

Algorithmic Price Discrimination and Consumer Protection A Digital Arms Race?

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algorithms, consum-
ers, discrimination,
personalisation, price

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Online market players are gradually gaining the capacity to adapt prices dynamically based on knowledge generated through vast amounts of data, so that, theoretically, every individual consumer can be charged the maximum price he or she is willing to pay. This has downsides for markets and society. European Union law insufficiently addresses these issues. Consumer-empowering technologies may help counter algorithmic price discrimination. We advocate for regulation to make the arms race between consumers and sellers more balanced by strengthening the digital tools available to consumer protection actors and to limit the battlefield by clarifying and refining the applicable rules and defining clearer categories of impermissible behaviours.

1. Introduction

Algorithmic price calculation is by far one of the most remarkable features of the present-day consumer economy, which to an unprecedented extent makes use of data to identify market conditions and the attitudes of individual consumers. The increasingly sophisticated forms of data-driven pricing have been met with apprehension in the public debate and remain highly puzzling from a legal and an economic perspective. The associated concerns do not stem merely from the novelty of algorithmic pricing. They are also indicative of the new types of economic and social perils that this way of price setting entails (or is likely to entail). Algorithmic price discrimination is one of the most prominent manifestations of data-driven pricing and raises challenging legal and policy questions.

In this paper we critically evaluate the applicable EU acquis, arguing that as a consequence of the limited protection it offers against algo-

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This work has been supported by the H2020 European Research Council (ERC) Project “CompuLaw” (F. Lagioia and G. Sartor) under the European Union’s Horizon 2020 research and innovation programme (Grant Agreement n. 833647) and by the Polish National Science Centre Project “Citizen empowerment through online terms of service review” (grant nr 2019/35/B/HS5/04444).

Received 30 Nov 2021, Accepted 13 Dec 2021, Published: 13 Apr 2022.

gorithmic price discrimination, consumers will have to rely on technologies. We explore the possible solutions to algorithmic price discrimination that can be provided by consumer-empowering technologies and put forward the idea of a “digital arms race” between the use of algorithms as market devices and their use as consumer protection tools. We observe that even if, at the current stage in the race, merchants/traders are not yet engaging in price discrimination on a large scale, this may change as digital consumer markets grow increasingly complex and consumers increasingly find themselves on an uneven playing field with merchants/traders. Based on these findings, we advance a claim for regulation which pursues two main goals: making “the race” more balanced by strengthening the digital tools available to consumer protection actors and limiting the battlefield between consumers’ and vendors’ technologies by clarifying and refining the applicable rules and clearly specifying impermissible market practice.

To this end, we begin with an analysis of the economic premises and ramifications of algorithmic price discrimination (sections 2–3). We then consider the associated autonomy- and fairness-related concerns (section 4). After assessing the development normatively, we bring in the existing framework of EU consumer and data protection law, exploring both the level of protection afforded to consumers and the effects of harmonised norms on the Member States’ lawmaking discretion (section 5). Finally, we dig deeper into the present-day dynamic between professionals who apply personalised pricing and consumers whose data are harvested and analysed to produce tailor-made valuations. In so doing, we focus on the imminent tension between regulation and technological developments (section 6).

2. From Dynamic Pricing to Price Discrimination

In structuring the discussion of the different approaches to pricing in the digital economy, it is instructive to distinguish between dynamic prices and price discrimination.

Dynamic pricing refers to the highly flexible and rapid adjustments of prices in response to market conditions, such as changes in supply and demand or the behaviour of competitors.

First, algorithms may adjust prices depending on supply and demand, increasing prices when demand is higher and decreasing them when demand is lower. A prominent case in point is so-called surge pricing, deployed by ride-sharing platforms.¹ Second, algorithms may change prices in response to the prices charged by competing businesses. The latter can also operate through algorithms, such that competitors continually monitor and adjust to each other's prices.² Pricing algorithms may directly execute human instructions (e.g., the instruction to lower/raise prices when the same is done by competitors) or they may determine their pricing strategies independently, such that only the aim—e.g., profit maximization—is set by humans. The literature is taking a growing interest in the consequences of the possible interactions between learning algorithms, which are able to discover profit-enhancing strategies by trial and error and to rapidly respond to each other's behaviour.³ A recent empirical analysis of algorithmic pricing on the Amazon Marketplace provides several instances where an algorithmic seller kept changing prices tens or even hundreds of times a day.⁴

Dynamic pricing exacerbates the disparity between algorithmic and nonalgorithmic sellers, as it creates a largely winner-takes-all marketplace where algorithmic sellers receive the vast majority of sales. In some cases, algorithms may also push prices to unrealistic heights,⁵ or they may lead to price-fixing and collusion.⁶ From the standpoint of consumers and consumer protection actors (market regulators and nongovernmental organisations), dynamic pricing complicates the observation and analysis of price variations.

Price discrimination differs from dynamic pricing in that it is based on consumer characteristics, rather than on market conditions affecting all consumers equally. At a general level, price discrimination consists in charging different consumers different prices for the same or similar products in order to maximize profits, where such differences are not motivated by different cost structures, e.g., different supply costs.⁷

On this basis, the economic scholarship, following Pigou's classical concept,⁸ usually distinguishes three types, or degrees, of price discrimination.⁹

First-degree price discrimination consists in providing an individualised price for each consumer on the basis of the consumer's willingness to pay. In the model case, consumers are asked for their reservation price, i.e., the maximum price each consumer is willing to pay. This presupposes that the seller has complete information about each consumer. Even partial knowledge of consumers may enable the seller to extract a higher price. For example, buyers of plane tickets may be offered different prices for the same flight depending on information about their financial situation, profession, travel history, etc.

Second-degree price discrimination consists in offering different packages, i.e., a combination of price and quantities/qualities, among which consumers select their preferred offer. For instance, different software packages may be offered depending on their functionalities (basic, professional, developer, etc.) or on the number of users or on quantities.

Third-degree price discrimination, also known as group price discrimination, consists in charging different prices to different consumer groups. This assumes that the seller has information both about a groups' relevant features and about which individuals belong to that group. For instance, different prices can be charged to students, seniors, members of a given community, residents in a certain area, etc. The more restricted is the target group, the more third-degree price discrimination approaches first-degree discrimination.

In this paper, we address first- and advanced third-degree price discrimination in the digital markets, which can also be referred to as price personalisation.¹⁰ Understood in these two ways, price discrimination is not a novel phenomenon in the economic history.¹¹ Long before the age of big data, different prices could be charged to individuals based on personal knowledge and face-to-face bargaining. Group price discrimination could also be applied to an array of socially identifiable groups, such as students or business travellers. In most legal systems, these well-established price-discrimination practices are generally not called into question. Price setting has long been viewed as an important aspect of freedom of enterprise and contract, and the limits placed on it are not extensive.¹² However, the rise of big data and artificial intelligence (AI) has introduced a new dimension to price discrimination and poses new regulatory challenges.¹³

AI as applied to big data allows for fine-grained distinctions between customers. The prices charged may thus vary according to data about consumers' specific situations, and group discrimination may become increasingly fine-tuned. In fact, through machine-learning approaches, people can be grouped according to any set of features that makes them relevantly similar for price-setting purposes (interests, available resources, attitudes, etc.). Moreover, the process of

1 Juan Camilo Castillo, Dan Knoepfle and Glen Weyl, 'Surge Pricing Solves the Wild Goose Chase' [2017] *Proceedings of the 2017 ACM Conference on Economics and Computation* 241; Alice Lu, Peter Frazier and Oren Kislev, 'Surge Pricing Moves Uber's Driver Partners' [2018] *Proceedings of the 2018 ACM Conference on Economics and Computation* 3.

2 Dana Popescu, 'Repricing Algorithms in e-Commerce' available at: <https://ssrn.com/abstract=2669997>.

3 Ariel Ezrachi and Maurice E Stucke, 'Artificial Intelligence & Collusion: When Computers Inhibit Competition' (2017) 32 *University of Illinois Law Review* 1775, 1795; Emilio Calvano and others, 'Protecting Consumers from Collusive Prices Due to AI' (2020) 370 *Science* 1040, 1040–1041.

4 Le Chen, Alan Mislove and Christo Wilson, 'An Empirical Analysis of Algorithmic Pricing on Amazon Marketplace', [2016] *Proceedings of the 25th International Conference on World Wide Web* 1339.

5 John D. Sutter, 'Amazon Seller Lists Book at \$23,698,655.93 Plus Shipping' (2011) CNN, available at <http://edition.cnn.com/2011/TECH/web/04/25/amazon.price.algorithm>.

6 Calvano and others (n 3).

7 See generally: George Joseph Stigler, *The Theory of Price* (4th edn, Macmillan 1966) 209–210.

8 Arthur Cecil Pigou, *The Economics of Welfare* (4th edn, Macmillan 1932) 278–279.

9 See e.g., Paul Belleflamme and Martin Peitz, *Industrial Organization: Markets and Strategies* (Cambridge University Press 2010) 196.

