ridesharing platforms." *ACM SIGecom Exchanges* 15, no. 1 (2016): 65-70.

payment[28]. It is referred to as the benchmark of price discrimination which is ideally unattainable because the firms may not be able to observe all the relevant heterogeneity of consumers accurately and discriminate the prices accordingly.

(2) **Second-degree price discrimination** – The price discrimination takes place by charging different price for a specific quantity or amount of products/services consumed. For example, a consumer receives discount on multiple purchases/bulk purchases, or providing reward cards to the frequent shoppers to offer discounts on the future products[29].

(3) **Third-degree price discrimination** – this involves the practice of setting different prices for a different customer segment which are categorized in accordance to their characteristics as observed from their purchase history[30]. While in this type of discrimination, the seller is unlikely to observe the heterogeneity in consumers accurately, hence the pricing scheme is designed based on general group characteristics rather than individual characteristics.

2.5 Supply and Demand Equilibrium

Cashore et al (2022) proposed a model that comprises three key parts i.e. supply, demand and relevant technology[31]. On the demand side, the riders can decide whether to open the app and request a trip. Alternatively, on the supply side, the drivers can decide on their flexible work schedule and which way to move when they are available. The matching technology matches the drivers with the requested trip based on the location between the rider and driver, to reduce the waiting time for pickup. All these three parts are integrated into the model of spatial equilibrium in an attempt to stimulate market behaviour by employing alternative pricing policies. On the contrary, Lu et al (2020) argues that high price fare will eventually lower the demand while increasing the

---

[28] Gautier, Axel, Ashwin Ittoo, and Pieter Van Cleynenbreugel. "AI algorithms, price discrimination and collusion: a technological, economic and legal perspective." *European Journal of Law and Economics* 50, no. 3 (2020): 405-435.

[29] Chevalier, Judith A., and Anil K. Kashyap. "Best prices: Price discrimination and consumer substitution." *American Economic Journal: Economic Policy* 11, no. 1 (2019): 126-59.

[30] Belleflamme, Paul, Wing Man Wynne Lam, and Wouter Vergote. "Competitive imperfect price discrimination and market power." *Marketing Science* 39, no. 5 (2020): 996-1015.

[31] Cashore, J. Massey, Peter I. Frazier, and Eva Tardos. "Dynamic Pricing Provides Robust Equilibria in Stochastic Ride-Sharing Networks." In *Proceedings of the 23rd ACM Conference on Economics and Computation*, pp. 301-302. 2022.

supply which in turn push the market out of equilibrium[32]. In order to match the pattern of supply and demand realistically, this model will take into account the high-resolution temporal and spatial heterogeneity along with the determinant of randomness. As opined by Xu et al (2019), the surge pricing algorithm could be used for evaluating the short-run elasticities- i.e. how the real-time change in pricing affects the rider's decision and driver's movement in a requested trip[33]. The estimations made by Wang et al (2022) have implied that riders are higher inelastic in the short run both in terms of pickup times and prices[34]. The drivers are more responsive to prices in the long run whereas the riders are focused on the value of time. This aspect is consistent with the trips that take place during time-sensitive situations such as the riders have an appointment to attend, or have to reach the airport in time to catch a flight[35]. On the other hand, the drivers are more likely to move to areas that have high surge multipliers. After the integration of these estimations into the equilibrium model, the simulations have appropriately fit into the temporal and spatial patterns of the market behaviour while matching the distribution of surge pricing more effectively.

Chang et al (2021) found that price discrimination increases the total welfare by 3.53% of the gross revenue and $0.41% per trip which is relative to uniform pricing. This indicates that price discrimination caters efficiency gains to the market[36]. Alternatively, price discrimination has dissimilar effects on other aspects of the market such as the rider surplus increasing by 6.98%, but the short-run profit and driver surplus decreasing by 1.42% and 1.97% respectively. This causes asymmetrical welfare effects which are explained in three different parts[37]. The price discrimination yield allocation efficiencies that mainly benefit the riders. During the situation of scarcity, the uniform pricing tends to allocate the trips randomly, eventually, the riders who are near the drivers get the trip. By the integration of price discrimination, trips are allocated to the riders who are

---

[32] Lu, Youshui, Yong Qi, Saiyu Qi, Yue Li, Hongyu Song, and Yuhao Liu. "Say no to price discrimination: decentralized and automated incentives for price auditing in ride-hailing services." *IEEE Transactions on Mobile Computing* 21, no. 2 (2020): 663-680.

[33] Xu, Zhengtian, Yafeng Yin, and Jieping Ye. "On the supply curve of ride-hailing systems." *Transportation Research Procedia* 38 (2019): 37-55.

[34] Wang, Jianfu, Geoffrey A. Chua, Arvind Sainathan, and Akshay Vijayendiran. "Equilibrium queueing analysis in a ride-hailing service with sharing option." *Journal of the Operational Research Society* (2022): 1-20.

[35] Duan, Yige, and Chunchun Liu. "Optimal Price Mechanism for Ride-Hailing Platform." *Available at SSRN 3426328* (2020).

[36] Chang, Yenjae, Clifford Winston, and Jia Yan. "Does Uber Benefit Travelers by Price Discrimination?." (2021)

[37] Chang, Yenjae, Clifford Winston, and Jia Yan. "Does Uber Benefit Travelers by Price Discrimination?." (2021)?

willing to make more payments while increasing the rider surplus[38]. On the other hand, drivers have no benefit from a better allocation of trips. In this model, the value for the trip is fairly homogeneous that simply follows the earnings from the trip minus the physical cost of completion of the ride, which is the same for each driver. Hence, the driver surplus does not get increased from a better allocation.

According to Lei et al (2019), the riders have more value of time than the drivers[39]. Hence, besides the allocation of better trips, price discrimination can further increase welfare by time-saving efficiencies, because the riders are picked up more quickly and drivers have to wait less between their trips. Here, the value of time for the drivers indicates the average hourly earnings net of their driving costs, which is a little above the minimum wage. Hence, the welfare gain from time-saving is substantially high for the riders than for their drivers.

2.6 Price-discrimination in ride-hailing platforms

Price discrimination in the ride-hailing companies i.e. in Uber is set on the grounds of primary intention to increase the profits by targeting affluent passengers who set their trips to the expensive metropolitan destinations. However, it has been observed that price discrimination is set when the drivers are scarce and there are possibilities of huge trip failure. It implies that price discrimination may have positive effects on the consumer welfare by reducing the trip costs and attract the price-sensitive travellers in the less popular areas[40].In other words, Price discrimination by Uber enhances the welfare of travellers for most of the trips in all respect by expanding their travelling options. On the other hand, the drivers who earn during busy and peak time tends to have high earning owing to price discrimination. In contrast, the prices and earnings of the drivers are lower during the off-season. Alternatively, the riders are affected by high prices who request trips on a Friday noon or Saturday noon when the Uber fares are highest.

The public debate on the significance of price discrimination has specifically emphasized its negative effects on drivers and riders. The results obtained by Tirachini (2020), have suggested that

[38] Brown, Anne E. "Prevalence and mechanisms of discrimination: Evidence from the ride-hail and taxi industries." *Journal of Planning Education and Research* (2019): 0739456X19871687.

[39] Lei, Chao, Zhoutong Jiang, and Yanfeng Ouyang. "Path-based dynamic pricing for vehicle allocation in ridesharing systems with fully compliant drivers." *Transportation Research procedia* 38 (2019): 77-97.

[40] Wei, Xin, Guofang Nan, Runliang Dou, and Minqiang Li. "Optimal business model for the monopolistic ride-hailing platform: Pooling, premier, or hybrid?." *Knowledge-Based Systems* 204 (2020): 106093.

complaints made by Uber drivers are not well-found[41]. Irannezhad and Renuka (2022) opine contrasting views by stating that the high surge price of Uber on the city level tends to reduce the average time of waiting, which is often regarded as the proxy of service quality[42]. Nevertheless, the study has found several counter-evidences which will erode the effectiveness of surge pricing tools. Hence, there are mainly two noteworthy findings by Griffith (2019), (1) the drastic price discrimination discourages the drivers to rely on the pricing tools, (2) Uber's surge pricing reduces the number of drivers in the adjacent areas instead of getting more new drivers on road for short-term[43].

2.7 Price Discrimination in Charging Fares to Customers

From the economic aspect, "price discrimination" is designed by the service providers specific to individual customers based on their travel habits, pick up and drop destinations and personal information, and then provide the same service/commodity to different users at a different price[44].

The Ride-hailing platforms deploy price discrimination in fare prices whereas the consumers are charged diverse fare costs based on variable factors. For example, the airline industry deploys the variant of directional price discrimination based on the trip destination and origin, and time of service (i.e. business travellers tends to make reservations lately by accepting high price). The research by Namin et al (2020) indicates that high-income passengers are less price sensitive and tend to accept the high price[45]. However, in the case of ride-hailing platforms (RHP), the customers are more price sensitive towards the fare. The Uber fare price variation specifically depends on relevant variations such as the time of day (i.e. peak or low hours), the gap between demand and supply, and the efficiency of the service. In critic, Gautier et al (2020) argues that the RHP may charge a high price to loyal/frequent users than new users who registered recently, or these

---

[41] Tirachini, Alejandro. "Ride-hailing, travel behaviour and sustainable mobility: an international review." *Transportation* 47, no. 4 (2020): 2011-2047.

[42] Irannezhad, Elnaz, and Renuka Mahadevan. "Examining factors influencing the adoption of solo, pooling and autonomous ride-hailing services in Australia." *Transportation Research Part C: Emerging Technologies* 136 (2022): 103524.

[43] Griffith, Keyawna. "The Uber Loophole That Protects Surge Pricing." *Va. J. Soc. Pol'y & L.* 26 (2019): 34.

[44] Leibbrandt, Andreas. "Behavioral constraints on price discrimination: Experimental evidence on pricing and customer antagonism." *European Economic Review* 121 (2020): 103303.

[45] Namin, Aidin, Dinesh K. Gauri, and Robert J. Kwortnik. "Improving revenue performance with third-degree price discrimination in the cruise industry." *International Journal of hospitality management* 89 (2020): 102597.

platforms may charge a high price to a user with consumption power than to a user with low consumption power, even it may charge more to users whose phone battery is low[46]. Hence, price discrimination tends to cause financial losses to the users in long run.

2.8 Route-based price discrimination

The ride-hailing platforms such as Uber make use of a "route-based pricing system" and deploy pricing discrimination in charging customers differently based on their location and routes of travel[47]. This system is significantly diverse from the traditional pricing model that charges its consumers based on commodities/services they purchase. Hence, the "route-based pricing" system by Uber calculates the fares by adding up mileage, time, and multipliers based on geographic demand. The route-based pricing scheme is reportedly estimated on the route and time of day specific prices by taking into the demand conditions and surge pricing into consideration. Uber. In critic, Liu, and Connor (2020) argues that Uber employ price discrimination by comparing the ride history and personal data of users (specifically the frequency of ride, willingness to pay, and economic background) in order to derive personalized prices[48].

In the context of customer welfare, such price discrimination can help companies to improve their profit and maximise shareholder values, however, it is highly alarming for the customers[49]. Personalized price discrimination may benefit consumers who have a low willingness to pay (WTP). However, the consumers end up paying prices close to its WTP which will leave them with less surplus.

2.9 Price discrimination based on Geography

This form of price discrimination is adopted by Uber where it exploits the geographic dimensions in making its pricing decision. In contrast, Uber customers often object to paying the varying amount

---

[46] Gautier, Axel, Ashwin Ittoo, and Pieter Van Cleynenbreugel. "AI algorithms, price discrimination and collusion: a technological, economic and legal perspective." *European Journal of Law and Economics* 50, no. 3 (2020): 405-435.

[47] Wertenbroch, Klaus. "Marketing Automation: Marketing Utopia or Marketing Dystopia?." *NIM Marketing Intelligence Review* 13, no. 1 (2021): 18-23.

