

Big Data Killing: Price Discrimination in Algorithmic Economy

Yiru Wang^{1*}, Guangzhi Zhang², Zhiyu Zhang³

¹*School of Liberal Arts, Macau University of Science and Technology, Macao Special Administrative Region, China*

²*School of Art, Heilongjiang International University, Harbin, China*

³*School of Safety Science and Engineering, Xinjiang Institute of Engineering, Ürümqi, China*

**Corresponding Author. Email: 1230022643@student.must.edu.mo*

Abstract. This paper focuses on the issues related to price discrimination under the background of big data, based on the actual situation and problem of Chinese Internet users' consumption data, through the methods of literature research and case analysis, and theoretically expounds its economic essence, so as to find the existing economic problems under the background of big data. The research background and significance of this paper point out that modern enterprises use big data to collect massive users' Internet browsing history and other actual situations to achieve precise marketing plan of enterprises, which makes the hot topic of "big data killing" cause a lot of disputes among users. It can be seen that discussing this issue is of great significance to promote the legal use of personal information records by enterprises, and protect the rights and interests of consumers. Then it analyzes the impact of big data on price discrimination, including the specific implementation path of "data-algorithm" and further makes a specific comparison with the traditional sense of price discrimination. This study also points out the damage of price discrimination to consumer experience and consumption fairness caused by the current situation, and there is no corresponding sound system, and some Internet industries still hide the defects of black box algorithm, and other specific situations, which urgently need to put forward solutions. In view of the shortcomings of regulation and algorithm transparency, this paper describes the specific content and implementation methods of China's digital economy in the future.

Keywords: Price discrimination, big data, fairness

1. Introduction

The progress of science and technology has also brought about the rapid development of big data. In business, based on the advantages and speed of big data, enterprises can collect and analyze various behavior records of users, so as to achieve accurate marketing and service, improve the production and efficiency of enterprises, and increase the competitive advantage of enterprises. However, the progress of big data also brings a series of "technical ethics and moral problems", among which the most typical is "big data killing", in which enterprises use the consumption records collected from

the use of facilities to make different consumption behaviors for different consumers. "Big data killing" is based on the price discrimination of big data. In recent years, some businesses in the fields of e-commerce platforms and online tourism have been exposed to use algorithms to discriminate pricing, which has attracted the attention of the community. This kind of big data pricing model based on big data collection has improved profits and increased market share to a certain extent, but the potential unfair trading risks behind it have seriously damaged the interests of consumers and greatly damaged the fairness of rights. At the same time, in today's context of more hidden models, it is difficult for existing relevant laws, regulations and management systems to carry out relevant investigations based on the premise of algorithm disclosure and data visibility, resulting in more difficult and onerous supervision [1].

In the context of big data, the methods used in this study to solve the price discrimination problem and its regulatory countermeasures are literature research and case analysis.

In this context, this study deeply studies the relationship between big data and price discrimination, which not only helps to reveal the new market failure mechanism under the algorithm economy, but also provides theoretical support for building a fair, transparent and reliable digital consumption environment [2]. Therefore, the purpose of this study is very meaningful. On the one hand, it can help policy makers to provide decision-making reference on how to improve the data governance and anti-monopoly regulatory framework. On the other hand, it can awaken the people to consciously safeguard their legal rights and encourage them to develop correct data usage methods. From the perspective of theory, this study will also promote the improvement of information economics and behavioral economics. Therefore, this study has a high practical value and significance.

2. Core concepts

2.1. The economic nature of price discrimination in the big data context

In today's big data market and social environment, price discrimination is generally regarded as mainly first-degree price discrimination, which is also called perfect price discrimination [3]. By leveraging data and technology advantages, businesses sell goods or services at prices that are as close as possible to each consumer's maximum psychological willingness to pay. Since this pricing strategy is extremely personalized and deprives consumer surplus to the greatest extent, it often raises social concerns about fairness, consumer welfare, and total social welfare.

2.2. Causes of price discrimination in the big data context

As big data technology keeps improving, price discrimination has become more widespread in customers' lives than before, with the goal of maximizing the extraction of consumer surplus and converting it into producer surplus to boost enterprises' net profits. However, some forms of price discrimination are not necessarily illegal or inefficient—they help optimize resource allocation and achieve Pareto improvement, mainly through differential pricing based on different purchase times and quantities, such as off-peak airfares.

2.3. The key role of big data technology

Big data technology improves three aspects, the accuracy, concealment, and dynamism of price discrimination. Based on users' behavioral analysis, then algorithmic pricing, enterprises can more accurately access individual consumers' data, purchase history, browsing history, and even consumer

preferences from other software. And they can also provide different price discrimination and push different products or services according to different locations (geographically).