10 Similarly: Marc Bourreau and Alexandre de Streel, 'The Regulation of Personalised Pricing in the Digital Era' (2018) OECD, DAF/COMP/WD (2018)150, 2; Jean Pierre van der Rest and others, 'A Note on the Future of Personalized Pricing: Cause for Concern' (2020) 19 *Journal of Revenue and Pricing Management* 113, 115.

11 Jeffrey Moriarty, 'Why Online Personalized Pricing Is Unfair' (2021) 23 *Ethics and Information Technology* 495, 496.

12 Thomas M.J. Möllers, 'Working with Legal Principles – Demonstrated Using Private Autonomy and Freedom of Contract as Examples' (2018) 14 *European Review of Contract Law* 101, 114.

13 Ariel Ezrachi and Maurice E. Stucke, 'The Rise of Behavioural Discrimination' (2016) 37 *European Competition Law Review* 485; Oren Bar-Gill, 'Algorithmic Price Discrimination: When Demand Is a Function of Both Preferences and (Mis) Perceptions' (2019) 86 *The University of Chicago Law Review* 217; Etye Steinberg, 'Big Data and Personalized Pricing' (2020) 30 *Business Ethics Quarterly* 97.

sorting people into such groups is often done without clear notification—which means that individuals may remain unaware that they are being subjected to differential treatment.¹⁴

Price discrimination is usually based on unsupervised learning techniques, that is, on clustering algorithms that segment consumers according to similarities (as determined by nearness of values for their features). It is then computed what the probability is that each segment will purchase the good at a given price, and the profit-maximising price for the segment is determined accordingly. In calculating how an individual in each such segment is willing to pay, recourse is had not only to classical demographic variables deployed but also to behavioural ones, such as online browsing and activity on social networks. For instance, the American insurance company Allstate is reported to optimize its prices based on the calculated likelihood that individual users would comparison-shop before purchasing insurance.¹⁵ As we learn from targeted advertising, it remains of secondary importance to merchants whether differentiated offers in fact reflect the targeted consumers' interests or, or in this case, their willingness to pay (and whether that willingness is in fact linked to the factors considered): what matters is instead that the strategy performs better at scale compared to the alternatives.

While the technological potential of algorithmic price discrimination remains unquestioned, the extent to which it is actually being exploited has been a matter of debate. A recent study covering 160 e-commerce websites did not find evidence of consistent and systematic online personalised pricing in the European Union markets that were investigated.¹⁶ A similar conclusion emerges from a 2021 study commissioned by the German Ministry of Justice and Consumer Protection.¹⁷ This may be due to available behavioural findings, suggesting that merchants may strategically avoid price discrimination if they know that customers may be aware of the practice.¹⁸ Indeed, over the past years, instances of price discrimination either disclosed or speculated about have led to strong consumer backlash.¹⁹ In 2015, Disneyland Paris came under criticism for charging different prices to consumers depending on their country of residence.²⁰ This illustrated how public outrage can be triggered merely by a granular differentiation in pricing. Further developments followed shortly. For instance, Uber was suspected of having price-discriminated on the basis of the battery level on the consumer's smartphone, something

the company vehemently denied.²¹ Some evidence of price discrimination is nonetheless presented in the United States in connection with aspects such as technology (e.g., operating systems and browsers),²² geographic location (e.g., the location from which different queries for the same product on the same vendor site originate),²³ and personal information (collected and inferred through a behavioural tracking method).²⁴ The scarcity of the evidence available in Europe may be due to the fact that the monitoring of prices offered to different consumers at a given time remains comparably difficult, in part due to the prevalence of dynamic pricing. Confirmed cases of algorithmic price discrimination around the world nevertheless show that the discussion is far from hypothetical.

The present analysis of algorithmic pricing does not encompass cases in which price differences are owed to different cost structures. This applies, in particular, to markets where costs and risks borne by merchants in connection with a transaction vary depending on the profile of the consumers concerned, as in the lending and insurance industries. Here, an economic rationale for price differentiation goes beyond the ability of merchants to maximise their share of the social surplus by identifying consumers' reservation prices.²⁵ Even in this domain, however, the differential treatment of consumers raises significant concerns. Although automated risk assessment may reduce human bias in consumer vetting, such practices pose the risk of discriminatorily classifying or misclassifying consumers and of perpetuating inequalities and cycles of poverty.²⁶ The possibility of (mis) using insights about consumers to maximize business gains cannot be excluded, either.²⁷ A general discussion of biases remains outside the scope of the present paper. However, we shall examine some concerns that are relevant to price discrimination.

3. Economic Effects of Algorithmic Pricing

The emergence of algorithmic price calculation and its potential proliferation in some spheres of the online consumer economy has raised multiple concerns about its negative economic and social externalities. Such concerns have been voiced from a range of perspectives. For the sake of completeness, before addressing the fairness and autonomy-related concerns, it is important to briefly summarize the economic effects of algorithmic dynamic pricing and

- 14 Willem H. van Boom and others 'Consumers Beware: Online Personalized Pricing in Action! How the Framing of a Mandated Discriminatory Pricing Disclosure Influences Intention to Purchase' (2020) 33 *Social Justice Research* 331, 332.
- 15 Ariel Ezrachi and Maurice E Stucke, *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (Harvard University Press 2016) 90.
- 16 Ipsos – London Economics – Deloitte consortium, 'Consumer market study on online market segmentation through personalised pricing/offers in the European Union' (2018) 171, available at <https://op.europa.eu/s/oNaC>. See also: Commission Staff Working Document – Guidance on the Implementation/Application of Directive 2005/29/EC on Unfair Commercial Practices, SWD (2016) 163 final, 135.
- 17 Ibi research and Trinnovative, 'Empirie zu personalisierten Preisen im E-Commerce' (2021), available at <https://www.bmjv.de/DE/Service/Fachpublikationen/Empirie-Studie.html>.
- 18 Andreas Leibbrandt, 'Behavioral Constraints on Price Discrimination: Experimental Evidence on Pricing and Customer Antagonism' (2020) 121 *European Economic Review* 103303.
- 19 For an early example, see: Mark Ward, 'Amazon's Old Customers 'Pay More'' (BBC, 8 Sep 2000) available at <http://news.bbc.co.uk/2/hi/business/914691.stm>.
- 20 Jim Brunsten and Duncan Robinson, 'Disneyland Paris Ditches Pricing Policy' (*Financial Times*, 2016), available at <https://www.ft.com/content/e472eac2-031b-11e6-afid-c47326021344>.

- 21 Nicole Martin, 'Uber Charges More If They Think You're Willing To Pay More' (*Forbes*, 30 March 2019) available at <https://www.forbes.com/sites/nicolemartin/2019/03/30/uber-charges-more-if-they-think-youre-willing-to-pay-more>. It is worthy of note, however, that it does process user device data. Furthermore, Uber's terms of services explicitly provide that amounts charged for the same or similar services to particular consumers may differ due to varied "promotional offers and discounts". See: Uber, Terms and Conditions, last modified 17.03.2020, and Privacy Notice, last modified 15.10.2020, available at <https://www.uber.com/legal/en>.
- 22 For instance, generally, Apple iOS and Safari users pay higher prices as illustrated by Aniko Hannak and others, 'Measuring Price Discrimination and Steering on e-Commerce Web Sites' [2014] *Proceedings of the 2014 ACM Internet Measurement Conference* 305.
- 23 For instance, Amazon, Staples and the video-game store Steam were found to vary price by geographic location by as much as 166%. See: Jakub Mikians and others, 'Detecting Price and Search Discrimination on the Internet' [2012] *Proceedings of the 11th ACM Workshop on Hot Topics in Networks* 79.
- 24 Mikians and others (n 23) 79.
- 25 This being the rationale for price personalisation, as accurately observed by Moriarty (n 11) 501.
- 26 Amy J Schmitz, 'Secret Consumer Scores and Segmentations: Separating Haves from Have-Nots' [2014] *Michigan State Law Review* 1411, 1415.
- 27 Tal Zarsky, 'The Trouble with Algorithmic Decisions: An Analytic Road Map to Examine Efficiency and Fairness in Automated and Opaque Decision Making' (2016) 41 *Science, Technology, & Human Values* 118, 123.

price discrimination in the sense mentioned above.

A significant body of economic research focuses on the threat of algorithmic collusion, i.e., the spontaneous emergence of price coordination between algorithms deployed by different merchants. Such effects, and the resulting increase in prices above a competitive level, have been identified in experimental studies.²⁸ Accordingly, the reservations of the consumers about the growing sophistication of pricing technologies are not unjustified when it comes to collusive pricing in dynamic price-setting scenarios.