[48] Liu, Yang, and Connor Greene. "The Dark Side of Big Data: Personal Privacy, Data Security, and Price Discrimination." *Digital Transformation in Business and Society: Theory and Cases* (2020): 145-153.

[49] Santos, Flavio Andrew do Nascimento, Verônica Feder Mayer, and Osiris Ricardo Bezerra Marques. "Dynamic pricing and price fairness perceptions: a study of the use of the Uber app in travels." *Turismo: Visão e Ação* 21 (2020): 239-264.

for the same distance travelled[50]. Several other businesses have similar price-based decisions based on the geography of location and implicitly focus on the WTP of the consumers. For example, restaurants, cafes, and bars operating within popular tourists destinations are often found to charge significantly more amount in comparison to similar venues in their neighbourhood locations[51]. However, such examples may not reflect or prove the actual differential costs.

The price discrimination of sellers is typically based on several information types that include customer location, geography, time of the day, characteristics of the customer's phone operating system, and purchase history. The evidence from the study by Jiang et al (2018), suggests that the geographic location of consumers affects price discrimination to a great extent[52]. For instance, Uber obtain the geographical data of its customers in order to devise the price discrimination strategy. Reportedly, Uber utilise the location and time to decide on its price discrimination while estimating the rider's "Willing to Pay" for a specific route at the peak time of a day or making the adjustment of prices accordingly[53].

2.10 Willingness to Pay

The fares in ride-hailing companies are estimated on the basis of the customer's "willingness to pay" which is described as the maximum amount a consumer would like to pay for a service/product). Shoman and Ana Moreno (2021) state that an RHP calculate the propensity of its riders to pay high price for a specific route at a particular time of day (i.e. it can be the peak time)[54]. For example, if a rider travelling from a wealthy/posh area, he/she will be charged more than a person who is travelling from a suburban region/low-economic area of the town, even if the distance and traffic

---

[50] Hojnik, Janja. "Tell me where you come from and I will tell you the price: Ambiguous expansion of prohibited geographical price discrimination in the EU." *Common Market Law Review* 56, no. 1 (2019).

[51] Chen, Le, Alan Mislove, and Christo Wilson. "Peeking beneath the hood of Uber." In *Proceedings of the 2015 internet measurement conference*, pp. 495-508. 2015

[52] Jiang, Shan, Le Chen, Alan Mislove, and Christo Wilson. "On ridesharing competition and accessibility: Evidence from Uber, Lyft, and taxi." In *Proceedings of the 2018 World Wide Web Conference*, pp. 863-872. 2018.

[53] Bimpikis, Kostas, Ozan Candogan, and Daniela Saban. "Spatial pricing in ride-sharing networks." *Operations Research* 67, no. 3 (2019): 744-769.

[54] Shoman, Maged, and Ana Tsui Moreno. "Exploring preferences for transportation modes in the City of Munich after the recent incorporation of ride-hailing companies." *Transportation Research Record* 2675, no. 5 (2021): 329-338.

are the same[55]. In other words, RHP charges high prices to its customers who are willing to pay more.

Such companies make use of the huge amount of fine-grained data that can derive customer preferences, demand and willingness to pay to make informed guesses on their individual price sensitivity. The machine learning techniques and sophisticated neural network system undertake several factors such as destination, booking location, trends, ride history and dependency into account to determine the estimated fare for the individual customers[56]. Consequently, reports by Shoman and Ana (2021) have confirmed that Uber just not employ price discrimination and raise the fares when demand for rides exceeds the supply of drivers, rather it charges high prices to customers based on their willingness to pay to emphasize on the route based price-discrimination[57].

Price discrimination has been widely integrated across the leading industries of Airlines and E-commerce industries which has been a successful approach towards improving their profitability. The examples presented as follows-

(1) The airline industry implement price discrimination in charging fare with respect to the route type, types of seat booked, and time of booking, etc[58].

(2) Cheaper movie tickets on specific days of the week are another prominent example of price discrimination that charges its customers based on the day and time of the week on which they decide to watch the movie.

(3) In the early 2000s, the leading e-commerce brand Amazon has introduced price discrimination to offer goods at a low price to consumers who were identified as new customers.

---

[55] Assegaff, Syafiq Basri, and Stanley Oktavianus Pranoto. "Price determines customer loyalty in ride-hailing services." *American Journal of Humanities and Social Sciences Research* 3 (2020): 453-463.

[56] Hong, Soo Jeong, Johannes M. Bauer, Kwangjin Lee, and Nelson F. Granados. "Drivers of supplier participation in ride-hailing platforms." *Journal of management information systems* 37, no. 3 (2020): 602-630.

[57] Shoman, Maged, and Ana Tsui Moreno. "Exploring preferences for transportation modes in the City of Munich after the recent incorporation of ride-hailing companies." *Transportation Research Record* 2675, no. 5 (2021): 329-338.

[58] Namin, Aidin, Dinesh K. Gauri, and Robert J. Kwortnik. "Improving revenue performance with third-degree price discrimination in the cruise industry." *International Journal of hospitality management* 89 (2020): 102597.

Such a price discrimination strategy enables the companies to generate more revenue while expanding the market simultaneously. On the contrary, Santos et al (2020) indicates the difference between what the company charge a customer and how much the customer is willing to pay is referred to as the "consumer surplus"[59]. Consequently, Price discrimination is an effective tool for companies to convert the entire consumer surplus into its revenue.

Price discrimination is the practice of charging variable fare charges to different customer groups for the same service/product[60]. Hence, the company must be able to evaluate the price sensitivity of individual customers before the implementation of this pricing scheme. While the economists refer to three specific models of price discrimination i.e. first-degree, second degree and third-degree, the Uber Company adopts third-degree price discrimination. The data derived by Uber is not yet granular to integrate first-degree discrimination, even though its pricing scheme is entirely based on the "customer group" rather than focusing on the individual customers[61]. However, ride-hailing companies like Uber integrate price discrimination based on the routes, such as some routes are more popular with high-income customers(which is an effective determinant to price discrimination). In argument, She et al (2020) claims that the trend of price discrimination following in the ride-hailing companies is mainly focused on the individual level helps the company to increase its customer base by charging less to the low-income passengers who have low WTP and generally find the Uber fares too high[62]. Alternatively, the RHP charge high fare to high-income people who are willing to pay more and can afford the extra cost. Hence, decoupling the driver's earnings from the rider payment implies that RHP can integrate low-fare charges in the low-income regions without being concerned that drivers will avoid these pickups owing to their low fare price.

2.11 Algorithmic Price Discrimination

Rosenblat and Luke Stark (2016) criticized the price discrimination by Uber owing to the characteristics of customer's digital devices (smartphones, tablets, etc) that have a strong trigger to

---

[59] Santos, Flavio Andrew do Nascimento, Verônica Feder Mayer, and Osiris Ricardo Bezerra Marques. "Dynamic pricing and price fairness perceptions: a study of the use of the Uber app in travels." *Turismo: Visão e Ação* 21 (2020): 239-264.

[60] Wei, Xin, Guofang Nan, Runliang Dou, and Minqiang Li. "Optimal business model for the monopolistic ride-hailing platform: Pooling, premier, or hybrid?." *Knowledge-Based Systems* 204 (2020): 106093.

[61] Tirachini, Alejandro. "Ride-hailing, travel behaviour and sustainable mobility: an international review." *Transportation* 47, no. 4 (2020): 2011-2047.

[62] She, Shengxiang, Haoran Xu, Zehong Wu, Yunzhang Tian, and Zelin Tong. "Dimension, content, and role of platform psychological contract: based on online ride-hailing users." *Frontiers in Psychology* 11 (2020): 2097.

the differential pricing strategy of the ride-hailing companies[63]. For instance, the research study conducted by Bonatti and Gonzalo (2020) has stated that Safari and Apple iOS users are shown high price occasionally for a similar trip[64]. The sophisticated algorithms enable to identify the associations between the consumer's WTP and other factors to guide the decision of pricing strategy. The most useful tool of price discrimination used by Uber is the consumer's purchase history and browsing history as a source of information for the customer's WTP for pricing algorithms.

Such price discrimination based on algorithm is apparently at the rise, however, there are several critical limitations to this personalized pricing. The limitation refers to arbitrage (i.e. the practice of taking advantage of the differential prices to capitalise on the price differentiation) when a consumer has low WTP, the estimation of price discrimination becomes difficult[65]. Hence, personalized pricing is more likely to occur across the markets in which arbitrage opportunities are restricted such as service markets and markets where the high transactional costs (search costs) which makes the arbitrage even more difficult. The next limitation of personalized pricing is on fairness. The users often complains of paying a higher price for the exact same distance in comparison to another consumer often feels wrong and such outrage is challenging for a business to flourish[66]. However, in the Uber business, personalized pricing may occur in the market where the consumers are unaware of the pay schemes of the ride-hailing companies. Also, the differential pricing gets coupled with the heterogeneous products/services, the comparative analysis tends to become even more challenging.

2.12 Market forecast sharing with Drivers

The ride-hailing platforms such as Uber and Lyft provide market forecasts to their drivers continuously about the locations, demand forecasts, and extent of their needs. The drivers new to this platform particularly rely on these forecasts whereas the experienced drivers are highly

---

[63] Rosenblat, Alex, and Luke Stark. "Algorithmic labour and information asymmetries: A case study of Uber's drivers." *International Journal of Communication* 10 (2016): 27.

[64] Bonatti, Alessandro, and Gonzalo Cisternas. "Consumer scores and price discrimination." *The Review of Economic Studies* 87, no. 2 (2020): 750-791.

[65] Guda, Harish, and Upender Subramanian. "Your Uber is arriving: Managing on-demand workers through surge pricing, forecast communication, and worker incentives." *Management Science* 65, no. 5 (2019): 1995-2014.

[66] Edelman, Benjamin G., and Damien Geradin. "Efficiencies and regulatory shortcuts: How should we regulate companies like Airbnb and Uber." *Stan. Tech. L. Rev.* 19 (2015): 293.

dependent on the forecasts to obtain symmetric information about the supply and demand[67]. For example, the market forecast creates a signal for the drivers to move from non-surge to surge zone. According to Kim et al (2018), to match supply with demand, ride-hailing platforms employ three specific tools that include strategic surge pricing, sharing of forecasts with the drivers, and price discrimination[68].

While the magnitude of demand surge is low (that typically specifies the extent of under-supply in the surge zone), the ride-hailing platforms share the zone-specific forecasts with the drivers, but they do not influence the moving decisions of drivers. Alternatively, when the magnitude of the demand surge is high, the platform tends to intervene more in making the drivers move[69]. The interventions take place in the form of strategic surge pricing/price discrimination based on the number of drivers they want to move to the specific zone where the demand is high and supply is less. For example, when the demand surge is significantly high in a particular zone, the Uber platform would require a substantial number of drivers to move to that zone. In such cases, price discrimination is considered profitable.

In critic, Berger et al (2018) opined that there is a spatial mismatch of supply and demand that tends to persist even if the drivers are informed about the market conditions[70]. On the supply side, the drivers are the decision maker of when to start or stop working, which zone to move when they are available. To implement the surge pricing, the consumer market is split into multiple small regions and zones where the Uber platform periodically update the current price across each of the zones. The drivers typically have the access to "surge heat maps" that can display the surge prices (market forecasts) in the various zones. The sharing of market forecasts with the drivers encourage them to become at the zones where they are needed the most. Furthermore, the industry experts and researchers asserted that surge pricing is effective for maintaining balance between the supply and demand in the surge zones specifically when the shortage of drivers are relative to demand. In addition, She et al (2020) have stated that surge pricing is anticipated to work in two chief ways i.e.

---

[67] Jiang, Baojun, Lin Tian, Yifan Xu, and Fuqiang Zhang. "To share or not to share: Demand forecast sharing in a distribution channel." *Marketing Science* 35, no. 5 (2016): 800-809.