Yet when enterprises collect customers' preferences via tools like cookies, information asymmetry and personalized pricing may lead to issues such as multiple asymmetric equilibriums, which in turn trigger a prisoner's dilemma. Contrary to enterprises' profit expectations, more refined price discrimination for consumers can intensify competition—for instance, consumers will compare prices across multiple platforms and brands, which ultimately harms enterprises' profits [4]. Meanwhile, ordinary users without professional knowledge can hardly detect algorithm usage, and enterprises can adjust prices at any time.

3. The impact of big data on price discrimination

3.1. The "data-algorithm" implementation path

Big data technology makes price discrimination more accurate and concealed by combining data collection and analysis with algorithmic model decision-making. Enterprises first collect the information mentioned in 2.2, process it to conduct accurate user profile analysis, label users, and predict their willingness to pay. Then they input the data into algorithmic models to implement pricing strategies, personalized pricing, and dynamic adjustments, which enables feedback optimization, real-time pricing, and simultaneous model iteration.

It should be noted, though, that excessive pursuit of data accuracy may weaken the tendency of algorithmic collusion and reduce industry profits, even though this measure could increase consumer surplus and total social welfare [5].

3.2. Comparison with traditional price discrimination

Price discrimination in the Internet era is algorithm-driven, meaning users are passively pushed products or services that big data identifies as what they "may want," while traditional price discrimination focuses more on customers' independent searching and selection—and this difference harms users' interests [6]. The traditional ones mainly relying on the experience, observation skills and bargaining power of salespeople, and highly dependent on face-to-face communication, salespeople set different prices by observing consumers' dress and behavior. In addition, it is difficult to prevent arbitrage, that is, buyers sell to consumers with higher psychological prices at more precise price discrimination to obtain more consumer surplus. Moreover, the products applicable to traditional price discrimination are also very limited, mostly personalized customized products, such as medical services, legal aid and educational services, etc.

Take platforms as an example: in the big data era, numerous sales platforms have been established, and whether to share the obtained information with third-party sellers has become a key decision-making issue for platforms. Studies show that owning information is not always beneficial to platforms—although information sharing boosts platform revenue, it intensifies competition and thus leads to the prisoner's dilemma mentioned in 2.2 [7].

This is quite different from traditional price discrimination implemented by individual merchants. In the past, information did not circulate quickly, and the competitive environment was not intense, so price discrimination could to some extent increase enterprises' profits. But in the big data era, enterprises need to consider multiple factors when making decisions. For example, if a platform has a high commission rate and few new users, it may give up product revenue and share information with merchants to attract more new customers, just like the food delivery platform war in the

Chinese market a few months ago. When the commission rate is high, regulatory authorities banning information sharing may increase consumer surplus and total social welfare, and relevant Chinese authorities have indeed introduced such regulations.

3.3. Typical industry cases

Online Travel Agency (OTA) platforms are hotspots for complaints about "big data price discrimination against regular customers." According to a 2025 survey by Tencent News, the complaint rate reached 49.5%. For instance, the ticket price of Osaka Universal Studios rose from 1,800 yuan to 2,600 yuan in a short time in 2025, and consumers speculated that this was due to the platform's dynamic price adjustment based on consumer behaviors such as hotel bookings. In addition, during the same period, prices varied when viewed on different electronic devices, depending on the device brand or user account.

Furthermore, the factors that membership level and price inversion incidents are common in China. For example, on the Fliggy platform, the ticket price for the same flight was lower for who have low-level members. And these facts lead to users' doubts about the fairness of the platform's strategy.

4. Impact analysis of big data price discrimination

4.1. Impact on consumers

Price discrimination impacts consumers as well, but they are unaware of this. This violates the principle of market fairness, undermines market trust, and causes dissatisfaction among many consumers. This consequently results in lower levels of trust that consumers place in platforms and reduced willingness to engage in consumption.

4.2. Impact on enterprises

Regulations prohibit big data price discrimination (commonly referred to as "big data price gouging"), and violations incur penalty costs. While enterprises may see short-term profit growth, the long-term risks are high. Big data price discrimination will intensify internal competition among industry peers, and excessive reliance on this practice can lead to price wars that squeeze profit margins. However, big data technology can also help enterprises implement precise marketing, which in turn increases corporate profits and attracts new users [8].

4.3. Impact on consumer surplus and total social welfare

Regulatory authorities in various countries have strengthened vigilance and supervision with the aim of safeguarding consumers' rights and interests and ensuring market fairness. In reality, big data price discrimination weakens consumers' willingness to spend, damages market trust, thereby hindering the development of the industry, and ultimately impairs total social welfare.

5. Regulatory approaches and solutions to big data price discrimination

"Big data price gouging" refers to price discrimination implemented by platforms through data and algorithms. It infringes on consumer rights and disrupts market fairness. Its supervision faces multiple challenges in technology, law, market definition, and burden of proof. Regulatory

authorities need to enhance technical capabilities, refine legal provisions, and explore new market definition methods to address these issues targeted.

5.1. Shortcomings of existing supervision

5.1.1. Insufficient legal targeting

Most existing laws and regulations focus on traditional price discrimination or manual collusion. They lack clear definitions and regulations for algorithm-driven big data price discrimination.

