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Research on the Antitrust Regulation of Algorithmic Price Discrimination

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Abstract: Business operators, failing to fulfill their due social responsibilities, abuse consumer data to implement algorithmic price discrimination. There is academic debate regarding whether the outcome of algorithmic price discrimination enhances total social welfare or harms economic efficiency, and whether the efficiency gains can compensate for the damages caused. The ambiguity surrounding its harmfulness makes it difficult for the law to establish comprehensive regulations against algorithmic price discrimination. This paper clarifies the theoretical basis that implementing algorithmic price discrimination may lead to consequences such as depriving consumers of their right to fair trade and right to know, and harming healthy competition. It analyzes existing regulations on algorithmic price discrimination, aiming to address current issues including the lack of a targeted preventive system, vague identification standards, and inadequate remedies and liability allocation for such discrimination. The ultimate goal is to construct a sound regulatory system for algorithmic price discrimination.

Keywords: Algorithmic Price Discrimination, Antitrust Regulation, Abuse of Market Dominance.

1. Overview of Algorithmic Price Discrimination

(1). Concept

With the rapid development of technology, algorithms have inevitably become integral to our lives. Advances in algorithms have overcome technical barriers, making first-degree price discrimination, once considered theoretically difficult to achieve, a possibility. An algorithm is a predefined set of procedures designed by its creator to achieve a specific outcome. After inputting massive amounts of data, the algorithm processes it to reach a conclusion. Algorithmic price discrimination refers to the practice where algorithm users utilize algorithms to collect vast amounts of consumer information, analyze and predict different consumers' willingness to pay and their internal reservation prices, thereby setting different prices to achieve personalized pricing.

Economist Pigou first classified price discrimination into three types: first-degree, second-degree, and third-degree price discrimination[1]. Third-degree price discrimination occurs when a business divides customers into distinct groups based on characteristics like geographic location or identity, where each group constitutes a separate market, and charges different prices to each group. Second-degree price discrimination involves setting different price discount rates based on the quantity purchased by consumers; the unit price decreases as the purchase volume increases. Consumers are aware of the conditions for obtaining discounts and have the right to choose them, making this form of discrimination transparent. First-degree price discrimination, also known as perfect price discrimination, occurs when a business charges each consumer a price equal to their individual willingness to pay. This results in all consumers with a willingness to pay above marginal cost having their demand met, leaving no consumer surplus. In traditional markets, price discrimination was primarily third-degree, followed by second-degree. Due to technological limitations, first-degree price discrimination remained largely theoretical in the past, but algorithms have overcome these limitations. Algorithms collect personal information, purchase history, browsing history, etc., to create precise consumer profiles, predict individual willingness to pay, and make automated pricing decisions accordingly.

There is academic debate regarding whether the outcome of algorithmic price discrimination enhances total social welfare or harms economic efficiency, and whether the efficiency gains can compensate for the damages caused. The ambiguity surrounding its harmfulness makes it difficult for the law to establish comprehensive regulations. China lacks specific provisions targeting algorithmic price discrimination; relevant regulations are scattered across different branches of law, failing to provide complete stipulations for algorithmic price discrimination and its consequences. This results in vague legal bases, a pressing issue the legal community needs to address.

(2). Characteristics of Algorithms

The high incidence of algorithmic price discrimination is attributable to the inherent characteristics of algorithms. Andreas Leibbrandt's behavioral experiment demonstrated that if consumers are aware of the prices offered to others, the probability of businesses implementing price discrimination drops significantly[2]. Businesses are cautious about using price discrimination, as its discovery can damage brand reputation and consumer trust. However, if price discrimination remains undetected, businesses are more inclined to employ it. The stealth and technical nature of algorithms precisely meet this requirement, making algorithmic price discrimination preferable for businesses.

First, Extensiveness. The replicability and easy accessibility of algorithms enable even small and micro-enterprises to widely use them to improve operational efficiency. Algorithms allow monopolistic practices to transcend past market structure constraints. Manual price decisions based on collected consumer data are susceptible to human subjectivity and computational limitations, leading to high error rates. Once businesses combine algorithms with consumer data, algorithmic price discrimination achieves unprecedented stability and objectivity, potentially harming consumer rights and placing other businesses at a competitive disadvantage.

