Research on Anti-Monopoly Regulations Against Algorithmic Price Discrimination

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Abstract. In the era of the digital economy, the algorithm is the core of productivity. As for the price, operators use algorithms to collect consumer data and customize "differentiated" prices for specific consumers, so as to gain or maintain competitive advantages. Clarifying the connotation, extension, and comprehensive influence of algorithmic price discrimination is the foundation of legal regulation. Illegal algorithmic price discrimination cannot be regulated spontaneously by the market alone, which needs legal intervention. This differential treatment of algorithmic price discrimination is prone to trigger serious unfair competition, resulting in an anti-competitive effect, so anti-monopoly regulation is necessary and reasonable. Information technologies such as data and algorithms further challenge traditional anti-monopoly regulation. In legislation, the definition of relevant markets, the determination of market dominance, the judgment of legitimate reasons, and the identification of the competition blockade impact are all vague. In supervision, the backward supervision technology and the supervisors that need to improve their ability also limit supervision efficiency. Therefore, we should first grasp the development status and value goal of China's digital economy, and then promote and amend the existing legislation from three aspects, including subject, behavior, and result. Finally, we should not only improve the new mode of pre-regulation and post-regulation step by step, and regulate technology with technology, but also adjust the supervision allocation and supervision subjects, aiming to build a new pattern of anti-monopoly joint governance.

Keywords: Anti-Monopoly Law; Algorithm; Price Discrimination; Consumer Rights Protection.

1. Introduction

With the development of the Internet, big data, and the digital economy in recent years, the growth momentum of Internet enterprises is irreversible, which profoundly changes people's consumption patterns and lifestyles. The head operators of Internet enterprises are large in scale with a number of users and also hold abundant data, which endows them with algorithm power and a certain domination in the market. The profit-seeking nature of capital makes it easy for Internet enterprises to take advantage of big data and algorithms, and abuse market dominance, which will eventually lead to monopoly. Algorithmic price discrimination is included. In other words, Internet enterprises rely on the data they have mastered such as consumers' equipment, location information, browsing history, purchase history, etc. before analyzing and integrating these data through algorithms, so as to understand consumers' willingness to pay, depict consumers, and predict their behaviors, thus setting different prices for various consumers, resulting in the phenomenon that each consumer with respective characteristics pays various prices. The user description and price adjustment of the algorithm improve sales efficiency, expand the economic aggregate, and intensifies social welfare to a certain extent. Nevertheless, if it is abused and allowed to develop unrestrained, it will do endless harm. Therefore, in the face of operators who not only abuse data and algorithm power, but also infringe on consumers' legitimate rights and interests in a subtler way, hindering healthy market competition, it is necessary to rationally regulate algorithm price discrimination. However, the current anti-monopoly law is not enough to meet the challenges of the hidden and technical new form of algorithmic price discrimination, which is difficult to effectively regulate algorithmic price discrimination. In practice, there are also problems such as difficulties in supervision and accountability. The research on anti-monopoly regulation of algorithmic price discrimination is helpful to improve the anti-monopoly regulation system, promote the judicial practice, and rationally

regulate algorithmic price discrimination, so as to maintain competition order, promote the healthy development of the market economy, and protect the legitimate rights and interests of consumers.

2. Main Body of This Paper

2.1 Definition and Influence of Algorithmic Price Discrimination

2.1.1 Concept and Definition of Algorithmic Price Discrimination

Up against the development of Internet big data, an algorithm is a series of computer program instructions, which is a programming calculation program manufactured to solve problems and achieve goals. However, the algorithm is not necessarily neutral, which contains value judgment and choice as it is established. When analyzing and reshaping personal data, it seems to have a potential risk of discrimination. Algorithm discrimination is an unfair, systematic, and repeatable phenomenon caused by algorithms, which is also an unfair treatment to special group members or users in the algorithmic operation. For example, algorithms can cause price discrimination, racial discrimination, employment discrimination, and so on. Algorithmic price discrimination is a category of algorithmic discrimination, which easily triggers the market order imbalance and damages consumers' rights and interests.