Coming to price discrimination, the economic literature indicates that the effects of this practice on the overall welfare are not straightforward.²⁹ Some findings suggest that price discrimination applied by monopolists is liable to increase efficiency while reducing consumer surplus.³⁰ At the same time, the practice is seen as capable of increasing product affordability and facilitating welfare redistribution among different consumer groups.³¹ On the other hand, because consumers may attempt to mitigate the effects of price discrimination—e.g., by hiding their identity—those who are better placed to manage the complexity of online environments may ultimately fare better.³²

With respect to oligopoly markets, it has been suggested that competition may in fact be intensified owing to price discrimination, making consumers better off.³³ This view has been challenged in some recent studies. It has been observed, for instance, that consumer harm and efficiency losses can concur where price discrimination goes hand in hand with commercial practices fuelling consumer misperceptions.³⁴ Another study looked at the interplay between price discrimination and targeted advertising, concluding that merchants can leverage both factors to sustain higher prices.³⁵ All in all, while the overall welfare effects of algorithmic price discrimination remain ambiguous, the prospect of consumer surplus being reduced is real.³⁶

- 28 Emilio Calvano and others, 'Artificial Intelligence, Algorithmic Pricing and Collusion' (2020) 110 *American Economic Review* 3267; Calvano and others (n 3) 1041.
- 29 Damien Geradin and Nicolas Petit, 'Price Discrimination Under EC Competition Law: Another Antitrust Doctrine in Search of Limiting Principles?' (2006) 2 *Journal of Competition Law and Economics* 479, 485; Christopher Townley, Eric Morrison and Karen Yeung, 'Big Data and Personalized Price Discrimination in EU Competition Law' (2017) 36 *Yearbook of European Law* 683, 702-703; Marco Botta and Klaus Wiedemann, 'To Discriminate or Not to Discriminate? Personalised Pricing in Online Markets as Exploitative Abuse of Dominance' (2020) 50 *European Journal of Law and Economics* 381, 386-388.
- 30 Mark Armstrong, 'Recent Developments in the Economics of Price Discrimination' in Richard Blundell, Whitney K Newey and Persson Torsten (eds), *Advances in Economics and Econometrics: Theory and Applications, Ninth World Congress* (Cambridge University Press 2006) 100-102.
- 31 Botta and Wiedemann (n 29) 386.
- 32 Townley, Morrison and Yeung (n 29) 701; Paul Belleflamme and Wouter Vergote, 'Monopoly Price Discrimination and Privacy: The Hidden Cost of Hiding' (2016) 149 *Economics Letters* 141, 144.
- 33 Drew Fudenberg and J. Miguel Villas-Boas, 'Price Discrimination in the Digital Economy' in Martin Peitz and Joel Waldfogel (eds), *The Oxford Handbook of the Digital Economy* (Oxford University Press 2012).
- 34 Bar-Gill (n 13) 237.
- 35 Rosa-Branca Esteves and Joana Resende, 'Personalized Pricing and Advertising: Who Are the Winners?' (2019) 63 *International Journal of Industrial Organization* 239.
- 36 van der Rest and others (n 10) 114; Natali Helberger and others, 'EU Consumer Protection 2.0: Structural Asymmetries in Digital Consumer Markets' (2021) 113-114, available at: https://www.beuc.eu/publications/beuc-x-2021-018_eu_consumer_protection.o_o.pdf.

4. Autonomy and Fairness-Related Concerns regarding Algorithmic Pricing

In this section we examine the notions of autonomy and fairness in the consumer market and develop their implications for algorithmic pricing focusing on price discrimination.

4.1 Fairness Perceptions

Apart from the competition and welfare-oriented arguments, the second key area of scepticism towards algorithmic pricing revolves around the notions of fairness and autonomy. Quite remarkably, the notion of fairness adopted in this regard merges theoretical accounts and common-sense concepts of price fairness.³⁷ In general, an average consumer is relatively more sensitive towards fairness in algorithmic price-setting than in classic marketplaces,³⁸ both where prices are determined through bargaining and where they are set unilaterally by a retailer.³⁹ The empirical evidence confirms the negative attitude that consumers take to algorithms setting differential prices.⁴⁰ This attitude may be driven by a general aversion to differential treatment and anxiety about being profiled by an unfathomable "black box", which makes judgments based on personal information.⁴¹

As mentioned, the social perception of fairness in price-calculating algorithms may have a regulatory effect. Consumer backlash may dissuade firms from using algorithms, or from using them opportunistically, as a way of rent-seeking in the marketplace. According to some authors, this more moderate price discrimination may in fact be ethically superior to unitary pricing.⁴² However, as noted, a potential regulatory effect under market conditions depends on the likelihood of consumers becoming aware of price discrimination. Moreover, a favourable valuation of algorithmic pricing from the perspective just outlined assumes that price discrimination is built on a general and measurable criterion (willingness to pay), which, as we argue below, does not necessarily hold true in the market reality. Finally, even when the consumer's willingness to pay is in fact established, both the reasons why such willingness is higher for particular individuals and the ways in which information about consumers' reservation prices is obtained may be raised as objections to the price discrimination regime,⁴³ which is likely to be reflected in the fairness perceptions.

4.2 Contractual Fairness and (Digital) Autonomy

The common-sense notion of fairness can be indicative, but not yet determinative, of the legal notion of price fairness. To establish such a legally relevant notion in the context of algorithmic pricing, we need to pay attention, in the first place, to the possible distortions of the parties' autonomy and, in the second place, to the general notion of

- 37 Lan Xia, Kent B Monroe and Jennifer L Cox, 'The Price Is Unfair! A Conceptual Framework of Price Fairness Perceptions' (2004) 68 *Journal of Marketing* 1.
- 38 Martin Fassnacht and Sebastian Unterhuber, 'Consumer Response to Online/Offline Price Differentiation' (2016) 28 *Journal of Retailing and Consumer Services* 137.
- 39 Timothy J Richards, Jura Liaukonyte and Nadia A Streletskaia, 'Personalized Pricing and Price Fairness' (2016) 44 *International Journal of Industrial Organization* 138; Kelly L Haws and William Bearden, 'Dynamic Pricing and Consumer Fairness Perceptions' (2006) 33 *Journal of Consumer Research* 304.
- 40 Frederik Zuiderveen Borgesius and Joost Poort, 'Online Price Discrimination and EU Data Privacy Law' (2017) 40 *Journal of Consumer Policy* 347, 355-356.
- 41 Cf. Townley, Morrison and Yeung (n 29) 706-707, distinguishing between substantive and procedural aspects in price fairness perceptions.
- 42 Jerod Coker and Jean Manuel Izaret, 'Progressive Pricing: The Ethical Case for Price Personalization' (2021) 173 *Journal of Business Ethics* 387.
- 43 Coker and Izaret (n 42) 8-10.

(price) fairness in private law, competition law, and anti-discrimination law. While the former issue is relevant to the consumer's position in the digital economy more broadly, the latter gains additional relevance in relation to price discrimination.

To begin with, the classic approach to fairness in private law builds on the assumption that price-control mechanisms should be applied as a way of safeguarding autonomy, which is contingent on a rudimentary degree of reciprocity and nonexploitation. Contractual fairness may address either the way of forming contractual relations (such as nondiscrimination in entering a contract) or the content of such relations. On this view, fairness is by and large considered a commutative benchmark for a contract as the product of interpersonal links between parties—a benchmark providing minimal standard of parity in exercising private autonomy. Limits can further be set on the design of conditions for accessing goods and services, and here distributive concerns begin to enter the picture, next to the relational aspects.⁴⁴ This is reflected in anti-discrimination law, providing that protected characteristics, like gender or racial origin, are not acceptable grounds for differentiating conditions of access to goods and services.⁴⁵

Second, algorithmic fairness is underpinned by a concept of autonomy that goes beyond the idea of “freedom to choose”, i.e., the freedom to make decisions about one's own contractual relations without constraints. This “thicker” concept of autonomy also includes sovereignty over individual privacy and data. Thus, it encompasses not only the parties' freedom to decide to enter a contract and determine its content (including prices), but also their ability to exercise control over personal information and on the consequences this information may entail when it falls into the hands of market actors.⁴⁶

Third, a separate set of concerns relates to price points as assessed against a particular legally relevant benchmark. This assumes that for every contract it is possible to identify a hypothetical price point that is commensurate with the value of the goods on offer—and so is not excessive (unfair). This idea builds on the classical concept of *iustum pretium* (whose remnants are still present in modern law).⁴⁷ It rests on the assumption that for each product it is possible to identify an objective criterion against which to compare the prices actually set by sellers or suppliers,⁴⁸ such that prices can be considered excessive

if they are set significantly above the benchmark value. Unlike the first dimension of price unfairness previously discussed, this *iustum pretium* concept is directly underpinned by distributional concerns. It carves parties' freedom to choose a price for a contract in a way that guarantees a balance between the price and value of a good. In this way, it preassigns a specific threshold of “fairness” to each good on the market—thereby assuming from the outset that there are certain decisions which the parties are not free to make when it comes to allocating their resources.