5.1.2. Lack of algorithm transparency

Platforms fail to fully disclose pricing logic, data sources, and other key information. This limits consumers' right to know and hinders regulatory intervention.

5.1.3. Imbalanced burden of proof

Consumers struggle to obtain pricing information of other users under the same conditions. Coupled with non-transparent algorithms, this makes it difficult for consumers to provide evidence. Additionally, the information disclosure requirements in current laws are insufficient to protect users' rights [9].

5.2. Feasible solutions

To regulate big data price discrimination, it is necessary to improve data rules in legislation, clarify the definition of algorithmic discrimination and the responsibilities of platforms, and optimize contract design. In terms of supervision, a multi-department collaborative mechanism should be established and technological monitoring should be implemented, while platforms need to safeguard data security. Platforms must not only prove the reasonableness of their pricing but also promote class actions to reduce the cost of rights protection. These measures should be integrated to form a reasonable and efficient, multi-pronged approach to build a healthy digital economy ecosystem [10].

6. Conclusion

Price discrimination based on big data is a kind of technical behavior with data and algorithms. From the economic point of view, it can help enterprises achieve profit growth in the short term, and part of the cost difference based on differentiation and data is conducive to the optimal allocation of resources. However, from the perspective of society and consumers, it challenges the principle of fair trade, infringes on the rights and interests of consumers and destroys the order of competition, and a series of problems will become increasingly serious. It seriously distorts the fairness and transparency of the digital consumption environment. On the other hand, the current regulatory system of regulatory measures and algorithm regulation is not good, in the application of the law and the process of ensuring transparency are difficult, and cannot effectively combat the unreasonable behavior caused by "algorithm rules". At the same time, many consumers are also faced with problems such as being unable to protect their rights.

In the future, in the field of big data and price discrimination, on the one hand, with the progress and development of technology, algorithms may be more transparent and easier to supervise, data management will be more perfect and efficient, and it will also help to reasonably distinguish

normal charges from abnormal price discrimination, and help to reach a good balance. On the other hand, people should adjust and increase the supervision measures for enterprises as soon as possible, strengthen the coordination and cooperation between different departments, gradually improve and supplement the laws and regulations related to data analysis, big data and related fields, and adopt more detailed and strict technical supervision measures. It is necessary not only to prohibit a series of unfair behaviors such as "killing", but also to ensure the fair market competition order of enterprises and consumers, so as to provide services and guarantee for a stable, orderly and harmonious society and economy. However, it is still necessary to further analyze and study the protection of the rights of enterprises in the face of various rules of the platform, as well as the status of consumers and the relative lack of professional knowledge. In addition, academic research should also deepen and expand in this field, enrich and refine the research results of behavioral economics, information economics and network platform governance, and jointly create a fair, transparent and reliable digital economy ecology.

Authors contribution

All the authors contributed equally and their names were listed in alphabetical order.

References

- [1] Xie, H., Zhu, Y. and Shishkin, D. (2025) On the Limitations of Data-Based Price Discrimination. *Theoretical Economics*, 20(1), 303-351.
- [2] Chioveanu, I. (2024) Consumer Data and Price Discrimination by Consideration Sets. *Economics Letters*, 236, 116105.
- [3] Wang, C. (2021) How Should "Big Data-Enabled Price Discrimination against Existing Customers" Be Regulated? Shanghai Law Society. <https://www.jfdaily.com/sgh/detail?id=549998>
- [4] Choe, C., King, S. and Matsushima, N. (2018) Pricing with Cookies: Behavior-Based Price Discrimination and Spatial Competition. *Management Science*, 64(12), 5669–5687.
- [5] Zhang, X., Zhang, M. and Zhao, W. (2024) Algorithmic Collusion and Price Discrimination: The Over-Usage of Data. *SSRN Electronic Journal*. <https://ssrn.com/abstract=4714202>
- [6] Chen, X. and Zeng, X. (2021, November 22) Chen Xinlei: Is There Really No Solution to Big Data "Killing Existing Customers"? Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University. <https://www.mbachina.com/html/saif/202111/383745.html>
- [7] Liu, M., Hu, Y., Li, G. and Qu, S. (2024) Information Sharing and Personalized Pricing in Online Platforms. *Production and Operations Management*, 33(4), 821-837.
- [8] Lin, G. and Cao, X. (2023) Big Data "Price Discrimination against Regular Customers" from the Consumer Perspective. *Strait Science*, (01), 84-88.
- [9] Zhang, T. (2025) Research on the Protection of Consumers' Rights and Interests in Big Data "Price Discrimination against Regular Customers." Yantai University.
- [10] Ouyang, J. (2025) Regulation of Big Data "Price Discrimination against Regular Customers" from the Perspective of the Data Security Law. *China Price Supervision and Anti-Monopoly*, (09), 42-44.