[68] Kim, Kibum, Chulwoo Baek, and Jeong-Dong Lee. "Creative destruction of the sharing economy in action: The case of Uber." *Transportation Research Part A: Policy and Practice* 110 (2018): 118-127.

[69] Hall, Jonathan V., and Alan B. Krueger. "An analysis of the labour market for Uber's driver-partners in the United States." *Ilr Review* 71, no. 3 (2018): 705-732.

[70] Berger, Thor, Chinchih Chen, and Carl Benedikt Frey. "Drivers of disruption? Estimating the Uber effect." *European Economic Review* 110 (2018): 197-210.

Firstly, it helps in pricing out the consumers having lower willingness to pay, the surge pricing can efficiently allocate the limited supply of drivers to the consumers who need the Uber rides the most. Secondly, the surge pricing increases the compensation of drivers at the high-demand zone and attract more number of drivers to move to that zone by reducing the extent of supply shortage. Hence, the surge pricing and sharing of forecast information helps in improving the functioning of on-demand consumer market by directing the drivers to the zones where demand is high and supply is less.

2.12.1 Estimation of Trip Price

The price of trips are largely depends on a set of parameters by Uber. It primarily encompasses a per-mile distance multiplier, per-minute time multiplier, differentiating services fees across the different markets and fixed initial charge that estimates the price discrimination[71]. To calculate the price discrimination for different passengers, these parameters are multiplied by the trip distance and realized the time to reach the destination which will be multiplied by the surge multiplier which is effective when the trip is ongoing. The surge multiplier in such platforms is algorithmically set to respond to the imbalance in supply and demand.

2.12.2 Hours worked by the drivers

The total number of hours worked by a driver is the total time spent by a driver online on the Uber platform. The overall time will encompass the trip timings, en route to pick up the passenger, or being available to receive the dispatch requests. Such a computer-mediated nature of the functioning can effectively quantify the hours worked without any error[72]. The drivers often keep them available for dispatching while commuting to the main city spots such as city centres, shopping malls, airports, etc[73]. The drivers often get the flexibility to drive with multiple ride-sharing platforms simultaneously, whereas in some cases, they keep the apps open and turn down the ride requests as needed.

---

[71] Liu, Yang, and Connor Greene. "The Dark Side of Big Data: Personal Privacy, Data Security, and Price Discrimination." *Digital Transformation in Business and Society: Theory and Cases* (2020): 145-153.

[72] Guda, Harish, and Upender Subramanian. "Your Uber is arriving: Managing on-demand workers through surge pricing, forecast communication, and worker incentives." *Management Science* 65, no. 5 (2019): 1995-2014.

[73] Sun, Zhongmiao, Qi Xu, and Baoli Shi. "Dynamic pricing of ride-hailing platforms considering service quality and supply capacity under demand fluctuation." *Mathematical Problems in Engineering* 2020 (2020): 1-26.

2.13 Uber Case Scenario

The Uber company have published its case study that clearly highlights its surge pricing strategy on the total number of drivers available when the demand is high. The case study data presented by Uber have the assessment of surge price rising in after the concert of Singer Ariana Grande finished at the Madison Square Garden in New York.

Figure 1: Uber Ride requests and Users opening up Uber App

● RIDE REQUESTS ● USERS OPENING THE APP
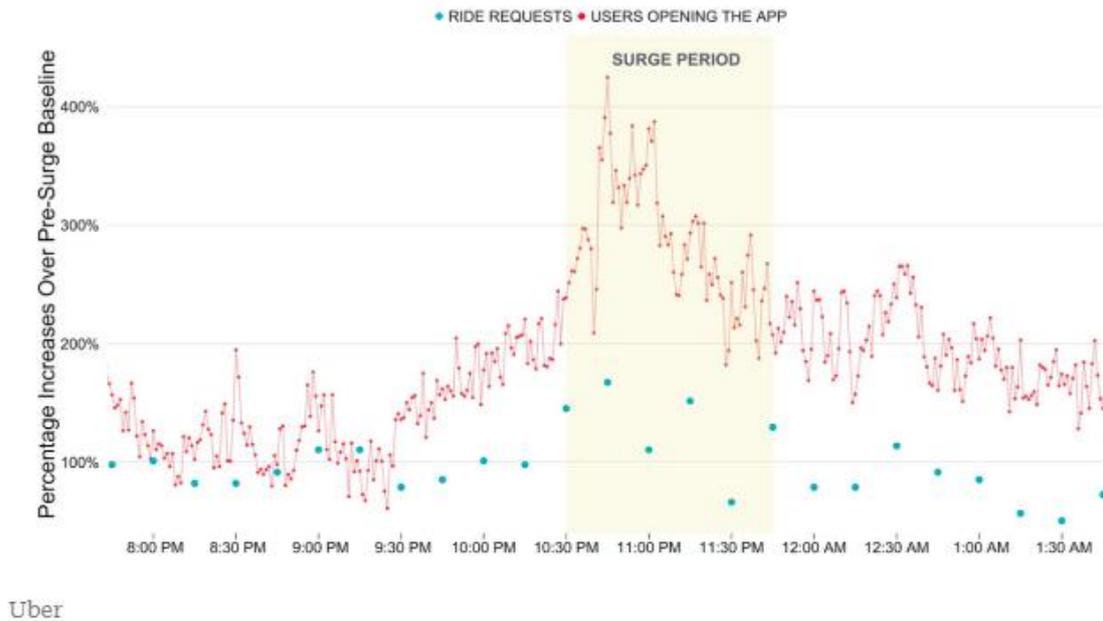
(Ref: Cook, 2015)

Figure (1) demonstrates the percentage change in the total number of people opening Uber, along with the increase in ride requests on the night of the Ariana Grande concert.

The concert finished off at the time of around 10.40 Pm when the total number of users opens the Uber App and requested rides have dramatically increased to peak (Cook, 2015). This is when the surge price system of Uber sets in i.e. as more number of people request for a ride, the price of rides increases automatically to balance the demand-supply curve.

Figure 2: Driver Supply

(Ref: Cook, 2015)

From the above figure (2), it can be observed that the percentage of driver supply in that area increases following the surge pricing into action after the Ariana Grande concert.

Figure 3: Uber Driver's App interface showing the surge pricing in Red Highlight

(Ref: Cook, 2015)

The figure shows the areas with surge pricing in effect are highlighted in red on the Uber Driver's App.

The figure above explicitly indicates that surge pricing causes more number of drivers to work in that particular area. On the other hand, it can be stated that Uber drivers mostly get to know much ahead of time that the concert was about to end which they intend to correlate with the surge pricing highlights that attract them to that particular zone[74]. According to the study conducted by Rosenblat and Luke (2016), it has been observed that Uber drivers actively seek surge pricing as it

---

[74] Cook, J. (2015) *These elegant charts show why Uber's hated surge pricing is actually a good thing*, *Business Insider*. Available at: https://www.businessinsider.in/tech/these-elegant-charts-show-why-ubers-hated-surge-pricing-is-actually-a-good-thing/articleshow/49014933.cms (Accessed: April 7, 2023).

appears[75]. In fact, the drivers move around different parts of the cities to actively leverage the surge pricing as a result of which they get paid more.

A similar trend was noticed during New Year's Eve 2018 when the surge pricing system broke down for a span of approximately 26 minutes due to a technical glitch.

Figure 4: Surge Outage

Uber

Uber

(Ref: Cook, 2015)

The above figure (4) shows the percentage of completed ride requests over the same night.

When the surge system of Uber dropped down, the total number of Uber drivers available to give rides to passengers declined significantly. Consequently, 100% of the ride requests were fulfilled

---

[75] Rosenblat, Alex, and Luke Stark. "Algorithmic labour and information asymmetries: A case study of Uber's drivers." *International Journal of Communication* 10 (2016): 27.

until the time of 2.30 am as the outage began. At that particular point, the percentage of total fulfilled requests dropped down to less than 20%[76]. This explicitly indicates that demand was low, but the availability of drivers was low. The surge pricing system of Uber is controversial. Uber was criticised for its surge pricing system back in 2014 that has come into effect following the hostage crisis around Sydney Café. However, the key factor here is the surge pricing in Uber does not get turned on manually, rather it is an automated system that only reacts according to the demand.

2.14 Criticism of Price Discrimination by Uber

The Uber Company have faced significant criticism for its practices of price discrimination and strategic fare policy to increase its revenue. The customer has defamed the brand on social media stating that the price discrimination targets people who are well-off and willing to pay high price UberX fares[77]. In contrast, investors and industry experts have positive viewpoints against this new change that can bring constructive outcomes for the brands. It can also help society by enabling more people to access the services. Alternatively, Kim et al (2018) suggest that such discrimination in pricing strategy will lead to the loss of trust among Uber riders and eventually the company would fail to bring in new customers[78].

On the contrary, the misperception of the customer's WTP is quite common because the consumers often overestimate the benefits or underestimate the risks associated with the price differences. In the majority of the Uber cases, the misperception apparently manifests underestimation of prices and overestimation of value, in order to combat the overestimation of price[79]. The critics also emphasize on the link between consumer misperception and price discrimination. Uber increasingly make use of sophisticated algorithms and big data to identify the WTP of customers and set its personalized pricing in order to price discriminate. In the studies by Thompson and Yannick (2020), it

---

[76] Cook, J. (2015) *These elegant charts show why Uber's hated surge pricing is actually a good thing*, *Business Insider*. Available at: https://www.businessinsider.in/tech/these-elegant-charts-show-why-ubers-hated-surge-pricing-is-actually-a-good-thing/articleshow/49014933.cms (Accessed: April 7, 2023).

[77] Berger, Thor, Chinchih Chen, and Carl Benedikt Frey. "Drivers of disruption? Estimating the Uber effect." *European Economic Review* 110 (2018): 197-210

[78] Kim, Kibum, Chulwoo Baek, and Jeong-Dong Lee. "Creative destruction of the sharing economy in action: The case of Uber." *Transportation Research Part A: Policy and Practice* 110 (2018): 118-127.

[79] Rosenblat, Alex, Karen EC Levy, Solon Barocas, and Tim Hwang. "Discriminating tastes: Uber's customer ratings as vehicles for workplace discrimination." *Policy & Internet* 9, no. 3 (2017): 256-279.

has been observed that price discrimination is fundamentally the product of both consumer misperceptions and consumer preferences[80].

Uber customers are not in favour of surge pricing because they perceive that Uber is increasing the costs of its services when their requirement is high. Conversely, the case study findings indicate that surge pricing is favourable to Uber customers which enable more number of cars available during peak hours.

2.15 Implications of Policy

In standardized business model, the price discrimination is deemed to be unfavourable for the consumers, but effective for business efficiency. Implication of legal interventions is critically underpinned by the relative efficiency and social objective of functions[81]. Referring to the demand inflation misperceptions, the price discrimination gets even worse for the consumers that may not lead to redeem the advantage of efficiency. Hence, price discrimination focuses on the misperception-based "Willingness to Pay" in correlation to the preference-based "Willingness to Pay", as a result, the underpinning of legal interventions gets even more stronger.

The algorithmic price discrimination could be curbed down by several ways. The policymakers have the provision to inflict direct ban on price discrimination; however, this approach is often infeasible in practice[82]. It often aid the market forces that specifically impose price discrimination by intruding easy arbitrage and the widespread diffusion of the information that may triggers a fairness-based criticism on the consumer. The policymakers focus to target the algorithmic price discrimination and its foundation using big data[83]. Algorithmic price discrimination is mainly fuelled by big data, so the severe forms of price discrimination may get reduced by restraining the company's access to information on consumer's willingness to pay. This could be attained by increasing data security and privacy protection measures.

---

[80] Thompson, Andrew W., and Yannick Perez. "Vehicle-to-Everything (V2X) energy services, value streams, and regulatory policy implications." *Energy Policy* 137 (2020): 111136.

