

Economic Effects of the Widespread Use of Personalised Pricing

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Abstract: This study explores the economic impact of personalised pricing in digital markets, based on microeconomic models and consumer welfare analysis. It argues that, although personalised pricing achieves efficient resource allocation through matching between prices and consumers' willingness to pay in the short term, it may distort price signals and increase transaction costs in the long term. While improving social welfare, personalised pricing can lead to the transfer of consumer welfare to suppliers, creating concerns about distributive fairness. In addition, the data advantages used for personalised pricing may strengthen platforms' monopoly power, weakening market competition. Therefore, this study argues that regulatory measures are necessary to balance efficiency, fairness and the sustainability of market development.

Keywords: Personalised Pricing; Price Discrimination; Consumer Welfare.

1. Introduction

As enterprises increasingly leverage AI, machine learning and real-time analytics to optimise pricing strategies, the number of online shoppers has also reached 2.77 billion in 2025, accounting for 33 percent of the global population, which can provide massive data that enables personalised pricing. Meanwhile, more than 73 percent of global e-commerce retailers implemented dynamic pricing algorithms to improve profit margins and stay competitive [1]. Recently, Delta Air Lines announced it would expand its use of artificial intelligence to provide personalised prices to customers [2]. Surprisingly, in the European Union, 93 percent of online shoppers express their concern about such personalised practices, especially for hidden high pricing based on user data tracking [3]. The evolving trend of personalised pricing indicates that, in today's digital world, it seems to be economically inefficient not to leverage it to its fullest potential. Up to now, this pricing strategy has raised public concerns about the trade-offs between efficiency, fairness and consumer autonomy.

This study aims to investigate the following issues: What efficiency paradox is shown between short-term efficiency and long-term market operation in personalised pricing caused by distorting price signals and altering consumer behaviour? How can personalised pricing lead to an imbalanced surplus distribution and structural unfairness, especially for those vulnerable groups and public services? How does personalised pricing form a self-reinforcing cycle of data monopoly and weaken innovation dynamics? In terms of research value, this study deepens the analysis of personalised pricing by systematically examining its real implications, which connects the traditional price discriminant theory with contemporary digital market practices.

Personalised pricing, also referred to as the technological realisation of first-degree price discrimination in the digital era, which effectively reshapes the function of prices in the market [4]. Based on more refined information precision and algorithmic capabilities, firms are able to charge different prices for the same product based on consumer differences in willingness to pay [5]. Although personalised pricing may

appear to be an efficient market strategy for improving resource allocation in the short run, its real economic implications are far more complex than efficiency-based arguments suggest. Fortunately, existing economic literature provides empirical evidence and an analytical framework to examine its wider effect. It is evident that personalised pricing not only brings economic efficiency gains, but also causes numerous practical controversies and regulatory challenges.

As Rhodes and Zhou [6] show, personalised pricing does not always improve efficiency. In contrast, it may intensify competition in high-coverage markets, while distorting market signals in concentrated markets in the opposite way. Similarly, personalised pricing reallocates surplus from consumers to firms, creating unequal welfare distribution and disadvantaging vulnerable groups who tend to be less informed [7]. Woodcock [8] further demonstrates that data advantages create strong barriers of entry, making it possible for large platforms to reinforce their monopoly and squeeze small-and-medium-sized competitors.

2. Market Efficiency Effects of Personalised Pricing

2.1. Short-term Efficiency Gains and Long-Term Distortion

From a market efficiency perspective, the short-term efficiency gains from personalised pricing are at risk of being ultimately offset by negative consequences like distorted consumer behaviours, data signal chaos and loss of market trust in the long run, which can result in an intractable efficiency paradox. As a significant reason for its rapid adoption in the digital era, indeed, personalised pricing can accurately capture the willingness to pay and preferences of different consumers. It overcomes the limitations of traditional uniform pricing in terms of supply and demand matching, and thus enhances profitability and market coverage [9]. However, the short-term efficiency achieved through data monitoring is not sustainable for the healthy development of the market.

