

PERSONALIZED PRICING AND DATA DISCRIMINATION

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Abstract

The development of the digital economy and the extensive use of personal data have facilitated the emergence of sophisticated commercial practices, among which personalised pricing occupies a central position. Through the use of algorithms, profiling techniques, and artificial intelligence, companies can adjust their commercial offers according to the individual characteristics and behaviour of consumers, raising concerns regarding fairness, transparency, and economic discrimination. The aim of this paper is to analyse personalised pricing as a contemporary form of price discrimination and to highlight the role of personal data and algorithms in differentiating the economic treatment of consumers. The research methodology consists of a theoretical and documentary analysis based on a review of relevant economic and interdisciplinary literature, as well as an examination of the legal and ethical implications of using data in price-setting processes. The findings indicate that personalised pricing can generate efficiency gains and enable a better alignment of commercial offers with demand characteristics; however, under conditions of limited transparency and information asymmetry, it may lead to subtle forms of economic and indirect discrimination. Consequently, algorithmic transparency, responsible data use, and stronger consumer protection mechanisms are essential conditions for limiting the potentially discriminatory effects of personalised pricing in the digital economy.

Keywords: personalised pricing, price discrimination, data-driven discrimination, digital economy.

JEL Classification: D42, D63, L86.

1. Introduction

The digital transformation of the economy has fundamentally reshaped the relationship between firms and consumers. Digital platforms, e-commerce, and data-driven services enable the collection, analysis, and exploitation of unprecedented volumes of information regarding individual behaviour. In this context, pricing is no longer necessarily a static and uniform process, but may become a dynamic process adapted to the characteristics and behaviour of individual users.

Personalised pricing is often presented as an instrument of economic efficiency, enabling firms to better adapt their commercial offers to demand characteristics and individual willingness to pay. However, the same technology may also function as a mechanism of data-driven discrimination when consumers are treated differently on the basis of collected information or characteristics inferred algorithmically.

The aim of this paper is to analyse personalised pricing as a contemporary form of price discrimination and to highlight the mechanisms through which the use of personal data and algorithmically inferred information may lead to differentiated economic treatment of consumers.

2. Research Methodology

The research is theoretical and exploratory in nature and aims to analyse the relationship between personalised pricing, the use of personal data, and the emergence of contemporary forms of economic discrimination in the digital economy. In accordance with the proposed objective, the research adopts a qualitative and interdisciplinary approach that integrates economic, technological, ethical, and legal perspectives on the phenomenon under investigation.

The methodology consists of a critical and comparative analysis of the relevant academic literature addressing the research topic. The bibliographic corpus includes academic studies and

reference contributions in the fields of economics, the digital economy, information theory, consumer protection, the economics of privacy, artificial intelligence, and technology law. The selection of sources primarily considered their relevance to the objectives of the paper, their contribution to the conceptual foundations of the issues analysed, and the current relevance of the topics addressed. Both established studies on price discrimination and recent research on personalised marketing, consumer profiling, and the use of algorithms in decision-making processes were considered.

The literature review focused on identifying and comparing the main concepts, arguments, and findings presented in the relevant literature. To this end, the sources were examined along four analytical dimensions. The first dimension concerns the economic foundations of price discrimination and the conditions under which it can be implemented. The second focuses on the role of personal data, profiling, and algorithms in the personalisation of commercial offers. The third analyses potential forms of economic discrimination, including indirect discrimination resulting from the use of proxy variables. The fourth dimension addresses the ethical and legal implications of differentiated consumer treatment based on collected data and algorithmically generated inferences.

From an analytical perspective, the research employs thematic synthesis and critical interpretation of the identified literature. The study does not seek to conduct a statistical meta-analysis or to quantitatively estimate the effects of personalised pricing, but rather to integrate existing findings and arguments into a coherent conceptual framework. This approach enables the identification of convergences and differences between economic and interdisciplinary perspectives and facilitates the identification of the main mechanisms through which the use of data may influence pricing decisions.

The analysis focuses on three main directions. The first concerns the transition from traditional forms of price discrimination towards forms of personalisation based on individual-level data. The second examines how observable data and algorithmically inferred information can be used to differentiate the economic treatment of consumers. The third analyses the tension between the potential efficiency gains associated with personalisation and the risks related to fairness, transparency, consumer autonomy, and personal data protection.

The literature analysis reveals the inherently ambivalent nature of personalised pricing. On the one hand, personalisation may enable a better alignment of commercial offers with demand characteristics and generate economic efficiency gains. On the other hand, extensive data use and the opacity of algorithmic processes may intensify information asymmetries and facilitate differentiated economic treatment that is difficult for consumers to observe and challenge. Consequently, the findings support the need for an interdisciplinary approach to personalised pricing, in which economic efficiency is considered alongside its implications for fairness, transparency, consumer protection, and the responsible use of data.