[81] Calvano, Emilio, Giacomo Calzolari, Vincenzo Denicolò, and Sergio Pastorello. "Algorithmic pricing what implications for competition policy?." *Review of industrial organization* 55 (2019): 155-171.

[82] Chen, Yongmin. "Improving market performance in the digital economy." *China Economic Review* 62 (2020): 101482.

[83] Seele, Peter, Claus Dierksmeier, Reto Hofstetter, and Mario D. Schultz. "Mapping the ethicality of algorithmic pricing: A review of dynamic and personalized pricing." *Journal of Business Ethics* 170 (2021): 697-719.

The imposition of personalized law on algorithmic price discrimination allows the companies gain immense data and information on the WTP of individual consumers[84]. Hence, policymakers can respond with personalized price caps on the personalized pricing schemes by Uber or other ride-hailing companies. The imposition of price caps is a fundamental policy in reaction to the differential high pricing charged by the consumers[85]. The price cap is conventional that uniformly applies across the overall market; however, such a trend of price cap is considered to be unfeasible in practice. Hence, the policy of personalized price caps is proposed in counter to the concerns raised on the concerns of fair dealing in price discrimination in the market without misperceptions. In addition, the individualized price cap have the ability to directly respond the discrepancies of price discrimination that are inflicted on the consumers to overestimate the Uber service benefit[86]. In particular, a price cap is equivalent to preference-based WTP of individual customers that would generally defuse the impact of misperception. Also, an even softer personalized law can replace the price cap with disclosure mandates.

---

[84] Montes, Rodrigo, Wilfried Sand-Zantman, and Tommaso Valletti. "The value of personal information in online markets with endogenous privacy." *Management Science* 65, no. 3 (2019): 1342-1362.

[85] Bonatti, Alessandro, and Gonzalo Cisternas. "Consumer scores and price discrimination." *The Review of Economic Studies* 87, no. 2 (2020): 750-791.

[86] Guda, Harish, and Upender Subramanian. "Your Uber is arriving: Managing on-demand workers through surge pricing, forecast communication, and worker incentives." *Management Science* 65, no. 5 (2019): 1995-2014.

Chapter 3: Research Methodology

3.0 Introduction

The research methodology is the systematic approach to conducting a research study in an attempt to meet the research questions and objectives by the appropriate application of the research techniques, approaches, data collection methods, and ethical concerns[87]. This chapter emphasizes on the overarching strategies and rationale of the study that forms the foundation of the secondary and primary research methods, Furthermore, the systematic frameworks followed in the methodology used for solving the research problem by incorporating the most feasible techniques to derive accurate results.

3.1 Secondary Research

This secondary research also known as desk research involves the derivation of the existing data from wide-ranging literature sources. The secondary data is useful for establishing a strong foundation of knowledge on the chosen topic which will further serve as the guidance for the primary research in the process of deriving empirical evidence[88]. Hence, the second study will emphasize on obtaining the theoretical knowledge and topic-related concepts on the basis of the following keywords - price discrimination, ride-hailing industry, dynamics of supply and demand, price discrimination in Uber and Lyft, surge pricing, service quality, high price fare, base fare, etc.

Furthermore, the wide-ranging sources of literature are obtained from peer-reviewed journals, University web libraries, online sources, academic articles, company statistics and industry reports. In addition, the secondary sources of data related to price discrimination in the ride-hailing companies are primarily obtained from reliable databases and empirical publications such as ERIC, JSTOR, ScienceDirect, Economist Intelligence Unit, Scopus and IEEE.

---

[87] Armond, A.C.V., Gordijn, B., Lewis, J., Hosseini, M., Bodnár, J.K., Holm, S. and Kakuk, P., 2021. A scoping review of the literature featuring research ethics and research integrity cases. *BMC medical ethics*, *22*(1), pp.1-14.

[88] Clarke, S.P. and Cossette, S., 2016. Secondary analysis: Theoretical, methodological, and practical considerations. *Canadian Journal of Nursing Research Archive*, *32*(3).

3.2 Primary Research

This research study has obtained primary data from the human participants (first-hand data sources) to evaluate the knowledge and understanding of the research subjects related to the chosen topic[89]. Hence, the primary data is collected from the sellers i.e. Lyft and Uber ride-hailing companies owing to the fact that the key objective of price discrimination will be evaluated based on the perspectives of the seller (Uber and Lyft). Hence, the primary research is collected through qualitative data collection by means of semi-structured interviews with the sales planners/managers of the Lyft and Uber Companies in the UK.

3.3 Research Philosophy: Interpretivism Philosophy

The research philosophy refers to the related knowledge and assumptions a researcher may incorporate to deal with a topic or evaluate the nature of the problem under investigation in a specific manner. The two major forms of research philosophy applied in academic research studies are positivism and interpretivism. The positivism philosophy recommends the incorporation of scientific methods for analyzing human behaviour and social aspects objectively, and it closely relates to the quantitative data collection[90]. Conversely, the interpretivism philosophy assumes that reality is a subjective and socially constructed phenomenon which is closely associated to qualitative methods.

Referring to the chosen topic of "An evaluation of the effectiveness of price discrimination in the ride-hailing industry" and qualitative data collection, the researcher seeks to comprehend the facts and evidence based on the experience of reality which are shaped by the motivation, and social perspectives and experience of the research subjects. Hence, interpretive philosophy aims to derive the facts by means of exploring the objective reality to delve in-depth into the research problem under investigation by correlating the primary data with the secondary information obtained from the literature review.

3.4 Research Approach: Deductive Approach

Inductive reasoning is referred to as the bottom-up approach and focuses on developing a theory that shifts from specific observations to a broader generalization. Conversely, deductive reasoning is

---

[89] Almalki, S., 2016. Integrating Quantitative and Qualitative Data in Mixed Methods Research--Challenges and Benefits. *Journal of Education and learning*, *5*(3), pp.288-296.

[90] Alharahsheh, H.H. and Pius, A., 2020. A review of key paradigms: Positivism VS interpretivism. *Global Academic Journal of Humanities and Social Sciences*, *2*(3), pp.39-43.

a top-down approach that aims at testing the existing theories while shifting the focus from generalized ideas to a specific conclusion[91]. With respect to the research problem and mixed method approach that combines both the primary and secondary data, deductive reasoning is sought to be appropriately applied in this study. The deductive approach enables the critical assessment of existing theories and related concepts to price discrimination in the ride-hailing industry in order to construct the hypothesis which will further be tested with respect to the primary responses.

3.5 Research Design: Exploratory Design

The academic research study can be subjected to any of the three research designs i.e. Explanatory, Exploratory and descriptive. The explanatory approach focuses on explanatory research to address the "how" and "why" questions on the specific problem and research topic under investigation. Alternatively, the descriptive research aims to define the topic following the descriptive assessment of the problem statement[92]. This particular research has emphasized on the integration of exploratory research design in order to comprehend the phenomenon by identifying the specific events that have led to the research problem under investigation.

3.6 Data collection: Qualitative Technique

The primary data collection could be obtained following the two major types i.e. quantitative data (closed-ended) and qualitative data (open-ended). Quantitative tools are useful for the collection of quantitative data from a large sample size and the responses thus obtained are measured through statistical analysis. Conversely, the qualitative data is deployed for the recording of narrative responses from a relatively small set of sample[93]. Hence, the implication of the qualitative data collection technique is aimed at deriving the subjective opinion of the participants based on their motivations, experiences, and social perspectives which are crucial to meet the pre-defined research objectives.

---

[91] Armat, M.R., Assarroudi, A., Rad, M., Sharifi, H. and Heydari, A., 2018. Inductive and deductive: Ambiguous labels in qualitative content analysis. *The Qualitative Report*, *23*(1), pp.219-221.

[92] Lawrence, J. and Tar, U., 2013. The use of the Grounded Theory Technique as a Practical Tool for Qualitative Data Collection and Analysis. *Electronic Journal of Business Research Methods*, *11*(1).

[93] McGrath, C., Palmgren, P.J. and Liljedahl, M., 2019. Twelve tips for conducting qualitative research interviews. *Medical teacher*, *41*(9), pp.1002-1006.

3.7 Sample Size and Sampling Strategy

The sample chosen for this interview is 2 employees (planners/sales) of Lyft and Uber. The participants are selected on the basis of generic purposive sampling in which the researcher identifies the most suitable individuals who appropriately fit into the research questions and objectives and are able to provide valuable insights for this research study[94].

3.8 Data collection using open-ended semi-structured interviews

The qualitative data is collected by using the efficient tool of semi-structured interviews that follows a series open-ended questions focusing on the research objectives and problem statement[95]. By using semi-structured interviews, the participants are given the liberty to express their opinions elaborately while the researcher also has the provision to ask probing questions in between to delve into insightful details and the hidden facts. Moreover, the semi-structured interviews are perfectly fitting to this research study due to their cost-effective and time-efficient.

3.9 Data Analysis Technique: Thematic Analysis

The qualitative data obtained from the semi-structured interviews are synthesized through the semi-structured interviews for processing the findings on the basis of factual themes[96]. The specific themes were framed with respect to the recurring data patterns classified in the narrative responses which were further correlated to the secondary data findings from the existing literature studies. The thematic analysis is grounded on the following procedures as given –

(1) Data familiarization- This step involves the transcription of data, assessment and formulation of the key ideas

(2) Developing codes – The specific themes that are derived from the data transcripts are coded

---

[94] Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N. and Hoagwood, K., 2015. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), pp.533-544.

[95] Muleme, J., Kankya, C., Ssempebwa, J.C., Mazeri, S. and Muwonge, A., 2017. a Framework for Integrating Qualitative and Quantitative Data in Knowledge, attitude, and Practice Studies: a case study of Pesticide Usage in Eastern Uganda. *Frontiers in public health*, *5*, p.318.

[96] Neuendorf, K.A., 2018. Content analysis and thematic analysis. In *Advanced research methods for applied psychology* (pp. 211-223). Routledge.

(3) Collation of the codes – The collation of codes into key themes and further relevant data was gathered to undertake credible data analysis.

(4) Thematic analysis – This is the final analysis of the findings obtained from each theme that proceeds with the cross-synthesis of literature findings in order to address the research objectives.

In addition, the findings of the thematic analysis are interpreted critically in order to derive the results and draw a conclusion and link it with the objectives.

3.10 Ethical concerns

It is the sole duty of the researcher to follow a standardized code of conduct and comply with the ethical standards enforced by the University while conducting an academic research study[97]. The research shares a consent form with each of the participants stating the aim, objectives and purpose of the research, duration of the interview, and problem statement and ensures their participation will be voluntary without any external pressure. In addition, the researcher cordially informs the participants that their identity will remain concealed and their participation would be anonymous in order to keep them protected from any sort of oppression. On the contrary, the participants even have the freedom to withdraw their participation from the study according to their will[98]. Hence, the overall process of participation of the research subjects will be based on their informed consent and wilful approach. Finally, the researcher has completed the Ethics checklist of the University before initiating the research procedures.

With respect to the secondary data collection, information used from the existing literature sources was cited with proper references to acknowledge the original author. The appropriate citation ensures that all the information is authentic and valid.

3.11 Research Limitations

In the due course of conducting this research, the following limitations are prevalent in the study-

Limited Time- While this academic research is a cross-section in nature; hence the researcher had a limited frame in order to execute the overall research within a specified deadline. Hence, the

---

[97] Perera, K. and Emmerich, N., 2018. *The Ethical Concerns of Writing in Social Science Research*. SAGE Publications Ltd.

[98] Ploug, T. and Holm, S., 2015. Meta consent: a flexible and autonomous way of obtaining informed consent for secondary research. *BMJ: British Medical Journal (Online), 350.*

research fails to undertake a comprehensive study and much of the insights and potential details could not be derived and erupted as the limitation for this study.

Reliability issues – The 2 participants selected from Uber and Lyft are more likely to be biased towards their respective companies, hence they may not provide honest responses which in turn can have a significant influence on the research findings.