Once consumers become aware of algorithmic surveillance and unfair price discrimination, they may proactively engage in strategic camouflage behaviours to avoid being exploited

for high prices [10]. They may deliberately conceal real preferences, use privacy tools, register anonymous accounts and falsify behavioural data. As Ezrachi and Stucke [11] propose in their theory of behavioural discrimination, such defective responses interfere with corporate data collection and pricing judgment, creating bilateral firm-consumer gaming dynamics.

The widespread strategic deception employed by consumers results in businesses collecting user data that is filled with false information [12]. The authenticity and validity of the data will be lost. As personalised pricing relies heavily on genuine data, this distortion can lead to failure of algorithms. The large-scale field experiment by Yuan et al. [13] of 555,800 randomly chosen consumers on the Alibaba platform shows that, when prices no longer serve as an objective indicator of the true relationship between supply and demand, it will lead to signal confusion and resource misallocation.

Over time, consumers incur additional time expenditure on cross-platform price comparison and information verification to avoid algorithmic discrimination [14]. Meanwhile, firms must increase investment in data maintenance and technological optimisation to counteract widespread consumer deception, which significantly raises operational and transaction costs.

2.2. Competing Interpretations and Regulatory Caution

Whilst the above evidence highlights the negative impacts of personalised pricing, contrasting perspectives on the positive sides offered by Yun [15] further elaborate competing interpretations. His research is based on the U.S. Federal Trade Commission-issued orders to eight enterprises within the surveillance-pricing ecosystem. Early findings revealed that it is possible for firms to utilise highly detailed data, such as consumers' historical transaction data, browsing records, consumption habits and geographic characteristics to influence the prices and options presented to different consumers [16]. However, it cannot be confirmed whether the boosted profit margins are due to the implication of personalised pricing. The publication of these preliminary findings has also sparked controversy, as it was released prematurely and driven by political motivations. The public will be misled if there are substantial revisions in later investigations, so conclusions drawn from the results should be treated with caution.

Based on industrial organisation theory and institutional analysis, Yun also claims that personalised pricing could be seen as a digital upgrade of price discrimination with redistributive welfare effects as one of the advantages of personalised pricing. Personalised pricing does not harm all consumers. Some highly price-sensitive consumers benefit from lower prices, while less price-sensitive consumers pay higher prices. Moreover, the paper states that market competition, reputation constraints and technical thresholds can significantly reduce the risk of abuse. It is the predatory pricing under monopoly, discrimination based on protected characteristics and opacity caused by algorithmic black boxes that should truly pay attention to. As a result, targeted regulation would be likely to be more appropriate than a total ban. Nonetheless, this view has its limitation, as it relies heavily on theoretical reasoning, without quantitative decomposition of consumer surplus and producer surplus, resulting in its failure to verify competitive analysis with

market concentration data, which means that conclusions remain unclear for platform-dominated markets in the digital era.

3. Welfare Distribution and Fairness Effects

3.1. Surplus Distribution Under Personalised Pricing

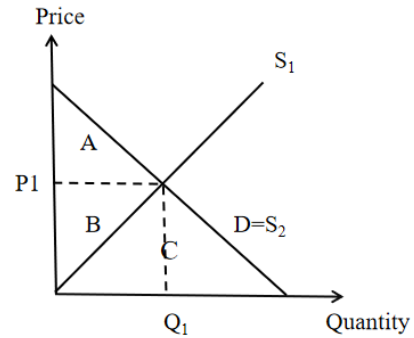


Figure 1. Surplus Distribution in Personalised Pricing

As shown in Figure 1, in a perfect competitive market, the initial market equilibrium is at the intersection of the demand curve D and supply curve S_1 , which is (Q_1, P_1) . In this case, area A represents consumer surplus and area B represents producer surplus. After personalised pricing is implemented, the new supply curve S_2 coincides with the downward-sloping demand curve D . This means the firm charges each consumer their exact maximum willingness to pay. The entire consumer surplus is transferred to the producer and becomes zero. The producer surplus expands to area $(A+B+C)$. Personalised pricing maximises total economic surplus by enabling access to consumers with low willingness to pay. From another point of view, high profits also encourage firms to further increase production, reaching economies of scale.