Second, Technicality. Understanding the operational mechanism of algorithms requires programming knowledge, which ordinary consumers and law enforcement officials often lack. Furthermore, the existence of the "algorithmic black box" means even designers cannot always explain how an algorithm reaches its conclusions. The algorithmic black box refers to the situation where, during the processing of big data, designers cannot ascertain which specific data led the algorithm to a particular conclusion, and there is a risk that running the algorithm again may not reproduce the same result. Businesses can use technical means to hide evidence of algorithmic price discrimination and defend themselves by citing reasons such as differing transaction conditions or market fluctuations.

Third, Stealth. Before the advent of algorithms, price discrimination by businesses often left traces, and the risk of consumer discovery and potential arbitrage through resale made businesses prefer uniform pricing. Algorithms, however, can adjust prices instantly by simply sending and receiving signals, or even by utilizing transparent market information, without human intervention, thereby reducing the existence of illegal evidence.

2. Monopoly Risks of Algorithmic Price Discrimination

Chinese laws mostly characterize algorithmic price discrimination as an illegal phenomenon. In theoretical circles, some scholars argue that algorithmic price discrimination harms competition, innovation, and consumer welfare [3]. They posit that algorithms possess quasi-public power characteristics and should be strictly prohibited. Other scholars believe that domestic regulations on algorithmic price discrimination are too "one-size-fits-all," arguing that algorithmic price discrimination has positive aspects and should be viewed with a "cautious scrutiny" attitude[4]. The core of the controversy lies in the assessment of its harmfulness. Whether the efficiency gains from algorithmic price discrimination can compensate for its harmful consequences is the benchmark for determining its legality. Regulation is only necessary if there are demonstrable harmful consequences.

Traditional economists argue that price discrimination can increase total social welfare, which is a measure of static efficiency[5]. They contend that algorithmic price discrimination does not affect market fairness, can increase dynamic efficiency, and is part of market pricing strategies. A business with some market power sets prices above marginal cost to earn profits, which results in losing customers whose willingness to pay (WTP) is below that price. The business loses potential profit, and consumers who want the product cannot obtain it, leading to a deadweight loss of monopoly. Algorithms, by collecting consumer information and generating profiles for personalized pricing, can, as technology advances, understand each consumer's reservation price. By charging prices above marginal cost tailored to each consumer's WTP, the business can reduce or even eliminate the deadweight loss, thereby increasing total social welfare. Consumers who can only afford prices lower than the uniform price may access products they otherwise couldn't, at a lower cost. Perfect algorithmic price discrimination allows the business to capture the entire consumer surplus, but total social welfare increases.

Algorithmic pricing mechanisms require greater transparency. Transparency can stimulate consumer rationality and reduce distrust in such mechanisms. Intervention is primarily warranted when businesses use algorithmic price discrimination for exclusionary conduct that eliminates or restricts competition. Consumers typically do not oppose price discrimination; they oppose being charged higher prices than others. Consumers tend to prefer purchasing goods priced lower than those offered to others[6].

(1) Behavioral Consequences of Algorithmic Price Discrimination: Harming Economic Efficiency

The price discrimination behavior experiment conducted by scholar Andreas Leibbrandt indicates that Consumer A will use other consumers' offers as a reference for their purchase decision. As long as others receive lower offers, even if the offer to A is higher compared to a uniform price, Consumer A may still purchase the product[7]. In the neoclassical model, only consumer preferences influence purchasing decisions. In behavioral models, both preferences and misconceptions influence consumers, and algorithms struggle to distinguish the proportional impact of each. What the business obtains is a WTP influenced by both. If algorithmic price discrimination reflects both consumer preferences and misconceptions, then consumers may suffer irreparable harm, subsequently affecting economic efficiency.