Chapter 4: Data Analysis and Interpretations

4.1 Qualitative Data Analysis and Interpretations: Interviews with 2 employees (Sales planners) of Uber and Lyft

Q.1 Tell us about the business model of Uber

The respondent (sales planner of Uber) has informed that the brand had an excellent business model focused on its unique offerings that have significantly differentiated the brand from the traditional cab services in the ride-hailing industry. Uber initiated the business with the aim to become a "Private driver" of its targeted consumers through the integration of disruptive driving technology and business innovation which have inevitably addressed the mounting challenges of urban transportation. The respondent has asserted that Uber has managed to comprehensively capture the largest market share through its interactive and efficient Uber App, aggressive courting of its drivers and unique marketing approaches. The users of Uber give positive reviews with immense acknowledgement of its easy-to-travel approach, where the users do make payments online, phone calls are not necessary and the users can even split the fare with other rides from the nearby locations. The seamless Uber interface enables the users to track the driver in real time and estimate the time of pickup too. Uber has also revolutionized the transportation industry by launching its self-driving technology across the sectors of personal transportation, trucking and delivery systems.

Q.2 How does the Pricing strategy of Uber work?

The respondent explains that "you will find a different fare of Uber ride on a Saturday night, in comparison to the cost of the same trip on weekdays". He asserted the reason for this price discrimination is due to the dynamic pricing algorithm that adjusts a Uber fare rate based on a number of variables such as route distance, time, traffic, road conditions, and the ride-to-drive demand in real-time. More often, such conditions lead to a temporary increase in pricing during peak hours or specific busy periods such as events, festivals, weekends, etc. Hence, it is quite evident that Uber make use of variable costs to encourage more drivers to serve the rising demands and help in balancing the number of ride requests. The respondents informed, "When we notify the customers of an Uber fare increase, simultaneously, we notify the drivers' too". Consequently, Uber customers are well aware of the change in Uber rates when they go ahead and book an Uber ride during peak times.

Q.3 What is the effect of surge pricing in balancing supply and demand? Does it help in maintaining consumer welfare?

In order to justify the significance and welfare effects of surge pricing, the respondents have analyzed couple of events. They shared one example, where the rise in Uber demand after a sold out concert in the New York. They observed, the mechanism of surge pricing has helped them to complete the requested rides at the peak hours. On the second event of New years Eve, there was a significant rise in Uber demand after the midnight, however the drivers were available in excess to satisfy the rising demand due to the surge in Uber price. Hence, both these events indicate that without the surge pricing, the supply of Uber rides in peak hours can be a total failure which can otherwise effect the rider's welfare reversibly.

Q.1 Tell us about the business model of Lyft Cars

The respondent (sales planner of Lyft Cars) suggests that Lyft has evolved as a "multimodal" platform that offers wide-ranging vehicle options and ride-hailing services to the transportation needs of the consumers. In addition, Lyft also offers food delivery and car rental services. While the business model of Uber is equivalent to Lyft, however, the riders can request a Ride and can choose from a wide variety of riding options such as Rentals, Priority Pickup, Lyft, Lyft XL, wait and Save, Lyft Lux, Priority Pickup, Transit, Preferred Mode, Transit and Bikes and Scooters. The Lyft app offers its customers with a map–based interface that facilitates the riders to keep track of the booked vehicles and estimate their time of arrival.

Q.2 How does the Pricing strategy of Lyft work?

The respondent apparently indicated surge pricing as a major source of revenue during peak times and high demand. Lyft has designed its heat maps that are primarily location and time specific and efficiently reflect a region which is high in demand. Subsequently, during the phase of high demand in a particular region, Lyft increases its price on temporarily to create a balance between supply and demand. The respondents have confirmed that this surge pricing has a significant contribution to the revenue model of Lyft.

Q.3 Surge Pricing is effective to ensure shorter lead times and moderate the supply and demand

The surge pricing ensure shorter wait times for the riders who are willing to pay high prices by moderating the demand and create incentives to encourage more number of drivers to participate. The respondents draws the concepts of economic theory and suggests when the demand outstrips

the supply, the price of rides in a free market continues to adjust until it reaches a new equilibrium where the supply satisfy the demand. Hence, the surge pricing algorithm plays the action of a free market and steer the ride-hailing market towards greater efficiency. However, the one rider's side, the high fares of ride may causes the customers to wait for the surge pricing to end (for the consumers who do no value rides), but on the driver's side, the high fares due to surge pricing lead more number of drivers to offer the ride services while increasing the rate of supply.

4.2 Secondary Qualitative Research: Thematic Analysis

Theme 1: Surge Pricing Strategy in Uber and Lyft ride-hailing services

Surge pricing is one of the chief variables integrated into the pricing strategy of Uber and Lyft that multiplies the fare rates of a ride when the demand for riders is higher than the supply of drivers. The main motive of the surge pricing strategy integrated by the ride-hailing companies is to ensure an even balance between the demand and supply of ride requests[99]. The activation of surge pricing in a particular area/location will enable more number of drivers on the road to leverage the benefits of higher earnings. In other words, the surge pricing model gets activated due to the lack of adequate numbers of drivers on the road to meet the surging ride requests from the riders, that mainly occur during the rush (peak) hours, special events, poor weather conditions, festivals, etc[100]. Hence, it is evident that the surge pricing of Uber is estimated as underlying the demand in real-time, which implies that the current multiplier can get changed on every few minutes. The accurate and exact multiplier of a particular moment is determined by the algorithm of Uber by taking into account the disparity between the total number of requests with the availability of drivers. Once the multiplier gets settled by the algorithm, the fare gets increased subsequently. For example, if the base fare is $20 for an UberX trip, while the multiplier is 2.5, the fare will ride up to $50.

Theme 2: Surge pricing relates to Consumer benefit or Uber profit

The surge pricing strategy by Uber and Lyft has drawn numerous complaints and consumer resistance as the riders were unwilling to pay high prices for the same rides at peak hours, which they get at a lesser price during regular times. The Surge pricing is claimed to be a consumer benefit or welfare to ensure the riders can get rides anytime when they need because a higher base price

[99] Assegaff, Syafiq Basri, and Stanley Oktavianus Pranoto. "Price determines customer loyalty in ride-hailing services." *American Journal of Humanities and Social Sciences Research* 3 (2020): 453-463.

[100] Chen, Mengjing, Weiran Shen, Pingzhong Tang, and Song Zuo. "Optimal vehicle dispatching for ride-sharing platforms via dynamic pricing." In *Companion Proceedings of The Web Conference 2018*, pp. 51-52. 2018.

motivates the drivers to move into the areas where the riders face challenges in finding a driver[101]. In correspondence, Cook (2015) dictates the concept of surge pricing strategy as dynamic pricing or flexible pricing under which the prices keep changing constantly on the basis of the market fluctuations. In literature, the practice of surge pricing is commonly in action with substantial examples given on online flight ticket prices that keep changing on a daily and even hourly basis. Uber make use of the multiplier pricing algorithm to settle the surge fare amount at a specific time, whereas the multiplier may lead to the price rise up to 25% and 50% during specific times.

Theme 3: Duration of the surge pricing and its correlation to balance supply and demand

As studied from the literature, surge pricing is the key to maintaining an equilibrium between supply and demand as the surge pricing will continue to last until the overburdened area/region have an adequate number of drivers to handle the excessive ride requests. In opposition, it has been observed that surge pricing can last anywhere from a few minutes to several hours depending on the occasion for the occurrence of this surge. On the other hand, the duration of surge pricing may largely depend on whether a substantial volume of drivers has reached at the surge radius or not. The drivers are often motivated to reach out to the surge pricing radius to earn high profits and specifically, if they are close to the busy area[102]. As more number of drivers converge at a specific area, the supply immediately catches up with the demand which in turn will close the surge at a fast pace. However, such a situation has led to drawn interesting issues that may reveal insights on the parts of Uber drivers who are willing to pick busy times as the best working hours often. On the other hand, the higher rate of Uber fare during busy hours or peak times significantly increases the total number of Uber drivers around a specific event, however, such a situation makes it difficult for the drivers to get passengers that evidently invalidate the equilibrium of supply and demand through surge pricing during busy hours.

Theme 4: Surge pricing is a suitable tool to balance demand and supply

Much prominently, the rise in Uber base price will lead to high fare prices for consumers is substantiated in the literature broadly. In contrast, it has been observed that this is not mechanical because the changes in surge pricing can entirely "undo" the overall fare changes. Gautier et al

---

[101] Chevalier, Judith A., and Anil K. Kashyap. "Best prices: Price discrimination and consumer substitution." *American Economic Journal: Economic Policy* 11, no. 1 (2019): 126-59.

[102] Duan, Yige, and Chunchun Liu. "Optimal Price Mechanism for Ride-Hailing Platform." *Available at SSRN 3426328* (2020).

(2020) mentioned that the surge does not play a buffering role because, with a high base price, the demand for a ride easily outstrips the supply much more often, hence these platforms may not need to utilise the surge pricing as a tool to clear out the market[103]. For example, every 10% raise in the fare causes a significant dip in the average surge rate by 2%[104]. On the other hand, with the increase in higher fare prices, the waiting times for passengers fall considerably. This particularly reflects that the lower utilisation makes the nearest cars available for dispatch. For example, a 10% increase in the base fare, significantly reduces the wait times by 6% approximately. However, such a quality improvement is not sufficient to offset a substantial reduction in passenger demand from the high price[105]. Hence, the increase in high base price subsequently leads to the failure of overall transportation and affects the total number of trips completed.

Theme 5: Drivers leverage Surge Pricing to earn extra profits

Focusing on the driver's aspect, the hourly earnings rate of drivers significantly rises up with a higher base fair. As a result, the drivers earn more profits on each trip. However, the rate of hourly earnings begins to fall sharply thereafter. The major reasons behind such a short-run or long-run difference are directed towards the pattern of driver utilisation or refer to the fraction of hours spent on serving the passengers tends to decline significantly with a high fare price. For example, the 10% rise in fare may lower driver utilisation by 7%. On combining this fall in surge multiplier, the decline in driver utilisation may offset the probability of hourly earnings rates. This can be explained by giving the example that a 10% increase in the fare will raise the hourly earnings of drivers by 0.7% while simultaneously increasing the number of hours worked by the drivers both on the intensive and extensive margins[106]. Furthermore, when driving with Uber/Lyft platforms appears to be a great deal for drivers during certain events, they tend to work more number of hours and chase few potential trips. This would lower the utilisation rates of the drivers, thus lowering their hourly earnings rates.

---

[103] Gautier, Axel, Ashwin Ittoo, and Pieter Van Cleynenbreugel. "AI algorithms, price discrimination and collusion: a technological, economic and legal perspective." *European Journal of Law and Economics* 50, no. 3 (2020): 405-435.

[104] Hall, Jonathan V., John J. Horton, and Daniel T. Knoepfle. "Ride-Sharing Markets Re-Equilibrate." NBER, February 27, 2023. https://www.nber.org/papers/w30883.

[105] Hall, Jonathan V., John J. Horton, and Daniel T. Knoepfle. "Ride-Sharing Markets Re-Equilibrate." NBER, February 27, 2023. https://www.nber.org/papers/w30883.

[106] Hall, Jonathan V., John J. Horton, and Daniel T. Knoepfle. "Ride-Sharing Markets Re-Equilibrate." NBER, February 27, 2023. https://www.nber.org/papers/w30883.

The equilibrium of decline in passenger demand owing to the higher price tends to be somewhat offset by improving the waiting times enabling the lower utilisation of drivers. Consequently, this process runs in reverse when driving with Uber becomes temporarily difficult for the drivers due to the fare cuts.