3. Theoretical framework: price discrimination

The digital transformation of the economy has fundamentally changed the relationship between firms and consumers. The digitalization of the economy has generated a profound structural change in the way firms interact with consumers, in particular by expanding the capacity to collect and process individual information[7]. This evolution has reconfigured traditional pricing mechanisms and brought price discrimination back to the forefront as a central instrument of modern commercial strategies[10].

In classical economic theory, price discrimination is the practice by which a firm sells the same good or service at different prices, without the differences being justified by costs.

The specialized literature identifies three cumulative conditions for the effective implementation of price discrimination: the existence of a market position that allows price control, the ability to differentiate between consumers, and the impossibility of transferring the good

between them. Varian emphasizes that, in the absence of one of these conditions, differentiated pricing strategies become difficult or impossible to sustain[10]. The digital economy significantly reduces the constraints associated with these conditions, as information technologies allow for the precise identification of individual preferences and the monitoring of consumption behavior in real time.

Economic literature traditionally distinguishes three main forms:

- First-degree discrimination, also called perfect, involves setting a distinct price for each consumer, equal to his maximum willingness to pay. Although long considered a theoretical ideal, the development of digital tools makes this form increasingly plausible in practice.

- Second-degree discrimination is based on self-selection mechanisms, with firms offering differentiated price structures or versions of the product, and consumers choosing the option that best matches their preferences. This approach is extensively analyzed within the framework of contract theory [3].

- Third-degree discrimination involves setting different prices for distinct segments of consumers, defined by observable characteristics. This form is frequently encountered in traditional markets and is associated with significant social and normative implications.

Personalized pricing is an extension of price discrimination in the context of the digital economy, coming closest to first-degree discrimination. The use of personal data and predictive analytics algorithms allows firms to accurately estimate individual willingness to pay, transforming information into a crucial competitive advantage [10]. This development is controversial, however. In the specialized literature, it has been argued that excessive price customization can lead to systematic discriminatory outcomes, even in the absence of explicit intention on the part of firms, as a result of algorithmic logic and correlations in the data[4].

The relationship between price discrimination and the information economy is fundamental. Models developed by Stiglitz highlight how information asymmetries can lead to inefficient allocations and persistent inequities [8]. In the digital economy, these asymmetries are accentuated by the concentration of large volumes of data in the hands of a small number of platforms.

Acquisti, Taylor and Wagman [1] show that the use of personal data for commercial purposes transforms price discrimination into a form of data discrimination, in which differentiation between consumers is based on algorithmic inferences, rather than on explicit or transparent criteria. A defining element of the digital economy is the automation of the decision-making process. Algorithms do not simply apply pre-established rules, but generate their own differentiation criteria based on available data.

Consequently, price discrimination becomes more difficult to identify and regulate through traditional legal instruments, which justifies the need for theoretical and normative frameworks adapted to the data-driven economy.

4. The data economy and the emergence of personalized pricing

The data collected by digital platforms is mainly used for three fundamental economic purposes: advanced consumer segmentation, prediction of future behavior and dynamic adjustment of commercial offers. Extremely fine-grained segmentation allows companies to identify subtle differences between users, going beyond classic socio-demographic classifications [10]. In parallel, predictive models based on machine learning are used to estimate the probability of purchase, price sensitivity and the optimal moment of the transaction. Thus, personalized prices no longer require explicit declarations from consumers, but are automatically generated based on correlations identified by algorithms in large data sets. This automation transforms the decision-making process into an opaque one, in which consumers do not know the criteria used to set the price and cannot assess whether the treatment applied is fair or discriminatory.

Machine learning algorithms play a key role in the implementation of personalized prices. They are able to process large volumes of data and identify complex patterns that are not easily

observable by traditional statistical methods [2]. Based on these patterns, companies build detailed profiles of users, a process known as profiling. Profiling can include purchase history, type of device used, geographic location, browsing behavior, and inferential data, such as estimated income level or the urgency of a purchase. These inferences are not always correct, but can have significant economic effects on the prices offered to consumers [1].

A central problem with the use of algorithms in pricing is that they can reproduce or amplify existing inequalities in society. Because algorithms are trained on historical data, they can reflect structural biases and pre-existing social correlations, without being subject to democratic control or adequate transparency.

In the algorithmic economy, economic discrimination can occur even in the absence of explicit intention on the part of firms, being the result of predictive logic and profit optimization. Thus, data discrimination becomes more subtle, but also more difficult to detect and regulate.

