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Research on legal regulation of differentiated pricing of algorithm data

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Abstract: With the rapid development of China's Internet platform economy and the massive increase of Internet users, algorithmic differentiated pricing is coming into the public's view. "Big data slavish" is the first negative description of algorithmic differential pricing. Whether consumers or news practitioners, they have found it difficult to describe this behavior as "fraud" and "differential pricing" after they found that Internet manufacturers used algorithms to implement differential pricing. The legal issue of algorithmic differential pricing lies in the extensive and mandatory collection of consumer personal information using algorithms, which makes algorithmic differential pricing different from the common price differences in the market and the monopolistic differential pricing that economic law needs to regulate. Without restrictions on algorithmic differentiated pricing, consumers' personal privacy will not be guaranteed, Internet enterprise monopoly will be more likely to occur, and the development of the market economy will be hindered. The harm caused to consumers and the sense of injustice generated during consumer transactions cannot be resolved.

1. The cornerstone of implementing algorithmic differentiated pricing behavior is—data

Data is the necessary and sufficient condition for the implementation of differentiated pricing by algorithm, and provides a judgment standard for the degree of differentiation.

In the Internet era, big data has transformed the traditional economic approach to differentiated pricing, providing a convenient path for differential pricing in the platform economy. It is now possible to implement behavior akin to monopolistic differential pricing without having a monopoly position, through large volumes of transactions, or even without knowing personal information[1]—something that was extremely rare or impossible in traditional economic transactions. Data has changed everything. In the age of big data, information is data; any actions and transactions on internet platforms leave records, whether intentional or unintentional, and these data records do not disappear over time. In the era of big data, transactions are digitized, archives are electronic, leading us into an age of information explosion. When China entered the 21st century, laws and regulations related to personal information security and internet data were still relatively scarce, and concepts such as information data had not been mentioned. The lack of knowledge dissemination and the imperfections in relevant laws and regulations meant that even internet users with ten years of experience did not realize they were almost running naked in the digital world, nor did they understand the concept of information erasure. It wasn't until 2021 that web crawlers still existed.

Business operators can achieve differentiated pricing monopolies without needing market dominance, provided they have complete knowledge of consumers. A person's consumption needs, willingness to consume, and acceptable psychological price points require operators to expend considerable effort and service to obtain this information. However, in the era of big data, it has become easy and simple. When consumers search for products they need, the personal information they input and the acceptable price range not only provide reference but also remain unknown to consumers after transactions. The personal information generated during transactions thus enters the black box of internet platforms. We can naturally imagine internet platforms as benevolent third-party custodians who ensure absolute confidentiality. At the same time, although building user profiles through data analysis is an extremely time-consuming and costly task, it is precisely the significance of algorithms. The implementation of algorithmic differentiated pricing must be supported by a huge amount of data. Even useless waste data can play the role of eliminating irrelevant factors. The huge amount of data that is not erased provides a huge space for the generation of algorithmic differentiated pricing, which is the significance of data to algorithmic differentiation.

2. The necessity of legal regulation of algorithmic differentiated pricing

Algorithmic differentiated pricing reflects the spontaneous pursuit of self-interest by producers and operators of goods under the spontaneous regulation of the law of value. Algorithmic differentiated pricing can quickly and accurately segment consumer groups, rapidly stripping away consumer surplus, bringing excess profits to internet operators. Unlike efficient price differences in economics, algorithmic differentiated pricing undermines market fairness while demonstrating the high efficiency of operators in seizing consumer surplus value, rather than in production and resource allocation.

Social resources are scarce, and scarcity means that in the allocation process, resources will naturally flow to the buyer who can make the best use of them and generate the greatest value—this is what we call "the highest bidder wins." Therefore, differentiated pricing in economics aligns with Pareto optimality. It is precisely because of price differences that hikers can drink clean bottled water at the summit, ensuring the most efficient use of resources. The highest bidder wins because the buyer clearly understands the utility of the product and their own needs, thus offering the highest possible price. Scarce resources (or goods) will be reasonably allocated based on the highest bid.

Algorithmic differential pricing uses data and algorithms to achieve effects similar to hoarding and speculative behavior in traditional economies, highlighting the urgent need for legal regulation of algorithmic differential pricing.