In a perfectly competitive market, businesses cannot control the price; the selling price PC equals the marginal cost (Figure 1). At this point, businesses capture no surplus; the entire economic surplus is captured by consumers, achieving a Pareto optimal state where social efficiency is maximized. PC is the perfectly competitive price, and QC is the quantity demanded under perfect competition. In the OECD report, the Demand 1 curve in Figure 1 represents the demand curve when algorithmic price discrimination is implemented[8]. In a monopoly market, the Demand 1 curve rotates upward. When it rotates to the red demand curve, the business can capture the entire consumer surplus. In oligopolistic and duopolistic markets, the Demand 1 curve rotates downward, indicating that businesses, to capture customers from competitors, offer personalized low prices below consumers' WTP, whereby consumers gain some producer surplus. When competition is intense, the Demand 1 curve may rotate downward to align perfectly with PC, where the business captures no surplus, and consumers fully benefit.

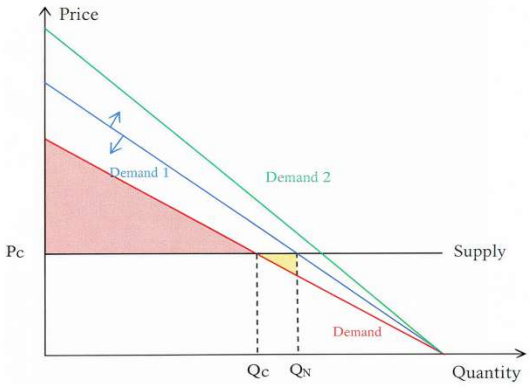

Figure 1. Supply and Demand Curves

In a monopoly market lacking sufficient competition (Figure 2), without algorithmic price discrimination, the business sets a price above marginal cost. Consumers with a WTP below this point will not purchase the good, resulting in the business selling less than QC units. The corresponding

surplus, 1/2*(QM-QC)*(PM-PC), cannot be captured (represented by the blue triangle in Figure 2). This constitutes the deadweight loss of monopoly, as total social welfare (the sum of consumer and producer surplus) is not maximized. Introducing algorithmic price discrimination into the neoclassical model allows the business to infer each consumer's WTP (absent misconceptions) and charge different prices accordingly. This enables every consumer with a WTP above marginal cost to obtain the product, potentially reducing the deadweight loss and increasing social welfare. However, in this scenario, the consumer surplus is fully captured by the business, approaching zero.