From an economic perspective, personalized prices can lead to increased allocative efficiency and profits for firms, by better matching prices with individual willingness to pay. In certain situations, they can allow some consumers access to goods or services at lower prices. However, the impact on social welfare is ambiguous. While some consumers may benefit from lower prices, others may be systematically disadvantaged, without having the opportunity to understand or challenge the pricing mechanism. Moreover, the loss of transparency can reduce trust in the market and affect competition in the long term, especially in markets dominated by digital platforms [8]. Therefore, short-term efficiency gains generated by price personalization may be offset by significant social costs, including increasing inequalities and eroding consumer confidence.

5. Types of Data-Driven Discrimination

Data discrimination associated with personalized pricing can take many forms, reflecting the way in which personal data and algorithmic inferences are used to differentiate the economic treatment of consumers. The literature highlights that these forms of discrimination are often subtle, difficult to identify and insufficiently understood by end users [1].

A first form is economic discrimination, whereby consumers with higher incomes or with a high estimated willingness to pay are systematically exposed to higher prices. Algorithms can estimate income levels based on indirect indicators, such as the type of device used, purchase history or consumption behavior, without having access to explicit information on actual income [10]. This practice leads to a redistribution of surplus in favor of companies and raises issues related to the fairness of the treatment of consumers.

A second form is geographic discrimination, which consists of setting different prices depending on the user's location, geographical region or even postal code. Studies show that such practices are common in e-commerce and digital services, where location is easily identifiable through IP address or geolocation data. Although sometimes justified by differences in cost or demand, these practices can lead to economically unjustified unequal treatment.

Behavioural discrimination is another relevant form, being applied to users perceived by algorithms as “captive” or less price-sensitive. These consumers can be identified based on the frequency of use of a service, loyalty to a platform or perceived urgency of purchase. Such strategies can exploit addiction or the lack of real alternatives, leading to overcharging certain categories of users.

A particularly problematic form is indirect discrimination, in which seemingly legally or economically neutral criteria generate discriminatory effects on vulnerable groups. For example, variables such as location, device type or browsing history can function as proxies for sensitive characteristics such as socio-economic status, education level or ethnicity. In these situations, the discrimination is not explicitly intended, but the end result is unequal economic treatment. A common element in all these forms of discrimination is the difficulty of detecting them. Consumers

do not have access to comparative information on the prices offered by other users and do not know the criteria used by algorithms in setting prices. This lack of transparency accentuates information asymmetries and limits consumers' ability to challenge discriminatory treatments.

6. Conclusions

In the contemporary digital economy, data has become a central factor of production, comparable to labor and capital in traditional economic models. Everyday activities such as surfing the Internet, using mobile applications or interacting on social media platforms generate massive volumes of data that can be collected, stored and analyzed at relatively low cost. This data provides detailed information about consumer preferences, consumption behavior, geographical location and even estimated income levels. Recent economic literature emphasizes that the economic value of data lies not so much in the raw information, but in the ability of companies to transform it into behavioral predictions and competitive advantages. In this context, data allows companies to go beyond traditional forms of market segmentation and adopt extremely fine-grained personalization strategies.

Personalized pricing accentuates information asymmetries between companies and consumers. While companies have detailed information about users, consumers do not have access to the criteria on which prices are set. This lack of transparency limits consumers' ability to make informed decisions and compare the offers available on the market. A major risk is the erosion of consumer autonomy. By exploiting behavioural vulnerabilities – such as urgency, loyalty or lack of alternatives – companies can influence purchasing decisions in a way that goes beyond simple commercial offers.

From an ethical perspective, personalised pricing raises questions related to fairness, distributive justice and respect for human dignity. Differential treatment can be perceived as unfair, especially when based on sensitive characteristics or questionable inferences.

Personalised pricing can have ambivalent effects on competition. On the one hand, it can intensify competition through tailored offers; on the other hand, it can strengthen the position of dominant companies, which have large volumes of data. Detecting personalised pricing is difficult due to the opaque nature of algorithms. The methods used in the research include: controlled experiments with fictitious profiles, comparative price analyses, algorithmic audits, collaboration with regulatory authorities. These methods are essential for ensuring accountability and transparency in the use of data. For companies, personalized prices represent an opportunity to maximize profits, but also a reputational and legal risk. Practices perceived as unfair can lead to a loss of consumer trust and regulatory interventions.

Adopting principles of “fair pricing” and mechanisms of algorithmic explainability can contribute to building sustainable business models. The analysis of personalized prices highlights a structural tension between market logic and the protection of fundamental rights. While personalization can bring economic benefits, the lack of clear limits risks undermining trust and fairness.

Personalized prices are an emblematic manifestation of the data-driven economy. While they offer opportunities for efficiency and innovation, they can generate subtle forms of economic discrimination. Regulation, transparency and algorithmic accountability are essential to ensure a balance between commercial interests and consumer protection.

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