Theme 6: Price discrimination amongst Uber/Lyft customers is unfair

The trend of personalized or pricing discrimination is significantly popular in ride-hailing companies such as Uber/Lyft as the passengers are often charged different rates for the same ride. These brands profoundly get involve in the mechanism of price discrimination by analysing personal data to figure out the price-sensitive attributes of the individual passengers[107]. These companies take advantage of consumer's big data and estimate the pricing for each ride on an individual level. On the other hand, Uber has acknowledged the mechanism of price discrimination as a new fare system of "route-based pricing" that effectively determines and calculates the propensity of users to pay more for a ride at a particular route at a specific time, hence it charges more for that particular route[108]. For example, it has been observed that passengers travelling to the city centre or a posh neighbourhood during peak commuting hours are typically charged with a premium fare rate. Similarly, the AI of these platforms judges the phone interface, payment methods and routes as a key factor to create the price-discrimination. For example, a customer when he switches the payment method from his personal credit card to the corporate credit card in Uber, the price of fare automatically gets increased. As a result, the customers do not support the concept of price discrimination or the idea of being charged more than others for the same ride and consider it to be an unfair practice. In opposition, the advocates of Price discrimination have acknowledged this concept as "third-degree price discrimination" stating they charge fares on routes differently based on the underlying demand patterns and not on the individual riders. In contrast, Jiang et al (2018) points out several other clues on Uber/Lyft assessing personal consumer data to toggle the price based on their willingness to pay more during specific events/time[109].

---

[107] Griffith, Keyawna. "The Uber Loophole That Protects Surge Pricing." *Va. J. Soc. Pol'y & L.* 26 (2019): 34.

[108] Banerjee, Siddhartha, Ramesh Johari, and Carlos Riquelme. "Dynamic pricing in ridesharing platforms." *ACM SIGecom Exchanges* 15, no. 1 (2016): 65-70.

[109] Jiang, Shan, Le Chen, Alan Mislove, and Christo Wilson. "On ridesharing competition and accessibility: Evidence from Uber, Lyft, and taxi." In *Proceedings of the 2018 World Wide Web Conference*, pp. 863-872. 2018.

4.3 Interpretations (Discussion)

The findings obtained from the Interviews and secondary thematic analysis, it has been observed that Uber and Lyft charge different prices for the varying offerings of their cab services, while the users are allowed to make a comparative analysis of the prices and cab variations to select the most suitable rate for their travel needs. Despite the growing trend of research conducted on ride-sharing services, however, there has been relatively negligible focus given on exploring the pricing strategies of these ride-hailing companies. The secondary research and qualitative data derivation from the sales planners of Uber and Lyft have explored the temporal patterns of price fluctuations that typically occur in response to the changing market dynamics that specifically emphasize on the occasional surge pricing and price discrimination trend of these renowned brands.

Similar to Uber, Lyft is a potential ride-hailing business that offers on-demand transportation service platforms to address the transportation needs of consumers. Lyft is another renowned ride-hailing service which is equivalent to Uber. Lyft is referred to as the second leading ride-sharing service in the US, however, the market share of Lyft is only 32% in comparison to Uber which holds a 71% market share in the US. Since the time of its inception, Lyft has introduced a diversified strategy of multi-mobility ride platforms that mainly include Halo cars, Motivate (bicycle sharing systems), PBSC Urban solutions (in partnership with a Canadian supplier of the bike equipment and technology sharing) in an attempt increase its expansion through the varied offerings of transportation modes such as networked access of shared scooters, bikes, first mile and last mile legs of the multimodal trips[110].

As per the opinion of the respondents (Uber and Lyft's sales planners), the objective of price discrimination in their payment system typically ensure that the customers get the best possible fare rates for their rides. Uber estimate a fare for any trip by the cumulative addition of base fare, distance and time of the ride. Even though the claims made by the respondents state that the fare rates of Uber differ across the cities just like the rates calculated in Taxis, however, these famous ride-hailing companies charge promotional rates on the rides to specific areas at certain times. Furthermore, Uber has attained its growth and competitive advantage through its pricing system[111]. According to the reports, Leibbrandt (2020) the average Uber ride costs two-thirds of the taxicab

[110] Jiang, Shan, Le Chen, Alan Mislove, and Christo Wilson. "On ridesharing competition and accessibility: Evidence from Uber, Lyft, and taxi." In *Proceedings of the 2018 World Wide Web Conference*, pp. 863-872. 2018.

[111] Kim, Kibum, Chulwoo Baek, and Jeong-Dong Lee. "Creative destruction of the sharing economy in action: The case of Uber." *Transportation Research Part A: Policy and Practice* 110 (2018): 118-127.

ride fares[112]. In contrast, Liu, Yang, and Connor Greene (2020) argue that despite of the evident benefits of surge pricing, it has generated significant criticism[113]. There are several complaints on Uber stating that the ride-hailing companies take advantage of the peak hours and force the riders to pay more fare. In opposition, the Uber sales planners have claimed that convenience and flexibility are the two chief differentiators whereas surge pricing is the next key factor that is essential to deliver the benefits to the consumers[114]. Defending on the criticisms, Uber has made claims that price discrimination is a strategic approach to balance the lack of supply during the high demand for Uber rides, which would result in a longer waiting time for the majority of the riders. In support, Muller (2019) has argued that Uber would even face an exacerbated situation of a chronic shortage of drivers if they cancel the surge pricing approach[115]. In correspondence, the industry experts have acknowledged the surge pricing strategy of Uber suggesting that price hikes can be a typical pricing issue of Uber, however, without the strategic integration of the surge pricing approach, the consumers (riders) would experience the even worse situation of scarce availability of cars on the road due to the lack of drivers that makes it difficult to match the customer's demand. Hence, during the busiest of times specifically when the demand is at its peak, it is not unusual to get a multiplier of even 2x and 4x than the regular price of an Uber ride.

On the other hand, in an attempt to minimize customer complaints, this renowned ride-hailing company (Uber) has initiated a phasing out of its highly criticized system of surge pricing. Following the statement made by the lead engineer of Uber Jeff Schneider, to National Public Radio, stating that Uber view its surge pricing as a market failure, hence it has focused on improving its prediction algorithms and machine learning programs to ensure accurate and precision forecasting of the demands while simultaneously eliminating the situations of supply and demand mismatch[116]. However, there has been an apparent argument raised on the fact that the initiative to eliminate or retain surge pricing in the future largely depends on the part of how the government policies and

---

[112] Leibbrandt, Andreas. "Behavioral constraints on price discrimination: Experimental evidence on pricing and customer antagonism." *European Economic Review* 121 (2020): 103303.

[113] Liu, Yang, and Connor Greene. "The Dark Side of Big Data: Personal Privacy, Data Security, and Price Discrimination." *Digital Transformation in Business and Society: Theory and Cases* (2020): 145-153.

[114] Lu, Youshui, Yong Qi, Saiyu Qi, Yue Li, Hongyu Song, and Yuhao Liu. "Say no to price discrimination: decentralized and automated incentives for price auditing in ride-hailing services." *IEEE Transactions on Mobile Computing* 21, no. 2 (2020): 663-680.

[115] Muller, Zane. "Algorithmic harms to workers in the platform economy: The case of Uber." *Colum. JL & Soc. Probs.* 53 (2019): 167.

[116] Rosenblat, Alex, and Luke Stark. "Algorithmic labour and information asymmetries: A case study of Uber's drivers." *International Journal of Communication* 10 (2016): 27.

reinforcements aid in the effective management of the whole transportation system. On the contrary, industry experts have suggested that the users/riders of the ride-hailing brands would become price-sensitive in the areas where Uber and Lyft tend to have substantial numbers of competitors.

Consequently, it is apparently evident that the strategic approach of surge pricing in the ride-sharing industry will not stop anytime soon. A large number of consumers and industry experts often accuse Uber and Lyft of their price gouging activities through the use of surge pricing models, however, the riders/consumers may have to come to terms with the fact that surge pricing and price discrimination are a common part of its experience. The fare changes caused due to surge pricing or price discrimination strategies by the ride-hailing companies can have persistent and real effects on the market equilibrium. Furthermore, it is empirically evident that the ride-hailing companies i.e. Uber and Lyft have multiple equilibria while the pricing strategies selected by these companies are consequential[117]. Hence, there is a critical equilibrium trade-off observed between driver utilisation and passenger fares. The passengers generally prefer low fares and higher utilisation equilibria, whereas the drivers prefer the reverse. However, for equilibrium with a significantly high fare, both the passengers and drivers want the fare cuts.

The personalized pricing or price discrimination between two passengers for the same Lyft/Uber ride has led to significant backlash and criticisms from the consumer group and industry experts. It has been observed that the dynamic pricing mechanism in Uber/Lyft is highly sensitive and alters every split second depending on various factors. On the contrary, the trend of personalized pricing (or price discrimination) is a growing trend, owing to the fact that nearly 40 percent of the brands utilise AI (Artificial intelligence) to personalize the customer experience and employ tailor-made pricing and promotion strategies in real-time[118].

As a whole, ride-hailing companies like Uber/Lyft have gained significant prominence in large metropolitan cities over a short span of time. In a time span of 9 years, Uber services have expanded across majority of the developing and developed countries while simultaneously rolling out unique ride options to the customers. Even though the improved mobility of Uber/Lyft has been a convenient solution for riders, however, the criticisms surrounding its price discrimination and surge

---

[117] Rosenblat, Alex, Karen EC Levy, Solon Barocas, and Tim Hwang. "Discriminating tastes: Uber's customer ratings as vehicles for workplace discrimination." *Policy & Internet* 9, no. 3 (2017): 256-279.

[118] Calvano, Emilio, Giacomo Calzolari, Vincenzo Denicolò, and Sergio Pastorello. "Algorithmic pricing what implications for competition policy?." *Review of industrial organization* 55 (2019): 155-171.

pricing have resulted in the potential diversion of passengers from these ride-hailing services. On the other hand, the analytical derivation of the findings indicates that the ride-sharing companies serve a prominently diversified role of mobility rather than providing a simple transit solution. Even though the analysis of its pricing strategy has generated consumer concerns about unfair price discrimination and fare fluctuations during the surge time, the passengers are highly motivated to opt for the ride-sharing services owing to their convenience and time-saving attributes. The passengers feel comfortable, safe and secure in transit without the fear of service interruptions. In addition, both Uber and Lyft have partnered with healthcare providers and private companies to offer discounted and free ride-hailing services for the population at risk such as to help them transit to primary care clinics and medical centres[119]. For example, UberHealth is a desktop platform that enables healthcare providers to order free and convenient rides for patients to and from healthcare centres. Such approaches taken by Uber and Lyft an effective approaches to counter the claims against its unfair pricing strategies and price discrimination. This approach is claimed to be a consumer welfare initiative to encourage commuters to avoid driving or get instant access to transportation during the phase of an emergency.

---

[119] "Chaddick Institute for Metropolitan Development." Chaddick Institute for Metropolitan Development | Centers & Institutes | College of Liberal Arts & Social Sciences | DePaul University, Chicago. Accessed May 6, 2023. https://las.depaul.edu/centers-and-institutes/chaddick-institute-for-metropolitan-development/pages/default.aspx.

Chapter 5: Conclusion and Recommendations

5.1 Conclusion

From the research analysis conducted above, it has been observed that the ride-hailing companies, specifically the Uber pricing strategy were focused on charging the customers on the basis of distance and time. However, Uber changed its pricing strategy in 2017 and introduced a more sophisticated version of surge pricing in the context of route-based pricing. Different from its previous approach, Uber started estimating the fares by using a combination of time, mileage and multipliers on the basis of geographic demand. In addition, Uber fares are also being calculated based on the customer's willingness to pay which describes the maximum amount a consumer would like to pay for a service, which certainly encompasses the distance, time of travel, and location. The trend of price discrimination is prevalent in ride-hailing companies that mainly emphasize on the rider's willingness to pay a higher price for a specific route at a certain time of the day[120]. For example, a rider travelling from a wealthy neighbourhood to another location is often asked to pay a higher price than another rider who is heading towards a poor part of the town even under the conditions of the same distance, demand and traffic. Hence, price discrimination is basically charging of higher prices to the customers who are willing to pay more.