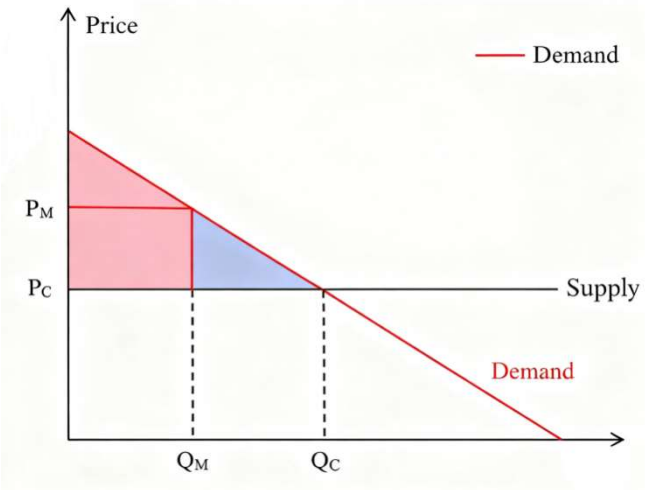

Figure 2. Supply and Demand Curves under Monopoly Pricing

As mentioned earlier, the OECD report suggests that the distribution of surplus between consumers and businesses is not fixed[9]. If the price discrimination demand curve rotates downward to the marginal cost curve, consumers gain more surplus . If it rotates upward to the preference-based demand curve, the business captures all surplus. But what if the discrimination curve rotates upward beyond the preference-based demand curve? In behavioral models, WTP also includes misconceptions. Suppose consumers overestimate the product's value due to exaggerated advertising. With algorithmic price discrimination, the algorithm precisely captures this inflated WTP. The discriminatory pricing curve would then lie above the true preference-based demand curve. Consumers would generally be willing to pay higher prices, leading them to be charged excessively. Consumers in the range QC to QN would be harmed (the yellow triangle in Figure 3). This is because consumers whose true valuation is below marginal cost might still purchase the product due to overestimation, a purchase they shouldn't have made. For example, heavy marketing of diamonds has historically created significant discrepancies between perceived and true value. Even rational consumers can make errors under information asymmetry. If algorithmic price discrimination exploits this, it becomes unfair. The business has already eliminated the deadweight loss and captured the entire consumer surplus from valuations above the competitive price, so no further efficiency gains are possible from that segment. However, consumers who should not have purchased the product (those with true WTP below cost) bear full losses, leading to an efficiency reduction. Even without algorithmic tools, marketing strategies aim to exaggerate value and understand customer WTP to set a uniform price that maximizes profit. If misconceptions are severe enough, causing the new demand curve (Demand 2) to have a much steeper slope than the original, the harm to total social welfare could far exceed any potential gains. This represents a problem of overconsumption. The damage to total social welfare and efficiency cannot be compensated by the captured surplus. Regardless of the efficiency standard used, some consumers are harmed. Dynamic efficiency gains are future-oriented, while static efficiency losses occur continuously in the present.

Scholar Oren Bar-Gill classifies WTP into two components: preferences and misconceptions (deviations in understanding the product's essential value), creating four combinations[10]. Misconceptions include both underestimation and overestimation. In Figure 3, the true demand curve and the perceived valuation curve (Demand 1, Demand 2 slanted lines) are two non-parallel inclined lines. They must intersect at some point, necessarily where price is zero. At a price of zero, the supplier offers no product, so the quantity obtained is the same (zero) regardless of valuation state. Assuming the lines intersect at price zero, where valuation error might be minimal, the exaggerated valuation perception curve and the true demand curve would show a widening gap as price increases (upper part wider, lower part narrower). This is because when overestimating, the degree of misconception correlates positively with preference intensity; higher preference leads to a larger gap between misperceived price and true preference price. When underestimating value, misconception correlates negatively with preference, resulting in an upper-narrower, lower-wider gap. Charging based on underestimated value would harm businesses more, reducing total social welfare, especially for low-cost goods.

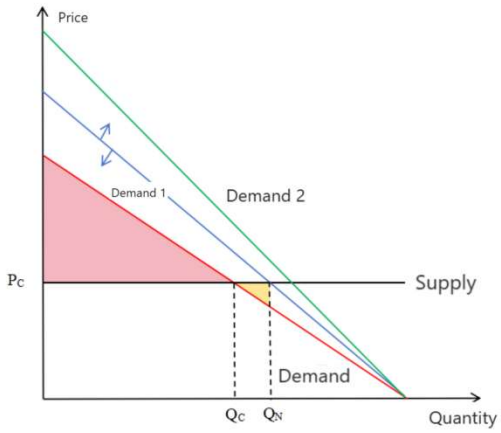

Figure 3. Supply and Demand Curves under Algorithmic Price Discrimination

Therefore, algorithmic price discrimination does not always enhance static efficiency as traditional economics suggests. Algorithms can amplify the negative effects of price discrimination, particularly when consumers overestimate product value. In such cases, antitrust law should intervene.

3. Current Regulatory Status of Algorithmic Price Discrimination in China

Article 22 of the newly amended *Anti-Monopoly Law* (2022) added a second paragraph stating that business operators shall not use algorithms to engage in abuses of

market dominance.

(1) The Undertaking Has a Dominant Market Position

The entity implementing algorithmic price discrimination is the business operator (undertaking), not necessarily the algorithm manufacturer. Articles 23 and 24 of the *Anti-Monopoly Law* stipulate factors for determining market dominance. Market share is generally the primary basis, supplemented by other factors such as purchasing power, financial resources, and technical capabilities. Super-platforms exhibit strong network effects[11]. The user scale and economic advantages accumulated by super-platforms allow them to rapidly expand into new markets. Therefore, more comprehensive digital factors should be established for determining the market dominance of new types of online operators. Due to the lack of clarity in the *Anti-Monopoly Law* regarding algorithmic price discrimination, the State Council Anti-monopoly Commission issued the *Antitrust Guidelines for the Platform Economy* in 2021 (hereinafter "*Antitrust Guidelines*"). These guidelines, considering the characteristics of the platform economy, list new factors for determining market dominance, such as using transaction volume and active user numbers to define market share.