Applied to algorithmic price calculation, the concept of a just price may be attributed to another general criterion, i.e., a consumer's willingness to pay.⁴⁹ Further, it posits an idea of “algorithmic fairness” where everyone will pay a price consistent with their economic conditions. On this approach, these advantages could counterweigh the perils of algorithmic pricing for party autonomy, welfare, and fairness. As the next section illustrates, however, the real world is far from this ideal.

4.3 Autonomy, Fairness, and the Reality of Algorithmic Price Discrimination

The idea of a “digital arms race” discussed in this paper originates from our sense that EU law is ill-equipped to address the concerns raised by algorithmic pricing: these concerns, as we saw, are not only economic but also relate to the fairness of transactions based on such pricing and to the autonomy of the parties involved. Thus, before we look at existing EU law, we need to consider how the concepts of autonomy and fairness can be shaped into practical instruments enabling consumers to make meaningful choices about entering a contract and hence accepting an algorithmically set price. This makes it possible to better recognize both the drawbacks of price discrimination in the market reality and the shortcomings of the applicable legal provisions as discussed in the next section. In operationalizing autonomy and fairness into instruments that can actually work to the benefit of consumers, we need to think on a few different levels.

First off, if consumers are to have their autonomy appropriately safeguarded, they need to be able to enjoy a real opportunity to refuse to be personalised. In reality, however, the algorithmic calculation of prices is usually offered on a take-it-or-leave-it basis, along with the entire contract. The possibility to refuse personalisation without refusing the contract itself should, on the contrary, be viewed as one of the tenets of freedom of contract, grounded in contractual autonomy. In other words, regardless of the fairness of the process or outcome of personalisation, each individual, by virtue of the market sovereignty accorded to all, should be able to decide whether to be subject to personalisation.

Second, the use of algorithms to establish the content of individual contracts is questionable since it may lead to substantial objectification of individuals, who are considered as mere “entries” in a database, rather than as autonomous beings endowed with dignity.⁵⁰ As Paul Krugman observed a *New York Times* op-ed of 2000, personalised price setting “uses a potential buyer's electronic fingerprint—his record of previous purchases, his address, maybe the other sites he has visited—to size up how likely he is to balk if the price is high. If

44 Cf. Rona Dinur, ‘Relational and Distributive Discrimination’, unpublished manuscript, June 2021.

45 Cf. especially Council Directive 2004/113/EC of 13 December 2004 implementing the principle of equal treatment between men and women in the access to and supply of goods and services [2004] OJ L 373/37, as well as Article 21 of the Charter of Fundamental Rights of the European Union [2012] OJ C 326/391. For a recent analysis in the context of algorithmic discrimination, see: Janneke Gerards and Raphaële Xenidis ‘Algorithmic Discrimination in Europe: Challenges and Opportunities for Gender Equality and Non-discrimination Law’ (2020) 53–62, available at <https://op.europa.eu/s/pkli>.

46 Cf. Mateusz Grochowski, ‘European Consumer Law after the New Deal: A Tryptich’ (2020) 39 *Yearbook of European Law* 387, 402–404 along with further references.

47 See e.g., Arthur T. von Mehren, ‘The Comparative Study of Law’ (1991–1992) 6/7 *Tulane Civil Law Forum* 43, 49–51; Alphonse M. Squillante, ‘The Doctrine of Just Price – Its Origin and Development’ (1969) 74 *Comparative Law Journal* 334–335.

48 An illustrative instance of this approach was provided in the PE Digital judgment of the Court of Justice. While discussing the proportionate reimbursement of the price paid following the exercise of the consumer's right to withdraw, the Court of Justice found that all the circumstances relating to the market value of the service provided, including the price charged to other consumers and the price of an equivalent service provided by other traders, are relevant for assessing whether the total price is excessive (judgment of the Court of 8 October 2020, C-641/19, PE

Digital, ECLI:EU:C:2020:808, para. 36).

49 Generally, on consumer's willingness to pay as the key point of reference of personalized pricing see Bourreau and de Strel (n 10) 3; Fabrizio Esposito, ‘Making Personalized Prices Pro-Competitive and Pro-Consumers’ (2020) 2 *Cahiers du CeDIE Working Papers* 1, 5.

50 Julie E Cohen, ‘Turning Privacy Inside Out’ (2019) 20 *Theoretical Inquiries in Law* 1, 11.

the customer looks price-sensitive, he gets a bargain; if he doesn't, he pays a premium." Therefore, it is "undeniably unfair: some people pay more just because of who they are."⁵¹ This general attitude is also reflected in the clear aversion to being personalised, an aversion that, as the empirical evidence illustrates, is widely shared by consumers.⁵² This distaste for personalisation may be understood as an overall uneasiness about being profiled and segregated on the basis of details accrued from one's personal life. The essence of this concern reaches beyond the simple privacy issue and goes to the much more profound issue of overlapping domains of privacy and individual dignity. The rise of the data economy unavoidably has shifted the previously existing division between the market sphere and the private sphere of a consumer's life and has significantly augmented the former by commodifying information about individuals' intimacy and making predictions about personal behaviour. Thus, data and privacy issues also fall under the broad label of ethical concerns about algorithmic price calculation, once again calling for instruments ensuring that consumers can refuse to be personalised on the basis of their personal data.⁵³

Third, by definition, setting different prices for different consumers on the basis of their individual features creates a substantial diversity that cannot be fit into any objective frame of reference, other than possibly the willingness of consumers to pay.⁵⁴ The estimated willingness to pay, however, is not computed in relation to each individual consumer, but rather in relation to his or her digital 'alter ego'.⁵⁵ Moreover, as was previously indicated, even when willingness to pay is in fact established, the reasons why this willingness is higher for some individuals than for others can still be grounds for objecting to price discrimination.⁵⁶ Finally, organisational and technological factors, such as the self-development of learning algorithms, turn the entire process into a "black box", where the explicit premises that go into setting a certain price for a certain consumer are indecipherable. Thus, failing verifiable information about the processes used for personalisation, even the vision of algorithmic prices as prices that optimally reflect consumers' willingness to pay may prove to be debatable in practice. Due to the negative perception of price discrimination, as well as a general propensity of algorithmic merchants to optimize profitability at scale, market incentives for disclosing such data voluntarily are currently very low.

Fourth, algorithmic designs often "cannot escape the influence of discriminatory rubrics that are deeply embedded in the data because they are deeply embedded in our society."⁵⁷ Accordingly, the use of algorithmic pricing poses an inherent risk that prices may be based on details (such as gender or ethnicity) that do not form an ethically valid ground for market valuations, and even worse, the practice poses the risk that algorithms may systematically discriminate against

individuals with these characteristics. In this way, the personalisation mechanism may not just harm individuals' privacy but can also further entrench discriminatory schemes and stereotypes that are already at work in society.⁵⁸ In fact, those who have already experienced unfavourable treatment in social and market relations, may be offered even higher algorithmic prices in view of their position of need and their lack of knowledge of alternative offers available in the market. Moreover, new patterns of discrimination may emerge.⁵⁹ As mentioned, being subjected to mechanisms that are prone to biases and misconceptions can be viewed as problematic because of how consumer autonomy stands affected, among other reasons. In this respect too, then, there is scope for regulatory action.

Finally, there are further shortcomings of algorithmic pricing that involve economic externalities. As explained, personalised prices may be skewed by the market structure, and especially by the presence of monopolies and oligopolies. Where price discrimination accompanies data-driven advertising, consumer surplus is likely to diminish.⁶⁰ This risk could further increase if patterns of collusion emerge in offering individualised prices to selected groups of consumers.

5. A Regulatory Race: Existing and Emerging Strategies for Algorithmic Pricing in EU Law and Policy

As we have seen, algorithmic price discrimination raises serious concerns about the welfare and autonomy of consumers and about the fairness of the consumer marketplace. Hence, it requires specific responses that could provide consumers with a real and meaningful choice between entering a contract with a personalised price or choosing a price that has been set for all consumers⁶¹ (or has been individually bargained for with a professional). This warrants the question: considering the commitment that EU law has made to strong consumer protections,⁶² to what extent has it been able to supply such consumer protection tools?

Until quite recently, the issue of algorithmic pricing has been escaping the attention of EU legislation and policy. In legal scholarship, the practice has been analysed mostly from the standpoint of competition law, with a focus on the practice where different market actors coordinate algorithmic pricing, as well as with insights into exploitative practices of dominant firms.⁶³ A number of potential hurdles to successful claims against personalised pricing under antitrust law have been identified, beginning with the finding of dominant positions in cases involving unilateral business conduct.⁶⁴ Moreover,

51 Paul Krugman, 'What Price Fairness?' (*New York Times*, 4 Oct 2000) available at <https://www.nytimes.com/2000/10/04/opinion/reckonings-what-price-fairness.html>.

52 Frederik Zuiderveen Borgesius and Joost Poort, 'Does Everyone Have a Price? Understanding People's Attitude Towards Online and Offline Price Discrimination' (2019) 8 *Internet Policy Review* 1, 6–15.