Linking Objective 1: To determine the major determinants of supply and demand behind the price discrimination in Uber fares

The findings thus derived from the above analysis have presented that Uber implements its dynamic or surge pricing when the demand is materially outstripping the supply. Furthermore, the frequent alterations in dynamic pricing are largely driven algorithmically when the waiting time increases dramatically as a result of which the "unfulfilled requests" starts rising high[121]. This implies that the change in the rider's fare is based on the variables which are subjected to change over time. More precisely, these variables tend to include (but are not limited to) the estimated distance and time of the predicted routing, road traffic, peak hours, and number of drivers and riders. The ride-hailing

---

[120] Banerjee, Siddhartha, Ramesh Johari, and Carlos Riquelme. "Pricing in ride-sharing platforms: A queueing-theoretic approach." In *Proceedings of the Sixteenth ACM Conference on Economics and Computation*, pp. 639-639. 2015.

[121] Sun, Zhongmiao, Qi Xu, and Baoli Shi. "Dynamic pricing of ride-hailing platforms considering service quality and supply capacity under demand fluctuation." *Mathematical Problems in Engineering* 2020 (2020): 1-26.

companies apply sophisticated neural networks and machine learning techniques to make the estimate of supply and demand factors behind the price discrimination in Uber fares. The major determinants behind the supply and demand equilibrium are booking location, trend, dependency, and destination which account for the estimated fare for each of the customers. However, the interview findings have asserted that Uber does not create a hike in fare when the demand for rides exceeds the supply of drivers; rather they impose a price discrimination strategy on customers who are willing to pay more. The findings clearly indicate that Uber introduced surge pricing in order to create a balance between supply and demand in the market particularly when the demand exceeds the supply to a great extent. This strategy is again a consumer welfare approach to serve the superfluous demand during the peak time and get more cars into the platform and reduce the unfulfilled rate of demands.

Linking Objective 2: To identify the correlation between the "route-based model" and price discrimination through surge price

Price discrimination is a commonly placed strategy in other sectors of the industry such as E-commerce supplies and airline industries. This strategy of price discrimination enables the companies to extract more revenues from the consumers while simultaneously expanding their market share. In theory, Uber has adopted third-degree price discrimination, in theory, underlying their price discrimination strategy which is focused on the "group of customers" rather than having an individualistic approach[122]. This is further explained through their pricing strategy which is based on the route system and some route-based pricing is apparently popular with high-income customers, hence it gets potentially correlated to price discrimination. In contrast, on analyzing the interview responses and secondary data findings, it has been observed that the pricing trend of Uber is clearly towards the direction of price discrimination at the individual level. The price discrimination in theory would effectively increase the customer base of Uber by charging less to the low-income passengers who generally find Uber fares too high, hence they create price discrimination and charge more to the high-income group who are able to afford these additional costs. On the contrary, decoupling the earnings of drivers from the driver's payments implies that Uber keeps the

[122] Banerjee, Siddhartha, Ramesh Johari, and Carlos Riquelme. "Dynamic pricing in ridesharing platforms." *ACM SIGecom Exchanges* 15, no. 1 (2016): 65-70.

prices low across low-income neighbourhoods without being concerned that drivers will reject the pickups due to poor pay and faraway locations[123].

The consumers of Uber and Lyft have expressed their criticism publicly while avoiding Uber due to their price discrimination. The customers are raising complaints about the new pricing systems that target customers who belong to a premium class segment and are willing to pay their UberX fares. However, the advocates of price discrimination can raise profits for the companies but also helps the consumers to better access the market. The findings suggest that the widespread market share and value proposition of Uber both rely on the company's ability to make an estimation of supply and demand. The ride-hailing companies have started off with a taxi meter pricing model initially; however, they have evolved their pricing strategy over the years of a successful business. To counteract these rising complaints against Uber's price discrimination strategy, Uber has made an immense effort to forgo surge pricing and introduced "Upfront pricing" through which they estimate the fare for a ride and show it to the customers at the start of their trip. Hence, they facilitate the customers to have a fair idea about the ride fare and decide whether they want to take the ride.

Linking Objective 3: To observe the effects of surge pricing on the drivers and riders of Uber

Furthermore, Uber and Lyft collect fine-grained data on the riders to determine the new "route-based" pricing model in which they incorporate the price discrimination strategy based on the customer's willingness to pay. This creates a difference between the calculations of ride fares and driver's pay to parlay a mathematical framework for shifting their business model more closer to profitability. Hence, it is conclusive that Uber's experiment with the pricing models based on surge pricing, price discrimination and introduces more complex problems based on route-based pricing which makes it a hard time for customers to trust Uber or other ride-hailing companies. However, it is evident that Uber and Lyft have focused on implementing a complex pricing model and surge pricing in order to create a balance between demand and supply, however, the brand has fallen short in educating and communicating with their customers on the same. In reciprocation, Uber has displayed surge pricing by notifying the riders when the surge pricing ends in order to improve transparency on its platform pricing[124]. Hence, such ride-hailing platforms must be transparent

---

[123] Chevalier, Judith A., and Anil K. Kashyap. "Best prices: Price discrimination and consumer substitution." *American Economic Journal: Economic Policy* 11, no. 1 (2019): 126-59
[124] Lu, Youshui, Yong Qi, Saiyu Qi, Yue Li, Hongyu Song, and Yuhao Liu. "Say no to price discrimination: decentralized and automated incentives for price auditing in ride-hailing services." *IEEE Transactions on Mobile Computing* 21, no. 2 (2020): 663-680.

about the pricing strategy as possible which will help the users/riders to trust the platforms and educate them on their strategic approaches and consumer welfare policies to avoid the negative sentiment and backlashes towards the ride-hailing platforms.

The two ride-hailing platforms Uber and Lyft have shown a subsequent price evolution which has shown that there is not a fixed trend of pricing strategy on these platforms. On the contrary, Uber and Lyft are highly proactive to communicate with their customers about their dynamic pricing strategy. Hence, they entailed a framework when the rider hails a cab, Uber makes the riders aware of the price increase on their screen or sent a text alerting them of any price increase. The rider has to hit the "OK" to accept the fare before they could go forward to the next screen and the ride is dispatched at the surge price.

5.2 Recommendations

This portion of the research will present some actionable recommendations with respect to the areas of the gap identified while evaluating the effectiveness of price discrimination in ride-hailing companies (Uber/Lyft).

- It is recommended that these ride-hailing platforms must improve their pricing strategy considering the chief determinants of transparency, simplicity and fine-grained data collection through the sophisticated models that help them to effectively tap into the consumer surplus. Such an approach will lead to the improvement in overall value maximization for both the consumers and the platforms to get higher revenue in return.

- The change in pricing strategy in these ride-hailing platforms must be evolved on the basis of consumer preferences and specific conditions such as competition, market trends, etc[125].

- As Uber has decoupled its rider and driver trip much recently with the strategic action of upfront pricing, however, the drivers typically continue to earn trip pay which is determined by the trip distance and time. Even if the trend moves towards upfront pricing, Uber must be able to focus on the price level of an "average trip cost" to satisfy both the customer demand and the driver's pay level. In addition, it is recommended that these platforms must switch to an auction model where drivers can submit their bid costs for each ride depending on the distance, location, time period, etc.

---

[125] Duan, Yige, and Chunchun Liu. "Optimal Price Mechanism for Ride-Hailing Platform." *Available at SSRN 3426328* (2020).

5.3 Future Scope of Research

A fundamental scope of future research would be on the micro-labour supply decisions of the labour by focusing on the role of individual drivers in devising price discrimination for a specific group of customers. In addition, there is a significant scope to model how the drivers vary their preferences over the various utilization equilibria preferably with the less fuel-efficient vehicles. This will help in devising higher utilization of the Uber platform to the target group who are highly sensitive to the fare.

Reference List

Alharahsheh, H.H. and Pius, A., 2020. A review of key paradigms: Positivism VS interpretivism. *Global Academic Journal of Humanities and Social Sciences*, *2*(3), pp.39-43.

Almalki, S., 2016. Integrating Quantitative and Qualitative Data in Mixed Methods Research--Challenges and Benefits. *Journal of Education and Learning*, *5*(3), pp.288-296.

Armat, M.R., Assarroudi, A., Rad, M., Sharifi, H. and Heydari, A., 2018. Inductive and deductive: Ambiguous labels in qualitative content analysis. *The Qualitative Report*, *23*(1), pp.219-221.

Armond, A.C.V., Gordijn, B., Lewis, J., Hosseini, M., Bodnár, J.K., Holm, S. and Kakuk, P., 2021. A scoping review of the literature featuring research ethics and research integrity cases. *BMC medical ethics*, *22*(1), pp.1-14.

Assegaff, Syafiq Basri, and Stanley Oktavianus Pranoto. "Price determines customer loyalty in ride-hailing services." *American Journal of Humanities and Social Sciences Research* 3 (2020): 453-463.

Balseiro, Santiago R., David B. Brown, and Chen Chen. "Dynamic pricing of relocating resources in large networks." *ACM SIGMETRICS Performance Evaluation Review* 47, no. 1 (2019): 29-30.

Banerjee, Siddhartha, Ramesh Johari, and Carlos Riquelme. "Dynamic pricing in ridesharing platforms." *ACM SIGecom Exchanges* 15, no. 1 (2016): 65-70.

Banerjee, Siddhartha, Ramesh Johari, and Carlos Riquelme. "Pricing in ride-sharing platforms: A queueing-theoretic approach." In *Proceedings of the Sixteenth ACM Conference on Economics and Computation*, pp. 639-639. 2015.

Belleflamme, Paul, Wing Man Wynne Lam, and Wouter Vergote. "Competitive imperfect price discrimination and market power." *Marketing Science* 39, no. 5 (2020): 996-1015.

Berger, Thor, Chinchih Chen, and Carl Benedikt Frey. "Drivers of disruption? Estimating the Uber effect." *European Economic Review* 110 (2018): 197-210.

Bimpikis, Kostas, Ozan Candogan, and Daniela Saban. "Spatial pricing in ride-sharing networks." *Operations Research* 67, no. 3 (2019): 744-769.

Bonatti, Alessandro, and Gonzalo Cisternas. "Consumer scores and price discrimination." *The Review of Economic Studies* 87, no. 2 (2020): 750-791.

Brown, Anne E. "Prevalence and mechanisms of discrimination: Evidence from the ride-hail and taxi industries." *Journal of Planning Education and Research* (2019): 0739456X19871687.

"Chaddick Institute for Metropolitan Development." Chaddick Institute for Metropolitan Development | Centers & Institutes | College of Liberal Arts & Social Sciences | DePaul University, Chicago. Accessed May 6, 2023. https://las.depaul.edu/centers-and-institutes/chaddick-institute-for-metropolitan-development/pages/default.aspx.

Calvano, Emilio, Giacomo Calzolari, Vincenzo Denicolò, and Sergio Pastorello. "Algorithmic pricing what implications for competition policy?." *Review of industrial organization* 55 (2019): 155-171.

Cashore, J. Massey, Peter I. Frazier, and Eva Tardos. "Dynamic Pricing Provides Robust Equilibria in Stochastic Ride-Sharing Networks." In *Proceedings of the 23rd ACM Conference on Economics and Computation*, pp. 301-302. 2022.

Castillo, Juan Camilo, Dan Knoepfle, and Glen Weyl. "Surge pricing solves the wild goose chase." In *Proceedings of the 2017 ACM Conference on Economics and Computation*, pp. 241-242. 2017.

Chen, Le, Alan Mislove, and Christo Wilson. "Peeking beneath the hood of Uber." In *Proceedings of the 2015 internet measurement conference*, pp. 495-508. 2015.

Chen, Mengjing, Weiran Shen, Pingzhong Tang, and Song Zuo. "Optimal vehicle dispatching for ride-sharing platforms via dynamic pricing." In *Companion Proceedings of The Web Conference 2018*, pp. 51-52. 2018.