3. Analysis of the lack of regulation of algorithmic differential pricing in existing laws and regulations

3.1 The gap of existing laws on algorithmic differential pricing regulation

China's existing economic laws and regulations are not sufficient to solve the problem of algorithmic differentiated pricing. This section analyzes the legal regulation that does not apply to algorithmic differentiated pricing from the perspective of contract law, consumer protection law, price law and anti-monopoly law.

The regulatory approach of contract law to algorithmic differential pricing. When consumers purchase goods or services online, an e-commerce contract is formed between the consumer and the e-commerce operator, which is subject to the general provisions of the Contract Law. Article 6 of

the Contract Law of the People's Republic of China stipulates that "parties shall exercise their rights and perform their obligations in accordance with the principle of good faith." Under this perspective, some scholars argue that internet platform merchants using algorithmic big data to build user profiles and raising prices for frequent users to gain excessive profits constitutes typical "price discrimination," which violates the principle of good faith. However, when consumers claim that operators have violated the principle of good faith, seeking to rescind the contract and demand refunds or even compensation, such claims are typically not supported by courts. This is because the application of the principle of good faith is supplementary; unless specific legal provisions would result in a clearly unfair judgment, judges will not base their decisions solely on the principle of good faith. Meanwhile, Article 54 of the Contract Law outlines five scenarios under which parties may amend or rescind a contract: significant misunderstanding, manifest unfairness, fraud, coercion, and taking advantage of someone in distress. In algorithmic differential pricing, as consumers, there is no significant misunderstanding. Consumers only have differences in purchase prices; the purchase price of other consumers cannot be a key factor for whether a consumer is subject to algorithmic differential pricing or not. Consumers often do not misperceive the attributes of goods themselves. Although they pay higher prices, these prices are not significantly higher than those paid by other consumers. The notion that algorithmic differential pricing with personalized rates is unfair and difficult to define is also unrelated to coercion or taking advantage of someone in distress. From the definition of fraud, the Interpretation of the Contract Law of the People's Republic of China defines fraud as "intentionally concealing the true situation or intentionally informing the other party of false information, deceiving the other party, inducing them to make an erroneous expression of intent, thereby entering into a contract." Under this definition, it is hard to say that an internet platform conceals the true situation by not informing another consumer about the price of the same goods or services that other consumers have purchased. Consumers also acknowledge the prices offered by operators before making purchases, so it cannot be said that they were deceived into making an "erroneous expression of intent." Therefore, it is very difficult for consumers to request the court or arbitration institution to amend or rescind an e-commerce contract based on the five scenarios stipulated in Article 54 of the Contract Law. In the case of air tickets mentioned above, consumers were not informed of the false situation. The price changed with the refresh, and the Internet platform created an indication of shortage, but this indication was obtained by consumers themselves. The Internet platform had the possibility of inducing, but there was no substantial proof of intentional informing of false situation.

The regulatory approach of the Consumer Protection Law to algorithmic differential pricing. The premise for implementing algorithmic differential pricing is to have access to consumers 'personal characteristics, and collecting and using such information may infringe on consumers' rights to personal information. Article 14 of the Consumer Protection Law stipulates that consumers "have the right to have their personal information protected by law," Article 29 outlines the obligation of operators to "collect and use consumer personal information," and Article 50 specifies the civil liability of operators for "infringing upon consumers 'rights to have their personal information protected by law." These provisions establish a framework for private law protection of consumers' personal information rights. However, the Consumer Protection Law does not prohibit internet platforms from collecting and processing consumers' personal information. If operators obtain prior "informed consent" from consumers and fulfill confidentiality obligations, their collection and use of consumer personal information comply with the provisions of the Consumer Protection Law, thus avoiding any legal fault. The administrative protection clauses for personal information stipulated in the Consumer Protection Law do not apply to algorithmic differential pricing. Additionally, although Article 10 of the Consumer Protection Law states that "consumers have the right to fair transactions," the reasons why the right to fair transactions cannot be invoked in the context where

consumers find it difficult to gather evidence to protect their rights have been explained in the preceding section.