53 Zarsky (n 27) 129–130.

54 Further on the individual price preference (willingness to pay) as the ultimate – yet slightly utopian goal – of price personalization see Akiva A Miller, 'What Do We Worry about When We Worry about Price Discrimination – the Law and Ethics of Using Personal Information for Pricing' (2014) 19 *Journal of Technology Law & Policy* 43, 57–58.

55 Natali Helberger and others (n 36) 103–104.

56 Cf. Coker and Izaret (n 42) 8–9, who acknowledge this as a "side constraint" to the proposed regime of progressive pricing.

57 Cohen (n 50).

58 See e.g. Betsy Anne Williams, Catherine F. Brooks and Yotam Shmargad, 'How Algorithms Discriminate Based on Data They Lack: Challenges, Solutions, and Policy Implications' (2018) 8 *Journal of Information Policy* 78; Anna Lauren Hofmann, 'Where Fairness Fails: Data, Algorithms, and the Limits of Antidiscrimination Discourse' (2019) 22 *Information, Communication & Society* 900; Aylin Caliskan, Joanna J. Bryson, Arvind Narayanan, 'Semantics Derived Automatically from Language Corpora Contain Human-like Biases' (2017) 356 *Science* 183.

59 Monique Mann and Tobias Matzner, 'Challenging Algorithmic Profiling: The Limits of Data Protection and Anti-Discrimination in Responding to Emergent Discrimination' (2019) *Big Data & Society* 1, 5.

60 Esteves and Resende (n 35) 264–268.

61 See also: Frederik Zuiderveen Borgesius and Joost Poort, 'Personalised Pricing: The Demise of the Fixed Price?' in Uta Kohl and Jacob Eisler (eds), *Data-Driven Personalisation in Markets, Politics and Law* (Cambridge University Press 2021) 174.

62 Article 38 of the Charter of Fundamental Rights of the European Union; Articles 12, 114(3) and 169(1) of the Treaty on the Functioning of the European Union (Consolidated version) [2012] OJ C 326/47.

63 See e.g., Geradin and Petit (n 29); Botta and Wiedemann (n 29).

64 van der Rest and others (n 10) 114.

the individual dimensions of fairness and autonomy are conceptually and politically independent of competition issues, even though competition mechanism may mitigate the negative effects set out above (while algorithmic collusion may, on the contrary, exacerbate these effects). Accordingly, concerns discussed in the present paper are more directly linked to the realm of the consumer law.

In general, in approaching the issue of price fairness, EU consumer law has traditionally focused on the transparent communication of prices rather than on the price-setting as such. The importance attached to price communication is well illustrated in the provisions of Directive 2000/31/EC on electronic commerce (ECD),⁶⁵ which requires Member States to ensure that, where information society services refer to prices, these are to be indicated clearly and unambiguously.⁶⁶ The same is true for Directive 98/6/EC on the indication of the prices of products offered to consumers (PID),⁶⁷ which provides that both the selling price and the unit price (e.g., per litre or kilogramme) must be indicated in an unambiguous, easily identifiable, and clearly legible manner.⁶⁸ It is worth noting, however, that the PID was recently amended to include additional provisions on communicating price reductions.⁶⁹ Accordingly, merchants who announce price reductions are required to indicate the lowest price applied over a period of time, in principle not shorter than 30 days, prior to the time the price reduction is applied. Since the new provisions have yet to be transposed by the Member States, it remains to be seen whether, and if so how, they affect the prevalence and disclosure of personalised discounts in consumer markets.

A similar approach to indicating prices can be found in Directive 2011/83/EU on consumer rights (CRD),⁷⁰ as well as in Directive 2005/29/EC concerning unfair business-to-consumer commercial practices in the internal market (UCPD).⁷¹ The information that merchants are required to list under the CRD includes “the total price of the goods or services inclusive of taxes, or where the nature of the goods or services is such that the price cannot reasonably be calculated in advance, the manner in which the price is to be calculated.”⁷² Accordingly, the manner of price calculation becomes relevant only to the extent that the selling price cannot be established otherwise. While it is true that price transparency in the sense just

described may indirectly diminish certain forms of price discrimination, especially those linked to a single, easily identifiable characteristic (e.g., country of residence),⁷³ the same does not necessarily hold true for the more sophisticated forms of price discrimination. Recent amendments to the CRD have partly responded to this challenge by requiring merchants to disclose, where applicable, that they have personalised prices on the basis of automated decision-making.⁷⁴ The new obligation, however, does not also require merchants to disclose the parameters they use, much less any benchmark prices, as in the case of the PID.CDR

Crucially, both the UCPD and the CRD are based on the principle of full harmonisation, which means that consumer protections must be uniform across Europe, with no Member State introducing or enforcing protections any stronger or weaker than in any other Member State. In respect of the UCPD, annexed to the Directive is a list of practices that are prohibited under all circumstances, and the Court of Justice has consistently held that national consumer protection provisions prohibiting practices not included in that list are incompatible with the UCPD.⁷⁵ Nowhere in the UCPD is price personalisation expressly mentioned, and the Commission’s guidelines in this regard are inconclusive.⁷⁶ Consequently, it remains unsettled whether under the UCPD, merchants applying price discrimination are required to disclose any additional information apart from the price itself and, following the amendments to the CRD, the fact that they are engaging in personalisation.⁷⁷

While the principle of full harmonisation in the UCPD and the CRD limits the scope of independent Member State action in the areas covered by the two directives, further-reaching duties to inform may still be imposed in other EU acts. Indeed, at Article 29, the draft Digital Services Act (DSA) proposed by the Commission⁷⁸ places upon “very large platforms that use recommender systems” an obligation to “set out in their terms and conditions, in a clear, accessible and easily comprehensible manner, the main parameters used.” The proposal, moreover, indirectly equips consumers with a right not to be subject to recommender systems which rely on profiling. As such, it not only provides consumers with more extensive information about the algorithmic system applied to them, but also enables them to take meaningful actions on the basis of such information (switch the parameters).⁷⁹ In relation to personalised prices, however, instruments supporting consumer decision-making do not seem to offer much of anything that is more robust than general disclosure.

As far as consumer law is concerned the only instrument that could indirectly enhance consumer choice in relation to varying price conditions is the right to withdraw from a contract, a right set forth

65 Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ('Directive on electronic commerce') [2000] OJ L 178/1.

66 Directive 2000/31/EC, Article 5(2).

67 Directive 98/6/EC of the European Parliament and of the Council of 16 February 1998 on consumer protection in the indication of the prices of products offered to consumers [1998] OJ L 80/27.

68 Directive 98/6/EC, Articles 3 and 4.

69 Directive (EU) 2019/2161 of the European Parliament and of the Council of 27 November 2019 amending Council Directive 93/13/EEC and Directives 98/6/EC, 2005/29/EC and 2011/83/EU of the European Parliament and of the Council as regards the better enforcement and modernisation of Union consumer protection rules [2019] OJ L 328/7, Article 2. Hereafter: Modernisation Directive.

70 Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council [2011] OJ L 304/64.

71 Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC, 98/27/EC and 2002/65/EC of the European Parliament and of the Council and Regulation (EC) No 2006/2004 of the European Parliament and of the Council ('Unfair Commercial Practices Directive') [2005] OJ L 149/22.

72 Article 6(1)(e) CRD.

73 Janja Hojnik, 'Tell Me Where You Come from and I Will Tell You the Price: Ambiguous Expansion of Prohibited Geographical Price Discrimination in the EU' (2019) 56 *Common Market Law Review* 23, 38.

74 Article 6(1)(ae) of the Modernisation Directive.

75 See e.g., Order of the Court of 7 March 2013, C-343/12, *Euronics Belgium*, ECLI:EU:C:2013:154, operative part.

76 Commission Staff Working Document – Guidance on the Implementation/Application of Directive 2005/29/EC on Unfair Commercial Practices, 133–134.

77 Cf. Article 7(5) UCPD.

78 Proposal for a Regulation of the European Parliament and of the Council on a Single Market For Digital Services (Digital Services Act) and amending Directive 2000/31/EC, COM (2020) 825 final. Hereafter: proposed DSA.

79 On the importance of such options for the exercise of autonomy, see: Marijn Sax, Natali Helberger and Nadine Bol, 'Health as a Means Towards Profitable Ends: mHealth Apps, User Autonomy, and Unfair Commercial Practices' (2018) 41 *Journal of Consumer Policy* 103, 109.

in the CRD.⁸⁰ The instrument gives consumers 14 days to change their mind about a contract concluded at a distance. Accordingly, a consumer who later finds out about the same product being offered at a lower price may decide to conclude a new contract and cancel the original transaction. Moreover, Article 14(3) CRD explicitly refers to an “excessive price” in a situation where a consumer exercises the right of withdrawal in service contracts and claims a partial reimbursement. Specifically, under Article 14(3), if the total price is excessive the proportionate amount which consumers can be charged for their use of services during withdrawal period is to be calculated on the basis of the market value of what has been provided. In *PE Digital*, a case involving a consumer who had found out about a lower price offered to other consumers, the Court of Justice stated that among the criteria that need to be taken into account in assessing whether a price is excessive is “the price charged by the trader concerned to other consumers under the same conditions”.⁸¹ In practice, however, consumers who are “locked” into their profiles may be unable to make such determinations, especially within the short window of time for exercising their withdrawal right.