The essence of price discrimination is an economic concept, different from the unfairness and injustice of the "discrimination" in law. Price discrimination has a neutral sense, meaning "differentiation". Price discrimination refers to the same commodity setting different prices for various consumers, that is, the price changes with consumers' identity, region, and purchasing power.

Different from traditional price discrimination, in the era of big data, the first-level price discrimination based on various payment willingness of each consumer can be realized through a data algorithm. Algorithmic price discrimination, that is, operators of Internet enterprises use hidden algorithms and big data to depict and analyze consumers' personalities and understand their payment willingness, so as to set different prices for various consumers when purchasing goods and services according to their willingness, thus achieving the obtaining consumers' surplus.

2.1.2 Forms of Algorithmic Price Discrimination

Big data-enabled price discrimination against existing customer is the most significant and direct manifestation of algorithm price discrimination, which is a merchant manipulation algorithm behavior relying on Internet data to analyze consumers individually. In addition to taking advantage of the trust and information asymmetry of regular customers, it also treats new customers and regular customers differently for the same goods and services without justifiable reasons, and gives regular customers a specific reserved high price, while giving new customers a low price to attract more consumers. In recent years, it is not uncommon for media reports to carry out big data-enabled price discrimination against existing customer and many consumers report that they have been tricked in many consumption occasions such as tourism, shopping, travel, and movies. The concealment and technical characteristics of big data-enabled price discrimination against existing customer make consumers find themselves fooled only when comparing prices with each other. Meanwhile, it is difficult to defend their rights.

There are indirect manifestations of algorithmic price discrimination, such as consumption grading and targeted coupons. Consumption grading means that the Internet platform grades consumers' consumption ability, and then recommends different products for those with different consumption abilities. The prices, types, and brands of products recommended to consumers are different so that consumers can pay the highest price under their willingness. Targeted coupons are a means that merchants use algorithms to predict which users will leave only browse without buying anything, and then issue certain coupons to these users to attract them to consume.The indirect manifestations of algorithmic price discrimination are more concealed and difficult to identify and regulate.

2.1.3 Impact of Algorithmic Price Discrimination

From the perspective of law and economics, it is analyzed that algorithmic price discrimination has positive effects on market development. From the perspective of market development, appropriate algorithm price discrimination can promote the healthy development of market competition and increase social welfare. Operators use algorithms to meet the individual needs of consumers, which improves the transaction efficiency of the market and is beneficial to the development of the market economy to a certain extent. At the same time, operators analyze the data according to the algorithm to implement more optimized business strategies. The algorithm price discrimination saves costs and promotes innovation. As for consumers, appropriate algorithm price discrimination not just recommends diversified commodities according to consumers' needs and saves selection costs, but also innovates products meeting such needs and stimulates market competition vitality.

However, algorithmic price discrimination will also harm consumers' rights and interests as well as damage consumers' welfare. The differential pricing between consumers will make them lose trust, which leads to their refusal to trade, affecting the overall welfare of society and not conducive to long-term economic development. The social effect of the phenomenon that each consumer with respective characteristics pays various prices caused by algorithmic price discrimination is to boost social efficiency and total welfare with lower consumer welfare. In the long run, the overall improvement of superficial welfare is a nibble at consumers and an invisible "contempt chain" for consumers. Super Internet platforms with market dominance use data algorithms to implement price discrimination without justifiable reasons, through which they further absorb and attract more consumers, strengthen market dominance, and expand market share. In addition, they can damage market competition. Because of the "algorithm black box", consumers are in a passive and ignorant state, which is impossible for them to know the operation and pricing law of the algorithm. Thus, they have more difficulty finding that their rights and interests have been infringed in the end, resulting in inequality between buyers and sellers. Algorithmic price discrimination may cause an infringement on most people. Moreover, subjectively speaking, it is intentional and violates the principle of honesty.

Based on the benefits and harms of algorithmic price discrimination, it plays a complex role in the economic field with different consequences for enterprises, consumers, and market competition, so it cannot be simply banned. From the perspective of anti-monopoly regulation, it is necessary to analyze the illegality of some algorithmic price discrimination, judge the illegality and value based on the elements stipulated in Anti-monopoly Law, and analyze the equivalence between the positive and negative effects of its behavior as well as the value goal to be achieved by the market economy, so as to comprehensively judge the illegality of algorithmic price discrimination and the necessity of the regulation on it.