First, factors for determining market dominance should consider the undertaking's user base and control over user data. Historical user numbers and active user numbers can serve as indicators of market share. Consumers can also be "locked-in" by platforms holding their data, increasing switching costs. Second, technological tools like algorithms are important considerations. Algorithmic technological monopolies can also become barriers to entry for new operators.

(2) Trading Counterparts

Abuses of market dominance can be categorized as exclusionary abuses and exploitative abuses. Exclusionary abuse refers to conduct by a dominant undertaking aimed at harming competitors' market position or driving them out of the market. Exploitative abuse involves a dominant undertaking directly harming end consumers by leveraging its position. US antitrust law generally does not consider exploitative abuse. While the EU includes exploitative abuse in its framework, the vast majority of cases involve exclusionary abuse[12] Exclusionary abuses, while targeting competitors, also ultimately harm end consumers. Therefore, the scope of "trading counterparts" should include end consumers.

Article 1 of China's *Anti-Monopoly Law* states that its purpose includes safeguarding consumer interests and the public interest, even prioritizing consumer interests. Paragraph 1 of Article 17 of the *Antitrust Guidelines* indicates that differences in transaction counterparts' privacy information, individual preferences, and usage habits do not constitute justifiable differences. The use of these keywords suggests that antitrust enforcement agencies regard end consumers as trading counterparts.

(3) Equivalent Conditions

Algorithmic price discrimination involves selling the same product or service at different prices to consumers under equivalent conditions. "Equivalent conditions" means that there are no substantive differences affecting the transaction between trading counterparts regarding transaction security, transaction costs, credit status, transaction stage, transaction duration, etc. Differences in consumer information obtained by the platform during the transaction do not affect the determination of equivalent conditions. The definition of "same product" should be construed narrowly; comparing essentially identical products at the same point in time is sufficient.

(4) Justifiable Reasons for Differential Treatment

The *Antitrust Guidelines* list justifiable reasons for differential treatment. First, undertakings can implement legitimate differential pricing strategies based on the different needs of trading counterparts, provided it conforms to established trading practices and industry customs. For example, price differences between first-class and economy airline seats are consistent with trading practices.

Second, undertakings can offer promotional discounts to new users for their first transaction within a reasonable period. Consumers generally understand transparent and customary new-user promotions as normal commercial activities.

Finally, undertakings can conduct non-discriminatory random transactions based on platform rules, as seen in the Zheng Yugao case[13]. Normal variations based on company operating policies do not constitute algorithmic price discrimination.

4. EU Regulation of Algorithmic Price Discrimination

(1) Legal Provisions

The EU categorizes price discrimination into collusion involving price discrimination and abusive differential treatment by dominant firms. Guided by the principles of the European Community, EU handling of price discrimination tends to be stricter and more standardized, considering the protection of consumer welfare a fundamental goal of the law. The legality of price discrimination is assessed using a dual standard: protecting total social welfare and consumer welfare. However, if algorithmic price discrimination only redistributes welfare among individual consumers or groups without reducing overall consumer welfare, the EU typically does not intervene. Algorithmic price discrimination affects the distribution of interests among different consumer groups. It may allow some consumers to purchase products at lower prices, expanding the product's reach and potentially increasing overall consumer welfare. The loss suffered by high-WTP consumers is transferred to low-WTP consumers, and the market-broadening effect might increase total consumer welfare more than the loss to high-WTP consumers. If evidence proves algorithmic price discrimination is used in collusion, it violates Article 101 of the Treaty on the Functioning of the European Union (TFEU). Currently, there is insufficient concrete evidence that algorithmic price discrimination causes irreparable harm to total consumer welfare; enforcement agencies should view it with an inclusive and scrutinizing spirit.