Aside from the consumer law *stricto sensu*, safeguards designed to enable consumers to meaningfully exercise autonomy in a context of price discrimination could derive from Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data (GDPR).⁸² Indeed, the GDPR is broadly deemed to hold significant potential for complementing the EU consumer rules in the digital economy.⁸³ Several recent studies assess the practice of price discrimination focusing specifically on the GDPR.⁸⁴ Since algorithmic price discrimination rests upon the processing of personal data, it must be supported by a sufficient legal basis, e.g., contractual necessity, legitimate interests, or consent. Most authors agree that the type of processing at issue is unlikely to be considered necessary for performing a contract and that the data subject’s interests can override legitimate interests pursued by the controller.⁸⁵ Accordingly, the data subject’s consent emerges as the least contentious basis for lawful processing. Notably, for consent to be validly constituted, a number of conditions must be met. In particular, consent must be freely given, specific, informed, and unambiguous and it cannot be pre-checked by default.⁸⁶ Moreover, regardless of the legal basis for the processing, the data subject must be informed specifying, among other things, the purposes of processing and the existence of automated decision-making, including profiling.⁸⁷ Consequently, where personal data is processed with a view to personalising prices, the data subject should at a minimum be informed about the purposes of processing and of its automated nature. Still, the relevant information and consent requests may remain contextually detached

from respective pricing decisions, while conditions for valid consent are subject to interpretation and, for now, have not prevented traders from resorting to manipulative interface design.⁸⁸

Moreover, a question can be asked whether additional safeguards can be derived from Article 22(1) GDPR. This provision protects a data subject only in cases where a decision is “based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her.” It prohibits such decisions unless based on the data subject’s explicit consent, or unless they are necessary for entering into or performing a contract, or unless they are authorized under Union or Member State law.⁸⁹ In cases covered by Article 22(1) and (4) GDPR, the controller must further disclose meaningful information about the logic involved, as well as the significance and envisaged consequences of automated processing for the data subject.⁹⁰ It may appropriately be asked what decisions to price-discriminate will affect consumers in ways significant enough to engage Article 22.⁹¹ The Belgian Data Protection Authority suggests that an advertisement that includes “a reduction and therefore a price offer” has a legal effect.⁹² From this perspective, it seems that according to the Authority, a price offer constitutes an invitation to enter an agreement, thereby giving rise to legal effects and making Article 22 applicable to a personalised price. However, the Guidelines of Article 29 Working Party, endorsed by the European Data Protection Board, use a more specific example of automated differential pricing resulting in “prohibitively high prices”.⁹³ It thus remains unclear in what cases explicit consent by the data subject would be required and what the corresponding information duty would involve.

Direct reference to Article 22 GDPR is made in the preamble of Directive 2019/2161, through which the CRD came to include the previously mentioned duty to disclose price personalisation. What this direct reference could suggest is that the EU legislature considers the GDPR’s provisions on automated decision-making to be applicable at least to some scenarios at issue.⁹⁴ A definitive interpretation, however, is yet to be provided.

Finally, business conduct can be subject to a further control under rules prohibiting contractual exploitation and discrimination. As for the former, pricing conditions proposed to consumers could be deemed non-individually negotiated terms and could accordingly fall within the purview of Directive 93/13/EEC on unfair contract terms (UCTD).⁹⁵ However, the Directive explicitly excludes from the unfairness test the definition of the main subject matter of the contract and the adequacy of the price and remuneration as long as these terms are stated in plain, intelligible language.⁹⁶ The scope and nature of the associated transparency requirements in the context of personalised pricing have not been clarified in the scholarship or in the case law.

80 Article 9(1) CRD.

81 Judgment of the Court of 8 October 2020, C-641/19, *PE Digital*, paras. 16 and 36.

82 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data and repealing Directive 95/46/EC (General Data Protection Regulation) [2016] OJ L 119/1.

83 See generally: Natali Helberger and Agustin Reyna, ‘The Perfect Match? A Closer Look at the Relationship Between EU Consumer Law and Data Protection Law’ (2017) 54 *Common Market Law Review* 1427.

84 Richard Steppe, ‘Online Price Discrimination and Personal Data: A General Data Protection Regulation Perspective’ (2017) 33 *Computer Law & Security Review* 768; Borgesius and Poort (n 40).

85 Borgesius and Poort (n 40) 360; Steppe (n 84) 778–781.

86 Recital 32 and Articles 4(11) and 7 GDPR. See also: judgment of the Court of 1 October 2019, C-673/17, *Planet49*, ECLI:EU:C:2019:801, para. 65.

87 Articles 13(1)(c) and 13(2)(f) GDPR.

88 Natali Helberger and others (n 36) 30-40, 108-111.

89 Article 22(2) GDPR.

90 Articles 13(2)(f) and 14(2)(g) GDPR.

91 Alexandre de Stree and Florian Jacques, ‘Personalised Pricing and EU Law’ available at <http://hdl.handle.net/10419/205221> 13-14; Borgesius and Poort (n 40) 361-362.

92 Commission for the Protection of Privacy Belgium, Opinion no. 35/2012, para. 80, available at <https://www.autoriteprotectiondonnees.be/publications/avis-n-35-2012.pdf>.

93 Article 29 Working Party, ‘Guidelines on Automated individual decision-making and Profiling for the purposes of Regulation 2016/679’, as last revised and adopted on 6 February 2018, 22.

94 Recital 45 of the Modernisation Directive.

95 Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts [1993] OJ L 95/29.

96 Article 4(2) UCTD.

At the same time, it is worth noting that in the *Ahorros* case the Court confirmed that the UCTD, as a minimum harmonisation directive, does not rule out national legislation authorising judicial review as to the unfairness of contractual terms which relate to core terms, even if they are drafted in plain, intelligible language.⁹⁷ It follows that Member States are not precluded from providing for a substantive fairness review of prices on an individual basis, but they cannot introduce additional disclosure duties or *per se* prohibitions on unfair commercial practices that would supplement the CRD and the UCPD. The EU acts in question also leave unaffected other well-established doctrines of national contract law, such as unfair exploitation, yet it is doubtful whether these provisions alone could provide a high level of consumer protection across the EU. We nonetheless concede that there still remains scope for further research in this domain.

As regards the latter, a broad consensus exists that (algorithmic) discrimination on the basis of protected characteristics needs to be countered⁹⁸ and that, for the time being, the EU legal framework fails to adequately tackle the problem of discrimination via price-setting algorithms.⁹⁹ The corresponding legal scholarship appears to be maturing, and several “pathways to resilience” have been identified.¹⁰⁰ Some of the questions that need to be addressed concern the identification of socially salient groups (including complex problems of intersectionality and emergent discrimination), methods for effective detection of disparate impact in online markets, and pro-active measures to be taken at the programming stage to prevent discriminatory outcomes.¹⁰¹ However, a recent proposal for an Artificial Intelligence Act addresses these problems only marginally, treating algorithmic bias as an aspect of data governance and linking the envisaged obligations only to high-risk systems.¹⁰²

As seen from above, market practices seem to substantially outstrip the EU’s governing capabilities, which visibly struggles to develop a well-fitting regulatory toolbox. Moreover, at least in several fields, Member States are hindered from acting independently, while in others they are likely to provide incoherent responses.¹⁰³ The lack of regulatory capacity to keep up with market practices fuels another type of race: between the use of algorithms as market devices and their use as instruments of consumer protection.

6. The Way Forward: A Digital Arms Race?

In this section we argue that in the absence of adequate regulatory and policy responses a technological arm race will emerge between

vendors and consumers, in which consumers are likely to be on the losing side. We suggest some possible countermeasures meant on the one hand to make the race more balanced by supporting consumer empowering technologies and on the other hand to limit the battlefield through clearer and more effective constraints over vendors’ practices.

6.1 Technological Countermeasures and a Digital Arms Race

As discussed, EU consumer law does not provide consumers with a sufficient protection in the context of algorithmic price discrimination, while restricting the Member States’ scope of independent action. Direct prohibitions of certain market practices in EU law are rather limited, rarely relate to price-setting, and the UCPD pre-empts further national bans. Other instruments of EU law largely rely on the information paradigm, sometimes coupled with more robust instruments enhancing consumer decision-making. The latter, however, do not stem from consumer law *stricto sensu* as far as algorithmic price discrimination is concerned, but potentially can be derived from the GDPR, whose interpretation is not entirely settled. Accordingly, consumer protection against the expansion of algorithmic pricing may rely, in practice, on consumer-empowering technologies and initiatives.¹⁰⁴

Over the past several years, various online tools and initiatives have been developed on a bottom-up approach to protect consumers in digital markets. It has been observed¹⁰⁵ that consumer-empowering technologies, relying particularly on AI, can protect consumers from different technological threats, such as information overload, manipulation through multimedia messages and interfaces, the opacity of unlawful practices, and discrimination. In the following we examine some of these threats and outline some possible technologies which may be used to counter them.