The regulatory approach of the Price Law to algorithmic differential pricing. Some scholars categorize algorithmic differential pricing as mere differential pricing. However, in China, provisions against differential pricing are mainly found in the "Price Law of the People's Republic of China" and the "Regulations on Administrative Penalties for Price Violations." Article 14 of the Price Law stipulates that operators shall not "provide the same goods or services but implement differential pricing for other operators who have equal trading conditions." Therefore, algorithmic differential pricing practices do not fall under the aforementioned anti-differential pricing provisions.

The regulatory approach of antitrust law to algorithmic differential pricing. The most relevant provision in the Anti-Monopoly Law of the People's Republic of China concerning algorithmic differential pricing is Article 17, Paragraph 1. Item 6 of this paragraph stipulates that "without justifiable reasons, differential treatment is imposed on trading counterparts with identical conditions regarding transaction prices and other trading terms," which is considered an "abuse of market dominance" and should be prohibited. However, internet platforms operate across a wide range of sectors, and their dominant market positions can change rapidly. If antitrust regulation were to be applied to algorithmic differential pricing, it would first require recognizing that the relevant internet companies have achieved a dominant market position.

3.2 The shortcomings of the newly issued relevant regulations —— The Regulations on the Management of Algorithmic Recommendation for Internet Information Services

The Regulations on the Management of Algorithmic Recommendation for Internet Information Services, which came into effect on March 1, 2022, have been hailed as a sword to solve the problem of "big data killing". Media such as China National Radio and The Paper also have high hopes for this regulation in their reports.

Using algorithms to implement unreasonable differential treatment in transaction prices is the core of this paper—algorithmic differentiated pricing. The premise for using algorithms to achieve this aligns with the definition of algorithmic differentiated pricing presented at the beginning of the article. However, judging whether merchants engage in unreasonable differential treatment based on transaction prices to protect consumers' rights to fair transactions is theoretically feasible but difficult to implement in real life. Even under equal trading conditions, price fluctuations occurring within seconds can be consistent with market economic principles. If a merchant reduces the quantity of goods or makes them scarce, raising prices is justifiable, as is lowering prices when goods are in excess. This is why the practice of price discrimination against regular customers has persisted for so long without legal regulation. Judging whether unreasonable differential treatment is being implemented through transaction prices is challenging, making it difficult to regulate algorithmic differentiated pricing by internet companies at this level. This is a significant shortcoming of the latest regulations related to algorithmic differentiated pricing, which have yet to address this issue even in their most recent form. Meanwhile, the overall regulations also overlook the role of social supervision in regulating algorithmic differentiated pricing.

4. Supplementary suggestions on the legal regulation path of algorithmic differentiated pricing

Although our country's economic law still has shortcomings in addressing algorithmic differential pricing, it is not hard to see that both the Personal Information Protection Law, which came into effect on November 1, 2021, and the draft amendment to the Anti-Monopoly Law in 2021

have specifically added content related to internet companies and platform economies. This includes new provisions under Article ——, which clearly strengthen anti-monopoly enforcement while accurately stating that operators must not abuse their data, algorithmic, technological, or capital advantages, as well as platform rules, to exclude or restrict competition. In Article 22 of the draft amendment, when listing scenarios for "abuse of market dominance," in addition to the seven scenarios from the original law, new content has been added: if an operator with market dominance uses data, algorithms, technology, or platform rules to set obstacles and impose unreasonable restrictions on other operators, this is considered an abuse of market dominance. Through these supplements and revisions, our country is gradually improving the regulatory approaches and methods for economic laws in the field of internet platform economies, ensuring that economic laws have sufficient means to maintain the stable operation of the social economy in the face of emerging internet economic sectors. As the importance of internet antitrust and fair competition is increasingly emphasized, we can also explore how our country can regulate algorithmic differential pricing in this broader context.