Chen, Yongmin. "Improving market performance in the digital economy." *China Economic Review* 62 (2020): 101482.

Chevalier, Judith A., and Anil K. Kashyap. "Best prices: Price discrimination and consumer substitution." *American Economic Journal: Economic Policy* 11, no. 1 (2019): 126-59.

Clarke, S.P. and Cossette, S., 2016. Secondary analysis: Theoretical, methodological, and practical considerations. *Canadian Journal of Nursing Research Archive*, *32*(3).

Cook, J. (2015) *These elegant charts show why Uber's hated surge pricing is actually a good thing*, *Business Insider*. Available at: https://www.businessinsider.in/tech/these-elegant-charts-show-why-ubers-hated-surge-pricing-is-actually-a-good-thing/articleshow/49014933.cms (Accessed: April 7, 2023).

Duan, Yige, and Chunchun Liu. "Optimal Price Mechanism for Ride-Hailing Platform." *Available at SSRN 3426328* (2020).

Edelman, Benjamin G., and Damien Geradin. "Efficiencies and regulatory shortcuts: How should we regulate companies like Airbnb and Uber." *Stan. Tech. L. Rev.* 19 (2015): 293.

Gautier, Axel, Ashwin Ittoo, and Pieter Van Cleynenbreugel. "AI algorithms, price discrimination and collusion: a technological, economic and legal perspective." *European Journal of Law and Economics* 50, no. 3 (2020): 405-435.

Griffith, Keyawna. "The Uber Loophole That Protects Surge Pricing." *Va. J. Soc. Pol'y & L.* 26 (2019): 34.

Guda, Harish, and Upender Subramanian. "Your Uber is arriving: Managing on-demand workers through surge pricing, forecast communication, and worker incentives." *Management Science* 65, no. 5 (2019): 1995-2014.

Hall, Jonathan V., and Alan B. Krueger. "An analysis of the labour market for Uber's driver-partners in the United States." *Ilr Review* 71, no. 3 (2018): 705-732.

Hall, Jonathan V., John J. Horton, and Daniel T. Knoepfle. "Ride-Sharing Markets Re-Equilibrate." NBER, February 27, 2023. https://www.nber.org/papers/w30883.

Hoffman, David Lynn, Nina Radojevich-Kelley, and Debora J. Gilliard. "UBER: A Great Disrupter or Not?." *Journal of Marketing Development and Competitiveness* 15, no. 2 (2021): 50-76.

Hojnik, Janja. "Tell me where you come from and I will tell you the price: Ambiguous expansion of prohibited geographical price discrimination in the EU." *Common Market Law Review* 56, no. 1 (2019).

Hong, Soo Jeong, Johannes M. Bauer, Kwangjin Lee, and Nelson F. Granados. "Drivers of supplier participation in ride-hailing platforms." *Journal of management information systems* 37, no. 3 (2020): 602-630.

Hu, Bin, Ming Hu, and Han Zhu. "Surge pricing and two-sided temporal responses in ride-hailing." *Manufacturing & Service Operations Management* 24, no. 1 (2022): 91-109.

Huang, Jianbin, Longji Huang, Meijuan Liu, He Li, Qinglin Tan, Xiaoke Ma, Jiangtao Cui, and De-Shuang Huang. "Deep reinforcement learning-based trajectory pricing on ride-hailing platforms." *ACM Transactions on Intelligent Systems and Technology (TIST)* 13, no. 3 (2022): 1-19.

Irannezhad, Elnaz, and Renuka Mahadevan. "Examining factors influencing the adoption of solo, pooling and autonomous ride-hailing services in Australia." *Transportation Research Part C: Emerging Technologies* 136 (2022): 103524.

Jiang, Baojun, Lin Tian, Yifan Xu, and Fuqiang Zhang. "To share or not to share: Demand forecast sharing in a distribution channel." *Marketing Science* 35, no. 5 (2016): 800-809.

Jiang, Shan, Le Chen, Alan Mislove, and Christo Wilson. "On ridesharing competition and accessibility: Evidence from Uber, Lyft, and taxi." In *Proceedings of the 2018 World Wide Web Conference*, pp. 863-872. 2018.

Kim, Kibum, Chulwoo Baek, and Jeong-Dong Lee. "Creative destruction of the sharing economy in action: The case of Uber." *Transportation Research Part A: Policy and Practice* 110 (2018): 118-127.

Lawrence, J. and Tar, U., 2013. The use of the Grounded Theory Technique as a Practical Tool for Qualitative Data Collection and Analysis. *Electronic Journal of Business Research Methods*, *11*(1).

Lei, Chao, Zhoutong Jiang, and Yanfeng Ouyang. "Path-based dynamic pricing for vehicle allocation in ridesharing systems with fully compliant drivers." *Transportation Research procedia* 38 (2019): 77-97.

Leibbrandt, Andreas. "Behavioral constraints on price discrimination: Experimental evidence on pricing and customer antagonism." *European Economic Review* 121 (2020): 103303.

Liu, Yang, and Connor Greene. "The Dark Side of Big Data: Personal Privacy, Data Security, and Price Discrimination." *Digital Transformation in Business and Society: Theory and Cases* (2020): 145-153.

Lu, Youshui, Yong Qi, Saiyu Qi, Yue Li, Hongyu Song, and Yuhao Liu. "Say no to price discrimination: decentralized and automated incentives for price auditing in ride-hailing services." *IEEE Transactions on Mobile Computing* 21, no. 2 (2020): 663-680.

McGrath, C., Palmgren, P.J. and Liljedahl, M., 2019. Twelve tips for conducting qualitative research interviews. *Medical teacher*, *41*(9), pp.1002-1006.

Montes, Rodrigo, Wilfried Sand-Zantman, and Tommaso Valletti. "The value of personal information in online markets with endogenous privacy." *Management Science* 65, no. 3 (2019): 1342-1362.

Muleme, J., Kankya, C., Ssempebwa, J.C., Mazeri, S. and Muwonge, A., 2017. a Framework for Integrating Qualitative and Quantitative Data in Knowledge, attitude, and Practice Studies: a case study of Pesticide Usage in Eastern Uganda. *Frontiers in public health*, *5*, p.318.

Muller, Zane. "Algorithmic harms to workers in the platform economy: The case of Uber." *Colum. JL & Soc. Probs.* 53 (2019): 167.

Namin, Aidin, Dinesh K. Gauri, and Robert J. Kwortnik. "Improving revenue performance with third-degree price discrimination in the cruise industry." *International Journal of hospitality management* 89 (2020): 102597.

Neuendorf, K.A., 2018. Content analysis and thematic analysis. In *Advanced research methods for applied psychology* (pp. 211-223). Routledge.

Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N. and Hoagwood, K., 2015. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), pp.533-544.

Paul, Sanjukta M. "Uber as for-profit hiring hall: a price-fixing paradox and its implications." *Berkeley Journal of Employment and Labor Law* (2017): 233-263.

Perera, K. and Emmerich, N., 2018. *The Ethical Concerns of Writing in Social Science Research*. SAGE Publications Ltd.

Ploug, T. and Holm, S., 2015. Meta consent: a flexible and autonomous way of obtaining informed consent for secondary research. *BMJ: British Medical Journal (Online)*, *350*.

Rosenblat, Alex, and Luke Stark. "Algorithmic labour and information asymmetries: A case study of Uber's drivers." *International Journal of Communication* 10 (2016): 27.

Rosenblat, Alex, Karen EC Levy, Solon Barocas, and Tim Hwang. "Discriminating tastes: Uber's customer ratings as vehicles for workplace discrimination." *Policy & Internet* 9, no. 3 (2017): 256-279.

Santos, Flavio Andrew do Nascimento, Verônica Feder Mayer, and Osiris Ricardo Bezerra Marques. "Dynamic pricing and price fairness perceptions: a study of the use of the Uber app in travels." *Turismo: Visão e Ação* 21 (2020): 239-264.

Saxena, Nripsuta Ani, Wenbin Zhang, and Cyrus Shahabi. "Unveiling and Mitigating Bias in Ride-Hailing Pricing for Equitable Policy Making." *arXiv preprint arXiv:2301.03489* (2023).

Seele, Peter, Claus Dierksmeier, Reto Hofstetter, and Mario D. Schultz. "Mapping the ethicality of algorithmic pricing: A review of dynamic and personalized pricing." *Journal of Business Ethics* 170 (2021): 697-719.

She, Shengxiang, Haoran Xu, Zehong Wu, Yunzhang Tian, and Zelin Tong. "Dimension, content, and role of platform psychological contract: based on online ride-hailing users." *Frontiers in Psychology* 11 (2020): 2097.

Shoman, Maged, and Ana Tsui Moreno. "Exploring preferences for transportation modes in the City of Munich after the recent incorporation of ride-hailing companies." *Transportation Research Record* 2675, no. 5 (2021): 329-338.

Song, Jaein, Yun Ji Cho, Min-Hee Kang, and Kee Yeon Hwang. "An application of reinforced learning-based dynamic pricing for improvement of ridesharing platform service in Seoul." *Electronics* 9, no. 11 (2020): 1818.

Sun, Zhongmiao, Qi Xu, and Baoli Shi. "Dynamic pricing of ride-hailing platforms considering service quality and supply capacity under demand fluctuation." *Mathematical Problems in Engineering* 2020 (2020): 1-26.

Thompson, Andrew W., and Yannick Perez. "Vehicle-to-Everything (V2X) energy services, value streams, and regulatory policy implications." *Energy Policy* 137 (2020): 111136.

Tirachini, Alejandro. "Ride-hailing, travel behaviour and sustainable mobility: an international review." *Transportation* 47, no. 4 (2020): 2011-2047.

Wang, Jianfu, Geoffrey A. Chua, Arvind Sainathan, and Akshay Vijayendiran. "Equilibrium queueing analysis in a ride-hailing service with sharing option." *Journal of the Operational Research Society* (2022): 1-20.

Wei, Xin, Guofang Nan, Runliang Dou, and Minqiang Li. "Optimal business model for the monopolistic ride-hailing platform: Pooling, premier, or hybrid?." *Knowledge-Based Systems* 204 (2020): 106093.

Wertenbroch, Klaus. "Marketing Automation: Marketing Utopia or Marketing Dystopia?." *NIM Marketing Intelligence Review* 13, no. 1 (2021): 18-23.

Woodcock, Ramsi A. "Big data, price discrimination, and antitrust." *Hastings LJ* 68 (2016): 1371.

Xu, Weina, Gui-Hua Lin, and Xide Zhu. "Bundling Strategies for Ride-Hailing Platforms Based on Price and Service Level." *Journal of Theoretical and Applied Electronic Commerce Research* 17, no. 2 (2022): 851-874.

Xu, Zhengtian, Yafeng Yin, and Jieping Ye. "On the supply curve of ride-hailing systems." *Transportation Research Part B: Methodological* 132 (2020): 29-43.

Yan, Chiwei, Helin Zhu, Nikita Korolko, and Dawn Woodard. "Dynamic pricing and matching in ride-hailing platforms." *Naval Research Logistics (NRL)* 67, no. 8 (2020): 705-724.

Zuanxu, Chen. "Business Analysis of Didi Chuxing in the Chinese Ride-hailing Market." *Contemporary Social Sciences* 2020, no. 5 (2020): 5.

Appendix

1.1 Interview questions to Uber employees (sales planners)

Q.1 Tell us about your business model of Uber

Q.2 How does the Pricing strategy of Uber work?

Q.3 What is the effect of surge pricing in balancing supply and demand? Does it help in maintaining consumer welfare?

1.2 Interview Questions to Lyft employees (sales planners)

Q.1 Tell us about the business model of Lyft Cars

Q.2 Q.2 How does the Pricing strategy of Lyft work?

Q.3 What is the effect of surge pricing in moderating supply and demand? Does it help in maintaining consumer welfare?