Information overload prevents consumers from making reasoned choices and makes them easily exploitable through targeted messages. A technological answer to this threat consists in the use of natural language processing methods to isolate and understand relevant parts of online documents—such as product specifications, terms of service, and privacy policies—and act upon them. Thanks to state-of-the-art techniques consumers can gain access to relevant information through information extraction, document classification, and question answering.¹⁰⁶ In this way, consumers could benefit from the wealth of information within their reach, just as many Internet companies do.¹⁰⁷

Manipulation through multimedia messages and interfaces is used to capture consumers’ attention and to target them with stimuli capable of influencing their behaviour, as through micro-targeted advertising.¹⁰⁸ A technological response to this threat consists in the use of ad

97 Judgment of the Court of 3 June 2010, C-484/08, *Caja de Ahorros y Monte de Piedad de Madrid*, ECLI:EU:C:2010:309, operative part.

98 See generally: Philipp Hacker, ‘Teaching Fairness to Artificial Intelligence: Existing and Novel Strategies Against Algorithmic Discrimination Under EU Law’ (2018) 55 *Common Market Law Review* 1143.

99 Raphaële Xenidis and Linda Senden, ‘EU Non-Discrimination Law in the Era of Artificial Intelligence: Mapping the Challenges of Algorithmic Discrimination’ in Ulf Bernitz and others (eds), *General Principles of EU law and the EU Digital Order* (Kluwer Law International 2020) 170.

100 Raphaële Xenidis, ‘Tuning EU Equality Law to Algorithmic Discrimination: Three Pathways to Resilience’ (2020) 27 *Maastricht Journal of European and Comparative Law* 736.

101 Solon Barocas and Andrew Selbst, ‘Big Data’s Disparate Impact’ (2016) 104 *California Law Review* 671; Jon Kleinberg and others, ‘Discrimination in the Age of Algorithms’ (2018) 10 *Journal of Legal Analysis* 113.

102 Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts, COM (2021) 206 final. See, in particular, Article 10 of the proposal.

103 Consider, for example, the objection of Poland to the EU Presidency conclusions ‘The Charter of Fundamental Rights in the context of Artificial Intelligence and Digital Change’ (11481/20) due to the use of the term “gender equality”.

104 See also Gal M and Elkin-Koren N, ‘Algorithmic Consumers’ (2017) 30 *Harvard Journal of Law & Technology* 309, 329, 331.

105 Marco Lippi and others, ‘The Force Awakens: Artificial Intelligence for Consumer Law’ (2020) 67 *Journal of Artificial Intelligence Research* 169.

106 Consider, for instance, the Privacy Policy Project, available at www.usableprivacy.org, the Polisis framework as reported in Hamza Harkous and others, ‘Polisis: Automated Analysis and Presentation of Privacy Policies Using Deep Learning’ [2018] SEC’18: *Proceedings of the 27th USENIX Conference on Security Symposium* 531.

107 Maartje Elshout and others ‘Study on Consumers’ Attitudes Towards Terms Conditions (T&Cs) Final Report’ (2016), available at <https://op.europa.eu/sf/pkuF>.

108 Jack M. Balkin, ‘Fixing Social Media’s Grand Bargain’ (2018) Hoover Working Group on National Security, Technology, and Law, Aegis Series Paper 1814; Shoshana Zuboff, ‘Big Other: Surveillance Capitalism and the

blockers and antitracking technologies. Thanks to AI, more powerful and selective consumer-friendly tools could be developed. Consumer devices could extract relevant elements from the ads a particular consumer is shown, such as images, videos, or audio signals, like the voice of personal assistants making product recommendations. These elements could then be further processed through techniques such as image classification or object detection to understand whether certain strategies are aggressive, misleading, or discriminatory. On this basis, unwanted, unlawful, or inappropriate messages can be blocked and filtered out.

The opacity of unlawful practices makes it difficult for individuals to be aware of and consequently react to such practices. This threat can be countered by examining texts produced by vendors and platforms (e.g., terms of service and privacy policies) as well as data flows. Through natural language processing technologies, texts can be analysed to detect unlawful or unfair content.¹⁰⁹ Similarly, data flows can be analysed by comparing normative standards with real practices, as by comparing the information regarding the data actually collected and shared with the information extracted from the privacy policies using natural language processing.¹¹⁰

Discriminatory practices can undermine the welfare and social standing of groups of consumers. This threat can be detected by tools that visit multiple services, using different identities, collect results, and examine them using statistical and other methods to detect differential treatment.¹¹¹ The methods just described can be used to detect instances of price discrimination and to prevent or react to it.

For instance, information overload concerning prices can be countered through price comparison tools enabling consumers to search for better offers when receiving a personalised price. Online tools monitoring price trends already exist today and can certainly be of added value to consumers. Better tools can be built that provide consumers with benchmark prices for their decision-making, and possibly guide them towards available responses (e.g., withdrawing consent to the processing of personal data, objecting to automated decision-making, withdrawing from a contract). Pricing information extracted from multiple websites could be analysed through AI to determine a fair market value, considering as well as the trustworthiness of vendors.¹¹² To enable consumers to trust such tools, their functioning needs to be monitored with regard to the transparency and impartiality of the information being provided.

Manipulation inducing consumers to accept an individualised price (e.g., through multiple limited-time offers) can be countered by

Prospects of an Information Civilization' (2015) 30 *Journal of Information Technology* 1; Sofia Grafanaki, 'Autonomy Challenges in the Age of Big Data' (2016) 27 *Fordham Intellectual Property, Media & Entertainment Law Journal* 803.

109 Marco Lippi and others, 'CLAUDETTE: An Automated Detector of Potentially Unfair Clauses in Online Terms of Service' (2019) 27 *Artificial Intelligence and Law* 117; Federico Ruggeri and others, 'Detecting and Explaining Unfairness in Consumer Contracts Through Memory Networks' (2021) *Artificial Intelligence and Law*, available at <https://doi.org/10.1007/s10506-021-09288-2>.

110 See Lisa M. Austin and others, 'Towards Dynamic Transparency: The AppTrans (Transparency for Android Applications) Project' (2018), available at <https://ssrn.com/abstract=3203601>; Peter Story and others, 'Natural Language Processing for Mobile App Privacy Compliance' [2019] *AAAI Spring Symposium on Privacy-Enhancing Artificial Intelligence and Language Technologies*.

111 Hannak and others (n 22) 305; Mikians and others (n 23) 79–84.

112 Derek Robert Haake, 'Method for Aggregating Pricing Information and Assigning a Fair Market Value to Goods Sold in a Peer-to-Peer E-Commerce Transaction' US Patent App. 13/537,012.

signalling such aggressive commercial practices to the consumers concerned. Manipulation is also prevented to the extent that anti-tracking tools can disable the collection of consumers' data, thereby preventing this information from being used to price-discriminate. Such tools, however, may bump up against tracking walls put up by providers, requiring users to accept data collection as a condition for accessing services and platforms.

Opacity in contracts including individualised price offers can be addressed by using comparison tools in combination with systems for detecting unfair clauses and data processing practices. Automated bots could be built that engage with the same or different vendors, hiding user data, or even acting under fake identities, to determine whether vendors provide differentiated prices based on different users' characteristics. The law might encourage this practice providing immunity to researchers, activists, governmental authorities, and possibly also to the general public.¹¹³ To be effective, such tools should have the ability to examine vendors' pricing policies, or at least to make queries to the vendors' websites using multiple fake identities. Discrimination in prices can also be countered by "watch-dog" systems to detect instances where similar products are differentially priced across different groups of people.¹¹⁴

These developments on the consumers' side can be countered—and will be countered to a greater extent in the future—by technological tools available to vendors. The latter have already shown much inventiveness and legal and technological skill in developing methods and tools for enticing consumers. Indeed, consumers are subject to intensive data collection which they are led to accept through misleading interfaces, what are known as "dark patterns".¹¹⁵ Consumers are targeted by personalised persuasive messages often leading them to make choices against their best judgement. Such messages are designed and selected using the most advanced machine-learning methods. Vendors' systems are protected by both intellectual property law and software barriers preventing any inspection. The complexity of the online information environment, and protection against the use of fake identities, makes it difficult to engage in comparative analysis to detect discrimination and unfairness. A further evolution of markets towards more prevalent personalisation of prices is also supported by the growing role of voice-operated personal assistants, which enable a pervasive collection of data, in context in which consumers can exercise little control.¹¹⁶

The trend just presented can be described as a "digital arms race" between the use of algorithms as market devices and as consumer protection tools: consumers and vendors are pushed toward increasingly performing technologies in order to resist their counterpart. However, it is unlikely that this trend will develop in such a way to reduce the current imbalance between the two parties, given the commercial side's greater financial and technological power.