2.2 Necessity and Rationality of Anti-monopoly Regulation of Algorithmic Price Discrimination

At present, many paths can be used to regulate algorithmic price discrimination. Consumers can invoke the Civil Code, Consumer Protection Law, and Electronic Commerce Law on the grounds of personal information protection and consumer rights protection. The General Administration of Market Supervision can enforce the law through the Price Law, E-Commerce Law, Anti-Monopoly Law, and relevant regulations. However, concerning the effectiveness of regulating algorithmic price discrimination, anti-monopoly regulation can better reduce and stop algorithmic price discrimination, play a realistic and direct disciplinary and deterrent role, and promote the sound development of the digital economy.There is a distinct necessity and rationality.

First of all, strengthening anti-monopoly regulation is fundamental to perfecting the legal system of the market economy. As an economic constitution, Anti-Monopoly Law is the essence of standardizing the market economy. The emergence of algorithmic price discrimination in the digital economy puts forward higher requirements for the legal system of the market economy, and anti-monopoly law should make corresponding regulations and responses to algorithmic price discrimination.

Secondly, intensifying anti-monopoly regulation is key to protecting users' equal trading rights. Individual consumer litigation is irrelevant to platform operators with strong financial resources and market dominance, this kind of compensation cannot deter the platform, which cannot well regulate algorithmic price discrimination. Compared with other laws, the Anti-Monopoly Law has stricter penalties, more fines, and a wider social impact, which has a strong deterrent to platform operators. Thus, anti-monopoly regulation on algorithmic price discrimination is more effective in better protecting the legitimate rights and interests of users.

Finally, strengthening anti-monopoly regulation is an inevitable choice to promote the orderly development of the digital economy. Head operators of digital economy platforms, such as Taobao, Ctrip, Meituan, etc., occupy more user data and market share with great social influence, which plays an imperative role in the development of the digital economy. It is easy for them to implement algorithm price discrimination, causing a butterfly effect on the market, which easily forms a monopoly and hinders other emerging platforms from participating in the competition. Anti-monopoly regulation must be carried out on algorithmic price discrimination to better promote the healthy development of the digital economy. In addition to refining the applicable rules of anti-monopoly in the platform economy, the new Anti-Monopoly Law adds safe harbor and other systems and constantly improves the legal system of the market economy, which is conducive to better protecting the privacy of users' data, promoting the healthy development of digital economy, and practicing the concept of "paying equal attention to standardization and development".

2.3 Existing Problems of Anti-monopoly Regulation of Algorithmic Price Discrimination

2.3.1 Legislative Defects of Anti-monopoly Regulation of Algorithmic Price Discrimination

There are some difficulties in applying the Anti-monopoly Law to algorithmic price discrimination.Only when the algorithmic price discrimination involves monopoly and meets the premise of anti-monopoly regulation can it be applied, so the requirement for apply is stricter.

As for the subject, first, it is difficult to define relevant markets. The traditional definition of related markets mostly starts from related product markets, regional markets, and time markets. However, up against the big data algorithm, algorithm price discrimination is characterized by decentralization, universality, and technicality. Meanwhile, the bilateral market mode of platform economy invalidates the traditional SSNIP test for defining related markets, which makes it increasingly difficult to define related markets. SSNIP test includes two stages as follows. The first step is to judge whether it has market advantage. The second step is to make a small (usually 5%-10%), not temporary (usually more than one year) price increase for a certain commodity, and then to see if customers will buy other commodities until their demand does not change because of the price increase. If a large number of customers turn to other goods, it can be regarded as a related market. Because of its cross-network effect, the traditional method based on the SSNIP test cannot consider the feedback effect of the other side of the platform on price increase, which makes it narrow to define the relevant market scope. Secondly, it is hard to identify the market dominance. The premise of anti-monopoly regulation is that the platform for implementing algorithmic price discrimination has market dominance. However, in the digital economy led by big data, it is thorny to identify market dominance. Many platforms will adopt initial free and coupon modes to attract users. Affected by consumption habits, network effects, market dynamics, locking effects, user stickiness, and technological advantages, the method of market share identification reflecting market share by sales cannot fully reflect the existence of market dominance. Thus, identifying the market dominance of algorithmic price discrimination is in trouble.