First, improve through the newly implemented Personal Information Protection Law: By continuously enhancing the protection of personal information, we can reduce the space for algorithmic differential pricing to collect user data. Through learning and summarizing the regulatory paths of the US and Europe, when regulating algorithmic differential pricing legally, we can prevent such practices by protecting personal information. In practice, internet platform companies that can engage in algorithmic differential pricing must use algorithms to collect and analyze consumer personal data to create user profiles. It has been clarified above that internet platforms do not need to have a dominant market position to conduct algorithmic differential pricing. Therefore, regulating algorithmic differential pricing focuses on prevention rather than post-facto measures. Thus, regulating this behavior must start with the protection of consumer personal information. The Personal Information Protection Law passed in China stipulates that algorithms should provide options without personal characteristics, which increases the difficulty for algorithms to analyze and predict consumers 'purchasing intentions and income levels. When collecting consumer personal information, internet platforms must adhere to the principle of necessity and must not collect non-essential information. They also cannot force consumers to use applications because they do not grant permission for non-essential information usage. The EU's General Data Protection Regulation, which came into effect in May 2018, outlines a series of rights enjoyed by data subjects regarding their personal information, including the right to informed consent for information collection, access to personal data, the right to modify, erase, restrict processing, carry, and oppose automated decision-making. The regulation also stipulates that data controllers shall not require data subjects to waive the aforementioned rights in exchange for services, and it details the procedures for data subjects to seek redress from regulatory bodies and judicial authorities. In the Personal Information Protection Law and the Guidelines on Anti-monopoly in the Platform Economy, our country has referred to and drawn lessons from the EU's General Data Protection Regulation to improve our personal data rights system. However, in the current Personal Information Protection Law, the concept of user profiling is not mentioned. User profiling involves aggregating users' personal information to construct non-real, virtual consumer individuals, excluding their actual real-life aspects such as height, weight, or any other data that differ from the consumers themselves. From the perspective of personal information protection, this user profile should not be possessed by any internet platform. The importance of resident identity cards in real life goes without saying, but user profiles contain even more detailed information than electronic identity cards, including all information about the user's resident identity card and even smaller details like purchase records and browsing history. Constructing such a user profile seems to be addressed through Article 47—— of the Personal Information Protection

Law, which states that personal information processors shall proactively delete personal information; if they fail to do so, individuals have the right to request deletion. However, consumers find it difficult to know whether personal information processors have improperly processed their personal information and to confirm whether these processors have violated relevant laws. If the processing purpose has been achieved, cannot be achieved, or is no longer necessary to achieve the processing purpose, preventing personal information from being collected would also be extremely difficult. The realization of the purpose for which an internet platform processes personal information does not occur after a single transaction but during the duration of the account, meaning the service continues. Internet platforms have a legitimate reason to collect consumer browsing records and other data under the guise of providing services. When individuals withdraw their consent, it often means the account has been canceled. However, in my survey of 20 internet applications, including Youqianhua, JD Finance, and Tencent Video, 14 mobile apps retained usage records, browsing data, and preferred products even after the account was canceled. This is especially true for internet finance apps, which still send relevant messages and calls even after cancellation. Only six PC programs, such as Tencent Video, ask if they should retain related records when uninstalled. Often, the option for internet users to withdraw their consent is very hard to find; most people do not choose to directly cancel their accounts but simply uninstall them. At this level, there should be more precise explanations regarding the withdrawal of personal information consent and the conditions necessary for achieving the processing purpose.

The legislative body should promptly pass legislation to establish and improve systems for protecting individuals' data rights and providing remedies. For instance, Taobao's Direct Express program directly discloses consumers' personal information, including age, purchase frequency, items purchased, and shopping carts, to paying merchants. Taobao then charges substantial "data analysis" fees, which is despicable and could even lead to the resale of personal information. However, user information is provided by Taobao at the time of registration for other purposes. The principle of scenario limitation should be more detailed and should not serve as a reason for internet platforms to withhold services. Whether it is the explanation of scenario limitations or restrictions on user profiling, it highlights that there are still many areas where China's Personal Information Protection Law needs to be strengthened.