Article 102 TFEU prohibits price discrimination to protect purchasers from being placed at a competitive disadvantage[14]. The "purchaser" here typically refers to an undertaking engaged in economic competition. Article 102 does not directly address conduct between undertakings and end consumers. However, some scholars note that EU case law does not always require proving the purchaser is at a competitive disadvantage due to the discrimination, suggesting end consumers might potentially fall under Article 102's "purchaser" in certain contexts[15] Alternatively, one could argue that a purchaser facing higher prices due to discrimination is necessarily at a disadvantage. In practice, the *German Post* case demonstrated that price discrimination

harming consumer welfare can violate EU antitrust law[16] The court found that the postal service charging unfair prices violated Article 82 of the EC Treaty (now Article 102 TFEU)[17]. The court stated that Deutsche Post's excessively high prices ultimately harmed consumers, constituting an unfair selling price.

Beyond seeking protection under antitrust law, other laws can help restrict algorithmic price discrimination. First, anti-discrimination laws may prohibit price discrimination based on personal characteristics[18]. Second, regarding data protection, reviewing the compliance of data used by algorithms can invoke the *General Data Protection Regulation (GDPR)*. A major concern with algorithmic price discrimination is the infringement of the right to know, leading to consumer distrust and pessimism. Combining GDPR's provisions on the right to explanation, requiring businesses to explain algorithms could alleviate perceived inequality and mitigate harm.

(2) Implications of EU Regulatory Experience for China

The EU believes antitrust law should not intervene rashly in algorithmic price discrimination. Pricing decisions change with market conditions, and algorithmic price discrimination can be a market-responsive behavior. Various jurisdictions have adopted a inclusive and cautious attitude, with governments minimizing intervention in market operations. The EU has comprehensive personal information protection; implementing strong data protection laws can achieve the goal of restricting algorithmic price discrimination. China should characterize algorithmic price discrimination as illegal based on its specific conditions, but enforcement agencies handling violations or legislators setting liabilities must proceed cautiously. Lessons can be drawn from the EU by first improving consumer data protection and algorithmic accountability systems, reducing the incidence of algorithmic price discrimination at the source (data and algorithms). Enforcement agencies and scholars should conduct in-depth market investigations and decide on mandatory prohibitions based on market feedback. For a first-time offense, businesses should be given an opportunity to rectify; penalties should be imposed only for refusal to comply. The severity of administrative penalties, fine amounts, and proportions must be carefully determined.

China could enact specialized consumer data protection regulations. Guarantee consumers' effective exercise of the right to erasure and rectification. Empower consumers with choices regarding how their data is used. If a consumer prohibits the use of their data for algorithmic price discrimination, the business has an obligation to prevent misuse, otherwise bearing corresponding legal responsibility.

5. Suggestions for Improving the Antitrust Regulation of Algorithmic Price Discrimination

Regulating algorithmic price discrimination requires more than patchwork fixes; it necessitates building a logically self-consistent regulatory system addressing prevention, identification, and liability.

(1) Establish a Targeted Preventive Mechanism for Algorithmic Price Discrimination: Information Disclosure and Data Compliance

Establishing ex-ante prevention for algorithmic price discrimination is the most economical approach. The difficulty in understanding the core logic of algorithms is a key reason for the high incidence of algorithmic collusion. Issues like the algorithmic black box and high comprehension barriers not only make it hard for enforcement agencies to find evidence but also prevent consumers from exercising social oversight.

Relying solely on ex-post remedies is insufficient for comprehensive supervision of algorithmic price discrimination. Establishing a comprehensive algorithmic supervision system first requires an algorithm disclosure mechanism. Antitrust enforcement agencies could require businesses to disclose the core logic of their algorithms to each consumer using the service. Businesses need not make algorithms completely transparent but should explain the core logic in an understandable way, allowing consumers to act as supervisors. Enforcement agencies should have the power for prior review before algorithm deployment. At this stage, businesses have an obligation to fully disclose algorithm details to the enforcement agency and explain its operation and data sources. The enforcement agency, in turn, must ensure the confidentiality of the business's algorithms.

Enforcement agencies can conduct preventive oversight by checking whether enterprises use data compliantly. When an enterprise uses private consumer information to create profiles for personalized pricing, enforcement agencies should scrutinize its data usage practices to prevent further exploitation of consumer surplus using private data.