In terms of behavior, the Anti-Monopoly Law only has the principled provisions in Article 9 and the provisions prohibiting differential treatment on trading conditions such as trading prices in Article 22, which are abstract and general without the refinement of the specific behavior patterns, making it difficult to accurately identify and summarize the platform's implementation of price differential treatment. Thus, it is difficult to cope with the ever-changing algorithmic price discrimination in reality and identify violations. Traditional monopolistic behaviors are mainly divided into three

categories, including monopoly agreement, the concentration of operators, and abuse of market dominance, each of which is subdivided into several types of behaviors. These types historically summarize the specific monopolistic behaviors of operators. However, with the changes of the times, new behavior types should be summarized timely with an open concept in the economic development, such as monopoly formed by algorithmic behaviors in the digital economy.

As for the result, it is difficult to determine whether the platform constitutes the consequence of excluding and restricting competition. In addition, there is a premise that algorithmic price discrimination is regulated by Anti-monopoly Law, that is, no "justifiable reason" exists. The existing Anti-Monopoly Law and related regulations lack specificity and clarity on legitimate reasons, with their vague applicable boundaries. Besides, the new business model under the digital economy is not considered, which needs to be further improved. In addition, the setting of a reasonably lower price for new users within a certain period is used as the defense,which makes the algorithm price discrimination between new and old customers can not be regulated by the anti-monopoly law under certain circumstances. There are still great controversies on how to identify the trading habits under the platform economy, how to determine the new users and reasonable time limit, and how to judge the legitimacy of other justifiable reasons. In practice, price discrimination is generalized. When people mention it, it will be linked with the abuse of market dominance. However, in fact, it is necessary to evaluate the competition damage and competition consequences of algorithmic price discrimination.The algorithm price discrimination that achieves the effect of substantial exclusion and restricted competition needs to be regulated by the anti-monopoly Law. However, the legal provisions are too abstract, and the abstract standard of "excluding and restricting competition" makes it hard to define specific, diverse, and complex illegal monopolistic behaviors. According to the existing legislation, it is impossible to clearly define whether algorithmic price discrimination is beyond the limit and unfair, thus excluding and restricting competition.

2.3.2 Regulatory Defects of Algorithmic Price Discrimination

In the era of the digital economy, there are many defects in the supervision of algorithmic price discrimination. First of all, the technology of price discrimination in supervision algorithms is immature. Facing the price discrimination of the platform using algorithm technology, it is necessary to monitor and control the algorithm technology. Algorithm technology as a new field rose in a short time with complex technology. China has not yet formed a complete and systematic supervision technology system and failed to build a unified technology platform for supervision, so it needs to further develop algorithm supervision technology. Secondly, the supervision of algorithmic price discrimination requires the high professional and technical ability of supervisors. At present, there is no reserve of professional supervisors for the supervision of algorithmic price discrimination in China. Supervisors not only need to be familiar with legal knowledge and economic principles, but also should have corresponding monitoring and identification capabilities in the face of algorithm technology. It's still urgent for China to train comprehensive supervision technical personnel, so as to better promote the implementation of supervision.

2.4 Path to Perfect Anti-monopoly Regulation of Algorithmic Price Discrimination

2.4.1 Grasp the Value Goal of Anti-monopoly Regulation of Algorithmic Price Discrimination

Article 1 of the newly revised Anti-Monopoly Law in 2022 expresses the value goal of anti-monopoly and adds the content of "encouraging innovation". The value goal of anti-monopoly law includes protecting fair competition, economic efficiency, protecting innovation, consumer rights, and social public interests, which is diversified. We should reconstruct the legislative purpose and value system of Anti-monopoly Law by encouraging innovation and protecting rights. Besides, we should strengthen the design of supervision in advance and optimize the punishment mechanism afterwards by supervision and technology, and establish an anti-monopoly law system with equal price-quality emphasis and co-governance of law and technology. According to the Opinions of the Central Committee of the Communist Party of China and the State Council on Accelerating the