In the next two sections we argue that to ensure a more balanced outcome, a new regulatory approach is needed pursuing two complementary goals: to make the "digital arms race" more balanced and

113 For a similar approach relating to copyright, see Maayan Perel and Niva Elkin-Koren, 'Black Box Tinkering: Beyond Disclosure in Algorithmic Enforcement' (2017) 69 *Florida Law Review* 181.

114 Kleinberg (n 101) 113–174.

115 Natali Helberger and others (n 36) 108–111; Jamie Luguri and Lior Jacob Strahilevitz, 'Shining a Light on Dark Patterns' (2021) 13 *Journal of Legal Analysis* 43.

116 See generally: Maurice E Stucke and Ariel Ezrachi, 'How Digital Assistants Can Harm Our Economy, Privacy, and Democracy' (2017) 32 *Berkeley Technology Law Journal* 1239.

to limit the battlefield. The former can be achieved by strengthening the digital tools available to consumer-protection actors; the latter, by clarifying and refining the applicable rules and defining clear categories of impermissible behaviour.

6.2 Making the Race More Balanced

Looking at the broad landscape of algorithmic pricing, it becomes apparent that one party—the consumer—is the one with particularly scarce information. Merchants making use of dynamic prices benefit from a knowledge of the prices charged by competitors and of other market conditions. In particular, algorithmic price discrimination is supported by wide-scale (personal) data gathering and knowledge generation. Consumers, by contrast, do not have access to equivalent information about their commercial counterpart, and may not even be aware of the fact that they are being treated to personalised offers. However, much can be done to address this digital asymmetry, not just through more regulation but also by promoting technology. As noted, consumers and consumer-protection actors could gradually arm themselves with digital tools with which to counter the position of power held by producers and intermediaries.¹¹⁷

To make the digital arms race more balanced, the development of consumer-protection technologies must be accelerated, with the support of the law- and policy-makers. The unexploited potential of such technologies, including the especially advanced ones relying on AI, remains significant.

Possible initiatives include fostering collaboration between researchers and practitioners, creating novel funding schemes and, more broadly, changing the way we as a society think of AI's relation to consumers. There is a need to develop measures by which to incentivize partnerships between research centres and administrations, as by launching new funding programmes specifically designed to support projects providing consumer-empowerment technologies to be used not only by consumers but also by consumer organizations and by public sector bodies. We believe that active empowerment needs strategic policies in order to become a reality. For example, a much-needed policy intervention could consist in incentivizing start-ups to work on consumer-empowering AI.

6.3 Limiting the Battlefield

The second goal that, we believe, ought to be pursued by the EU regulators relates to the battlefield itself. The first step towards this goal consists in clarifying the rules that are currently in force. As we have seen, this is especially the case for different duties to inform and for requirements restricting the processing of personal data. Interpretation of these two types of measures with respect to algorithmic price discrimination should be elaborated upon in order to strengthen consumer protection *de lege lata* and lay the groundwork for a possible legislative reform.

As noted in Section 5, the Modernisation Directive has amended the CRD by introducing a duty to inform consumers when prices are personalised based on automated decision-making. However, contrary to the proposal from the European Parliament, the EU legislature has decided not to introduce any additional requirement for merchants to disclose the main parameters underlying their pricing decisions. This remains at odds with a regulatory tendency that can otherwise be observed where numerous duties are being introduced requiring information to be provided about the main parameters used in automated decision-making (e.g., ranking of offers or search results).¹¹⁸

Even though information about such main parameters may often seem superfluous, in the context of algorithmic pricing such details could actually prove valuable to consumers. Alternatively, consumers' autonomous decision-making could be enhanced by explicitly requiring traders to disclose a reference price, e.g., the "impersonal price".¹¹⁹ Should the disclosure duty about personalised prices be revisited, we suggest that violations of it should carry not only to possible consequences under the UCPD,¹²⁰ but should also entitle consumers to an extended withdrawal period.¹²¹

Recent proposals on recommender systems made as part of the Digital Services Act deliver further food for thought as to how the information paradigm can be combined with more robust tools for escaping personalised outcomes. In the context of price discrimination, a similar role could be played by Article 22 GDPR, which as we saw only covers automated decisions having a legal effect on data subjects or similarly significantly affecting them. It is thus necessary to clarify the extent to which that provision can be brought to bear on price-setting. As seen from the previous analysis, interpretation of this aspect of the GDPR—along with the question of the legal basis available for corresponding data processing and the right to withdraw from a contract—is central to the consumer's ability to act on the information about a merchant's recourse to price discrimination.

Finally, categories of impermissible behaviours, and their respective consequences, could be more clearly set out.¹²² This includes, for example, price discrimination that negatively affects consumers on the basis of their identified vulnerabilities or of protected characteristics, or that does not rely upon valid consent. Further, it is also worth considering innovative regulation in the form of personalised price caps,¹²³ among other examples.

As the EU framework on personalised prices becomes increasingly settled, questions about viable approaches to compliance monitoring will grow in prominence. The proposed Digital Services Act lays the groundwork for this development, particularly with respect to very large online platforms.¹²⁴ Fostering "innovative e-tools" for online investigations also forms part of the New Consumer Agenda, announced by the Commission in late 2020.¹²⁵ In this respect, a distinction will need to be made between detecting objectionable decisions, on the one hand, and identifying nondisclosure, on the other. As for the former, counteracting discrimination on the basis of protected characteristics remains a challenge to be tackled in connection with algorithmic prices and beyond. In both respects, attention need to be paid to the potentially new distributive effects that may emerge as technology, regulation, and markets evolve. When relying on disclosure and consumer empowerment, regulators should remain mindful of parties who are vulnerable due, for example, to limited digital competences associated with age or lower socioeconomic status.

ulation (EU) 2019/1150 of the European Parliament and of the Council of 20 June 2019 on promoting fairness and transparency for business users of online intermediation services [2019] OJ L 186/57; Article 29 of the proposed DSA.

¹¹⁹ Esposito (n 49).

¹²⁰ See: Article 7(5) UCPD.

¹²¹ This consistently with existing rules on the omission of information about withdrawal right (Article 10 CRD).

¹²² Similarly: Natali Helberger and others (n 36) 79.

¹²³ Bar-Gill (n 13) 243–244.

¹²⁴ Section 4 of the proposed DSA.

¹²⁵ Communication from the Commission to the European Parliament and the Council: New Consumer Agenda Strengthening consumer resilience for sustainable recovery, COM (2020) 696 final, 15.

¹¹⁷ See generally: Lippi and others (n 105) 169.

¹¹⁸ Articles 3(4)(b) and 4(5) of the Modernisation Directive; Article 5 of Reg-

7. Conclusions

Algorithmic price calculation challenges the classic ideas of market and transactional fairness: an individual price is no longer based on market valuations, nor does it necessarily settle at the point where supply meets demand. The price is rather determined by the way a machine correlates the characteristics of individuals with their willingness to pay. Moreover, individuals may be offered prices that build on biases embedded in the collection of data or in the design of the algorithm.

On top of these problems, algorithmic price determination also raises a fundamental question about private autonomy in online contracting. The current development of algorithms seems to validate the claim that the notion of autonomy is increasingly crossing categorial boundaries. It encapsulates richer concepts of fairness and self-determination and relates them to a broader set of ethical premises than the classic accounts of contractual fairness. At the same time, nowadays it seems rather clear that algorithmic pricing cannot ensure fair and bias-free valuations of goods and services on the consumer market. In particular, the practice of price discrimination raises two basic concerns. First, it may decrease consumer welfare, setting prices at a higher median point than in fixed-price commerce. Second, it may build on discriminatory premises, negatively affecting consumers in a situation of need and lack of knowledge. For all these reasons, algorithms may exacerbate pre-existing inequality and injustice.

As shown above, the current framework of EU consumer law does not adequately address algorithmic pricing, and in many domains it may in fact restrict the Member States' scope of independent action. Moreover, the vastly inferior financial and technological resources available to consumers make it difficult for them and for consumer organisations to effectively respond to the power exerted on the market side. The ensuing "digital arms race" between consumers (supported by regulators and civil society) and suppliers (supported by platforms and marketers) therefore remains unbalanced.

This calls for a two-pronged regulatory response by which to level the playing field. And to this end, in the effort to achieve a satisfactory equilibrium, it will be necessary to enact policies pursuing two main goals: to make the "digital arms race" more balanced and to limit the battlefield. The former can be achieved by strengthening the digital tools available to consumer protection organizations and authorities; the latter, by clarifying and refining the applicable rules and defining categories of impermissible behaviour.

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