Establish specialized antitrust enforcement units focused on algorithmic price discrimination. As algorithmic cases increase, there is an urgent need for specialized departments to handle these issues specifically, ensuring fair and efficient case resolution. Enforcement agencies can integrate technological means, such as using algorithms designed for enforcement or automated monitoring of business practices to detect violations like price-fixing.

(2) Improve the Identification Standards for Algorithmic Price Discrimination

1) Special Considerations for Determining Dominant Market Position

The *Guidelines* reinterpret factors for determining market dominance, including order volume and active user numbers. However, further refinement is needed for enforcement agencies to make reasonable case-by-case judgments. Agencies should consider factors comprehensively, not relying on single data points.

Even operators without a dominant position can engage in algorithmic price discrimination. Algorithms reduce labor costs, enabling SMEs to significantly increase profits through personalized pricing. Therefore, Article 22 of the *Anti-Monopoly Law* could potentially be applied more broadly to algorithmic differential treatment, not strictly limited to undertakings with dominant market positions.

2) Narrow Interpretation of "Same Product"

The *Anti-Monopoly Law* and *Antitrust Guidelines* do not emphasize the basis for determining the "same product." To protect technological innovation, the scope of "same product" should be interpreted narrowly. Traditionally, defining the "relevant market" considers whether core functions are roughly similar, allowing for product differentiation[19]. For algorithmic price discrimination, the definition of the same product should require identical brand, quantity, model, color, product/service provider, and shipping costs. Products customized based on customer needs, even with nearly identical costs, should be considered different goods. However, caution is needed to prevent businesses from

exploiting this to evade regulation by creating unlimited variations of seemingly customized products with minimal cost differences.

3) Clarify "Equivalent Conditions" and "Justifiable Reasons"

The *Guidelines* adopt a "substantive impact" standard for judging equivalent conditions. However, the definition and scope of "substantive impact" lack further clarification. The term "substantive impact" implies that enforcement agencies have some leeway in judging transaction conditions; they do not require absolute or near-absolute identity, otherwise differential treatment would be hard to establish. Judgments should be made case-by-case based on principles of fairness and reasonableness, considering the transaction type. Justifiable reasons for algorithmic price discrimination should consider whether the trading counterpart is aware of the trading practices and industry customs. The burden of proving awareness (or lack thereof) likely rests with the trading counterparty, who bears the adverse consequences of failing to provide evidence.

(3) Remedies and Liability for Algorithmic Price Discrimination

1) Improve Ex-Post Algorithm Explanation Rules

Parties affected by algorithmic monopolies need the right to request an explanation of the algorithm as a remedy, and responsibility must be allocated among those who create and use the algorithms. Generally, the right to an explanation involves the counterparty requesting the business operator to explain the algorithm in use. However, without public authority involvement, this right may be ineffective. Consider incorporating enforcement agencies into the algorithm explanation mechanism. Affected parties could report suspected algorithmic price discrimination or collusion to the enforcement agency, which could then compel the business to explain the algorithm. Alternatively, if the agency discovers clues suggesting illegal algorithmic conduct, it could proactively initiate an explanation procedure, requiring the business to explain the algorithm within a specified period[20]. Such a mechanism could significantly broaden the scope of social supervision, and public authority involvement would bolster the effectiveness of the right to explanation.

2) Allocate Liability Among Different Subjects

The user of the algorithm is primarily liable for algorithmic price discrimination. If the algorithm manufacturer and user are different entities, and the manufacturer is unaware of the user's intent to use it for price discrimination, the manufacturer generally bears no liability. If the manufacturer benefits from the price discrimination or assists the user, liability should be allocated based on the extent of benefit or involvement.

6. Conclusion

Algorithms can no longer be simply regarded as trade secrets. When businesses implement algorithmic price discrimination, they abuse this power to extract consumer surplus. While algorithms bring convenience, the harmfulness of algorithmic price discrimination to economic efficiency can no longer be ignored. Improving the *Anti-Monopoly Law* and related regulations, and constructing an algorithmic supervision system, can ensure effective regulation of algorithmic price discrimination at the ex-ante, interim, and ex-post stages. As an emerging phenomenon, while confirming the illegality of harmful algorithmic price discrimination, enforcement departments must exercise caution to avoid hindering pro-competitive innovation by businesses.

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