Construction of a National Unified Market issued on April 10, 2022, it is necessary to reduce transaction costs, get rid of the shortcomings of the system and mechanism, and build a unified market. The White Paper on Global Digital Economy (2022) points out that the digital economy provides important support for global economic recovery.We should promote digital governance, improve the top-level design of the digital economy, protect citizens' data rights. At the same time, we should also strengthen platform anti-monopoly, accelerate the establishment of a competition order in the digital economy market, and promote the new development of the digital economy.In this context, the positive significance of algorithmic price discrimination includes improving total social welfare, boosting economic efficiency, encouraging innovation, and reducing transaction costs, which will help promote the development of the digital economy to a certain extent. In the face of algorithmic price discrimination that does not exceed a certain limit or reach the scope regulated by Anti-monopoly Law, we should take the attitude of combining leniency with strictness to carefully consider and regulate it.

2.4.2 Legislative Amendment of Anti-monopoly Regulation of Algorithmic Price Discrimination

Under its existing legislative framework, the anti-monopoly regulation of algorithmic price discrimination should be amended to further improve the relevant identification details of the Anti-monopoly Law, so as to make the anti-monopoly identification of algorithmic price discrimination more specific and effective.

From the perspective of the subject, first of all, the identification method of relevant markets should be improved. The traditional SSNIP test is obviously not suitable for platform monopoly in the digital economy, so it should be improved and perfected. We can learn from the profit model test, which is a new definition method introduced by the EU in Internet industry cases. Its essence is based on the bilateral market characteristics of the Internet platform, integrating price elements into the profit model and defining relevant markets based on the trader profit model. The profit model test does not need to understand the complex price changes, nor does it need to fully understand the complex technical characteristics. Therefore, judicial personnel and law enforcement personnel only need to analyze the profit model of the target products, and then judge whether they belong to the same related market. Secondly, the criteria for identifying market dominance should be refined, and factors such as data, conversion cost, and user viscosity in the digital economy era should be taken into account.

In terms of behavior, through sorting out similar cases, the specific behavior types of algorithmic price discrimination in cases should be summarized. Besides, the legislative form of "abstract generalization + specific enumeration + miscellaneous provisions" is adopted to clearly use algorithms to form a monopoly, supplement relevant legislative and judicial interpretations, and refine algorithmic differential treatment, so that most algorithmic price discrimination behaviors have specific legal correspondence, aiming to better identify algorithmic price discrimination from behavior and provide the scientific basis for judicial practice. In other words, we can learn from the model of unfair competition on the Internet in the Law Against Unfair Competition, and list the specific types of algorithmic price discrimination, such as big data-enabled price discrimination against existing customer, targeted coupons, consumption grading, and miscellaneous provisions.

As for the result, the criteria for identifying illegality should be refined and the content of "legitimate reasons" should be clarified. We should analyze the competition effect, that is, whether the operators use data algorithms to restrict other operators from participating in competition fairly.We can draw lessons from the new development of the reasonable principle of the Chicago School, investigate the anti-competitive effect by case, and actively explore the more refined structural reasonable principle to determine the consequences of competitive damage. In view of the "legitimate reasons", we need to further clarify the identification standards of trading habits and make restrictions on reasonable concessions. We can also consider increasing social benefits, economic benefits, business rationality, necessity, etc., so as to further clarify other legitimate reasons.

Under specific circumstances, the judgment rule of "legitimate reasons" can consider whether other platform operators who do not have dominance in relative shares will take similar restrictive measures and make alternative comparisons, so as to judge whether "legitimate reasons" can constitute an effective defense against abuse of market dominance.

2.4.3 Perfect the Supervision of Anti-monopoly Regulation of Algorithmic Price Discrimination

Firstly, as for the supervision mode, we should set and boost the supervision mode of both pre-supervision and post-supervision to form a joint force. Given the concealment of algorithmic price discrimination relying on algorithmic technology, it is difficult to detect, track, and regulate afterwards, and the consequences are difficult to evaluate, which makes it difficult to measure and make up for the damage to consumers, operators, and market order. In addition, the cost of relief afterwards is high, so pre-supervision plays an important role. As for operators, we can learn from the gatekeeper system of anti-monopoly in European and American countries, give specific legal obligations to qualified gatekeepers, and shift from post-supervision to pre-supervision, thus changing the passive situation that the existing Anti-monopoly Law mainly relies on accountability afterwards.