Second, the responsibilities of algorithm designers and users must be clearly defined. Even if algorithms can conduct self-analysis and judgment, it is not an excuse for algorithm designers and user platforms to shirk responsibility. Internet platforms should conduct self-audits of their own algorithms, which is far more cost-effective than applying irresponsible and unforeseen algorithms to the internet platform and then governing them afterward. In this regard, China can refer to the EU's draft Digital Services Act and Digital Markets Act released at the end of 2020, which clarify the responsibilities of digital service providers and propose methods and obligations for defining "gatekeepers." Algorithms are naturally production tools developed by internet platforms with significant time and cost investment; there is no need to make them public. Publicizing algorithms would impose constraints on research efficiency and development, but this is not a reason to fail to regulate algorithms. Major U.S. internet giants like Twitter and Google have gradually established positions such as algorithm reviewers responsible for auditing internal algorithms. China can also determine the extent to which internal algorithm reviewers should be set up based on the market position of internet platforms in relevant markets. This clarifies the responsible party when algorithms infringe upon others' rights and provides a safeguard for the reasonable development of algorithms.

Third, the government's ability to handle algorithms should also be strengthened. The government needs to enhance its technical capabilities in algorithm regulation; otherwise, regulatory requirements and legal responsibilities for algorithms will become mere formalities. The

government can improve its technical capabilities in algorithm regulation by establishing specialized institutions for algorithm regulation, cultivating and introducing technical talent, or leveraging external technical resources. Additionally, legislative bodies should increase penalties for abuses of algorithmic power that harm consumer rights through legislation. Guiding the pricing mechanisms of algorithms toward rationality is not only a meaningful task for the government but also a necessary condition for ensuring stable economic development. To guide the pricing mechanisms of big data algorithms toward rationality and eliminate the drawbacks of differential pricing caused thereby, effective regulatory measures must be found. Regulation is a form of government action aimed at maintaining and achieving specific public interests, imposing certain restrictions and constraints on market entities' behaviors. The government must regulate the differential pricing of algorithms through laws and regulations, safeguarding the stable development of internet platform economies through administrative means such as formulating rules, setting permits, conducting supervision and inspection, imposing administrative penalties, and making administrative decisions.

Fourth: Enhancing consumers 'self-protection and remedy capabilities, ensuring broad public participation in personal information protection and the prevention of algorithmic differential pricing. This is a crucial aspect for consumers to safeguard their legitimate rights and interests as well as for the governance of algorithmic power. While it may be too demanding to expect ordinary consumers to enhance their awareness through knowledge dissemination about algorithm design and operation, given that the learning cost for most consumers is extremely high and unattainable, understanding the implementation path of algorithmic differential pricing is not difficult. For instance, the basic process of algorithmic differential pricing involves user personal information collection[2]—— building user profiles to analyze psychological price points —— differential pricing. By grasping the fundamental process of algorithmic differential pricing, consumers can protect their personal information and access other internet platforms from operators who might engage in price discrimination. On the surface, algorithmic differential pricing appears to infringe upon consumers' rights under the Consumer Protection Law, but in essence, it violates consumers 'data rights. At the same time, it is necessary to improve provisions concerning consumer rights and remedies in both the Consumer Protection Law and the Price Law, enabling consumers to further constrain operators' algorithmic power from the perspective of consumer rights.

5. Conclusion

Research on the legal regulation of algorithmic differential pricing has significant theoretical and practical value for the application of economic law in various issues within the internet platform economy. Algorithmic differential pricing has already brought about numerous real-world problems, with big data price discrimination being particularly prominent. How to ensure the standardized development of internet companies has become a new challenge for the industry. At the Central Economic Work Conference held in 2021, anti-monopoly and anti-unfair competition measures were once again emphasized. Based on a thorough understanding of these trends, we should set up our regulatory and enforcement measures. Differentiated pricing algorithms harm consumer rights, squeeze out other competitors, and make competition among internet platforms more fragile. The disorderly expansion of internet capital has led senior government officials to resolve to regulate this chaos. When facing new issues such as legal regulation of differentiated pricing algorithms and economic law related to the difficulty in defining relevant markets, we deeply understand that these are not only new challenges brought by the internet platform economy but also new tests for us to contribute to building a digital economy in the era of big data.

References

[1] Wang Z, Shao L, Heidari A A, et al. Prior knowledge evaluation and emphasis sampling-based evolutionary algorithm for high-dimensional medical data feature selection[J].Expert Systems With Applications,2025.
[2] Legal Issues - Policy and Law; Data from Australian National University Provide New Insights into Policy and Law (Legal Hybridity, Trust, and the Legitimacy of the Shari'ah In the Bangsamoro) [J]. Politics & Government Week, 2019.