3.2. Structural Unfairness and Public Services

However, in terms of distributive fairness, personalised pricing can lead to internal problems of imbalanced consumer surplus distribution and structural unfairness, especially for vulnerable groups and public services. Through a systematic analysis of welfare and fairness model, Kallus and Zhou [17] show that data collection tools are likely to label those low-income groups, information-disadvantaged individuals, older populations and minority groups as “price-insensitive consumers” due to their weak bargaining power, limited access to information and insufficient digital literacy. As a result, they are at a risk of being subjected to high-priced pricing and targeted algorithmic exploitation [18]. Companies possess core technologies, holding absolute control over pricing rules, while consumers remain passive with their data being collected by the algorithmic black box. As they may not understand the basis, criteria and logic behind their pricing, this extreme power asymmetry of information is further amplified in the system [19]. Nonetheless, even if firms disclose all the rules behind personalised pricing, consumers will still feel uncomfortable or even angry about being monitored and treated differently as it invades their privacy and harms their benefits. Distortions in consumer behaviours will not improve.

What is even more alarming is that personalised pricing has the potential to seep into areas like healthcare and education,

driving basic public services towards commodification. If profit-driven suppliers in the private sector use algorithms to differentiate pricing for public services, medical and educational resources will be skewed towards consumers with higher financial capacity. Firms are not likely to charge these special services at an extreme low price for the poor, because the public may suspect whether the services are inferior and the wealthier groups may strive to obtain the low-price qualification through intermediaries [20]. As a result, the low-income groups will find it difficult to access equal public service resources, further causing structural social conflicts and damaging the foundational pillars of social equity.

4. Market Competition and Data Monopoly

4.1. Data-driven Monopoly and Entry Barriers

Regarding market competition dynamics, platform enterprises using personalised pricing may create a self-reinforcing data-driven monopolistic closed loop, leading to a negative transition of market focus from “product innovation” to “data extraction”. The larger the platform’s user base, the more extensive the data accumulated on consumer price sensitivity, serving as the starting point for this closed loop [21]. As algorithms become increasingly capable of identifying a consumer’s willingness to pay, near-perfect implementation of first-degree price discrimination generates excess profits. Then the platform enterprises are able to continuously reinvest this excess profit into technological optimisation, further reinforcing their pricing-dominant status.

This closed-loop system raises barriers to entry the market, threatening the survivals of small-and-medium-sized firms, as they are not able to access massive user data and sufficient funds to cover the costs of algorithmic development and data cleaning [22]. Small-and-medium-sized firms have to rely on large platforms, while large platforms with digital hegemony manipulate them. This phenomenon can be seen in the case of Ctrip, the world’s leading one-stop online travel platform known as China’s Expedia. In 2025, several hotels in Zhengzhou reported that Ctrip had modified room prices through its “price adjustment assistant.” This was because the platform kept tracking price gaps online and forced the hotels to change their pricing strategy. As for the May Day holiday, prices were even reduced by half, with the maximum daily difference reaching 44.88 yuan [23].

4.2. Innovation Distortion

In addition, when market competition is replaced by data monopolies, the direction of industry innovation may experience a significant distortion. Top-tier enterprises may no longer focus on innovations related to product quality and service upgrades. Instead, they will allocate more resources on improvements on algorithmic capabilities as it is of lower cost of collecting and storing [24]. Pasquale [25] also states in his research that the data-driven operations can contribute to the emergence of digital hegemony through technological advantages.

5. Conclusion

In conclusion, this study indicates that personalised pricing generates an efficiency paradox between short-term gains and long-term market distortion, causes significant structural

unfairness in surplus redistribution that threatens vulnerable groups and public service, as well as driving a self-reinforcing data monopoly cycle which reshapes the market competition focus from “product innovation” to “data extraction.” While personalised pricing brings certain allocative efficiency, the harms discussed above cannot be ignored. Therefore, in order to achieve sustainable development in a digital economy, future regulatory invention by the government is essential to balance market efficiency, social equity and competitive dynamics.

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