From the perspective of users or consumers, we should pay attention to the protection of personal data and supervise the platform's use of personal data. We can learn from the EU's regulation of algorithm price discrimination, which focuses on the protection of personal data information and gives individuals the right to confront algorithm power.Only by perfecting the protection system of consumers' individual data rights can consumers of platform enterprises compete with "algorithm power" to a certain extent through data empowerment.

In addition, we should actively promote the proper openness and transparency of algorithms.We can order the e-commerce platform to provide information types and algorithm operation rules that may contain discrimination, so as to reduce information inequality and the impact of the "algorithm black box", which is conducive to better promoting prior supervision and protecting the legitimate rights and interests of consumers and operators.

Secondly, in terms of regulatory technology, under the platform economy, the application of big data and algorithms makes it difficult to effectively regulate the cross-sectoral and cross-industry economic model with traditional anti-monopoly means. We should try to explore an co-governance model of algorithm and anti-monopoly that effectively combines the technical root of "calculating by calculation" with the anti-monopoly means. We should strengthen the supervision of platform data compliance, regulate the whole process of platform data collection, processing, and utilization, and strive to supervise beforehand to be the gatekeeper of the digital economy.An online supervision platform can be set up to compare commodity prices and other information in real time, and the price discrimination behavior of the algorithm in real time should be monitored background. Relevant regulatory authorities should make use of regulatory technology, continuously improve regulatory technical means, adapt the update of regulatory technology to the development speed of the digital economy, and continuously promote the algorithmic regulation of algorithmic price discrimination.

Finally, in terms of supervision subjects, it is necessary to give full play to the diversified utility of supervision subjects and form a good supervision atmosphere of social co-governance and co-management. We need to clarify the division of labor and responsibilities of government regulatory authorities, get rid of the unclear responsibilities and chaotic supervision among regulatory authorities for algorithmic price discrimination. On the other hand, we should pay attention to the role of industry supervision, make the most use of specialized industry associations, conduct industry reviews on algorithm price discrimination, and regulate illegal algorithm price discrimination by means of informing and punishing illegal enterprises. It is also crucial to give full play to the supervisory role of the public, public opinion, and news media. The platform with illegal algorithm price discrimination will be reported and complained, and announced to the society, so as to curb the illegal price discrimination of the platform.In a word, it is vital to form a benign and effective supervision

system of algorithmic price discrimination in the whole society, which is led by the government, coordinated by industries and participated by the public, public opinion, and news media.

3. Conclusion

Nowadays, with the rapid development of the digital economy, facing the emerging algorithm price discrimination, it is necessary to treat it rationally and carefully consider its positive and negative impacts. Moreover, various factors such as social welfare, economic benefits, innovation promotion, and consumer rights should be integrated, and then make a judgment on whether it is legal and reasonable, and carry out anti-monopoly regulation with an inclusive and prudent attitude. In view of the defects in legislation and supervision of anti-monopoly regulation of algorithmic price discrimination, we should not only learn from foreign experience and grasp the value goal of China's digital economy development, but also focus on promoting legislative amendment and strengthen legislative interpretation, so as to constantly explore supervision mode, improve supervision efficiency, and better regulate algorithmic price discrimination.

This paper focuses on the analysis of anti-monopoly regulation of illegal algorithmic price discrimination, but has not further explored the prerequisite issues such as whether the platform's use of the algorithm to operate prices inevitably constitutes discrimination and needs to be regulated and sanctioned by law, which deserves the attention of academic and practical realms. Given that algorithm is the basic element of the digital age, we should promote the Anti-Monopoly Law to better fit the new economic form in the big data era, stimulate the new development of the digital economy while strengthening anti-monopoly regulation, and strive to realize the co-governance system of algorithm and anti-monopoly.

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